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Vote As You Go: Blending Interfaces For Community Engagement Into The Urban Space

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ABSTRACT

This paper presents a series of studies on situated interfaces for community engagement. Firstly, we identify five recurring design challenges as well as four common strategies used to overcome them. We then assess the effectiveness of these strategies through field studies with public polling interfaces. We developed two very different polling interfaces in the form of (1) a web application running on an iPad mounted on a stand, allowing one vote at a time, and (2) a playful full-body interaction application for a large urban screen allowing concurrent participation. We deployed both interfaces in an urban precinct with high pedestrian traffic and equipped with a large urban screen. Analysing discoverability and learnability of each scenario, we derive insights regarding effective ways of blending community engagement interfaces into the built environment, while attracting the attention of passers-by and communicating the results of civic participation.

Categories and Subject Descriptors

D.H.5.2 [User Interfaces]: Interaction Styles.

General Terms

Design, Human Factors.

Keywords

Urban informatics; community engagement; pervasive displays;

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Figure 1. The urban precinct for the studies, with the large screen at the back on the left hand side.

media architecture; urban IxD.

1. INTRODUCTION

Community engagement is a requirement in urban planning to ensure that areas retain their unique character and qualities [[6]], to allow deliberation of public opinion and discussion of alternative perspectives [[15]], and to improve the direct dialogue between public administration and citizens [[7]]. Traditional methods of community engagement, such as face-to-face meetings and online surveys fail to reach a representative proportion of the public, as they are not easily accessible, require people to dedicate time and effort, and are disconnected from the sociocultural context [[6], [7], [13], [15]]. Consequently, a number of applications have been proposed that allow people to participate in the discussion of civic topics as they are passing through public space. A range of interfaces has been studied, including low-cost interactive posters [[17]], gesture-based large projection displays [[15]], urban screens [[13]], and media façades [[2]].

A common issue observed in field trials of situated public displays for community engagement is the lack of participation from the public [[7], [15]]. People usually do not expect public displays to be interactive [[12]] and either do not notice the interfaces [[7], [11]] or worry about embarrassing themselves [[2]]. These effects present barriers to community engagement via interactive

technologies, but previous field trials show that once people overcome these barriers and submit responses, they express feelings of empowerment and connectedness with the local government [[14]] and broader community [[10]]. Based on previous studies, key to successfully deploying situated polling interfaces is to address the following challenges (Table 1): (C1) how to increase accessibility to the community engagement interfaces, so that a larger section of the community can engage in civic participation [[7], [10], [14], [15], [17]]; (C2) how to raise awareness about the opportunity to participate in community engagement among passers-by [[2], [5], [10], [12], [15], [17]]; (C3) how to motivate people to participate [[2], [9], [10], [13], [15], [17]]; (C4) how to balance visibility of the interface and privacy in the engagement process [[2], [13], [15], [16]], and (C5) how to provide effective feedback on the interaction with situated interfaces to participants [[9], [10], [11], [12], [15], [16]]. In this paper, we present the outcomes of a series of field studies on polling interfaces with a local community in an urban space equipped with a large urban screen (Figure 1). We attempted to investigate challenges C1 and C2 above by blending two interfaces into the built environment. Each posed different levels of playfulness, hence probing motivational attributes for the participatory experience (C3). We then used the urban screen to create different scenarios that allowed us to investigate visibility of the interfaces, privacy of the voting process and mechanisms of feedback to participants (C4 and C5).

2. BACKGROUND AND RELATED WORK

2.1 Community engagement

Governments around the world undertake community engagement in urban planning to guide the development of infrastructure within the built environment, and to ensure that communities maintain their unique character and qualities [[6]]. Community engagement helps to inform better outcomes that reflect the interests and concerns of communities and stakeholders [[4]], providing opportunities for all citizens to be involved in decisions that affect their local environment [[7]]. Greater dialogue between governments and citizens encourages deliberation amongst stakeholders in the decision making process [[8]].

