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Enabling Audience Participa- tion and Collective Content Generation Through Urban Media as a Diagnostic Method in Urban Planning

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Blue sky project

Final Report 2015

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1. Tomitsch, M., Haeusler, M.H., McArthur, I., Foth, M. (forthcoming). The Role of Digital Screens in Urban Life – New Opportunities for Placemaking. In: Citizen's Right to the Digital City – Interaction Design for Participatory Urbanism and Open Innovation, Springer.
2. Hespanhol, L., Tomitsch, M., McArthur, I., Fredericks, J., Schroeter, R., Foth, M. (2015). Vote As You Go: Blending Interfaces For Community Engagement Into The Urban Space. In Proceedings of the 7th International ACM Conference on Communities and Technologies (C&T 2015), Limerick, Ireland, ACM Press.
3. McArthur, I., Tomitsch, M. (2015). Diagnostic Design: A framework for activating civic participation through urban media. Presented at the International Research Conference: Design for Business, AGideas, Melbourne, Australia.
4. McArthur, I., Tomitsch, M., Hespanhol, L. (2015). Empowering Citizens and their Input on Civic Issues through Urban Media. In Proceedings of the 3rd International Hybrid City Conference, Athens, Greece.
5. Fredericks, J., Tomitsch, M., Hespanhol, L., McArthur, I. (2015). Digital Pop-Up: Investigating Bespoke Community Engagement in Public Spaces. Submitted to the Australasian conference on Computer-Human Interaction (OzCHI'15), ACM Press.
6. Fredericks, J., Caldwell, G., Foth, M., Tomitsch, M. (2015). The City as Perpetual Beta: Fostering Systemic Urban Acupuncture. Presented at the Digital Cities 9 Workshop, University of Limerick, Ireland.
7. Hespanhol, L., Tomitsch, M. (2015). Power to the People: Hacking The City With Plug-In Interfaces for Community Engagement. Presented at the Digital Cities 9 Workshop, University of Limerick, Ireland.

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We would further like to acknowledge the contribution of PhD candidate Joel Fredericks, who joined the project in the second half of 2014. His contribution was crucial for the deployment study of the third iteration.

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Executive Summary

This 1-year Blue Sky project allowed us to establish a relationship with the Willoughby City Council (WCC), who have come on board as partner for an ARC Linkage Project proposal (currently under review). Based on the fruitful collaboration, WCC have further agreed to fund the upcoming Media Architecture Biennale as venue partner (valued at up to \$40,000). The Blue Sky studies funded from the Henry Halloran Trust led to 1 book chapter, 4 conference publications, 2 workshop papers, and a digital handbook.

The project set out to study the use of so-called 'urban screens' for enabling audience participation in discussions around civic topics. For this purpose we partnered with Urban Screen Productions and the Willoughby City Council, who provided us with access to their urban screen at the Concourse in Chatswood. This screen posed a particularly interesting media platform for our research, since it is placed in a less than ideal position and in an unaccommodating environment.

The project involved the iterative deployment of a total of three audience participation platforms:

1. A platform consisting of a) a small audio device with a gesture sensor to record votes and b) an iPad polling app for recording responses to polar questions.
2. A platform consisting of a) the iPad polling app from (1) in Chatswood, b) the iPad polling app with a polar visualisation on the urban screen at the Concourse, and c) a full-body voting application, in which people could answer polar questions by waving their arms at the screen.
3. A platform/setup consisting of an open response visualisation and iPad app at the Concourse in Chatswood in conjunction with a pop-up concept for engaging the local community into a civic discourse.

These platforms were deployed for a total of 9 days distributed throughout the second half of the project duration (3 days at the University of Sydney campus in July 2014, 3 days at the Concourse in July 2014, 1 day at the Concourse in September 2014 during the Chatswood StreetFair, 1 day in December 2014 at the Concourse, and 1 day in February 2015 during the Chinese New Year Festival in Chatswood).

The project outcomes include:

- A project website (<http://cityconcepts.org/>) that serves as online repository for the research and findings developed through the project. The website includes an online blog that aggregates the state of the field, and which we will continue to populate with our findings and future projects in this area.

- Two documentary videos of the platforms, their deployment, and the studies conducted.
- Public lecture by CI Foth as part of the Urban Research Festival in March 2014, and presentations by CIs Tomitsch, Foth, Haeusler, and McArthur as part of the Digital Arts Symposium hosted by Urban Screen Productions in collaboration with UNSW Art+Design, in June 2015.
- A handbook developed for urban planners and local councils about the use of urban media for community engagement and published as a free resource online.

We have submitted the findings from the project in the form of articles to a number of research forums spanning a range of disciplines:

1. Tomitsch, M., Haeusler, M.H., McArthur, I., Foth, M. (forthcoming). The Role of Digital Screens in Urban Life – New Opportunities for Placemaking. In: Citizen's Right to the Digital City – Interaction Design for Participatory Urbanism and Open Innovation, Springer.
2. Hespanhol, L., Tomitsch, M., McArthur, I., Fredericks, J., Schroeter, R., Foth, M. (2015). Vote As You Go: Blending Interfaces For Community Engagement Into The Urban Space. In Proceedings of the 7th International ACM Conference on Communities and Technologies (C&T 2015), Limerick, Ireland, ACM Press.
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5. Fredericks, J., Tomitsch, M., Hespanhol, L., McArthur, I. (2015). Digital Pop-Up:



Investigating Bespoke Community Engagement in Public Spaces. Submitted to the Australasian conference on Computer-Human Interaction (OzCHI'15), ACM. (under review)

6. Fredericks, J., Caldwell, G., Foth, M., Tomitsch, M. (2015). The City as Perpetual Beta: Fostering Systemic Urban Acupuncture. Presented at the Digital Cities 9 Workshop, University of Limerick, Ireland.
7. Hespanhol, L., Tomitsch, M. (2015). Power to the People: Hacking The City With Plug-In Interfaces for Community Engagement. Presented at the Digital Cities 9 Workshop, University of Limerick, Ireland.

The workshop papers (6) and (7) will be extended and resubmitted as book chapters after presentation at the Digital Cities 9 workshop in Limerick, Ireland in June 2015. The Digital Cities workshop series is a bi-annual event that has in the past led to key publications based on the papers presented at the workshop, including the “Handbook of Urban Informatics Research” (IGI Global, 2009) and “From Social Butterfly to Engaged Citizen” (MIT Press, 2011).

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Preface

Interaction design is something perhaps few people think about. Yet it is one of our most important areas of research. The world is now changed every few years by information and communication technologies, and it is interaction design that has to make these changes work for people. In 2015, such changes involve computing's return to the world at large—back “into the wild”¹. There are little slivers of computing everywhere these days, not only in mobiles and laptops, but also throughout buildings, in the urban environment, attached to natural objects, or even to us. A complex web of data networks links up all these slivers of computing. This is called the “internet of things” or “ambient intelligence”. The fullness of this ambient intelligence at work is hidden from us, yet it is also increasingly in close proximity to what we do.

Our “media ecologies” are changing dramatically. Changing flows of information change the way we sense the world and the way it senses us, the way we move through the world and the way it moves with us. Alongside these new media ecologies is a new and complex “ecology of mind”, that pattern of relations which produces and makes sense of everything folded within it, a pattern of relations that Gregory Bateson thought was mind itself.

There is now something of a question of where these ecologies of media, data networks and mind might go next. The whole ecology of the data soaked world stands poised on a razor's edge. Some interests are walling off their own slices of this world, closing down more open interaction ecologies. On the other hand, never has there been so much potential to use these new media/data ecologies to create new worlds, in part via new forms of public participation. Either way, new media/information/data ecologies are changing the very nature of power.

The new relations between screens, world and us are emblematic of this. Screens are everywhere these days, and these are increasingly networked and intelligent screens. Yet interaction design is still figuring out how to design for this. The challenge is to make the most of the potential new worlds provided by a more thoroughly computational computer.

It's easy to forget what “screens” were only 50 years ago. The “screen” meant cinema or TV Interaction, at best, meant fighting with one's brothers or sisters over the knob on the television set that changed channels. Now we have screens of every size, throughout our everyday world, from the small screens in our hands, to the very large screens in our public worlds. We do all kinds of things with them and they do all kinds of things with us. Is this the 1960s situationist Guy Debord's “Society of Spectacle”² on steroids? Is the “Spectacle” that so troubled Debord exponentially strengthened by the new forms of capture made possible by interactive screens? Or, as power itself changes nature, is there now an

¹ Edwin Hutchins (1995) *Cognition in the Wild* Cambridge Ma: MIT Press; Yvonne Rogers (2011) ‘Interaction Design Gone Wild: Striving for Wild Theory’, *Interactions* 18(4), August: 58-62.

² Guy Debord (1994) [1967] *The Society of the Spectacle* New York: Zone Books.

opportunity for us to rethink what we know about screens and how we might use them? Like so many things—computers, information, power, interaction—the question of what screens are, and what they can do, has never been so complex, or so promising, or in some ways so strange to us. The screen’s new complexity—it’s new informational, interactive depth—remain obscure, even as we interact with it everyday.

How then do we approach interaction design for the screen today?

One answer is research that takes such questions on in a very practical way, but also, crucially, in a way that builds the everydayness of the interactions involved into the design process of information technologies. This is what has become called participatory IT³, or simply put IT tailored to allow for maximum participation by those using it. An important part of this is participatory design⁴, in which designers begin “in the wild” and return there often in order to design well for actually lived lives.

So this project has asked how to design interaction, using screens and data networks, for empowerment and connectedness. As such the project aimed to bring together participatory design, data visualisation and urban informatics, here with regard to local government. Putting participatory IT/design to work, we discovered there were lessons to be learned, and possibilities to take up, by all sides—everyday users, local governments and of course the researchers/designers themselves. Accessing information and putting it to good use is a continuous experiment for all of us. “Build it and they will come” is not enough. We discovered that we need to rebuild relations as we rebuild technical systems. Without this, it will be difficult to take on the new powers involved in interaction, in the development of new informational commons, and in the dynamics of data-powered relationality.

The project contributes to the work of designing for new ways that people negotiate images. We are now designing for a new kind of image, and have to allow for the composition of a new kind of informational imaginary. This is an imaginary that constantly shifts, and constantly registers the shifts of the communal body. It creates the need for a new flexibility in the ongoing negotiation of what is public or private for everyday users. It challenges forms of power, including government, to adapt to the unstable dynamics of massively enhanced data networks. The modulation of power in such circumstance, for all involved, is perhaps not that different to the modulation of music by a DJ, or better a group of DJs working together—a new model perhaps for interaction design.

The philosopher Alfred North Whitehead remarked nearly a hundred years ago that the world is a medium for the transmission of feeling⁵. Our technical systems now seem to be catching up with this idea. They inhabit the world, as medium, and aim to enhance it, to create new forms of relations that change the very nature of the world itself. Along the way, the complexity of these enhancements has created a world that is no longer a world of

³ See, for example, the Participatory Information Technology research project at Aarhus University in Denmark (<http://pit.au.dk/research/>) and the Urban Informatics and Participatory Design project at the Queensland University of Technology (<http://www.urbaninformatics.net/projects/southbank/>).

⁴ See, for example, the work of Susanne Bødker or Jacob Buur in Denmark, or Yvonne Rogers in the UK, or the work of Marcus Foth, a member of this project’s team, at the Queensland University of Technology.

⁵ Alfred North Whitehead (1978) *Process and Reality* New York: the Free Press: 284ff.

fixed media forms that are familiar to us. Rather it is a world in which there is a constant generation of new media forms and idiosyncratic data events. It is this that interaction designers will have to help us all negotiate⁶.

Andrew Murphie

⁶ On the generative nature of contemporary media see Andrew Murphie (2014) 'Making sense: the transformation of documentary by digital and networked media', *Studies in Documentary Film* 8(3): 188-204.

