

A Tale of Two Publics: Democratizing Design at the Margins

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ABSTRACT

The design and use of Information and Communication Technology (ICT) has now evolved beyond its workplace origins to the wider public, expanding to people who live at the margins of contemporary society. Through field work and participatory co-design with homeless shelter residents and care providers we have explored design at the common boundary of these two “publics.” We describe the design of the Community Resource Messenger (CRM), an ICT that supports both those in need and those attempting to provide care in a challenging environment. The CRM consists of three components: 1) a message center that pools messages to and from mobile users into a shared, persistent forum; 2) a text and voice messaging gateway linking the mobile phones of the homeless with the web-enabled computer facilities of the care providers; 3) a shared message display accessible from mobile texting, voice, e-mail, and the web, helping the two groups communicate and coordinate for mutual good. By democratizing design and use of technology at the margins of society, we aim to engage an entire “urban network,” enabling shared awareness and collective action in each public.

Author Keywords

Constructed Publics, Homeless, Urban Computing, Design

ACM Classification Keywords

H.5.3 Group and Organization Interface: Collaborative Computing, Theory and Models

General Terms

Design

INTRODUCTION

The design and use of Information and Communication Technologies (ICTs) has evolved beyond the workplace origins that lie at the heart of much of HCI research. In doing so, the field has taken on, as inspiration and context, the challenges and opportunities of engaging with the myriad experiences of human life [24, 25]. Tools like Gaver's cultural probes, and notions like reflective design provide compelling ways of engaging a variety of social contexts, especially where efficiency, productivity, and usability, as traditionally defined by HCI, are not well-suited forms of evaluation [9, 24]. At the same time, these tools provide

access to rich social interactions, where ambiguity and interpretation can usefully be brought to bear as mechanisms for engagement and inclusion.

Arguably, such design efforts engage the broader HCI theme of democratizing technology—that is, bringing interactive experiences and technologies to a wider public for participation, expanding the boundaries of inclusion, and answering the siren song of technology as instigator and mediator of social and political revolution [27]. Democratizing technology however, goes beyond simply increasing the rolls of technology users and involves bringing different social groups into discourse about technology, its place in society, and its potential for enabling action, facilitating connection, and providing access to information.

In this effort to broaden the scope of participation with and through technology it has become apparent that there are deep challenges in reaching certain user communities even within the relative wealth and privilege of western society [16, 17, 23]. Especially in efforts that fall toward expanding access to people who live at the margins of contemporary society, we must focus on understanding how they might appropriate technology as a function of their cultural and social identities rather than through their capacity for consumption.

To address these issues we build on the position forwarded by DiSalvo *et al.* that ICTs, especially those meant to engage users in participation, can be effectively informed by recognizing and constituting “publics” [6, 7]. This notion of a public is based on Dewey's ideas on how people organize around collective action [5]. For Dewey, a public is brought into existence by action around a shared social condition, through mobilizing either to mitigate or promote its consequences. DiSalvo *et al.* note, however, that publics can also be constituted around the introduction of new technologies designed to create opportunity for reflection and action [7].

In this paper, we describe the process of designing a system we call the Community Resource Messenger (CRM). The design of the CRM was undertaken as the constitution of two publics; the first public consisted of the homeless individuals living in a shelter where our work was sited and the second public consisted of the care providers and staff at the shelter. Basing our design in extensive fieldwork, we built a communication gateway between care providers and their homeless clients, linking them as two publics, and enabling information exchange, social interaction, and co-

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ordinated delivery of social services as dynamic participation from both publics.

By developing a design process for the CRM that framed the context as design for two publics, we were able to build a system that recognized the social legitimacy of the homeless, supported the existing but ephemeral connections formed during shelter residence, and helped preserve the knowledge accumulated by residents and care providers alike. Throughout this process, we engaged care providers and the homeless residents equally as co-designers.

BACKGROUND & MOTIVATION

For the homeless and very poor, access to technology is often treated as the primary challenge (e.g. if only they could have access to computers and the internet, then the homeless would have the means of pulling themselves up) [17]. More important than access, however, are the social and cultural factors that figure into how people choose and adopt different technologies, for even when barriers to access are removed, there is no guarantee that the technologies will become integrated into people's lives or act as mechanisms for social inclusion [2, 17].

Part of addressing the challenge of responding to the social and cultural conditions of the homeless, or any marginalized community, is approaching it not as design *for*, a corrective, a means of re-entering society, but as design *with*, recognizing them as socially legitimate and masters of their own choices. The challenge of dealing with a "social other" is precisely what we propose can be effectively handled by treating the homeless as a public in and of themselves.

