Social Interaction around a Rural Community Photo Display

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Abstract

Public displays of photographs are a common sight in community spaces, yet while much attention has been given recently to the use of digital photography in the home, the community domain remains underexplored. We describe the Wray Photo Display, a public situated display for community-generated photography in an English rural village, which aims to understand the community's use of photos for social purposes and the ways in which public display technology may support these social interactions. This article presents the techniques used in designing and evaluating the display as well as understanding the community and its use of photos, and our discussion of the issues and challenges presented by this study.

Keywords: Situated displays, Community, Participatory design

1. Introduction

In recent years the vastly increased availability, affordability and sophistication of technologies associated with ubiquitous computing—large flat displays, wireless networking, mobile devices etc.—has enabled a proliferation of ubiquitous devices and applications. In the domain of photography, this has included the development of household digital photo frames that attempt to improve upon traditional frame and print photo displays by allowing dynamic content or multimedia. However, less well explored is the use of photo displays outside of the home domain, in public areas and social spaces where photography might traditionally be displayed for various purposes, which may overlap those purposes found in the home, but also differ. For example, displays of photos might play a role in instilling a sense of community through shared history or awareness of community events.

The overall aim of our work is to investigate the role that public displays of information can play in a rural community and the techniques that can be used in accessing communities to design these displays. Our first prototype in this project has been a community photo display (Figure 1) in Wray, a rural village in North West England, which has been

Figure 1: The Wray Photo Display

deployed since August 2006, displaying photos uploaded by members of the community (Taylor et al., 2007). From this we have gained insights into the way this display and its photos have been used, the issues surrounding the deployment and the techniques we have used.

Our approach has been to employ a prolonged and iterative cycle of observing, designing, deploying, observing and so on, while maintaining the close participation of village residents by using a wide range of techniques to generate various forms of feedback and data for informing the design, including cultural probes (Gaver et al., 1999),

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technology probes (Hutchinson et al., 2003), focus groups and in-situ observations. Our prototype display has not only been useful in assessing the use of public displays in the community, but also in learning about the community itself and its use of digital content, in this case photos, within its social activities. We have been able to observe the types of photos uploaded and their community-centric nature, the way they are categorised, the comments people make about them and the way people interact with each other around these photos.

In this article we explore the techniques we have employed to investigate the Wray community and the potential for public, digital photo displays in supporting community activities and discuss our findings and observations of the display's usage based on over two years of continuous monitoring and development cycles. By doing this, we hope to illustrate not just how the community has interacted with situated digital photo displays but also the role that photos themselves play in the community.

2. Background

Our work draws from a wide range of fields, including ubiquitous computing, computer supported cooperative work (CSCW) and studies of community technologies and photo-related systems. This section introduces current relevant research in these fields and the challenges that we believe indicate the potential for public situated displays to play an increased role in communities and community photo use.

2.1. Photo Studies

The rapid shift towards digital photography over the past decade has led to increased interest in the study of interaction and activities surrounding photos, or 'photowork' (Kirk et al., 2006). In part, this appears to be because photo practices have not evolved alongside photo technology itself: while Frohlich et al. (2002) identified co-located sharing as the most common and enjoyable social practice related to photos, both for storytelling to those who were not present when the photo was taken and reminiscing with those who were, this seems to be a task for which interactions around PC-based collections are particularly unsuitable, lacking the flexibility that paper photos afford so easily by being passed around, shared or casually reorganised. Although digital photos can be printed, the cost and

inconvenience involved makes this an imperfect solution.

In our own experience, it seems that these issues are equally pertinent to collections of photos owned by a community, such as displays of photos on a public notice board or a publicly accessible photo album. While online galleries and photo sharing websites such as Flickr allow community collections to be generated with relative ease, these online galleries lack support for the social interactions that may occur around photos displayed on a public notice board, particularly the collocated storytelling and reminiscing activities.