Chapter 1: Introduction

Large digital screens, also known as urban screens, are increasingly prevalent across today's cities dispersing into everyday urban spaces such as public squares and cultural precincts. The screen at Federation Square is maybe one of the best-known examples for using urban screens as a tool for establishing the character of a precinct and engaging citizens for example through the screening of live events. Local governments, developers and urban planners increasingly attempt to implement the "Federation Square model" in new Australian developments, with the aim to create a sense of place and to add long-term social, cultural and economic value for the citizens who live and work in those precincts. For example, the recently completed "Concourse" precinct in Chatswood features a large screen, and new developments such as Barangaroo and the Gold Coast Cultural Precinct involve proposals for urban screens that flank public sites.

The challenge with implementing urban screens in new urban planning developments is that they need to carefully respond to the physical as well as socio-cultural environment in which they are placed. Previous attempts to implement the Federation Square model have had only limited success, largely due to the fact that there was a lack of interdisciplinary consultation during the implementation process. Typically in such developments the architect or builder hand over the screen to the precinct owner, without providing a long-term strategy for how the screen can be used to successfully engage local citizens.

The funds received from the Halloran Trust allowed us to bring together a series of ongoing research efforts into a holistic approach. Such an approach has not been tested before and there is a unique opportunity to break new ground due to the interdisciplinary background of the team.

The project investigated how to 'program' urban screens so that they respond to the specific physical and socio-cultural environment. This involved the design and development of methods for facilitating citizen-generated content, participatory voting processes, and public large-scale data visualisation of crowd-sourced content.

The project was aligned with the aims of the trust by:

- Promoting of scholarship, innovation and research in town planning, urban development and land management by bringing together an interdisciplinary team of researchers, involving two PhD candidates, and aligning the activities with some of the postgraduate courses in the Faculty.
- Being intensely collaborative, cross-disciplinary industry-based research that aims to support innovative approaches to urban and regional policy, planning and development issues as they relate to urban screens in the built environment.

- Focusing on how urban screens can contribute to the creation of more liveable, creative and engaging 'smart' cities.
- Contributing to a framework that enables participatory citizen engagement to foster thriving urban communities and sustainable development



Chapter 2: Background

A variation of this chapter was published in: Citizen's Right to the Digital City – Interaction Design for Participatory Urbanism and Open Innovation, Springer. Text contributions by Martin Tomitsch, Hank Haeusler, Ian McArthur, and Marcus Foth.

In academia, there are two common terms for describing media displays in urban spaces that are closely related to each other: urban screens and media façades (Tscherteu and Tomitsch, 2011; Haeusler et al., 2012). The fundamental difference between urban screens and media façades lies in the relationship between the screen element, the architecture, and the urban setting. Urban screens typically take the form of mid to large-scale screens that can either be freestanding (e.g., at the centre of a plaza) or attached to a building façade. If an urban screen is attached to a building, the screen and the building façade remain two separated layers both in terms of the technical installation as well as in the way the two elements communicate their function. If urban screens appear as freestanding, independent architectonic elements, they take on the single purpose to communicate media content (McQuire et al., 2009).

Media façades feature a closer integration of the screen and the building layers, if not a complete integration into a new hybrid structure (Haeusler, 2009; Kronhagel, 2010). The 14th Venice Architecture Biennale – on the theme of 'Fundamentals' curated by Rem Koolhaas in 2014 – lists media façades as one of the twelve ecologies of the envelope and consequently acknowledges media façades as an architectural element, similar to a double façade or a precast concrete façade (Zaera-Polo et al., 2014). Media façades consist of integrated light sources or kinetic elements and network infrastructures for power and data distribution. Although from a technical perspective the image production still takes place on certain parts of the façade, the visual imagery is designed to be perceived as part of the built architecture. This interaction between the building and the audience has been described as 'media architecture' (Tscherteu and Tomitsch, 2011), although the term is more recently used to more broadly describe the integration of any form of media with the built environment, including mobile media. Media architecture also includes media installations that work with the depth of space, in which case it is no longer possible to speak of a screen or a façade (Tscherteu and Tomitsch, 2010).

The idea of embedding information into the built environment has been around as long as the written language (Weiser, 1991). But when and where did designers or architects for the first time decide to create a media façade? We argue that the beginning of the history of media façades falls at a time where architects and designers considered for the first time the application of a TV screen as a building component on an external wall. First steps were made in the 1930s with the competition or concept entry of Oskar Nitschke's 'Maison de publicité' in Paris, designed between 1934 and 1936. Cedric Price and Joan Underwood's project development for the 'Fun Palace' in 1961 as well incorporated first ideas of embedding large screens into the building fabric. Although neither of the two projects were

built at the time and have been primarily idea concepts, it has strongly influenced subsequent media façade projects.

Nathan Silver in his book 'The Making of Beaubourg' (1994) lists these early idea concepts as a precursor of the media façade entry for Richard Roger and Renzo Piano's successful competition entry for the Centre Pompidou in Paris in 1971. Obviously, the technological opportunities at the time differed from what is possible today and thus the envisioned media façade project for the Centre Pompidou was never realised. Still, one could argue, based on a reading of Nathan Silver's book that the Centre Pompidou was very close to realising a media façade. Alan Stanton, the person in charge for the Roger/Piano partnership, experimented with various options ranging from fluorescent lights to projection technology and only the very tight timeframe and the financial pressure stopped the realisation at the end.

Media façades famously featured in the 1982 movie *Blade Runner* directed by Ridley Scott, which showed personal transport vehicles flying past large-scale screens displaying colourful advertising against a dark dystopian cityscape. Today, the 2001 project *Blinkenlights* is considered to be one of the first media façades that was actually realised (Haeusler, 2009), albeit for a temporary period only. The project used standard lamps that were arranged behind the windows of the top eight floors of a high-rise building, creating an 18 by 8 pixel display. The project differs from contemporary media façades, which use light and pixels as building material, with the aim to emphasise certain aspects of the architecture rather than creating a large screen (Haeusler, et al. 2012). However, *Blinkenlights* is noteworthy in the context of this chapter, as it provided a participatory platform for citizens. People were able to generate their own 18 by 8 pixel video message, which was then scheduled to be played back on the building façade.

With advancements in the production of LED technologies, commercial media façades offer increasing pixel density, making them suitable for displaying high-resolution content. However, following the above definition of media façades, such high resolution screens may be rather considered to be urban screens, if their primary purpose is the display of media content rather than adding to the architectural topology of a building. Indeed, from the perspective of this chapter, urban screens are more promising as they offer a higher-density information space to engage people in city making. Media façades, in comparison, are often of non-rectangular shape and low or even incoherent resolution, such as the *Espacio de Creación* media façade in Cordoba, Spain (Haeusler et al., 2012; p.114).

The availability of cheap LCD and LED / OLED technology has given further rise to the proliferation of urban screens, as well as screens in retail outlets and cafés – often used only to display muted, free-to-air TV (Foth et al., 2013a). A recent market analysis suggested that the average global consumer was exposed to digital signage, or 'digital out-of-home' (DOOH) media, for 14 minutes per week in 2013, representing a 75% increase since 2007 (PQ Media, 2014). The annual growth rate of DOOH exposure is forecasted to be 8.6%. However, the majority of digital public screens are still used for advertising and remain far from fulfilling the vision of providing a useful "gateway that connects the physical city and the digital city" (Foth et al., 2013a). Yet, the investment into DOOH media for advertising demonstrates the significance of this new technology. For example, 7-Eleven

operates a network of 12,400 screens through which they reach over 200 million viewers monthly, making them one of the largest broadcast TV networks in the U.S.

The increasing availability of sensor technologies theoretically provides more opportunities for equipping digital screens with interactive capabilities, e.g. through touch (Jacucci et al., 2010) or gestures (Ackad et al., 2013). Adding interactive capabilities would make urban screens a more interesting platform from an interaction design perspective, and open them up as a participatory platform. Providing interactivity at the display increases their value as people can walk up and retrieve specific information, extending the use of public screens beyond simple advertising and entertainment. However, there are a number of challenges associated with creating interactive digital displays, which provide barriers to the practical realisation of adding interactivity to urban screens:

- People are often not aware of the interactive capabilities of a display, or might not notice the display at all (Müller, et al., 2009).
- New forms of interaction are required, since there is typically no mouse or keyboard available. Touch input, which has become the standard input mechanism on smartphones, is in many cases not practical due to distance between user and display and the form factors of the display (Ackad et al., 2014). Touch is further not well-accepted in public environments due to health risks associated with touching the surface of the display (Jiang et al., 2007), which has prompted interaction designers to trial gestural interaction techniques (Müller et al., 2012; Ackad et al., 2014).
- Interactions at public displays are typically of opportunistic nature (Valkanova et al., 2013) and of short periods. If a passer-by does not see an immediate benefit that they can gain from engaging with the display, they will quickly decide to move on. This effect may also lead to passers-by appropriating the interactive display for other purposes than what it was intended for, such as engaging in game play (Tomitsch et al., 2014).
- Interactive displays in public spaces may need to cater for multi-user interaction. This further includes the need for essential information, such as service departure times or general wayfinding information to remain visible at all times, even when someone is interacting with the display.
- The design of the interactive display needs to take into account the physical context. In that regard, the design of an interactive display in a busy city centre at a major transport hub is likely to be vastly different from an interactive display designed for a suburban location.

The project attempted to tackle some of those challenges in the context of community engagement. In order to achieve one of the initial goals – to reach a broader cross-section of the demographic – we used an urban screen (provided through our project partners Willoughby City Council and Urban Screens Productions) as media platform, augmented with a range of additional tools and technologies, such as a touch kiosk and mobile websites.



Chapter 3: Urban Screens as Artefacts

A variation of this chapter was published in: Citizen's Right to the Digital City – Interaction Design for Participatory Urbanism and Open Innovation, Springer. Text contributions by Martin Tomitsch, Hank Haeusler, Ian McArthur, and Marcus Foth.

Urban screens represent a type of media artefact (Tscherteu and Tomitsch, 2011). Thus, the term 'urban media environment' is used to reflect these artefacts' impact on public space as well as the cultural setting in which they are embedded. Urban media environments consist of: media artefacts, such as urban screens and media façades, but also personal mobile devices that are either integrated in a local media architecture or that are simply used for personal mobile communication; other artefacts like buildings, cars, traffic lights, monuments, urban furniture, and so on; and specific modes of interaction as the artefacts invite people to behave in a certain way.

While artefacts determine modes of interaction in an environment, they are at the same time themselves the result of, or the reaction to, a sequence of interactions that took place in this environment. For instance, department stores are often built at a specific location as a response to a long tradition of trading in that space, or the installation of traffic lights is the consequence of accidents that happened in comparable urban situations. Similarly the installation of urban screens at a specific location is typically determined by the location's character, for example using an opportunity where traffic slows down allowing drivers to watch the content of the screen.

The notion of 'urban media environments' suggests a shift from the 'hardware' to the more complex web of artefacts and interactions in a specific space, while also considering the history of the space. It emphasises the fact that objects in public space do not exist on their own, but are the result of a co-evolution of artefacts and the daily interactions of city dwellers. This interdependency has a temporal dimension. Artefacts and interactions continuously produce the next generation of artefacts and interactions. In that sense, urban media environments can be considered to be 'cultural spaces' (Tscherteu and Tomitsch, 2011). 'Culture' here refers to the historical (or evolutionary) dimension of urban life, which is composed of the inhabitants and their behaviours, buildings, technical developments as well as reflections and theoretical and political concepts that form urban life and its development over time.