A Tale of Two Publics

Building from the view that publics emerge from a shared social condition [5], we set out to engage two of the publics that exist at the margins of social inclusion and technical sophistication: the public of the homeless and the public of their care providers. Both groups can be profitably viewed as publics in their own right: they share a set of social conditions and they engage in action to cope with the consequences that give rise to these social conditions. It is important to point out that the social conditions that constitute a public go beyond the immediately shared goals or desires of a group of people and include the direct and indirect consequences of externalities: for care providers this would include the policy landscape in which they operate, their accountabilities to funders, and their responsibilities to the homeless they serve; for the homeless it includes the cities in which they live, their social networks, and the social institutions upon which they depend. While these two publics are distinct, they are also necessarily linked such that considering design for one demands considering design's consequences on the other.

The Homeless Public

The *prima facie* social condition that defines the homeless as public is the fact of their homelessness. Yet within this larger defining feature rest a number of smaller social conditions that give depth to the public.

The first of these finer grained issues focuses on information access by the homeless. While the dearth of access to ICTs by the homeless and very poor is a recognized barrier

to economic inclusion [17], there is not a concomitant dearth of information [13]. For the homeless, the notion of information overload is counterintuitive, but it is a defining feature of the public as they must manage information from multiple care providers, from family and friends attempting to provide help, and from fellow homeless offering advice and guidance on how to navigate the various social institutions in place to provide aid [15]. Add to this mass of information and procedure the emotionally compounding factor of crisis from being without a home, and the difficulty of *managing many sources of information* becomes apparent [18].

The second social condition that defines the homeless public is that of *maintaining social support*. As others have noted, maintaining social support is critical when managing the crisis of homelessness [15, 18]. When a person becomes homeless there are two issues that complicate maintaining social connections. The first is the practical difficulty of staying in touch once a stable residence is lost. The second challenge comes from coping with the stigma of being homeless and the desire to maintain an image of stability for friends and family who might otherwise be concerned [18].

Third, there is the social condition of developing and maintaining *trusted relationships* with care providers. The challenge here is that for many of the homeless, the default position with respect to social institutions and individuals offering help is one of distrust—either from previous bad experiences or as a result of going through personal upheaval [14]. For the homeless, and for those providing care, developing a trusted relationship is key to successfully navigating social services and ultimately arriving at a position of self sufficiency.

Finally, the homeless public is *transient and impermanent*. The mobility of the population and the social conditions within urban settings often work against the emergence of the kinds of social structures that would sustain a homeless public: cities are not interested in allowing the homeless to congregate, often removing the homeless from public places and rousting them from urban shanties and off-grid living quarters; shelters offer only a partial solution as they are frequently closed to residents during the day and actively encourage the homeless to break their associations with fellow street-dwellers [4, 26]; and ultimately, the homeless themselves may eschew membership in a homeless public instead striving to be identified with a more socially acceptable public.

Despite these challenges, constituting a public of homeless individuals around co-designed technologies is arguably an opportunity to express and sustain an urban network of support and knowledge that is otherwise opaque and fleeting.

The Care Provider Public

Unlike the homeless public, care providers are a public that align with existing social institutions—namely, the non-profit and government agencies that provide social services to the homeless and very poor. As a result, the work necessary to constitute them as a public is lessened because of

the institutional infrastructure already in place. Instead, we can turn to examining some of the challenges the care provider public faces in using ICTs to support action as a public.

First are the *resource constraints* placed on care providers both in supporting ICTs and in developing and maintaining expertise to effectively use ICTs in the provision of social services [19]. These constraints often mean ICTs go underutilized, adding complexity to care provision through misconfigured or mismanaged systems.

Second, care providers must develop and manage *multiple relationships* as they are responsible for many clients at a given time. This condition is the flip side of the condition faced by the homeless public in that developing the kinds of relationships that most readily lead to effective care requires close attention. Care providers become the preferred source for information about social services and aid programs which often leads to situations where they are a bottleneck in helping each of their clients find resources [14].

Third, care provision relies on *cooperative action*, requiring varying degrees of coordination between individual care providers as well as across distinct organizations. This condition creates a mix of consequences care providers must manage; some in relation to external accountabilities and some in relation to specific case management and client needs [19].

Beyond these social conditions, which highlight some of the challenges care providers face, there are also strong shared beliefs within particular organizations. The shared philosophies of care provision and social service, often expressed through an agency's mission, further establish definition around the kinds of actions care providers take in response to identifying and managing consequences facing their homeless clients.