Additionally, they may introduce accessibility issues, excluding those without Internet connections or with limited computer skills. Nevertheless, there are other potential advantages offered by digital photo collections in communities: support for a greater number of images, a more democratic collection of photos, the ability to download copies and the ability to leave comments to enter into a dialogue with other community members.

2.2. Community Systems and Displays

Past research has speculated on the potential use of community 'networks' or 'portals' to support communities and documented significant successful deployments that have helped communities to improve involvement and communication (Carroll and Rosson, 1996; Colstad and Lipkin, 1975; Hampton and Wellman, 2003; Rogers et al., 1994; Schuler, 1994). Typically, these community systems are web-based and we see many of the same issues, particularly inclusivity, which affect web-based collections of community photos. Our proposed solution to the problems with both community photo collections and web-based community systems focuses on the use of situated displays—digital displays of information in public places that provide "opportunities for novel forms of communications, coordination and collaboration, and raise question about the emergence of social behaviours" (O'Hara et al., 2003).

The use of public displays in the context of communities has various benefits, including peripheral awareness of community activity, the inclusion of those who may not have web access or be entirely comfortable with web technologies and the ability to tailor a user interface for the functionality required, creating a simpler, more appliance-like experience (Bergman, 2000). While much of

the founding work with situated displays concentrated almost exclusively on awareness and group work in workplace communities of practice (Grasso et al., 2003; Churchill et al., 2004), more recent work has begun to extend outside of this domain into local geographic communities (Churchill et al., 2006; Foth et al., 2006), including developing nations where web access is less pervasive (Jones et al., 2007; Maunder et al., 2007).

Central to the 'situatedness' of displays is the notion of 'place', which Harrison and Dourish (1996) define as "a space which is invested with understandings of behavioural appropriateness, cultural expectations, and so forth". Thus 'place' encompasses not only the physical aspects of the environment and the constraints these impose on behaviour (such as community activity) but also what actions and patterns of behaviour are *expected* there and the particular routines that have developed there over time, making it all the more important to take care in understanding the community setting.

2.3. Studying and Designing with Communities

Designing for communities is a challenging task and can be subject to complex sociotechnical issues that may be unique to individual communities. As such, 'insider' knowledge and an understanding of the community are critical when designing, yet this can be difficult to achieve where designers are considered to be 'outsiders'. Without proper consideration, this can lead to the development of systems that are unsuitable for the community's needs and ultimately go unused. For these reasons, we support the use of user-centred and participatory design techniques that prioritise the needs of users and involve them in the design process. This approach has been taken throughout our work with Wray when developing the display, to gather feedback from residents directly and ensure that the systems we develop are of use to the community. This iterative approach is also inspired by participatory action research (Whyte, 1989), which involves a community in a series of iterative improvements through planning, action and results.

Our ability to learn about the community has benefited greatly from the use of probes—tools extended into the community environment to collect data. The use of probes in HCI has become popular as a method of reaching domains that may be outside the scope of traditional techniques (Boehner et al., 2007), particularly where

long-term and intensive observations of the environment are not feasible. The cultural probe (Gaver et al., 1999) was designed as a flexible technique involving a collection of open-ended materials designed to elicit 'inspirational' responses from participants; this may include scrapbooks and diaries, postcards to complete, or disposable cameras to capture thoughts. The technology probe approach (Hutchinson et al., 2003) built upon this concept by introducing technology-based interventions into the environment. This typically involves the deployment of a functional but simple and adaptable 'seed' technology, with the goals of exploring the environment and users' needs, field testing the technology and generating new ideas from researchers and users.