Strategies for designing urban media environments need to reflect the specific challenges of public space. For instance, public space has a much older history than digital cultural spaces like the Internet. Thus, strategies that focus on designing digital spaces are only of limited value, and it is necessary to consider the physical as well as the social domains of the built environment (Dourish, 2006). Compared to other digital products, like websites, mobile apps, or smartphones, large-scale public installations, such as urban screens and media façades, offer less opportunity for iteration and refinement. Such projects therefore

have to be approached from a cultural perspective, meaning that it is necessary to look beyond the design of specific single artefacts, such as an interactive installation, and to consider their effect on the entire urban environment instead. Design strategies for urban media environments have to include methods of assessing and planning and evaluating the long-term effects of a media intervention in a specific urban environment. Tschertou and Tomitsch (2011) propose the following steps towards implementing a successful strategy for designing urban media environments:

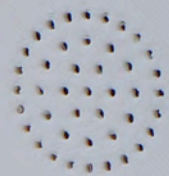
1. It is necessary to understand public space as an environment that consists of (media) artefacts and social interaction. Interactions can be as simple as crossing a square, taking the dog out, or stopping at a traffic light. They can be of ephemeral and invisible nature, or involve visible artefacts, such as cars, traffic lights, buildings and large displays.
2. Artefacts and interaction constitute each other. Specific environments invite people to behave in specific ways: A park entices people to walk slower compared to a noisy and busy street. There are different modes of perception when driving a car versus walking down an alley. When additional artefacts, such as large screens, are introduced to an urban environment, it is necessary to understand how they influence the holistic system, for instance by comparing the behaviour of city dwellers before and after a media intervention.
3. The introduction of new media artefacts into an existing environment often creates a cultural conflict due to the fact that the display and/or content were produced in another environment. Content displayed on urban screens is often targeted at a mode of perception that belongs to a different cultural environment such as watching TV at home. It is necessary to understand the cultural shift between environments by analysing the target space and developing an appropriate form of perception.
4. The introduction of media interventions in public space requires several design and feedback cycles as well as a long-term perspective. This also poses a challenge for city governance, planning and administration to consider the long-term impact of large-scale displays and other media interventions on urban life.
5. A long-term development can only take place when urban media environments are considered as a challenge for society. It is therefore necessary to look beyond the technical aspects of deploying media artefacts in urban environments. Ultimately, there has to be the right balance between citizens' basic needs in public space and economic interests. The proper design of media in urban life should be considered as a basic need that in the future will be as self-evident as the need for proper transport systems or waste management.

We used these strategies to guide the design, development, and deployment of the digital applications developed as part of the project. To consider the diverse range of people passing through and using the public space around the urban screen, we conducted studies at different times of the day, week and year. For instance, this included running

studies on weekdays around lunchtime to reach local office workers, and a study on a Saturday during the Chinese New Year festival.

We also extended previous research on the socio-cultural role of urban screens, by investigating how they can contribute to placemaking in the digital era – both as an artefact as well as by being a communication channel for the public to have a say in placemaking strategies.

YES



N



Chapter 4: Embedded Polling

A variation of this chapter was published at the Digital Cities 9 Workshop, University of Limerick, Ireland. Text contributions by Luke Hespanhol and Martin Tomitsch.

Community engagement initiatives provide public venues for citizens to partake on decisions affecting their immediate environment, allowing local governments to take actions informed by public opinion and aligned with the community concerns. Various initiatives have been proposed for situating digital polling interfaces directly in public spaces (Schroeter et al., 2012; Taylor et al., 2012), therefore lowering the entry barrier. However, a common observation from those studies is that passers-by often do not notice or trust the interfaces (Fredericks & Foth, 2013; Gianluca et al, 2013; Taylor et al., 2012), which leads to low levels of participation.

Increasingly, also, interaction designers and urban planners have grown aware of the fact that the design of interfaces for community engagement is strongly shaped by the physical, social and cultural contexts of the urban public space where it is deployed to (Behrens et al., 2014; Bilandzic & Venable, 2011; Gianluca et al., 2013) – which, of course, may significantly shift overtime. Such an awareness has led to more lightweight urban interventions, “hacking” various elements of an urban precinct by appropriating and augmenting them for a short period of time and with a purpose often unrelated to their original role in the public space.

Caldwell & Foth (2014) investigated the emergent attempts to articulate placemaking specifically with digital media and interactive technologies, through grassroots approaches generally referred to “do-it-yourself” (DIY) media architecture. They examined the technical, spatial and social aspects of DIY media architecture, which combines maker culture, placemaking and urban citizenship to enable temporary citizen control of urban infrastructure for dissemination of content produced by the community members themselves. Inspired by Brand’s argument that the designer’s intent is not always identical with the way people use perceive or appropriate an artefact (Brand, 1997), Caldwell and Foth propose five areas for further investigation in DIY Media Architecture:

- (1) transdisciplinary teams with expertise that covers social, spatial and technical research and design domains;
- (2) participatory approaches and methodologies;
- (3) open source repositories of code and documentation;
- (4) creative commons licensing; and
- (5) design strategies that allow for appropriations and remixes.

Based on this previous research we were interested to investigate the utilisation of *plug-in interfaces* – portable interactive technology deployed directly to public spaces on a temporary basis – for the purposes of community engagement. As we will discuss in the next section, this is not an entirely novel concept, rather a direct consequence of the “city hacking” ethos born out of the abovementioned bottom-up activism boosted by digital technology.

Plug-In Interfaces

In the 1960s, the British avant-garde architectural group Archigram conceived *Plug-In City*, a futuristic concept for dynamic city planning (Sadler, 2005). *Plug-In City* consisted of a central scaffolding framework spanning a very extensive area, where moveable modular residential and commercial units could be attached to, moved around or removed according to local urban planning and design requirements. Transportation, sanitation, computing and other essential services would be embedded into the central infrastructure and shared by the community, but designed in a way that would allow them to be readily reallocated to other parts of the city, if necessary. By allowing a temporary and flexible deployment of urban resources, *Plug-In City* would enable adaptable collective living, integration of transportation and the accommodation of rapid change in the urban environment. Despite its clearly utopian character, *Plug-In City* helped to forge a vision for a more agile, readily adaptable deployment of specific resources for well-defined purposes within the urban environment. By keeping the scope of the plug-in modules smaller, design solutions could not only become more realistic, but also their implementation less risky – if a newly tried module failed its intended purposes, consequences would be less damaging and reversing the change much easier and less costly.

The concept of *plug-in modules* has also been borrowed by information technology and extensively used since the 1990s in the design of software applications. Typically, plug-in modules consist of third-party software components that can be installed as extensions to existing applications, expanding their scope of features. Plug-in releases consist in an extremely common platform for allowing controlled addition of features by independent developers to well-established applications such as web browsers, content management systems or integrated development environments.

Plug-in initiatives are particularly well suited for grassroots, placemaking activities, for allowing the quick trial of new layers of public infrastructure to specific section of the city, which can be completely and seamlessly uninstalled after the event. *PARK(ing) Day* and *Build A Better Block* are relevant examples of such grassroots plug-in initiatives. Examples exist where, upon community endorsement on the outcomes of those initiatives, local governments approve their deployments as permanent new urban features – as is the case of the ‘parklets’ installed at the Civic Centre in Canberra, Australia, illustrated in the figure above.



Following on from the concepts above, we therefore define *plug-in interfaces* as portable, interactive media technology, deployed directly to public spaces on a temporary basis and leveraging on existing urban infrastructure and social dynamics. They tap into the ethos of the internet culture and agile practices to promote user-centred, participatory design of public spaces, whose features emerge from its own live social dynamics through a low-risk iterative process that embraces change and swiftly adapts. By bringing rapid prototyping and continuous improvement into the urban planning field, they promote placemaking iterations through direct consultation with the general public as well as with stakeholders – such as urban planners, local governments and urban interaction designers. In the process, they also enable stakeholders to fail soon, fail often, welcome community input in the elaboration and test of urban interventions, and attain continuous improvement from quick design iterations.

Our Case Study

When designing the deployment of digital interfaces into public spaces, researchers are repeatedly faced with three common contextual constraints:

- (1) the *technology familiarity* of interface;
- (2) the *level of integration* of the interface into the built environment it was deployed to; and
- (3) nature of *pedestrian activity* ordinarily unfolding in the urban precinct.

Technology familiarity refers to the extent to which passers-by would quickly make sense of the interface and learn how to use it upon a brief encounter in the public space. Level of integration relates to how much the interface blends into the surrounding architecture: for example, card readers on train stations are usually *installed into* local public furniture such as gates or station entrances, while beverage machines or ATMs are often *placed alongside* other architectural elements in the public space such as walls or escalators. Finally, the

likelihood of passers-by stop by an interface in a public space is determined by extrinsic factors such as the primary function of the space (e.g. connecting destinations, or rather a destination in itself) and the presence of other elements of interest nearby, such as shops, buskers, public art, benches or stairs.

In order to get a better understanding about the impact of each of those contextual constraints in the levels of participation by the general public, we devised a series of field studies aimed at testing each of them of plug-in interfaces.

Contextual Constraint		Scenario	Description
Where	Location	Pedestrian Crossing	People normally stop near the interface while waiting for the traffic light to turn green
		Thoroughfare	There is normally a steady flow of people walking past the interface
What	Interface	iPad	High technology familiarity
		Audio	Low technology familiarity
How	Configuration	Pole	Blended into existing street furniture
		Stand	New street furniture

The Locations

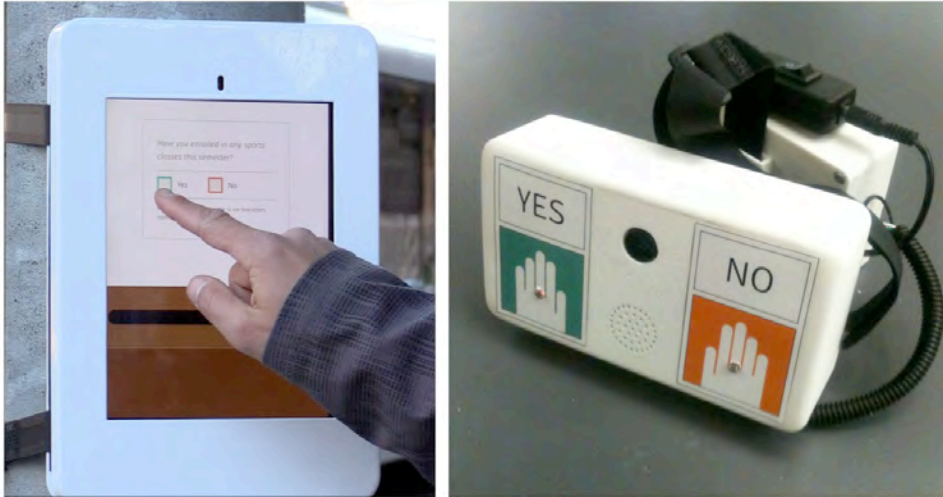
To gauge the impact caused by the nature of pedestrian activity, we adopted two different locations for running the studies. The first location (L1) was a pedestrian crossing on a busy wide avenue running through a university campus. The crossing is controlled by traffic lights both for cars and pedestrians, and pedestrians can indicate their intention to cross the road by pressing button-driven devices installed in electricity poles on each side of the zebra crossing. As we observed, pedestrians tend to adhere to traffic rules at that particular crossing when walking towards the crossing as it is located at a busy major road: they walk towards the area of the sidewalk immediately behind the zebra crossing (and therefore besides the electricity pole where the button-driven light control device is installed) and then assess the lights status. If they are red, they press the device button and stand at the same spot for up to a few minutes waiting for the lights to go green. This waiting period offers therefore a window of opportunity for casual interaction with a plug-in interface.



The second location (L2) was a fully pedestrianised thoroughfare. Importantly, it was located in the same university campus as L1, so that we could ensure participation in all scenarios would involve members of the same community. The thoroughfare consisted of a 3-metre wide concrete pathway running on a straight line through a small park flanked by seating faculty buildings on one side and a wide grassed area on the other. Sitting benches of different types are present on both sides of the pathway, which connects one of the campus entrances and sport fields to a library, food court and other faculty buildings. As a result, it receives a continuous flow of pedestrians in both directions all day long.

The Plug-In Interfaces

As indicated in the table above, to address the interface technology familiarity, we implemented two very distinct interfaces. The first (I1) consisted of a web-based survey running on a 9.7-inch iPad Air. The web application would present the users with a series of yes/no questions. Walking up to the interface, participants would encounter a single question displayed on the iPad screen, above buttons corresponding to “yes” and “no” answers. Once participants answered the question, an animation would play confirming that the vote had been cast, followed by a visualisation of the cumulative results for that question gathered up to that moment, so that the participants could learn how their opinion stood in relation to their fellow citizens. After 30 seconds, the interface would display the next question, thus starting a new cycle.