As we approach these two publics as contexts for design, we want to carefully qualify how we are bounding what we are referring to as the homeless public and the care provider public. We do not propose to lump all homeless people everywhere as part of a single public. Instead, we would like to focus attention on the smaller co-located groups that form within urban communities around specific shelters or other service outlets. These groups will often cleave along the lines of care providers who focus their resources at different segments of the homeless population: homeless youth, single men or single women, homeless families, single-parent homeless families. These smaller and specialized configurations result in more commonalities with respect to the social conditions facing these individuals. Their association with a particular service provider creates a social setting in which to site the public, aligning the members' actions along courses of care, support programs, and relevant institutional and local knowledge.

DESIGN FOR PUBLICS: FIELDWORK & ITERATION

Our design intervention with the homeless and their care providers drew on findings from the established literature along with extensive fieldwork with both publics. Treating service providers and the homeless they serve as publics provided a perch for design interventions that made space

for each to actively participate in design as groups with legitimate social agendas, setting the ground work for exploring technologies that both support and transform the relationships currently tying care providers to their homeless charges.

We staged our fieldwork so as to alternate between engagements with the homeless and engagements with the care providers. By doing so we were able to scaffold our understanding of each as independent publics as well as vet ideas across both groups.

Engaging the Homeless

We began our fieldwork with a study to characterize perceptions of technology among the homeless, to identify the unique needs of the homeless when considering appropriate technological innovations, and to describe the challenges in both working with, and designing for, the homeless population.

The results of the initial investigation have been reported elsewhere [20], but we offer a brief précis of those findings here. To engage the homeless we performed a qualitative photo diary study where participants were provided a camera and instructions to take photos of their choosing; these photos were then used to elicit participant responses during a semi-structured interview.

In the interviews, we focused on understanding how different technologies figured into the lives of our homeless participants. Our analysis laid the foundation for our work here by calling out mobile phones as an important technology for the homeless. We found that mobile phones play a *functional* role for the homeless by supporting communication with family, care providers, and potential employers as well as a *social* role as a device used to manage the perceptions of others and return a modicum of control to individuals swept up in the current of personal crisis. However, the relevance of the mobile phone went beyond the functional and social roles it played: it was a technology our participants understood and integrated into their lives.

Engaging Care Providers

As with our effort to understand the homeless, initial results of our fieldwork to understand how care providers operate and the role technology plays in the provision of service have also been reported elsewhere [21]. This earlier work entailed more than a year of fieldwork that included ethnographic observation of work practices and rolling interviews at twelve separate organizations, each with differing service models and target demographics. Through that initial fieldwork we identified a cohort of eight service providers who had established cross-organizational relationships and that were willing to further work with us in a design workshop, the results of which we are reporting here first.

The workshop was an all-day event structured around three "mapping" activities culminating in a final activity integrating materials developed during the day. Each activity juxtaposed resources, process, and goals against the geography the agencies covered, their different philosophies of providing service, and the procession from crisis to stability. These activities documented the range of resources avail-



Figure 1: Materials from the design workshop.

able through the agencies, the information flow through the agencies, the goals that clients were to meet while under the care of the agency, and the flow and structure of care provision (Figure 1). The materials generated during the design workshop became a way to engage the agencies around specific challenges and opportunities for technology intervention.

Site Selection & Design Iteration

From the design workshop we selected a specific site to begin more detailed design work. The choice was made based on the centrality of one of the shelters with respect to the other service providers in our cohort—ultimately, we wanted to begin work at a single site with connections to the other providers so we could integrate each in turn.

The site we chose is a small emergency shelter that provides 30 to 90 days of emergency housing to single women with children. Up to eight families are at the shelter at a given time. Over a six month period we met with the care providers and residents of the shelter, discussing design ideas, engaging their participation in evolving the design, and bringing each public—care provider and homeless—into the design discourse.

Our meetings with care providers included all six program directors and case managers at the shelter. Our early meetings focused on understanding how the work practices at the shelter were situated around the resources, goals, and information flows expressed in the design workshop. We discussed challenges the care providers faced and whether or not a technology-based intervention—particularly an intervention utilizing mobile technology—was viable in removing or easing those challenges.

When we met with the shelter residents, we focused on understanding their particular experiences in using mobile phones, talking through how they communicated with their care providers, and discussing the challenges they faced in their day-to-day routines. We wanted to understand their perspective on what they were doing for the relatively brief time they were at the shelter, what their relationships were to each other and to care providers both at the shelter and at external organizations.