When it comes to gathering input from the general public, mobile devices have become a popular choice of platform: they are reasonably ubiquitous in modern urban society, can be used on demand and allow for more articulate expression of opinions, particularly when leveraging texting and social media [[6], [13]]. However, those solutions run the risk of excluding whole sections of the community that for various reasons may not own a mobile phone or engage with social media on a regular basis. In addition, although more situated than online forums, they make for a less situated input channel than interfaces blended in the urban environment (such as digital kiosks or interactive displays), as they move the discussion of local community issues to a virtual space not necessarily visible to the shared urban space being discussed [[16]]. This makes an argument in favour of platforms for civic engagement exploring opportunistic interaction with members of a local community, for instance, by making input and feedback mechanisms physically situated in or around the public space the discussion topic relates to.

2.2 Case studies

PosterVote [[17]], *SCSD* [[2]] and *MyPosition* [[15]] are works that we considered good representatives of the current research in

Table 1. Challenges in the development of situated public interfaces.

C1. Increase accessibility to community engagement interfaces.
C2. Raise awareness about campaigns among passers-by.
C3. Motivate people to participate.
C4. Balance visibility of interface and privacy of engagement process.
C5. Provide effective feedback on interaction to participants.

the field related to our study. In our view, they reflect key approaches and issues encountered in regards to blending community engagement interfaces in public spaces, and are therefore discussed in detail as follows.

PosterVote [[17]] is a low-cost electronic voting system designed to take advantage of such integration into the built environment. It consists of two components: (1) a lightweight hardware kit of buttons and LEDs; and (2) a paper poster placed on top of the hardware module and displaying questions to the community. People can then answer the questions by pressing the buttons, receiving some limited feedback on the interactive process from the LEDs. Given its low cost and portability, *PosterVote* makes an ideal platform for grassroots activism and can be easily distributed across a public space, allowing both in-situ and dispersed social action. Despite its strengths, field studies [[17]] revealed, however, that a perceived limitation of *PosterVote* is its inability to provide immediate feedback to the general public about the results of the public consultation, therefore compromising the feeling of civic empowerment among participants.

One strategy often explored to overcome the lack of feedback provided by portable, non-screen based devices for public consultation such as *PosterVote* is to provide a real-time visualisation of the results on situated public displays or media façades. The *Smart Citizen Sentiment Dashboard (SCSD)* [2], for example, presented the concept of media architectural interfaces (MAIs), a design approach where a tangible user interface (TUI) is positioned in an urban precinct, mediating the interaction between citizens and the content in a media façade (the carrier). The system was deployed at a large avenue in the centre of Sao Paulo, Brazil, with the polling results displayed as colourful chart visualisations in a very large (3700 sqm.) media façade of a local tall building. The interface consisted of a stand with a console made of three sections: (1) a knob enabling the selection of a discussion topic among five options available (environment, transport, safety, public space, and housing); (2) three sensors for smartcards, each labelled with a different mood: happy, indifferent, and sad; and (3) a push button for changing visualisation modes in the façade. Due to the façade's large scale, the interface was positioned across the avenue in a small square near the entrance to the local metro station; since smartcards are used as electronic tickets for the local public transport system, such a setting could provide a suitable scenario for opportunistic interaction by pedestrians in the space. The system ran for a period of about a week, during which 588 separate interactions (i.e. votes with smartcards) were recorded. Admittedly, however, the visualisations addressed a much larger public, given the commercial and cultural profile of the area, with continuous high levels of pedestrian and car traffic. According to the authors, the very busy character of the public space, combined with the small scale of the interface and the much greater visibility of the façade made most passers-by unaware of the interaction mechanisms or even the meaning of the façade graphics, with

Table 2. Strategies for addressing challenges in the development of situated public interfaces.

S1. Blend interfaces into the urban built environment.
S2. Use of public urban screens for real-time feedback.
S3. Use of tangible user interfaces or full body interaction.
S4. Ensure "just enough" playfulness.

most instead perceiving them as enjoyable ambient art – a commonly observed behaviour was people taking photos of themselves with the façade in the background. Still, the majority of participants who actually interacted with the interface (72%) did express meaningful opinions, while the remaining (28%) clearly explored the interface playfully, which was apparent from the conflicting multiple votes registered to the same topics by the same smartcards. While succeeding in creating a situated, blended public interface and providing highly visible real-time feedback on polling results, *SCSD* was arguably difficult to be discovered in the urban environment, as well as prompting playful behaviour among a large portion of participants.