The second interface (I2) consisted in a portable ready-made device using audio to ask “yes/no” type questions to passers-by, once they were detected to be in the vicinity (within 3 metres) of the device by a proximity sensor. After hearing the question (recorded by an English speaker female actor), participants could cast a vote by placing their hands on top of one of two cards labelled with “yes” or “no”. The cards were embedded with sensors to detect the variation of light once a hand was placed on top of it, and a vote was only counted if only one of the two cards was covered. Like the iPad web interface, upon computing a vote the audio device would present the participant with the cumulative results for that question, reading out loud how many other citizens had voted the same way. The cycle would then resume, with the device asking the next question if the participant stayed around, or going silent otherwise until being approached by the next participant. The cycle would also resume in case of no vote being detected in the first place (e.g. if the participant walked away half way through the question being asked), timing out after waiting 10 seconds for a response.

Through those two interfaces, we sought to compare the effects of technology familiarity in the usage of urban plug-in interfaces for community engagement. We assumed the iPad interface to be perceived as more familiar – being a well-known device, and given the fact we created the survey as a standard web application. However, it would like to investigate how strong a role technology familiarity would play when presented in a rather unfamiliar context. Also, to facilitate the understanding of both interfaces, we designed them using a combination of very simple user actions, quick interaction cycles and complete independence between the questions, in order to produce a *walk-up-and-use interface* scenario. Our intention was to allow passers-by to join in or opt out from the interaction anonymously, at anytime and at their own pace, therefore facilitating the interaction with the interface by passers-by who would encounter them among other public space features in a way that was most likely sudden and unexpected.

In order to isolate the survey content as a stud variable, we asked the same survey questions on both interfaces. As we run the study at a university campus during school holidays, we targeted the survey to the university staff community, asking five questions about sustainability and physical activity around the campus:

1. Do you drive your car to work?
2. Do you turn off your computer when you go on lunch break?
3. Do you use a reusable coffee cup when you get coffee or tea?
4. Are you able to control the air condition or heating in your office?
5. Do you take public transport to get to work?

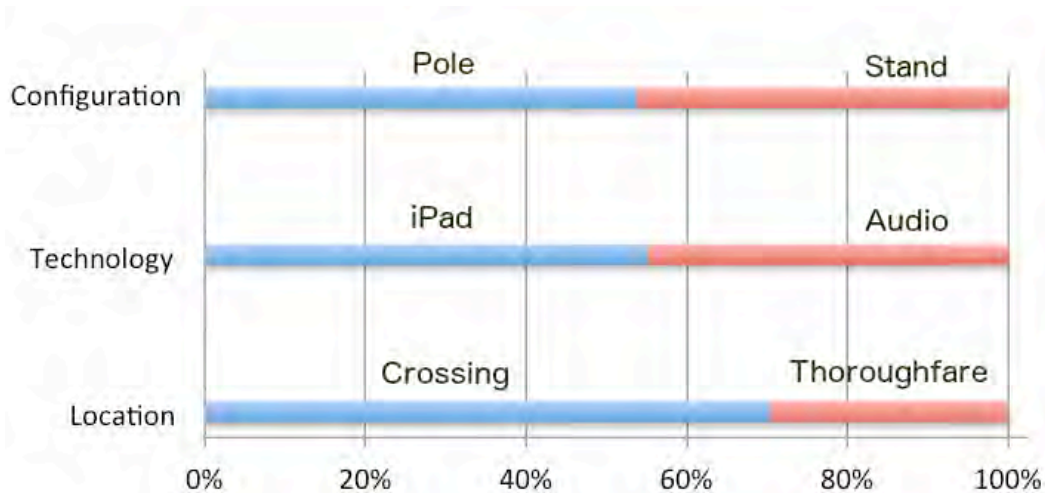
To test the level of integration of the plug-in interfaces into the built environment, we deployed each of them in two configurations. The first one was intended to give the interface a seamless character, well blended into pre-existing elements of the urban landscape. We chose to use velcro straps to attach the interfaces to *poles* on each environment next to where people walked: on the pedestrian crossing, we attached them to the electrical pole also hosting the button-controlled crossing lights device; in the thoroughfare, to a tree at the edge of the pathway.

While the first configuration would have the devices mounted on existing street furniture, the second should, on the contrary, cause the interfaces to stand out prominently on their own among the other elements in the local built environment. This second configuration, therefore, involved having the interfaces mounted on a portable stand, placed near the electrical pole (in the pedestrian crossing) or the tree (in the thoroughfare), but as clearly separate visual entity.

Methodology and Results

We ran a total of eight field studies, testing all combinations of the above variables. Each study ran for one hour, during which we recorded two metrics: (a) total number of passers-by who approached the plug-in interface under observation; (b) number of passers-by who actively interacted with the interface. For the purposes of this study, we defined *approaching the interface* as the act of walking towards it while aware of its presence, which therefore entailed slightly different behaviour depending on the location. In the thoroughfare, we counted passers-by walking within a range of up to 3 metres from the interface and who performed active movements indicating their awareness of it, such as changing their walking pace around the interface, turning their heads to or walking towards it. In the pedestrian crossing, we counted all people walking from the side of the road the interface was deployed to and crossing towards the other side, therefore incidentally coming within close proximity with the interface. The definition of *actively interacting* with the interface was the same for all scenarios: the act of making explicit gestures in or around the interface in an attempt to explore it further and cast a vote.

From the two metrics described above, we derived the *conversion rate* for each field study as the percentage of passers-by who, having become aware of the plug-in interface, actually interacted with it. Combining the numbers per design scenario, across all studies, we derived then the conversion rates per design scenario. The figure below shows the distribution of participants when each design scenario is looked in isolation.



Discussion

Before we analyse the results obtained on our studies, it is important to acknowledge their limitations. Each study ran only for a short period (one hour) and, therefore, the total number of participants come in contact with the interfaces is relatively low. The percentage of total participants was somewhat unbalanced when location is considered in isolation, with almost two thirds (70%) engaging in interaction with the interfaces at the pedestrian crossing. The distribution of participants across the other two contextual constraints – configuration and type of interface – was much more uniform: 54% pole versus 46% stand, and 55% iPad versus 45% audio device, respectively. Given the reduced population sample, the studies can only offer preliminary impressions of the effectiveness of each design strategy regarding location, choice of interface or spatial configuration.

Despite those limitations, we believe the results obtained still provide some important initial clues towards motivational factors for impromptu interaction, intuitiveness of the interfaces and other relevant factors for consideration in the design of plug-in interfaces for community engagement, which we intend to explore further in upcoming studies. For example, from the metrics observed, the pedestrian crossing location seems to offer more favourable conditions for passers-by to learn and actively make use of the interfaces: not only the conversion rates across all setups were greater for the pedestrian crossing (43%) than to the thoroughfare (28%), but also that was the location for three out of the four setups with highest conversion rates (setups 5, 6 and 7, respectively), including the two at the very top (setups 5 and 6). This seems to validate the strategy of positioning the interface next to a spot in the space where passers-by were already pre-conditioned to stop by (e.g. next to the button-controlled crossing lights controlling device), therefore taking advantage of their natural behaviour in that space. Waiting for the lights to open seems to offer people just enough time for noticing the plug-in interface, while the perspective to cross the street provides a suitable excuse to quickly trying it out before walking away. Since the pedestrian normal routine is not disrupted and requires little time commitment, participation becomes more likely.

A similar behaviour has been observed on the studies conducted by Koeman et al. (2015), when the voting devices were positioned in strategic location where people would already normally stop by: shop counters. On that context, while walking on the streets towards the

shops, passers-by were gradually introduced to the community engagement campaign via the visualisations on the shop fronts; upon entering a shop and stopping by the counter to pay for their goods, they would then have just enough time to engage with the voting interface without greater disruption to their normal routines, while all along feeling that they had contributed by participating in the civic event. *Vote With Your Feet* (Steinberger et al., 2014) also tapped into the local dynamics by having the foot-controlled voting interface deployed in a bus shelter – again, a location where people would otherwise have to stand idly anyway. Positioning the voting interface on spots within social spaces where people are already likely to stop during their daily walkabouts seems, therefore, to be a very effective strategy to encourage civic participation.

Even more significant, however, appears to be the effect of technology familiarity. All three setups with the highest conversion rates (setups 5, 6 and 2, respectively) employed the iPad interface. Across all setups, the iPad interface also resulted in a conversion rate more than 3.5 times higher than the one produced by the audio interface (57% and 15%, respectively). Those results strongly endorse the effectiveness of technology familiarity of the interfaces for participation. Despite the lack of explicit signage guiding the interaction, and the fact that neither interface constitutes a familiar feature in public spaces, passers-by still manage to swiftly make sense of the iPad-based setups and engage in interaction with that interface much more successfully than with the audio device. This is consistent with the literature on intuitive interaction, which argues that an interface will be perceived as intuitive if used in similar contexts as it is normally found at or, if used in a different context, it follows the same interactive rules as those on its original context. A web survey running in an iPad works the same way as it would be expected to run in any other context, hence passers-by making sense of it immediately. Our portable ready-made audio device, however, may not have presented sufficiently recognisable interaction mechanisms to allow for a swift uptake by passers-by in the community it was tested at.

Another important consideration relates to the utilisation of visual versus audio feedback for the interaction. Previous research has indicated that synchronous, immediate visual feedback – as the one provided by the iPad web application, upon input from the user, is a relevant factor for conveying *identity* – i.e. for giving the individual interacting the sense that the interface is responding *directly to them* – and, therefore, forging a sense of *control*. Audio feedback, however, may easily become ambiguous: although our audio interface started playing upon identification of a person close-by, if the person walked away the device would continue to play; if a second individual walked then into the space, they would encounter the audio being played half way through, therefore losing the sense of being directly addressed by the interface. Likewise, if the surrounding environment becomes too noisy that the question can no longer be heard, passers-by might not understand that the interface could be addressing them.

In regards to the mounting configurations, 3 out of 4 of the setups where the interfaces were mounted in a stand produced greater conversion rate than their counterparts where the interfaces were mounted in a pole. Likewise, when looked in isolation across the setups, the stand configuration yielded a greater conversion rate than the stand configuration (49% and 29%, respectively). Such a result suggests that interfaces little integrated to the built environment – rather than perceived as temporary or misplaced

structures – are actually more attractive to passers-by. Those results reflect some of the conclusions raised by similar grassroots “city hacking” deployments for community engagement. The design iterations reported by both Koeman et al. (2015) and those of *Vote With Your Feet* (Steinberger et al., 2014), for example, also pointed into the effectiveness of utilising elements that visually disrupted and stood out from the ordinary street aesthetics (chalk visualisations and extra signage, respectively).

Conclusion

Through this study, we sought to gain further understanding about approaches to address three core contextual constraints recurrently faced by studies of this nature:

- (1) *technology familiarity* of the interface;
- (2) *level of integration* of the interface into the built environment; and
- (3) nature of *pedestrian activity* ordinarily unfolding in the urban precinct.

Our analysis points towards design aspects that should be favoured in the design of plug-in interfaces as lightweight tools for similar bottom-up initiatives.

Aspects worth consideration include:

- (a) use of simple, clear and familiar interfaces, adaptable to the circumstances;
- (b) quick interactions, placed on locations people would normally stop by;
- (c) low integration and distinctive aesthetics; and
- (d) iterative prototyping via user-centred, participatory design.

Furthermore, a greater contextualisation of the interfaces regarding their purpose in the public environment might have help to make them more trustworthy among members of the community and, consequently, increased participation.

Do you think Willoughby has a great community spirit?



NO
0
votes

WAVE YOUR ARMS CAST YOUR VOTE

CHATSWORTH LIBRARY | CIVIC HALL



Chapter 5: Situated Polling

A variation of this chapter was published at the 2015 International Conference on Communities and Technologies. Text contributions by Luke Hespanhol, Martin Tomitsch, Ian McArthur, Joel Fredericks, Ronald Schroeter, and Marcus Foth.