Throughout both sets of interactions—with the care providers and with the homeless at the shelter—our goal was to

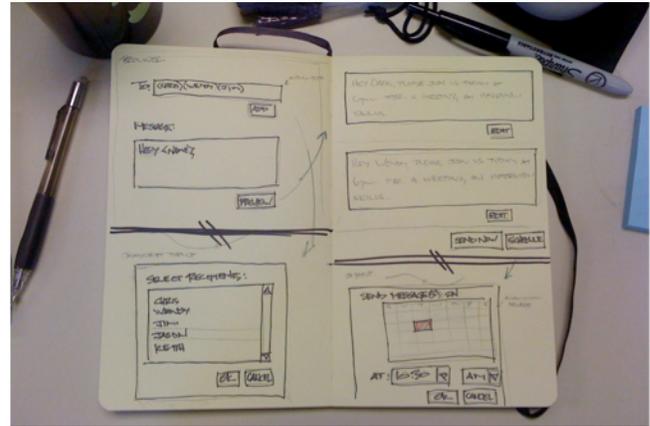


Figure 2: Early design sketch of CRM interface.

understand the social conditions that defined them as a public and that provided opportunities for design intervention. We encouraged both care providers and the shelter residents to describe how they would like to address the issues at stake. This participatory process reflects some of the current discussion within the participatory design community around having stakeholders not just design for themselves, but in engaging those stakeholders in designing for future use [8].

SYSTEM DESIGN: FROM MAP TO MESSENGER

The design of the CRM progressed from our initial fieldwork and design workshop through to meetings with shelter staff and residents. In those meetings we developed and refined design sketches (Figure 2), paper prototypes (Figure 3), and progressively more functional software prototypes (Figure 4). In discussing and developing these prototypes we engaged the range of experience at the shelter: we held one-on-one design meetings and focus groups with staff, including program managers who set the direction for specific aid programs and case workers who worked more closely with the residents themselves; we also held group design meetings with shelter residents, some of whom had just been admitted into the shelter, and others who were preparing to move on to transitional housing programs.

We prepared an initial system design to facilitate our discussions and activities with the staff and residents. Our initial concept of the CRM was as a Community Resource Map, and derived from the design workshop as a collection of resources for the homeless, updated by case workers and available to the homeless through a mobile application. These resources would include, among others, information about shelters, counseling services, soup kitchens, employment training, and healthcare. In the workshop we identified challenges in referring clients across agency boundaries, which led us to conceive of the Community Resource Map as an aggregated resource database—a map of available resources mediated by the individual preferences, needs, and goals of the homeless individuals using the system. To compliment the map, we developed a design prototype around on-phone software that could provide location-based notification of resources and opportunities.

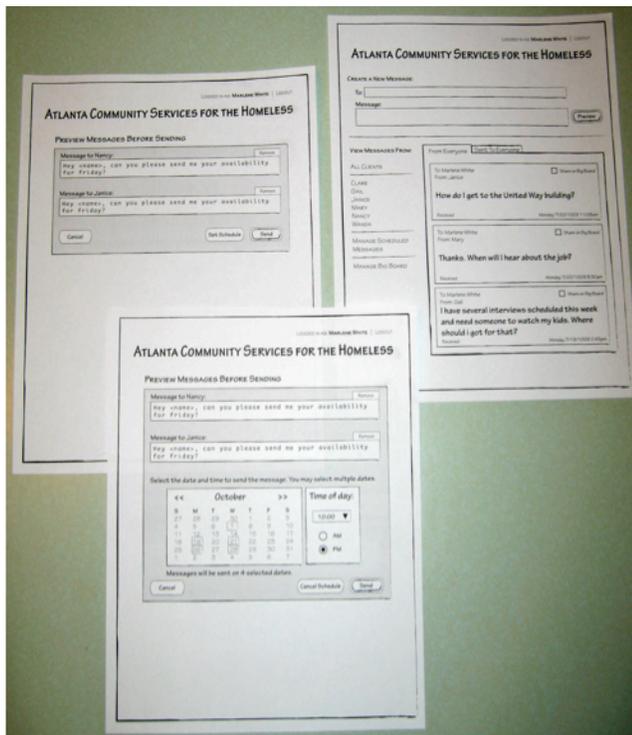


Figure 3: Paper prototypes of Message Center.

This initial concept was the departure point for iterating and evolving the design with the case workers and shelter residents. One of the first things we discovered was that while the map concept was useful as a way to expose resources in the community, the more fundamental challenge faced by both publics was managing communication: case workers mediated access to various resources, so supporting information exchange and social interaction around those resources took priority over mapping. In recognizing this, we shifted focus away from developing a map, toward developing a set of services to support communication within and between the case worker public and the shelter resident public. This shift led us toward creating a Community Resource *Messenger*, where the design space we were engaging centered on the boundary of the two publics and developing communication channels to support them at that boundary. For the case workers, the focus was on supporting their need to manage multiple relationships, coordinate actions around service provision, and deal with resource constraints. For the homeless shelter residents, the focus was on structuring the information they received to help with information overload, establishing and maintaining relationships at the shelter, and developing a network for social support.