MyPosition [[15]] attempted to overcome similar issues by making the interface more utilitarian and more easily discoverable. The system allowed passers-by to cast their vote through gestures, using depth-view cameras to track participants in front of a back-projected 5 by 2 metres canvas. It then enticed opportunistic participation by displaying participants' mirror images, a strategy perceived as highly effective for communicating interactivity [[12]]. The interface displayed a polling question at the top and graphics corresponding to a 4-point scale: 'strongly agree', 'agree', 'disagree' and 'strongly disagree'. Each section displayed the votes it had received, with each vote being displayed as a colourful tile. Participants would cast their votes by walking in front of the desired section and raising their arms for 2 seconds. A dwelling animation was displayed as feedback for the voting action, after which a new tile corresponding to the new vote would be added to the chosen option. Three scenarios for visual feedback were tested: (1) identical tiles for all participants; (2) each tile with the participant silhouette; (3) each tile with the participant image captured by the cameras. Results revealed that in the latter scenario interactions were less frequent and votes more evenly distributed across the four options. That might be explained by greater public exposure during the voting process potentially leading to greater accountability for the opinions cast. Yet, most participants interviewed during the study stated they actually meant the answers they gave, revealing that the relative playfulness of the interface was not a hindrance to participation, with the field studies yielding a conversion rate of 5%. However, only one participant was allowed to participate at anytime.

2.3 Summary

The case studies above nicely illustrate the current status of the research field, highlighting the recurrent challenges summarised in Table 1, while pointing towards strategies perceived as effective for addressing them (listed in Table 2): (S1) blending interfaces into the urban built environment for more democratic access; (S2) using public urban screens for real-time feedback on the engagement process; (S3) using tangible user interfaces or full-body interaction as interactive mechanisms and to raise awareness about the interface itself; and (S4) ensuring a level of playfulness

enough to cater for an enjoyable yet trustworthy experience. However, the fact that the proposed interfaces are situated makes them highly dependent on contextual constraints, and there is a lack of comparative studies of the different strategies within the constraints of the same location and community. In this paper, we present such a comparative analysis, based on studies of two different interfaces deployed in the same urban location. With minor variations to the study parameters, we tested a total of five different scenarios observing 1,501 passers-by and 110 active interactions (conversion rate of 7%). We present the results from the field studies and derive findings regarding the utilisation of the strategies identified above in the design of interfaces for community engagement.

3. THE URBAN SPACE AND COMMUNITY

Our field studies were run at the Concourse, a public space in Sydney, Australia, equipped with a large LED screen and consisting of a central plaza surrounded by restaurants, a library and a concert hall. Figure 1 shows a view of the space from the top of a stairway leading to the concert hall, with the urban screen on the far left hand side. 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.

4. THE POLLING INTERFACES

For the design of our polling systems, *Vote As You Go*, we considered evaluating the impact on participation caused by (a) *feedback* about the interactivity and affordances of the environment [[9], [12]]; (b) *awareness* about the interaction by previous participants [[14], [15]]; (c) *playfulness* of the interface [[5]] and; (d) *participation as performance* (i.e. visibility of individual actions by the surrounding public) [[7], [15]]. 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 (Figures 2, 3 and 4). The survey consisted of a series of yes/no questions, displayed sequentially in random order (Figure 5, left). After each question was answered, the iPad screen displayed for a few seconds a visualisation of the cumulative results for it (Figure 8), after which period it moved on to the next question. All questions were asked before starting a new, randomised sequence.



Figure 2. iPad interface running the survey, with urban screen displaying unrelated content.