This field study was run at the Concourse, a public space in Chatswood equipped with a large LED screen and consisting of a central plaza surrounded by restaurants, a library and a concert hall. The screen normally features a variety of entertainment content, including cartoons, movies and documentaries. The centre of the space is dominated by a grassed breakout area, often occupied by children playing, groups having picnic and workers from the nearby offices relaxing during their lunch break. Pedestrians normally walk along the pathways around that area, alongside the restaurants, on one side, and the cultural venues (library, gallery, concert hall) on the other. A large railway station, two shopping malls and a pedestrianised shopping precinct are also close by, feeding a regular amount of visitors into the space. The location is highly multicultural, with a strong presence of immigrant groups. The demographics of the community occupying the space, however, vary with the day of the week (business days versus weekend) and time of the day. For example, during the morning on workdays, there is a prevalence of mothers taking their toddlers to watch the cartoons on the screen and play in the grassed area; around lunchtime office workers occupy the space to take their lunch break; in the afternoon, students returning from school or going to the library and shopping malls become noticeable in larger numbers. The public is more mixed on weekends, however also less numerous. In order to collect data from a representative cross section of the local community, we therefore scheduled our field studies to be run at different times and days during the week.

The Polling Interfaces

For the design of our polling systems, here referred to as ‘Vote As You Go’, we considered evaluating the impact on participation caused by (a) feedback about the interactivity and affordances of the environment; (b) awareness about the interaction by previous participants; (c) playfulness of the interface and; (d) participation as performance (i.e. visibility of individual actions by the surrounding public). To that end, we developed two different interfaces for polling members of the public. The first interface consisted of a web-based survey running on an iPad Air 9.7 inch, installed on a custom stand. The survey consisted of a series of yes/no questions, displayed sequentially in random order. After each question was answered, the iPad screen displayed for a few seconds a visualisation of the cumulative results for it, after which period it moved on to the next question. All questions were asked before starting a new, randomised sequence.

The second interface was a full-body voting application running solely on the large urban screen. A configurable surveillance camera, installed right below the screen, provided the application with live footage from a section of the precinct. Making use of computer vision

techniques, the application could then track the presence and movements of people in that particular area. The screen displayed the live feed divided into two zones, denoted by different colour filters applied over the original footage: purple on the left, corresponding to “yes” votes; and light blue on the right, corresponding to “no” votes.

To assist with quick learning of the interface, we also labelled each section accordingly. The current question asked was displayed at the top of the screen, while simple instructions for interaction were displayed at the bottom. When people walked in front of the screen, the application displayed the contour of their bodies in red. In doing so, we followed insights from the literature recommending the utilisation of easily identifiable mirror images to rapidly communicate interactivity. If the participant started to move, a rectangular bar displayed vertically besides the section where she was standing would start to progressively fill up in response; if she stopped moving, its level would recede back until empty. Once the bar got full, a corresponding new vote (“yes” or “no”) would be counted, after which the bar was once again emptied so that a new vote could be cast.

The full-body interface could, therefore, enable very different voting dynamics, allowing not only multiple votes for the same question, but also group votes for the same option (“yes” or “no”) or simultaneous votes for opposing ones. In that sense, the interface could potentially enable a more natural expression of social debate by allowing people to join forces to express a shared opinion, or engage in playful competition to voice their contrary opinions. For consistency, the survey followed the same style as the iPad interface, consisting of yes/no questions displayed sequentially and in random order. Unlike in the iPad, however, each question in this interface would run for a set time (1 minute), after which the votes cast would be aggregated to the total results. The time remaining on each round was indicated via a progressively filled clock.

The two interfaces addressed two opposite levels of interaction:

- (1) private interactions, in the case of the iPad, restricting participation to one user at a time;
- (2) public interactions, with the full body interface, designed to accommodate multiple participants simultaneously.

While the iPad interface offered a certain level of protection to the privacy of voter akin to other public interfaces (such as ATMs, for instance), the larger urban screen interface inevitably amplified their opinions to the surrounding public, therefore enabling manifestations of social activism.

Field Studies and Results

Our interest was in observing how the different social dynamics prompted by each Vote As You Go interface could affect levels of participation. Adopting deployment-based research as methodology, we structured a series of field studies so that we could run the two interfaces with different parameters, and then evaluate their impact on the level of participation. Common to all scenarios was the location of the interaction zone: a corner in the public space diametrically opposed to the urban screen. We selected this spot based on observations from early trials of the interfaces and grounding research on site, which

revealed three important aspects: (a) the spot was located on the intersection of two walkways, therefore continually exposed to pedestrians (as opposed to the lawn area, for instance, where as we observed most people tended to sit down); (b) it was right at the entrance of the precinct for people coming from the pedestrianised shopping precinct and railway station nearby; and (3) it afforded a clear and frontal view of the large screen.

We ran a total of four different scenarios:

- (1) iPad interface with unrelated content on the urban screen, e.g. cartoons, documentaries, music videos, etc., part of the regular screen program;
- (2) iPad interface with the poll results visualisation;
- (3) same as (2) plus the live video camera feed from the interaction zone, each on a section of the screen;
- (4) full-body interaction.

We ran each of the scenarios on weekdays around lunchtime (i.e. between 11am and 2pm), in order to ensure consistency of the demographic groups in the space (during that time mostly occupied by people working and shopping around the precinct). Given the playful character of the full-body interface, we decided to also run with an extra session during late afternoon on a weekday in the school period, where a large number of students would come to the area. While the first study with the full-body interface could offer some comparison with the iPad in terms of discoverability and levels of feedback, the second study would enable us to test how that same interface, arguably more playful, would appeal to the community at different times of the day.

We deployed each of the five sessions for 2 hours, during which period we observed the behaviour of passers-by around the space. For each study, we counted: (a) the total number of people who walked near the interaction zone (within a maximum distance of about 3m), regardless of becoming aware of it; (b) those who approached the zone, checked the interface but did not engage in interaction; and (c) those who actually interacted with it. In addition to our observations, we also conducted semi-structured interviews with 9 participants – 6 for the iPad (4 male, 2 female) and 3 for the full-body interface (2 males, 1 female) – to gauge their experience and intentions when casting votes. In the interest of maintaining as much ecological validity as possible, we approached participants for interviews only after they had finished their interaction.

Analysis

In all our scenarios, the great majority of passers-by did not approach the interfaces. That is expected given the casual nature of the voting: we strove not to disrupt the regular crowd dynamics, blending the interfaces into the urban environment in order to prompt citizens with a possibility of expressing opinions quickly, on the go and, most importantly, through self-initiated participation. That said, our observational data clearly shows that some scenarios were more successful than others in attracting potential participants and, eventually, leading some of them towards interaction. In this section, we discuss the outcomes of our studies in regards to the awareness about the interfaces among passers-

by, participation rates, emerging social interaction, the impact of playfulness on community engagement, and the validity of the citizen participation.

Awareness and participation rates:

We propose to analyse the results from the field studies in regards to the awareness rate about the interfaces verified for each scenario, as well as the participation rate observed. We define the former as the rate of passers-by who actively engaged in interaction with the interface. That, combined with the rate of passers-by who approached the interface but refrained from further interaction, determines its awareness rate. In the full-body interaction scenarios, however, it was at times much harder to judge whether passers-by within the interaction zone were intentionally or accidentally interacting with the interface, since by merely making movement in the space they would affect it to a certain degree. For that reason, we decided not to make a distinction between awareness and participation rates for the full-body interface. This allowed us to have a more concrete measurement for comparison between the full-body and iPad scenarios.

In all three studies with the iPad interface, we observed people looking at the urban screen as they entered the precinct, with most of those subsequently approaching the iPad and submitting their vote. The outcomes we gathered from each study show that the version producing greatest level of participation was the one where the urban screen was partitioned to display both the visualisation of the poll results and the live camera feed of the interaction zone. This setting yielded a total of 9% of awareness about the interface, with 5% of the passers-by engaging in active participation (a number equivalent to similar settings in the literature), while 4% approached the interface but refrained from further interaction. Interestingly, the similar scenario where the urban screen displayed the poll results but not the live feed produced the smallest awareness levels, with only about 1% of active participants and another 1% of passers-by approaching the interface without further interacting. Providing no feedback about the poll on the large screen (by showing unrelated content) was more effective to attract attention to the interface (5% overall), with 2% active participation rate.

A potential explanation for the results above would be that the iPad stand in itself attracts attention by sparking curiosity among passers-by, giving its unfamiliarity to the urban space the study was run at. In fact, 5 out of the 6 participants with that interface we interviewed affirmed the main motivation for stopping was the unusual employment of new technology and the consequent curiosity they felt about it. Results displayed on the screen, however, may have just been perceived as a large billboard, and consequently subject to display blindness. As a consequence, the survey results visualisation ends up grabbing people's attention to the detriment of the iPad stand itself. In general, people seemed to fail in making the connection between the results observed on the large screen and the iPad stand as the interface through which those results had been submitted. That connection, however, becomes more clearly expressed when the live footage of the interaction zone – and, consequently, the iPad stand itself – is simultaneously displayed on the large screen, revealing an obvious visual reference between what is seen on the large screen and a physical element in the surrounding urban environment. Such a visual connection therefore

increases the level of discoverability of the polling interface, leading to a greater level of civic participation.

The full body interface, in both studies, yielded a higher level of awareness – which is expected given its larger noticeability and for its more inclusive nature, being able to accommodate more participants simultaneously. Participation itself was also more immediate on the full body interface, since people only needed to notice the interface while in the footage to be ‘participating’ (i.e. prompting the interface to respond). However, that does not necessarily mean participation was effective or meaningful. Interviews revealed that people were initially attracted by the fact that they could see themselves on the urban screen: “We were walking along the space when we noticed we were on the screen, so we came back to check it further. We immediately understood how to interact, it was very straightforward” (P8 and P9, couple interacting together).

Social interaction and reception by the community:

The public screening of the interactive space in the full body interface gave also rise to collective interaction – thus increasing the number of participants. The full body interface allowed for groups to dwell in the space for a few moments (while collectively watching the urban screen) and vote simultaneously, a factor identified as an important requirement for community engagement interfaces. Participants we interviewed deemed the interface “straightforward, although a bit confusing at start because you cannot immediately understand where the camera is” (P3, male, interacting with group of friends). It was also considered “slightly embarrassing, but at the same time quite fun” and “a much more interesting way to engage the public than, for instance, the distribution of forms or flyers” (P8 and P9, couple). Concerns with public embarrassment were also linked to the strong multicultural character of the local community: “People would likely feel more inclined to play if they saw other people playing first” (P3, male). That has not been expressed as a concern in regards to the iPad, which is expected since it is a more familiar interface, allowing only a single user each time and, therefore, providing less exposure to participants’ opinions. Collaboration during the voting process itself was also much less common with the iPad: the few occurrences we observed were restricted to social nudging, i.e. a voter being told by an acquaintance watching the process about what their response should be.

At the same time it created higher awareness about the polling event, the two full body interaction studies also yielded more inconsistent outcomes when compared to each other: the late afternoon study resulted in about 30% level of participation, while the one run at lunchtime yielded only about 8%. A potential explanation would be that playfulness and the ‘instant fame’ granted by the image on the screen were more appealing to a younger demographic, given the high number of students around the area during late afternoon. At that time of the day, as we observed, many students transit between the nearby railway station, the shopping mall across the street and the local library. That was particularly apparent during the first hour of running the afternoon study, when the great majority of passers-by noticing and/or engaging in interaction with the interface consisted of children or young teenagers (26 out of 33, or 79% of active participants). There were noticeably less

students around during the study run at lunchtime, resulting in much lower participation by that group (7 out of 33, or 21% of active participants).

Validity of citizen participation:

Of course, with both interfaces, it is difficult to tell solely from observations whether participants were expressing their opinion seriously or merely exploring the interface through play. Yet, 8 out of the 9 participants we interviewed across both platforms expressed that they meant the opinions they were casting – in other words, they not only noticed the interface and understood its purpose, but also expressed their opinions with sincerity, believing in the interface as tool for democratic participation. As a participant interacting with the iPad interface expressed: “If this is going to bring improvements to our area, I think it’s valuable” (P2, female). That also seemed to have been a constant: the concern from participants about the authorship of the survey and about whether and how the answers they gave would be utilised corroborates previous studies.