The final system, as Community Resource Messenger, included three main components: a *Message Center* for the case workers, a *Shared Message Board* in the shelter for both case workers and shelter residents, and *Mobile Messaging* support for shelter residents. The case workers would have access to the CRM via a web application to help them manage communication with all of their clients and coordinate support activities. The message board would become a fixture in the shelter to disseminate announce-

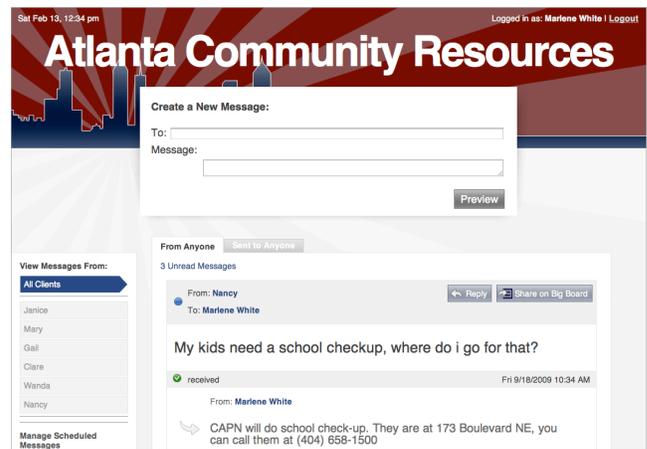


Figure 4: Final Message Center interface with mock data.

ments from case workers and staff as well as collect messages and inquiries from residents. The shelter residents could interact with both systems via Short Message Service (SMS) or voice as a matter of preference. We turn now to describe how each of these core features developed through our design process, highlighting some of the specific issues that arose and how we worked to address those issues.

Design Evolution: Message Center

The Message Center was built primarily to support the case workers and address the larger issues of managing multiple relationships, coordinating the action of case managers as they worked with shelter residents, and coping with constrained resources. However, through the use of the Message Center we would also be addressing some of the issues faced by the homeless, such as building and maintaining trusted relationships (specifically with care providers) and gaining access to organized and timely information. The challenge was to weave the specifics of these dynamics together within the context of our design site.

We began by developing the design discourse around how information was shared at the shelter. We examined the different ways information was made available to shelter residents, both through one-on-one communication between various case workers and through shelter-wide information sources like bulletin boards and announcements made during communal activities (e.g. group sessions, evening classes, meal times). The first pieces to take shape were features for composing and scheduling mobile SMS text messages to clients, making it easier for a case worker to manage their communication with multiple clients. The challenge and opportunity here was two-fold: some of the case workers already had an established pattern of using SMS to communicate with clients and needed more robust support for using that communication channel; other case workers had limited experience with text messaging—for example, the program manager of the shelter was initially skeptical about using SMS to communicate because it was not something she herself engaged in.

Using SMS as a starting point, we began to explore how a messaging system might look. The first thing we noticed was that SMS messages, by virtue of going through case workers personal phones, were private. At the outset, we

assumed that such privacy would be a central concern for the case workers; that they would prefer to maintain a privileged relationship with their homeless clients and not have their messages be accessible to other case workers. To support this, we began by assuming each case worker would log-on to the Message Center and see a list of the privately sent and received messages with their clients. We also proposed the ability to reply to messages privately with conversation threads reflected in the interface. These features combined to create an email-like experience where messages arrived in an inbox and could be filtered and sorted in various ways.

Yet as the design developed, the case workers pointed out that they really needed to see not only their own messages, but all messages that came into the Message Center including those directed at and sent by other case workers, noting that they had shared responsibilities across clients and that it was more important to establish a shared context for action than to cordon off each other's messages.

This prompted a fundamental change in how we provided access to messages in the Message Center. Instead of treating the messaging system as one might an email account—where each user's messages remain private—we started viewing it as a shared message forum. We allowed case managers to see all of the messages regardless of which case worker originated the message or to whom it was addressed. This change had important implications for treating the case workers as a public: it provided an additional persistent social context around which to organize action. The case workers contended that such a shared context would help surface issues their clients were facing, enabling access to shared expertise while reducing the overhead of keeping everyone up to date.

For the residents of the shelter, the Message Center also provided a perch from which to address the dynamics of information overload and maintaining trusted relationships. Message automation was a feature that we initially thought would be compelling for both the case workers (as a way to streamline their interaction with the system) and for the shelter residents (as a way to reduce information overload through timed and triggered message delivery). However, the automation features were greatly scaled back for two reasons: the kinds of resources and events the case workers wanted to use the Message Center for were contingent on their own expertise and judgment with respect to prioritizing and negotiating access (especially for services at external providers), and there was an expressed concern that automation would erode the trusted relationship between case workers and the residents by virtue of messages failing to reflect the tone and tenor of individual case worker-resident relationships.