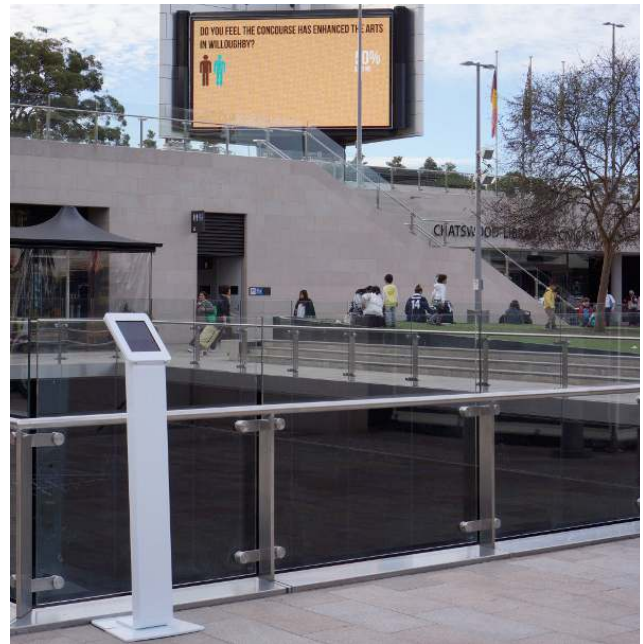


Figure 3. iPad interface running the survey, with urban screen displaying visualised votes.

The second interface was a full-body voting application running solely on the large urban screen (Figures 6 and 7). 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 (Figure 7) 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 [[12]]. 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



Figure 4. iPad interface running the survey, with urban screen showing visualised votes and live feed.

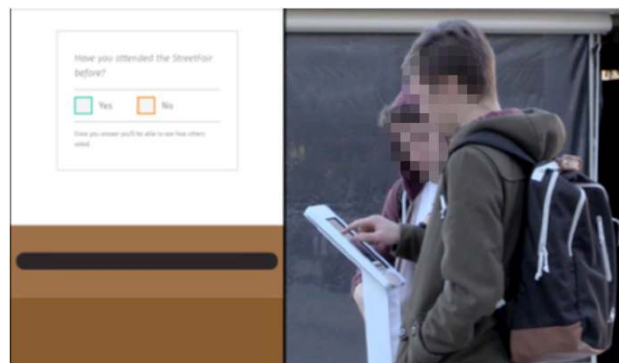


Figure 5. Left: Screenshot of the iPad interface. Right: Social interaction prompted by the interface.

the votes cast would be aggregated to the total results. The time remaining on each round was indicated via a progressively filled clock.

Both interfaces ran exactly the same survey, consisting in questions related to the provision of public facilities and events by the local government (Figure 7 shows an example). They 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), the larger urban screen interface inevitably amplified their opinions to the surrounding public.

5. 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 [[1], [12]] as methodology, we structured a series of “in the wild” field studies so that we could run the two interfaces with different parameters. We then used those deployments to derive insights about 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 (Figures 2, 3, 4 and 6). 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, music videos, etc., part of the regular screen program (Figure 2); (2) iPad interface with the poll results visualisation (Figure 3); (3) same as (2) plus the live video camera feed from the interaction zone, each on a section of the screen (Figure 4); (4) full-body interaction (Figure 6). 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



Figure 6. Full-body interaction.

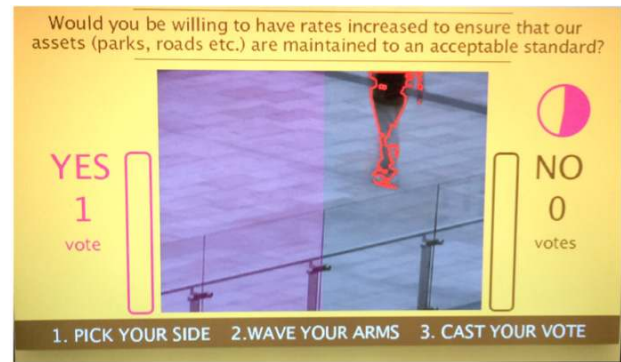


Figure 7. Screenshot of the urban screen during run of the full-body interaction interface.

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. Figure 9 shows the results for each session. In addition, we also conducted semi-structured interviews with 9 participants – 6 for the iPad (4 males) and 3 for the full-body interface (2 males) – 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.