Time to properly reflect upon answers was also seen as a potential issue with the urban screen interface. According to one participant: “I took the questions very seriously, but since I was asked impromptu, I may not have reflected upon my answer as much as I would if I was filling in a written survey” (P3). In that regard, the iPad interface would seem to encourage more confident responses.

Design Considerations

From our literature review, we identified five challenges for the development of public situated interfaces for community engagement. We also identified four strategies that have been sparsely used in key related works in the field to address those challenges. Although perceived as effective when used in isolation in the related analysed works, the evaluation of Vote As You Go is the first study to compare their efficacy by deploying them in the same location and community.

We blended both Vote As You Go interfaces into the built environment with the goal of prompting opportunistic interaction with members of the local community, regardless of their technological literacy or degree of familiarity with mobile devices and social network platforms. We did observe passers-by stopping to interact, although the interfaces failed to attract the attention of the majority. Among the participants we interviewed, the majority (6 out of 9) revealed they were attract by the novelty of the interfaces and by the fact new technology was employed in an unusual circumstance. Yet, all welcomed the initiative, saying they would like to see more of it and that they believed the broader community would benefit from similar initiatives. The ability to opt in and out and not being coerced to participate was pointed out as valuable. Our observations therefore indicate that strategy of blending interfaces in the built environment (S1) strongly addresses the challenge of increasing accessibility to public interfaces for community engagement (C1). The fact they are currently uncommon also contributes to raising awareness about community engagement events among citizens (C2) and motivating them to participate (C3). It is questionable, however, whether curiosity and interest in technology would remain a relevant factor in recruiting participants once implementations where polling interfaces are blended into public spaces become more widespread.

As is clear from the study results, the integration of urban screens as part of tangible and full body interfaces (S2 and S3) had a great impact on awareness (C2) and participation (C3). Previous works have made use of public screens for two main forms of real-time feedback: (a) displaying visualisation of interaction results; and (b) displaying mirror images to reflect the identity of participants and increase their sense of agency. For the iPad interface, we tested (a) in isolation as well as combined with (b). While the former type of feedback produced the smallest levels of participation observed, the latter produced the highest. That suggests that combining the display of the poll results with a live display of participants on the large urban screen (as in our third iPad scenario and the full body interface) is a particularly effective strategy for promoting participation.

The iPad stand by itself was not very noticeable. However, when displayed in the large screen alongside the poll results, an obvious visual connection was established between the civic polling and a physical element on the surrounding urban precinct. Such a connection helped to communicate passers-by about where to go should they wish to take part in the survey. The live display of participants on the large screen may have also contributed to add an element of playfulness and public performance to the otherwise conventional iPad interface (S4). Although playfulness did not appear to be a decisive feature in itself (the iPad still attracted some people even when unrelated content was shown on the screen), it was certainly appreciated: the admittedly more playful full body interface not only yielded the highest participation rates but the interviewed participants also perceived it as highly engaging (C3). At the same time, all interviewed participants declared they quickly learned how to interact with the interfaces, leveraging from tacit rules for social interaction: higher degree of collaboration around the full body interaction; individual voting or social nudging around the iPad stand.

Almost all of the interviewed participants (8 out of 9) also affirmed to have meant the opinions they expressed. In other words, despite somewhat playful aspects of the interfaces, citizens seem to have taken them seriously as instruments for community engagement. The combination of urban screen with either tangible or full body interaction (S2 and S3) can therefore be seen as reasonably effective when balancing the visibility of the interfaces with the privacy of the engagement process (C4), while providing good level of feedback to participants (C5).

Limitations

When considering the insights above, it is however important to acknowledge the limitations of our studies. For example – as it is often the case with studies conducted “in the wild” – similar deployments in other locations, communities or times of the day might produce different results. When structuring our studies, we strove to strike a balance between ensuring a consistent sample of the community (e.g. for running most of the studies at the same time of the day) and contextual constraints such as access to public assets (availability of the urban screen, use of the same spot in the public precinct, avoid disruption of other local government activities, etc.). Likewise, we sought to ensure as much ecological validity as possible, setting up the interfaces and leaving the space to observe participants from a distance, only approaching them for interviews after they had finished their participation and started to walk away. Consequently, most people declined

to take part in the interviews, which is reflected in the low number of those when compared to the number of actual participants. Yet, we believe the interviews offered some valuable qualitative insights into the intentions and reactions of participants when faced with this form of opportunistic civic engagement, especially in light of the consistent feedback gathered from them. When combined with the metrics we gathered from our observations, the interview data helps to paint a much more comprehensive picture about how the initiative was received by the community.

It is also important to point out that the challenges and strategies we identified emerged mostly from the review of a particular selection of recent works that we considered good representatives of the current research in the field. In our view, those works reflect key approaches and issues encountered by many other similar implementations. Nevertheless, we acknowledge that a different selection of works from the literature may perhaps highlight some of the challenges and strategies more than others, or even reveal additional ones. In fact, we hope that future research in this field could expand the analysis we proposed with our studies in this paper.

Conclusion

Based on our results from this study, we derived a number of insights, notably:

- (a) blending community engagement interfaces into the built environment (and consequently promoting opportunistic interaction) makes them more accessible to the general public, but in itself is not sufficient to grab the attention of passers-by and encourage them to interact;
- (b) live screening of the interactive space and its resulting playfulness can be an effective strategy for attracting the attention of passers-by and converting them into active participants; and
- (c) while urban screen interfaces increase participation by encouraging group interaction, privately-oriented tangible user interfaces (such as the iPad) give participants a longer time to reflect upon their answers.

The combination of the iPad interface for data entry in concert with the awareness raised by live screening of the interactive space on an urban screen points towards a balanced hybrid model between private and public aspects of civic participation.

What infrastructure can Council implement to promote healthy lifestyles?

Carrot Good walking paths [Fred] Lessons in school facilities Bike lanes with public info Bike hire & awareness campaigns

cityofboston.com



Chapter 6: Situated Discussions

A variation of this chapter was submitted to the Australasian conference on Computer-Human Interaction (OzCHI'15). Text contributions by Joel Fredericks, Martin Tomitsch, Luke Hespanhol, and Ian McArthur.

Building on the findings from the previous studies we devised a research plan to investigate effective ways for involving citizens in community engagement activities that involved the submission of open comments. We designed a series of field studies to engage representatives of the local community that are hard to reach with traditional community engagement approaches. The objective of the field studies was to obtain community feedback on LGA services, how to promote healthy lifestyles and improve recreational needs within the community to create a healthy built environment.

Healthy built environments advocate the development of well-being and health in sustainable and efficient communities (Thompson et al. 2014), with the objective of improving active transport networks, spatial planning, access to wholesome food options and the development of policies that guide built environment professionals (Kent et al., 2012) accordingly. Undertaking community engagement initiatives for healthy built environments provides stakeholders with significant opportunities to investigate how citizens would prefer infrastructure encouraging healthy lifestyles to be deployed in their communities.

Design Elements	Output
1. Shelter	Market umbrella
2. Furniture	Bar stool, ottoman, synthetic lawn turf, information signs, iPad stand, pot plants
3. Information channels	iPad, large posters, staff members
4. Data entry point	iPad
5. Data visualisation	iPad, urban screen

Built environment professionals have traditionally addressed specific health issues such as sanitation, contaminated land, workplace safety, and access for persons with disabilities (Jackson, 2003). However, the built environment is now playing a broader supportive role in interdisciplinary research on human health, policy development and related practices (Kent et al., 2012). The number of people with chronic diseases is rising in urban environments due to physical inactivity, social isolation, and poor nutrition (Thompson et al., 2014; Kent et al., 2012; Freeman et al., 2011; Jackson, 2003).

In addition to our community engagement study we conducted a focus group with three professional representatives from the Willoughby City Council to obtain feedback on the outcomes of the study, and to gauge the receptiveness to employ this approach as a viable engagement activity.

Field Studies Design

In order to create our community engagement strategy for each study we initially undertook informal meetings with representatives from the WCC to discuss the community engagement objectives, the types of data we would like to capture, and the demographics we would like to reach. From these discussions we were able to formulate the community engagement questions we would display on the urban screen, as well as the design of the tablet interface (an iPad Air 9.7 inch) that served as the entry point for participant responses.

Through an analysis of previous (non-digital) pop-up interventions across the globe we also identified five key elements (Table above) that guided the design of our community engagement activities. To obtain data from both local residents and office workers who might not live in the local area we undertook three field studies. Due to constraints regarding the utilisation of the public space and the urban screen, we limited the time each study would run to two hours, adding up to a total of six hours.

For our first field study (S1) we deployed a standalone iPad within the civic space during a regular workday. The findings from S1 informed the design of the second field study (S2). S2 introduced the pop-up approach, which we ran during the Chinese New Year Festival held on a Saturday, aiming to interact with local residents who are culturally and linguistically diverse. Based on the findings from S2, we adapted the pop-up design for the third field study (S3), which was held on a regular workday, so that we could engage with local business and office workers. The iterative development of the field studies and the physical set up used in the field studies followed the action research cycle of “Observe-Reflect-Plan-Act” (Baskerville & Wood 1996; Avison et al., 1999), with each cycle being grounded in the findings from the previous cycles.

Our overall goals for the field studies were (1) to draw attention to the engagement activity; (2) to create discussion around healthy built environments; and (3) to provide a space for participants to interact within the civic space. The questions used in the studies were developed in consultation with representatives from the LGA. Due to the iterative approach and the externally driven requirement to align our studies with the ongoing consultation process from the LGA, questions also varied from study to study. All questions focused on obtaining community feedback from local residents on how the LGA could improve local services. Specific issues included promotion of healthy lifestyles through the implementation of infrastructure, access to healthy food options, and sport and recreation facilities.

The research team consisted of an urban planner, an interaction designer, a visual designer and a creative technologist. The diversity within the team enabled the research to take a holistic approach, focusing on all aspects of the study, from the visualisation design for the public screen to facilitating the community engagement process. The research team

regularly consulted representatives from the LGA, in particular a representative from their marketing and communications team and a representative from their community development team.

Study 1: Tablet and Urban Screen

The objective of the first field study was to investigate how the standalone iPad tablet installed on a customised stand, in conjunction with the existing urban screen could attract participants to submit their responses to a series of polar questions. The tablet was situated diametrically opposite the urban screen. We selected this location based on previous scoping observations and trials of the iPad and urban screen interfaces that identified three important aspects:

- (1) the area was located on the intersection of two walkways, therefore continually exposed to pedestrians;
- (2) it was right at the entrance to the civic space for pedestrians coming from the shopping precinct and public transport interchange; and
- (3) it afforded a clear frontal view of the urban screen.

Tablet Interface Design

The interface was implemented in the form of a web-based survey consisting of a series of yes/no questions. When participants walked up to the interface, they encountered a single question displayed on the tablet screen alongside separate buttons corresponding to “yes” and “no” answers. Once participants answered the question, an animation would play confirming that the vote had been cast, followed by a visualisation of the cumulative results for that question gathered on the day up to that moment, so that the participants could learn how their opinion stood in relation to their fellow citizens. This visualisation would be displayed for 30 seconds, after which the next question would be posed, therefore starting a new cycle. The design’s combination of very simple user interface, quick interaction cycle, and independence between the questions created a walk-up-and-use interface (Jacucci et al. 2010) allowing passers-by to join in, or opt out from the interaction anonymously, at anytime and at their own pace.

Study Set-Up

Due to limited screen time available, we ran this study over two regular weekdays during lunchtime. The first day was between 1:00pm and 1:30pm and the second day 11:00am and 12:30pm, thus adding up to a total of two hours. While the engagement questions were answered via the tablet, the cumulative results submitted by passers-by were also displayed on the urban screen, with visualisation for all the questions playing in a loop, each for 30 seconds. The visualisation occupied two thirds of the urban screen. In the remaining third, we displayed a live camera feed of the public space around the tablet in order to increase awareness among passers-by of the connection between the results on the screen and the tablet deployed in the built environment. This approach was based on the findings from our earlier studies, in which we found that showing a live feed increased awareness of the interface and led to higher participation rates.