We found middle ground by providing the ability to schedule messages and to send group messages that would appear as individually addressed. On the first account, scheduling messages was seen as a way to receive timely reminders—something both case workers and residents wanted as they set schedules and managed some of the daily chaos at the shelter. On the second account, personalizing group messages allowed for some kinds of group an-

nouncements to be simplified without giving up control over how the message was created.

By working with the case workers throughout the design of the Message Center, we were able to hone in on the features that supported their work practices—such as creating a persistent message history and making it easier to create messages from existing content on their PCs (rather than thumbing everything into a phone). The net effect of the design process was a software prototype that addressed the functional needs of individual case workers, accommodating their abilities, and establishing a technological artifact to augment their ability for collective action as a public.

Design Evolution: Shared Message Board

The Shared Message Board was a feature that emerged toward the end of the design process when we began to integrate the perspectives of the shelter residents and the shelter staff. It became clear from discussions with both publics that direct private communication within and between the two groups had limitations. Namely, private communication made it impossible for the two groups to develop a “public memory.” For the shelter staff this implied a large corpus of “cyclical” information that they were imparting to new residents every 30 days. For the homeless residents, it was the knowledge and experience they accumulated as they progressed through the programs at the shelter that was not preserved.

In addition to the cyclical information shelter staff communicated to the residents, the shelter had a number of paper bulletin boards for announcements, job postings, housing postings, and general “information awareness” between case workers and between residents. One case worker said that these boards were often ignored in large part due to the density of information collected: job and housing listings were often pages deep and affixed to the board in such a way as to make it difficult to leaf through the content. As we explored these issues, one case worker specifically asked for a large display they might use to share information. The stable cyclical information could be made visible, prompting case worker client interaction around specific needs, and volatile information like current housing opportunities could also be made available in a more accessible and timely way.

Beyond the information coming from shelter staff, we wanted to create a space for residents to share information with each other. Our discussions with the residents started with thinking about whether there were experiences or knowledge they would want to share on such a board. As we reflected on how sending messages about opportunities found, and requests for help or knowledge might work, the residents shifted from talking specifically about the things they might need at a given time to thinking about kinds of messages and information that would help future residents as they came to grapple with similar challenges. This led us to create a path for posting messages to the Shared Message Board via SMS or by leaving a voice mail that would be converted from speech to text and then posted.

From these discussions, we built a mockup (shown in Figure 5A), and considered various types of messages that



Figure 5: Shared Message Board prototype (A) and final(B).

might be posted. There are several things to notice about this design. First, the message board is a space for both case workers and shelter residents to share information. This represents an innovation within the shelter as the existing bulletin boards did not provide space for residents to post messages. Second, the message board facilitates dialog between staff and residents, providing a living space for exchange. To organize this dialog, we needed a way to thread messages around request and reply. One common request and reply pattern that came up during design discussions was question and answer—whereby case workers could reply to shelter residents’ posts to the Shared Message Board. Third, and finally, the display scrolls information across the board to accommodate many messages and presents a dynamic display to attract attention [21]. By highlighting some messages (in red) we intended to indicate priority; however, we pulled this feature in the final design because we were concerned that an incorrect inference about priority could be a distraction for case workers and shelter residents. Our mockup also included a list of topics along the bottom of the display as an indication of the kinds of information currently in circulation on the board.

Our final design (Figure 5B) makes the electronic message board a reflection of information in the CRM, with messages coming from many sources: mobile text, voice messages, e-mail, as well as messages promoted from the Message Center. The design makes space for residents to expose common issues, leverage group expertise, and establish a set of common knowledge that can be sustained across resident (or case worker) turnover.

Design Evolution: Mobile Messaging

The third core component of our system was the integration of mobile messaging. We chose to target mobile phones as the interface of choice for the shelter residents based on our earlier fieldwork that pointed to the utility of the mobile phone for the homeless. As further evidence of the importance of the mobile phone, we note that the shelter residents all had mobile phones of their own. Some had phones through low-cost carriers like MetroPCS, and others had phones through public programs like SafeLink.

We also wanted to build on prior work that has shown the effectiveness of mobile messaging when reaching the homeless population [12]. The opportunity we saw was to

further develop our understanding of how text messaging is used in different contexts (e.g., [10, 11]) while moving beyond text messaging to the homeless as a one-way communication channel [3].

During our trips to the shelter, several residents indicated that they were already receiving text message reminders from their case workers. Shelter residents also indicated that query-and-response text-based services (like 1 800 FREE 411) were often more useful than interactive voice response systems because they did not require the user to write down information, instead sending it right to their phone. As a result, we felt that the most sensible way forward was to keep the phone interaction as transparent as possible; no specialized software on the handset, instead, focusing on the social coordination via the case workers’ Messaging Center as a way to innovate how and when information from shelter residents might be shared with case workers and arrive back to the shelter resident with answers.