6. 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

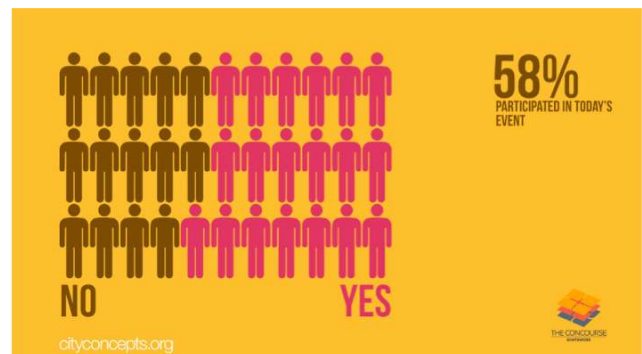


Figure 8. Sample of the data visualisation.

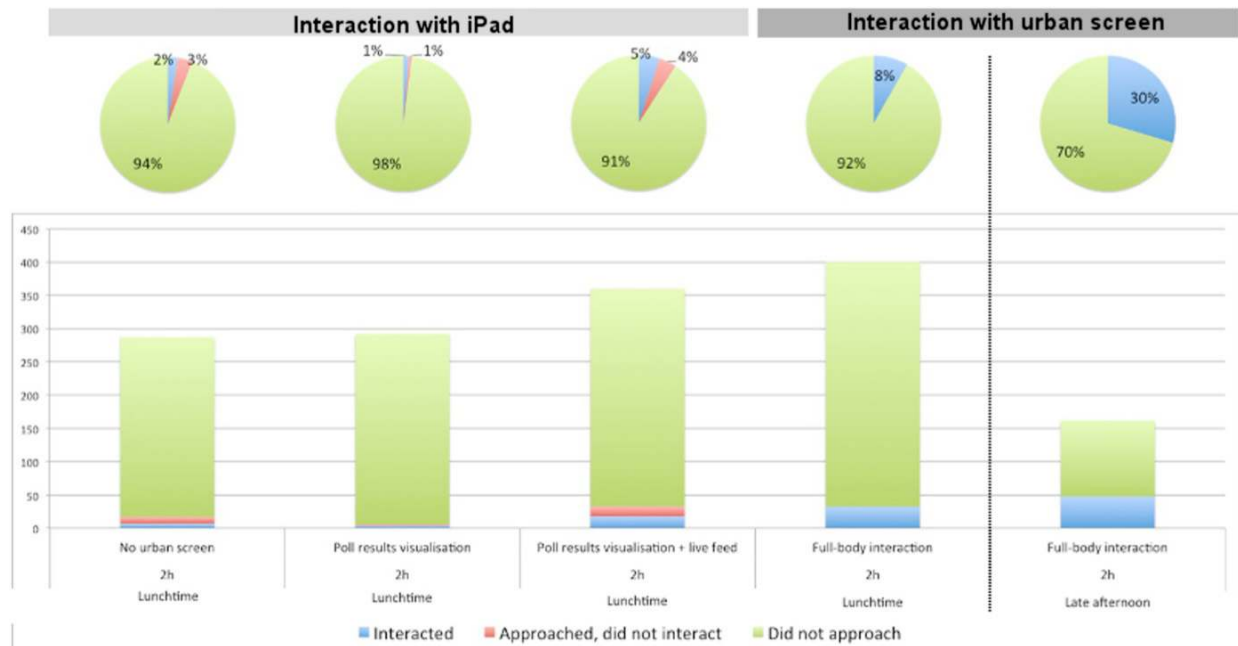


Figure 9. Participation rates and number of participants for each session – three involving the iPad, two with the full-body interaction interface running on the urban screen. The first four sessions took place during lunchtime, the fifth session took place in the late afternoon.

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.

6.1 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 latter 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 other words, $awareness\ rate = participation\ rate + rate\ of\ active\ avoidance$. In the full-body interaction scenarios, however, it was at times much harder to judge whether passers-by within the interaction zone and looking at the urban screen were intentionally or accidentally interacting with the interface, or attempting to avoid it, 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 [[15]]), 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) produced 5% overall awareness, with 2% active participation rate.