In consultation with the LGA, in this study we asked two questions: (Q1) “Are you happy with the services that Council provides to the people of Chatswood?”; and (Q2) “Would you be willing to have rates increased to ensure that our assets (parks, playgrounds, roads, footpaths) are maintained to an acceptable standard?”

During the study period we observed and took notes about the behaviour of members of the public around the space. Furthermore, we counted:

- (1) the total number of people who walked near the iPad (within a maximum distance of approximately 3m);
- (2) people who actively approached the iPad but did not engage with it;
- (3) people who interacted with the iPad (i.e. touched the screen).

Findings

The majority of passers-by (91%; 327 out of 360) walked past the tablet without approaching it. This is not an unexpected result given the casual, unobtrusive nature of the tablet and the urban screen. Our aim was not to disrupt the regular civic activities within the space, but to blend the two interfaces into the urban environment in order to create curiosity around the engagement activity. Despite the very low participation rate, we conducted interviews with 4 participants (3 males, 1 female) to gauge their experience and intentions. In the interest of ensuring ecological validity, we only approached participants for interviews after they had finished their interactions. 3 of the 4 interviewees declared they approached the interface out of curiosity, since it was novel and unfamiliar in that particular urban precinct. The same participants also welcomed the initiative and expressed the desire of participating in similar forms of public consultations in the future. Naturally, four interviews is an extremely low number, and impressions gathered from those can only be interpreted as anecdotal. Yet, they provided valuable feedback that we took into account for the design of the subsequent studies – particularly in regards to the apparent curiosity aroused by the tablet interface on the members of the local community.

Study 2: Tablet, Urban Screen and Pop-Up

This study introduced the first of our integrated pop-up interventions, which we deployed during the Chinese New Year (CNY) festival. The objective was to engage with local residents and business owners, and to observe if an unmanned pop-up could create a sense of curiosity and encourage self-initiated participation. We kept the same basic setup as S1, deploying an unmanned tablet on a stand within the urban space, but placed it within a physical pop-up context with the aim of amplifying the curiosity effect reported in S1. Because this study ran as part of CNY, which featured many other stalls and activities, we were not able to locate our pop-up in exact the same location as the tablet in S1.

Tablet Interface Design

The interface was implemented in the form of a web-based Twitter-style input form. A question was displayed at the top of the screen, above two input fields – one for the answer, and another (optional) for the participant’s name. Below the question, a

touchscreen-based keyboard was made available. All the questions were displayed in English. Once participants typed in and submitted an answer, the interface would acknowledge their participation and display a new question. In the meantime the entered answer was forwarded to an operator responsible for blocking offensive content. Once approved the answer was displayed on the urban screen alongside previously entered answers.

Pop-up Design

Drawing from our design elements and taking into consideration that we were deploying this concept during the CNY festival with other stallholders using similar gazebo structures, as well as the peripheral location we had been allocated, we decided to use a market umbrella, synthetic turf, barstools and a stand housing the tablet.

Our aim was to create a pop-up that was distinctive from the other market stalls thereby eliciting an interest in our activity. The synthetic turf and barstools were chosen to create a comfortable, relaxing atmosphere within the urban space that was largely dominated by concrete. We hoped that the bar stools would invite passers-by to sit down while answering the questions displayed on the tablet interface. Apart from sparking curiosity, the umbrella also served a functional purpose of providing shading, as this study was held during summer. It also increased the legibility of the tablet interface. This was identified as an issue in S1.

Study Set-up

We ran the study for a two-hour period during lunchtime (between 12:15pm and 2:15pm) on a Saturday. As in S1, the engagement questions were displayed on the tablet, which acted as a data entry point and visualised the last few previous responses at the end of the data entry process. Additionally, the engagement questions and participant responses were also displayed on the urban screen. Unlike in S1, however, this time participants were able to enter a short free text through the tablet app, therefore enabling more elaborate responses. The urban screen was therefore programmed to cycle through the questions and their responses using a text grid visualisation. The backdrop of the visualisation was composed of an abstracted live video stream, in an attempt to replicate the amplification effect of live video (Hespanhol et al., 2015).

In consultation with the LGA, the following two questions were displayed during the period of the study: (Q1) “What infrastructure can Council implement to promote healthy lifestyles?”; and (Q2) “What healthy food options would you like in Chatswood?”

Similar to S1, we observed and took notes about the behaviour of members of the public around the space during the two-hour period. We also recorded similar metrics, counting manually:

- (1) the total number of people who walked near the pop-up (within a maximum distance of approximately 3m);
- (2) people who approached the pop-up, but did not engage with it;

(3) people who interacted with the pop-up.

In addition to our behavioural observations, we conducted interviews with 3 participants (2 females, 1 male) to capture their experience of the pop-up. We asked questions such as: why did they choose to interact with it; what would they like to happen with their responses; and whether they had attended any traditional community engagement events in the past. As in S1, in the interest of observing how the pop-up created curiosity and enticed people to interact, we approached participants for the interviews after they had finished their interaction.

Findings

Similar to our observations in S1, the majority of passers-by in S2 (93%; 1,044 out of 1,110) did not approach the pop-up. This result can likely be linked to the fact that we decided to leave the pop-up unmanned in an attempt to observe if it could create a sense of curiosity and attract people through self-initiated participation. The fact that this study was run during CNY, which featured a large number of activities likely further impacted the observed participation rate. The chosen design elements ensured that our pop-up stood out from other stalls, however the large number of activities on offer may have led to engagement fatigue in passers-by. For example, there was a face-painting stall in the vicinity of our pop-up attracting large crowds of children and their parents.

The fact that we left the pop-up unmanned appeared to invite some people to seek shelter from the busy festival activities. A few people sat down on the bar stools, without showing any interest in the tablet interface with one person staying for about 5 minutes, essentially using the pop-up as a shelter to take a call on her mobile phone.

The abstract video live feed was less effective when compared to the live feed displayed on the urban screen in S1. From our observations, it appeared that none of the passers-by recognised themselves within the text grid visualisation. To test whether this was due to the abstract nature of the video feed or the people attending the festival being distracted by the many activities offered in the urban space, we briefly switched the urban screen to show a live feed at the end of the 2-hour session. This rapidly led to people gathering in front of the pop-up and paying attention to the urban screen, although they did not seem to notice the tablet interface as the live feed took over the entire screen removing any visual link to the consultation process.

Overall, 14 people interacted and participated in the engagement questions during S2, with 11 providing valid responses. Responses for Q1 included: More green areas; good walking paths; and, bike lanes with public information and awareness campaign. For Q2, participants responded with: quinoa salad bar; Japanese food; fruit stalls; and, juice and salad bar.

In the exit interviews we undertook with participants, we were particularly interested in their overall experience of the pop-up. The value provided by the interface was perceived differently depending on previous familiarity with the technology. One participant commented: *"It was easy to use, but it doesn't have a lot of information around it, so I didn't know what it was for, and it doesn't invite you to take part"*. Another participant stated: *"I*

use an iPad a lot, so this is a very good experience, as I can see other people's responses". Additionally, we also wanted to understand why people chose to interact with the pop-up. Our design was successful in that curiosity appeared to be a relevant driver for participation, with one participant observing that: *"It was there, not something that you would normally see and it looked interesting"*, and another, *"I was curious of what was going on"*.

To understand how important the engagement topics were to participants we asked them what they would like to happen with their responses. According to one participant: *"It would be good if the Council looked at the responses, and if there is a want for services or infrastructure, then they should make the effort to implement those, and improve the community engagement"*.

We also wanted to gauge if participants had attended any traditional community engagement events in the past. By asking participants this question we could assess if the pop-up is a viable tool that can be used in parallel with traditional community engagement activities. All three interviewed participants said they had not attended any community engagement events. Accordingly, all three expressed positive responses towards the pop-up concept for community engagement.

Study 3: Tablet, Urban Screen, Pop-up and Signage

The objective for this study was to obtain community feedback from local businesses and office workers on recreational and sporting activities within the LGA. In order to engage with people who are culturally and linguistically diverse we decided to adapt the tablet web interface to provide the option to display the engagement questions in the languages most commonly spoken by the local community. These are English, Chinese and Korean. Otherwise the tablet interface was the same as that used in S2.



Pop-up Design

Based on the observations derived from S2, we reflected on the design of the pop-up and decided to make amendments for S3. Drawing on the five design elements, we decided to use a gazebo, synthetic grass, ottoman seating, pot plants, and signage displaying “*Have your say*” in English, Chinese and Korean, in addition to the tablet and stand used in S1 and S2.

Study Set-up

We ran the study for a two-hour period during lunchtime (between 12:45pm and 2:45pm) on a Friday. For this study, both the engagement questions on the iPad and call-to-action “*Have your say*” on the urban screen could be displayed in the three languages, therefore matching the pop-up physical signage. As in S1 and S2, the engagement questions and the cumulative results were displayed on the urban screen. Also like S2, we displayed the text grid visualisation on the urban screen with backdrop composed of an abstracted live video stream. For simplicity, we decided to display the answers in the same language they had been entered.

To evaluate the effect of staff being present at the pop-up, we maintained a presence at the pop-up at all times during the study (one researcher and one representative from the LGA). The following two questions were used during the study: (Q1) “Are there any recreation or sport activities you would like to be provided in the CBD?”; and (Q2) “Are there any facilities

or places you think would improve sport and recreation opportunities in the CBD?” In the same manner as S1 and S2, we observed how members of the public behaved around the space and recorded the same interaction data. To collect qualitative feedback from participants we interviewed 6 participants (4 females, 2 males).

Findings

In comparison to S1 and S2, we had a higher rate of people who approached the pop-up (29%; 532 out of 754). From the 7 people who interacted and participated in the engagement questions, 7 valid responses were recorded for each question. Responses for Q1 included: corporate games; better cycling paths; falls prevention for the elderly; and exercise equipment in parks. For Q2 participants responded with: Running tracks and improved cycling infrastructure; more green space; and a local pool. Our 6 interview participants commented positively on the engagement experience: *“This was very easy to use, convenient and good, it was interesting with the screen and the different multi-media devices, it was much easier than having to fill out forms”*; *“Makes it easy to be involved in the engagement process”*; and *“It was good, I got to interact with the people at the pop-up and the technology, it was a good experience”*.

In regards to their decision to interact with the pop-up, participants also expressed a positive motivation largely driven by curiosity: *“Looked interesting, I haven’t seen many displays set up like this with an iPad and a screen”*; *“Looked like an interesting setup, and I wanted to come over and check it out”*; and *“It was something that is not usually here when I walk past, the energy of the space was positive and it attracted me to it”*.

When asked what they would like to happen with their response, participants stated: *“I would be interested to see what the overall results were, what everyone else had to say and whether they will display the responses back on the screen again”*; *“I hope it goes towards this type of engagement being used in the future”*; and *“Would be great to see the summary of all responses given, and how the Council will use those responses for their future planning”*. Participants highlighted that it was important for them to see a summary of all responses.

Four of the 6 participants had never attended a community engagement event before because of lack of time or interest in attending such events.

Practitioner Focus Group

A focus group was held with the Community Development Manager, Open Space Manager, and Corporate Planning and Governance Manager from the Willoughby City Council with the objective to obtain feedback on the digital pop-up engagement activities we had undertaken.

The following five key themes were discussed during the focus group:

- (1) attractiveness of the pop-up;
- (2) types of social interactions observed;
- (3) demographics;

(4) relevance to desired planning outcome; and

(5) ability of digital pop-up engagement to enhance community engagement.