Our design conversations with the shelter residents also touched on voice-based services as an important way of using their mobile phone. A minority of shelter residents preferred voice-based services to SMS, noting that they do not mind reading an SMS, but they disliked having to send them. This was an important point of discussion because it was a design priority to engage the homeless shelter residents as a public, providing a means for them to share and interact with each other through and around the CRM—while we could not guarantee participation, we did not want passive consumption to be the default position of system use.

We realized, with input and direction from the shelter residents, that the phone was an entry point to interacting with the system and as such, the barrier to entry should be as low as possible. The aim was to enable simple input into the CRM—either through messages from case workers, or by posting to the Shared Message Board.

Details of the Final System

Our onsite co-design with shelter residents and case workers revealed a design space at the boundary of the two publics. This led us to a set of issues and questions that informed our design of the CRM. We came to realize that supporting cooperative action was a primary need for case workers, so the Message Center evolved from an email metaphor to that of a shared forum. We developed different views of public information, and concomitant democratization of access, by creating a Shared Message Board where the knowledge of shelter staff, the experiences of shelter residents, and information from the community could be actively created and interpreted by both publics.

Figure 6 shows a high-level view of the CRM as implemented at the homeless shelter. We have connected three loci of activity: shelter residents using mobile phones anytime and anywhere, case workers using desktop PCs while at home or at work, and both publics interpreting and acting on information on the shared display while co-located at the shelter.



Figure 6: Final CRM system architecture.

Shelter residents access the CRM through basic mobile phones, sending messages or leaving voicemails at one of the system's two phone numbers: a "private" phone number routes messages to the case worker; a "public" number routes messages to the Shared Message Board. Voice-mails are transcribed using Google Voice and forwarded to the Message Center or Shared Message Board via email.

Case workers create messages in the Message Center which are either published on the Shared Message Board or scheduled and broadcast to residents' mobile phones via the Kannel GSM gateway. All messages are stored in a MySQL database accessed through JDBC. The Message Center and Shared Message Board are deployed on Apache Tomcat as Java web applications along with supporting Javascript to control presentation and updates in the browser.

The Shared Message Board runs on a large display installed in the common room of the shelter. It rotates between three different information views: messages from staff that originate in the Message Center, messages from residents that come from SMS and voice messages sent into the system, and external community information pulled in by scraping results from a housing search web page.

DISCUSSION

We began this paper by framing our design intervention within the notion of designing for two publics. It is useful to return to this notion and examine where it led to useful insight, and where the limitations were.

Constituting Publics in Technology

With respect to the design of interactive systems, two key implications can be drawn from Dewey's notion of publics. The first is that a public can become a useful boundary for design by highlighting existing social conditions, suggesting a conceptual space within which to engage potential

users around reflecting and acting on that condition [6]. During the design of the CRM we came upon two strong social conditions that arguably did the most to shape our design thinking, and ultimately our system around each public. For the care provider public, evolving the design of the Message Center to one of a shared forum (with respect to other case workers) instead of private mailboxes meant that shared action could form around the exposed conversations instead of through additional coordination and interpretation work. For the residents in the homeless shelter, the development of the Shared Message Board became an important interface in facilitating awareness within the residents' public and promoting how each of these publics become aware of the other's experience.

While messages in the Message Center remained privileged, if not strictly private, the content posted to the Shared Message Board was for all eyes to see, creating a unique interface between these two publics where the consequences being dealt with (homelessness and the many social struggles that attend it) were managed from two different perspectives—that of care provider, those intervening, and that of shelter resident, those directly experiencing. By creating a single space where both publics could be represented, we created an explicit opportunity to sustain and organize around the differences present in how each public identifies and responds to the other.

The second implication draws on the notion that publics not only expose common issues, but also are a means for dealing with conflict and controversy around those issues [20]. From the point of view of how the CRM took shape, the open forum model of the Message Center had an important implication on the level of trust and openness when communicating via the system. The decision to present the Message Center as a shared forum meant that the individual relationships between case worker and residents were made subordinate to the relationship between case worker public and shelter resident public. On one hand this makes it easier to promote issues of the public (i.e. shared across several individuals) but on the other hand it is more difficult to bring equanimity to existing power dynamics: the resident public was exposed to the case worker public in a way that was not reciprocal.

One of the main differences in how each public engaged with design of the CRM can be articulated through how they worked through specific features. The case workers had fairly functional requests of the system: ways to solve particular problems and manage specific aspects of their jobs. Upon reflection, we believe this was in large part because they already had social infrastructure in place to support them as a public—the organization of the shelter and their role in it. The shelter residents, on the other hand, had fewer specific functional requests, instead focusing on issues of awareness and developing social infrastructure to support their perspective. Their priority was to find ways to render their experience and expertise visible.