A potential explanation for the results above might 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 [[11]]. 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 generally yielded a higher level of awareness – which is expected given its larger noticeability and

more inclusive nature, being able to accommodate more participants simultaneously. Interestingly, however, the full-body interface lunchtime study produced an awareness rate (8%) comparable to that yielded by the iPad backed by visualisation and live feed on the urban screen (9%). 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). This confirms similar findings in the literature for general public displays [[12]], but here the effect was likely amplified by the large scale and highly public nature of the screen, creating for the participants a short moment of fame. We also observed the widely reported *honey pot effect* [[3]], which seems to translate to long-distance interaction with large urban screens but not to the iPad stand itself.

6.2 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 (Figure 6) – 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 [[7]]. 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). This was not 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 (as in Figure 5, right) were restricted to social nudging [[15]], 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, largely in groups, 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).

6.3 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 [[7]]. 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.

7. 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 (Figure 9). Among the participants we interviewed, the majority (6 out of 9) revealed they were attracted 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 the 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

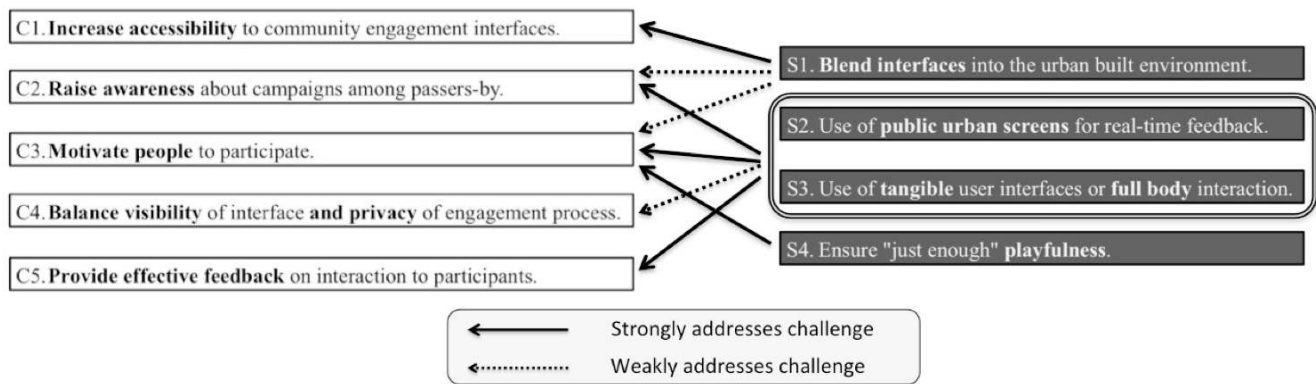


Figure 10. Design recommendations for using the strategies to address design challenges.

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 [[9], [12], [15]]. 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. Although that echoes findings from the literature regarding general full-body interaction with public displays [[12], [15]], we observed that its effectiveness is also verifiable in conjunction with a TUI (here represented by the iPad stand). 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). Figure 10 summarises the considerations presented here, providing an assessment of how each strategy can be better employed when it comes to address the recurring challenges in the design of interfaces for community engagement.

8. 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.). That considerably limited the availability of time slots for the study. Some sessions also had to be cancelled due to bad weather. As a consequence, we could only end up with the 2h timeframes presented for each scenario, arguably limiting the strength of our results.

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.

Finally, 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. We hope that future research could expand the analysis we proposed with our studies in this paper.

9. CONCLUSION

In this paper, we presented *Vote As You Go*, a community engagement application consisting of two public situated interfaces. Firstly, we presented a brief review of recent literature and describe works we considered representative of the current state of the research field. From that, we identified five recurrent challenges faced by initiatives of this nature, as well as four common design strategies used to overcome them. We then presented field studies we conducted in an urban space equipped with a large urban screen, in an effort to assess the effectiveness of the strategies identified when deployed under the same conditions. To that end, we ran five field studies with two different interfaces: the first using an iPad in a stand as data entry point, combined with various levels of feedback displayed on the urban screen; the second, using the urban screen directly as interface and full-body tracking as the interaction mechanism.