Attractiveness of the Pop-Up

All three professional representatives agreed that the digital pop-up intervention was a new and innovative way of attracting people for community engagement, depending on how willing people are to stop and use it. One professional representative commented, *“It gave a modern and updated feel to community engagement, a step beyond someone standing there with a clipboard”* and another professional representative mentioned, *“The more attractive it is, and how it reaches out to people, it could be quite useful and a new way of doing things”*. However, it was also highlighted that there seemed to be a step missing and something further was needed to attract people. Suggestions included additional community activities around the pop-up, such as face painting, artwork, music or people going around the civic space promoting the engagement activity. One of the professional representatives commented that *“If you’re talking about sporting, have someone there dressed up in a sporting outfit, otherwise it looks boring and bland or too formal”*. Additionally, it was also suggested that the pop-up may have seemed a little bit complex and people might not like their answers going up on the screen.

Social Interactions Observed

One professional representative who observed the interactions during the various studies mentioned that this type of engagement does attract people who are confident, for example, digital savvy participants and people who are willing to interact with people and new things. It was also highlighted that the particular urban area, in which the pop-up was installed, generally has a lot of competing interests trying to capture people’s attention within the high pedestrian traffic areas, for example, charity sign ups and gym memberships. As a result of these types of social interactions in public spaces people might have been more reluctant to engage with the digital pop-up.

Demographics

From the participant interactions observed during the three field studies it was clear that the digital pop-up approach attracted a younger demographic. One professional representative commented, *“It’s a good thing to attract younger people, and it’s an effective medium to engage with them”*. It was also reiterated that this approach attracts a certain demographic that feels more comfortable using this type of technology, *“Lack of skills to use an iPad and information going on the screen could deter older people”*.

Relevance to Desired Planning Outcome

All three professional representatives agreed that the information collected from these studies was helpful. They stated that it would aid in the decision making process, reflected the feedback from other engagement activities done in the public space, was consistent with feedback from other engagement methods, and provided a snapshot of the responses from people in that location.

Enhancing Community Engagement

There was a consensus amongst the professional representatives that digital pop-up interventions can complement existing community engagement methods employed by the LGA. “Community is where people are already, rather than having to get people to come somewhere, you’re already there,” and “You’re mobile because they are mobile”.

Discussion

Validity of Responses

The community engagement questions from all three studies produced valid responses in regards to LGA services and healthy lifestyles, with a total of 9 responses for S1, 11 for S2 and 7 for S3 collected during a 2-hour period for each field study. We used a moderation system for S2 and S3 (which used free text input) that involved manually approving responses before they appeared on the screen. This type of moderation is important in a public context, where the council might be held accountable for inappropriate message being publicly displayed on the large urban screen (Schroeter and Foth, 2009). However, in our field studies no one attempted to post off-topic or inappropriate responses. This was surprising particularly in S2, where the pop-up was left unmanned. A potential reason could be the fact that the engagement took place in a very public space and, even when unmanned, a pop-up has an official character that may deter inappropriate behaviour. It is further possible that the tablet stand is perceived as a less anonymous engagement platform (more similar to an actual megaphone to use Schroeter and Foth’s (2009) analogy) compared to Twitter or SMS based participation.

Conversation and Participation Rates

From the observations we undertook S2 had a larger rate of people, who walked past our voting interfaces without approaching (93%), followed by S1 (91%) and S3 (70%). This suggests that the iterative refinement of the physical design of our intervention, from freestanding tablet stand in S1, to unmanned market umbrella in S2, to manned gazebo with large signage in S3, led to a higher conversation rate. It is difficult to generalise findings due to other parameters, such as the change of context (Chinese New Year festival versus regular weekday), and the difficulty of controlling variables in in-the-wild studies. However, the recorded data indicates that designing the context around a situated community-voting interface is as important as designing the interface itself. Our observations reflect findings from the field trial of Postervote (Vlachokyriakos et al, 2014), which saw an increase in people interacting with the interface when it was presented within an information booth, compared to an earlier deployment in a street.

The number of people who approached our voting interfaces without interacting was lower in S2 (1%, or 14 out of 1110) and S3 (1%, or 7 out of 754) compared to S1 (4%, or 15 out of 360). These observations suggest that the hybrid approach of using a physical pop-up and digital voting interface has the potential to increase participation rates. People may feel more comfortable to engage with the interface, once they have entered the pop-up environment. Interestingly, the additional signage and staffing used in S3 had not additional effect on participation rate. However, as with the findings regarding conversation rates, the

quantitative findings from our observations can only be seen as indicative trends due to the varying nature of the field studies. Since S2 was conducted during a cultural festival on a weekend, the activity within the urban space was much higher than on the days on which S1 and S3 were conducted.

Acceptance of the Digital Pop-Up for Community Engagement

All participants across the three studies expressed positive feedback to the digital pop-up engagement activity with numerous responses reflecting that this type of engagement works well within contemporary society and is a good short, sharp way of engaging citizens. Participants from S1 welcomed the initiative and expressed the desire of participating in similar forms of public consultations in the future. Participants from S2 expressed positive responses towards the pop-up concept for community engagement, however, participants in this study did highlight that the pop-up lacked the appropriate signage necessarily to invite people to attend. S3 participants expressed that the pop-up looked interesting and is something that is not normally located within the civic space around Chatswood. Furthermore, they expressed that the pop-up was convenient, easy to use and they were able to interact with people who manned the space.

The representatives from the council, who participated in the practitioner focus group, described the digital pop-up to be an effective approach to complement other community engagement techniques. Their responses suggest that they trusted the validity of the data collected through the pop-up and saw a benefit of this approach in its potential to attract a younger demographic within a specific precinct. They further agreed that the information collected during the three studies would aid in the decision making process and was consistent with the feedback received from traditional engagement activities undertaken.

Raising Awareness and Engaging Local Audiences

The community engagement activities that we conducted over the three studies were successful to an extent in raising awareness of the engagement process. This is demonstrated through the total amount of people who participated during our three field studies (2%, 39 out of 2224 passers-by), who interacted and contributed valid response around healthy lifestyles and recreational needs.

From the exit interviews undertaken the digital pop-up approach did attract a younger demographic with participants ranging between the age brackets of 25-34 and 35-45. The professional representatives from the LGA also acknowledged this, however, it should be noted that we were unable to compare participant rates of the traditional engagement activities, as the LGA had not collated their consultation data at the time when we conducted the focus group. Digital pop-up engagement does have the potential to display summary results in real-time (e.g. using an urban screen), which is something that non-digital pop-ups and traditional community engagement events are not able to do.

CONCLUSION

Interactive, situated digital technologies configured within pop-up style formats have the potential to facilitate effective community engagement by attracting varied demographics, fostering local discourse and augmenting decision-making processes for urban planning.

Our case study has shown how this approach deployed within a civic space provides citizens the option to participate on the spot, with little effort in comparison to attending traditional community engagement events. The study further demonstrated how existing digital technologies, such as tablets and urban screens can be easily appropriated to engage citizens within civic spaces.

Furthermore, our study has shown how this approach can help address community-wide issues such as awareness and discussion of healthy lifestyles and highlights how citizens would like their responses to be considered.

Our findings demonstrate the importance of carefully designing the physical context around digital voting interfaces. To that end we have proposed a framework consisting of five design elements to specifically guide the design of digital pop-ups. Our work extends previous research on the use of digital interfaces for community engagement through the findings from our iterative field study evaluation of three distinct physical setups.

Chapter 7: Challenges and Opportunities

A variation of this chapter was presented at the International Research Conference: Design for Business, AGideas, Melbourne, Australia. Text contributions by Ian McArthur and Martin Tomitsch.

Contemporary manifestations of the built environment such as urban screens, media façades, media architecture, and urban media environments are critical sites for research. This affords an opportunity to consider the notion of the city itself as a living laboratory concerned with developing new visions of what sustainable, urban-centric futures will look like (McArthur et al., 2013). Although almost every aspect of our lives are now being mediated, even in public space, we lack a reliable capacity for mapping ‘the wisdom of the crowd’ in a manner accessible to stakeholders concerned with facilitating liveable, sustainable precincts.

Inevitably, discussions and research into urban screens and media architectures involve the deployment of digital technologies. Fortunately, however, we appear to be moving away from the early emphasis placed on hardware that tended to be couched in terms of the purely technical at the expense of the human experience of living in cities (Yang et al., 2013). More recent understandings of what makes a smart city have focused on expanding definitions of ‘smartness’ to include knowledge cities, digital cities, and eco-cities (Bell and Niemi-Hugaerts, 2013). We have to be ever wary of overstating and idealising what the technologies that drive media informatics can actually deliver and what they might allow citizens and stakeholders to actually achieve. The potential for innovation in new services, business and models of governance and development are an elusive yet critical focus in the global race to create the ‘smartest’ cities (Yang et al., 2013). Bernstein et al. (2011) suggest that networks of humans and the computers that drive urban informatics provide a capacity for accessing collective or civic intelligence (Schuller, 2009; 2010) in transformative ways useful to education, industry, government, the arts, and the common good. This implies that there are opportunities to reflect and consider the potential of expanded urban media to move beyond the entrancing imagery presented at art and light festivals and on architecture worldwide, and instead trying to engage media savvy citizens in constructive ways (Yang, McArthur, Miller, 2013). Simply put, “Smart cities are cities of smart people. We must make sure we are open to finding ways to put this connected intelligence to best use...” (Bell and Niemi-Hugaerts, 2013).

With all the increased attention from researchers, governments, urban planners, architects globally, when we look at the deployment of digital media in urban environments, ideally we should be evolving towards a capacity to envision and build precincts that use media in ways that translate into constructive community and cultural engagement benefiting and empowering beyond the banality of advertising (McQuire, 2011) and in so doing enriching the environments, artifacts and public experience of the urban environment (Yang et al., 2013).

In the context of this area of research ‘participatory’ often refers to open and social co-creation processes including crowdsourcing and distributed socially derived content development. As defined at the Central St Martins Media Architecture Conference (2007), “...media architecture (the intersection of media and architecture) describes developments in display technologies, building materials and approaches to architectural façades that are creating opportunities for dynamic new forms of hybrid architecture, ...that break away from existing conceptions of surface, structure, lighting and moving imagery...”.

Situated at the intersection of these conceptual drivers, lies the potential for a networked and participatory urban media (curated or real time) and a more participatory and interactive notion of public space. As noted by McQuire (2011) despite being deployed historically, primarily as a means of advertising or playing television, more recent conceptions of media architecture suggest the potential for developing “...innovative tools for exploring new modes of social interaction and cultural exchange.”

Approaches to research and development leading to deeper integration of urban screens and media façades and the creation of viable, vibrant urban media environments that could be considered include:

- Meshing the thinking of artists, designers and other disciplines in contemporary problems associated with precinct development and urban informatics;
- Stimulation of strategies promoting collaboration in ‘real’ and digital public spaces;
- Integration of online and social technologies as armatures for conceptualisation, communication, collaborative interaction, documentation of ideation, design propositions and processes, and display and archiving;
- Deployment of media artefacts, the body, community, digital networks, public space and architecture as sites for transformations taking into account issues of social construction, politics and sustainability.

Large-scale, urban, networked, immersive screens have the potential to facilitate collaborative, speculative and participatory expressions of place and identity. Mapping and storytelling in public space contexts might enable us to conceive new understanding of what screens are for, and what they can do. One innovative instance is based at PKUVIS, Peking University’s Visualisation and Visual Analytics Group (Yang et al., 2013). The Weibo Event Visualisation Analysis System or “WeiboVA Project” builds visual representations from unique events, keywords, or individual user posts on Weibo, China’s very popular equivalent to Twitter. Comprised of a public online visualisation interface and an offline visual analytic system enabling complex analysis functions, the system produces data visualisations that reveal how an event, idea or thematically-based Weibo ‘tweet’ permeates throughout the network of user screens (potentially both public and private) through retweets. The initial ‘voice’ contained in the tweet flows through the network and in doing so identifies critical ‘influencers’ who also participate in spreading the idea. As such the visualisation process organises the chaotic data-noise of Weibo into legible social patterns that are navigable and contain the potential to engage and “generate social energy and motivate it into positive strands” (Yang et al., 2013). This example highlights the latent

yet critical role of the designers of new urban interfaces and offers insight into the need to understand the local community and their desires, and how they can unfold in the physical context of public space, in order to facilitate civic engagement and city making.

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