Constituting Publics in Design

Surprisingly, there is evidence that the act of design participation, central to the constitution of a public, took precedence over the final artifact. This became especially

apparent in our work with the homeless residents of the shelter. For the residents, the work they did by reflecting on their needs and preferences seeded the idea that they were more than just consumers of information. This shift from consumer to participant became evident during design discussions of the Shared Message Board. Instead of designing to suit their needs and expertise, they began to consider how to sustain their experience and expertise into the future, recognizing that they were only going to be in contact with the system for a short time, but the work they contributed could have a longer life.

This shift marks a change in how the CRM was perceived and a move to create a more lasting social infrastructure—a public—by laying out their advice and foresight for future generations of shelter residents. Ehn points to this kind of design for future use as an important step in sustaining a public through awareness and through action [8].

Like the residents, the case workers also recognized that future use was important: case worker turnover and staff changes meant the design choices they made and the problems they identified would impact future generations of shelter staff. The main difference between how these two publics approached designing for future use revolved around whether they were thinking of future actions (as the case workers did in focusing on actions to coordinate care) or future awareness (as the residents did through using experiences to support future residents of the shelter).

Constituting Publics and Democratization

Although democracy is a term with multiple, at times conflicting, meanings and methods, we have based our approach to democratization as fundamentally about discourse through participation. The role of technology in democratization (through free access to information) depends in part on democratizing access to technology (by considering for whom technology is created). In this interplay there is a deep optimism that asserts we are able to overcome our challenges through sharing ideas and engaging with each other. This idea also sits at the foundation of Dewey's notion of publics—organizing around action as a way to confront the challenges facing society. However, when Dewey wrote that a public is “constituted through controlling these [indirect, extensive, enduring, and serious] consequences,” he continued by pointing out that “the machine age has so enormously expanded, multiplied, intensified, and complicated the scope of the indirect consequences, [and] formed such immense and consolidated unions in action, on an impersonal rather than a community basis, that the resultant public cannot identify and distinguish itself” [5]. The point being while publics can form around collective action, the myriad consequences facing contemporary society “produce both disaffection... and skepticism that collective action [can] solve pressing social problems” [1].

Democratizing information access and production through technology innovation is one way to help bound and define a public's action. As Sackman suggested in 1968, real-time computing could be the tipping point for supporting and instigating public action [22]. Developed in light of command and control systems of the day, Sackman's assertion is equally compelling—and optimistic—when applied to-

day: constituting and supporting publics with technologies that enable access to information, provide means of distributed information production, and social mechanisms to identify and sustain individual members will help small groups mobilize and organize around the issues that affect them.

These are precisely the kinds of features we worked to co-design with the case workers and shelter residents. The challenge was to engage both publics around participation, breaking the established production-consumption relationship between case workers and their residents.

Setting the Stage for Future Work

The evidence we have presented here only takes us through the design process. At the time of writing, we have just begun the deployment of the CRM and have yet to collect the kinds of detailed accounts that would indicate how the CRM supported each of these publics. As we follow the deployment of the CRM, we will return to the notion of publics as an analytic frame (rather than just a design frame) to inform how we understand and interpret the successes and failures of the system [7]. We would point out that there are many awareness issues that will come into play: Will the sharing of information via the message board violate established norms in the relationship between residents and case workers? How will residents perceive the privacy and individual purpose of messages sent to them or posted to the message board? Who pays attention and takes action, and to which messages? We will also explore in more depth how much content should be persisted on the Shared Message Board, how that content impacts information overload, and different approaches to sharing control over what content is available and for how long.

CONCLUSION

In developing a design intervention with the homeless and their care providers, we have begun to explore how to democratize access to information within this social context. We based this design process around the idea of constituting two publics—the public of care providers and the public of homeless individuals at a particular shelter. The goal in attempting to democratize information access and production between these two publics was to generate opportunities for participation and action. Some of these opportunities came through the design process: reflecting on specific system features, engaging in discourse around individual expertise, and developing notions of how to sustain both into the future. Other opportunities will come through system use and will no doubt evolve with the individuals participating in the public—as case worker or shelter resident.

By presenting this work, we hope to extend our understanding of how framing design around the notion of publics, combined with a participatory design process, foregrounds not just the needs of a particular public, but also the design opportunities at the boundaries of that public. In introducing the notion of publics as a design frame, DiSalvo pointed out the tension between constituting publics via awareness and supporting them in action [6]. We have attempted to further explore these challenges by weaving awareness and action around participation between two

publics, highlighting the specific needs of each and the opportunities for design at their common boundary.

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