Based on our results, we derived a number of insights, notably: (a) blending community engagement interfaces into the built environment (therefore 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 turn 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 people a longer time to reflect upon their answers. The use 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. We hope that the analytical process and initial insights we presented can serve as a starting point for future research that evaluates other parameters of and strategies for community engagement through public situated interfaces.

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11. REFERENCES

- [1] Alt, F., Shirazi, A. S., Kubitzka, T., Bial, D., Zaidan, F., Ortel, M., Zurmaar, B., Lewen, T., and Schmidt, A. Digifieds: Insights into deploying digital public notice areas in the wild. In Proc. MUM'11, ACM (2011).
- [2] Behrens, M., Valkanova, N., gen. Schieck, A. F., and Brumby, D. P. Smart Citizen Sentiment Dashboard: A Case Study Into Media Architectural Interfaces. In Proc. of PerDis'14, ACM (2014).
- [3] Brignull, H. and Rogers, Y. Enticing People to Interact with Large Public Displays in Public Spaces. In Proc. INTERACT'03, Springer (2003).
- [4] Foundations of Public Participation. (2009). Retrieved 10-Feb-2015, from <http://www.iap2.org.au/sitebuilder/resources/knowledge/asset/files/38/foundationsdocument.pdf>
- [5] Fritsch, J. and Brynskov, M. Between Engagement, Affect and Information - Experimental Urban Media in the Climate Change Debate. In Foth, M., Forlano, L., Gibbs, M., and Satchell, C. (Eds.). From Social Butterfly to Engaged Citizen: Urban Informatics, Social Media, Ubiquitous Computing, and Mobile Technology to Support Citizen Engagement, MIT Press (2011), 115-135.
- [6] Fredericks, J. and Foth, M. Augmenting public participation: enhancing planning outcomes through the use of social media and web 2.0. Australian Planner, 50(3), Taylor & Francis (2013), 244-256.
- [7] Gianluca, S., Milano, M., Saldivar, J., Nasir, T., Zancanaro, M., and Convertino, G. Agora2.0: enhancing civic participation through a public display. In Proc. C&T'13, ACM (2013).
- [8] Head, B. (2007). Community Engagement: Participation on Whose Terms. Australian Journal of Political Science, 42(3), 441-454.
- [9] Hespanhol, L., and Tomitsch, M. (2015). Strategies for Intuitive Interaction in Public Urban Spaces. Interacting with Computers. doi: 10.1093/iwc/iwu051
- [10] Koeman, L., Kalnikaite, V., and Rogers, Y. "Everyone Is Talking about It!": A Distributed Approach to Urban Voting Technology and Visualisations. In Proc. CHI'15, ACM (2015).
- [11] Mueller, J., Wilmsmann, D., Exeler, J., Buzeck, M., Schmidt, A., Jay, T., and Krüger, A. Display blindness: The effect of expectations on attention towards digital signage. In Proc. Pervasive'09, Springer-Verlag (2009).
- [12] Mueller, J., Walter, R., Bailly, G., Nischt, M., and Alt, F. Looking glass: a field study on noticing interactivity of a shop window. In Proc. CHI'12, ACM (2012).
- [13] Schroeter, R., Foth, M. and Satchell, C. People, Content, Location: Sweet Spotting Urban Screens for Situated Engagement. In Proc. DIS'12, ACM (2012).
- [14] Taylor, N., Marshall, J., and Blum-Ross, A. Viewpoint: Empowering Communities with Situated Voting Devices. In Proc. CHI'12, ACM (2012).
- [15] Valkanova, N., Walter, R., Vande Moere, A., and Müller, J. MyPosition: Sparking Civic Discourse by a Public Interactive Poll Visualization. In Proc. CSCW'14, ACM (2014).
- [16] Vande Moere, A., and Hill, D. (2012). Designing for the Situated and Public Visualization of Urban Data. Journal of Urban Technology, 19(2), 25-46.
- [17] Vlachokyriakos, V., Comber, R., Ladha, K., Taylor, N., Dunphy, P., McCorry, P., and Olivier, P. PosterVote: Expanding the Action Repertoire for Local Political Activism. In Proc. DIS'14, ACM (2014).