3. The Photo Display Study

Located 15km from the city of Lancaster in North West England, Wray has a population of approximately five hundred people and contains a number of public social spaces, including a village hall, post-office and local pubs. It has a friendly and vibrant community with a reputation for encouraging participation, which runs various annual events including a Scarecrow Festival, village fair and produce show. Although the village has a large elderly population, it has embraced technology wholeheartedly—the community has freely accessible computers, formerly hosted in a local pub and now in the village hall, which holds a weekly Computer Club. A wireless mesh network was installed across the village as part of another university project, providing fast Internet access where previously only dial-up connections were available. For these reasons, Wray presented an excellent test site for situated display deployments in terms of infrastructure, contacts and goodwill.

3.1. Investigating the Community

Our approach throughout the project has been entirely user-centric and participatory, opening lines of communication between residents and researchers to allow discussion, feedback and demonstration of ideas. We see involvement of this kind as being vital to the success of community systems where complex sociotechnical issues must be taken into account. To achieve this, we have used an iterative approach of observing the environment, discussing our observations with residents, designing
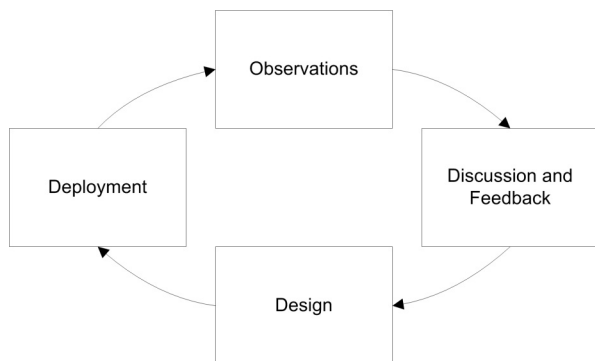
Figure 2: The development cycle.

Figure 3: Historical photos displayed in Wray.

and deploying a prototype, observing and so on (Figure 2). This involvement with the community has been enabled by our main contact in the village, a local technology enthusiast and community volunteer, who has acted as an access point (Marsden et al., 2008) with knowledge of both technology and local needs.

The first stage of observations was vital to gain some understanding of the study environment prior to attempting to design any technological intervention. In March 2006, contact was established with the village community and researchers embarked on a brief investigation of Wray in an attempt to understand how public displays might benefit the community. We began by conducting a small number of site visits to the village in order to familiarise ourselves with the deployment domain, involving taking pictures of locations that seemed to have relevance to notions of community and publicly displayed information and attendance at the annual village fair. A cultural probe pack (Gaver et al., 1999) was developed and handed out to members of the village Computer Club, aimed at identifying the ways information was currently displayed in the village and the social spaces critical to the community.

Inspired by the various photos displayed in community spaces such as the pub and village hall (Figure 3), especially historical photos that seemed to support the community's sense of history, we suggested a simple photo display deployment within the village, which would act as a technology probe to further our understanding of the community and the role a situated display might play. The Wray Photo Display technology was deployed in the village hall in August 2006, and later the village post office, consisting of a touch screen display attached

to a small PC that displayed thumbnails of photographs uploaded using a web application. The display itself directly collects data from the community through analysis of both usage logs and the photos themselves, the ways they are categorised and the comments posted on them.

In addition to data collected directly from the Photo Display, we have also received large amounts of feedback from users. A paper notebook has been left beside the display for the entirety of the project as a 'comments book', in which residents and visitors could leave their thoughts and feedback regarding the system (Figure 4) and we have held meetings with groups of residents in May 2007 and February 2008, each attended by half a dozen residents, where we discussed issues with the display and possible future additions.

Finally, we have a duplicate display that can be deployed at community events. This has the advantage of making the display visible to a greater number of residents and visitors, as well as allowing researchers to observe interaction with the display, discuss display issues with residents and take part in community events. To date, the duplicate display has been installed at annual produce shows in August 2006 and 2007 and the annual Wray Fair in May 2007 and 2008. We have found these events to be an excellent way of meeting regular display contributors, many of whom are active at community events but may not attend arranged meetings to discuss the project. Often, the display acts as a talking point to drive discussion between researchers and community members by providing a concrete example of situated display technologies.
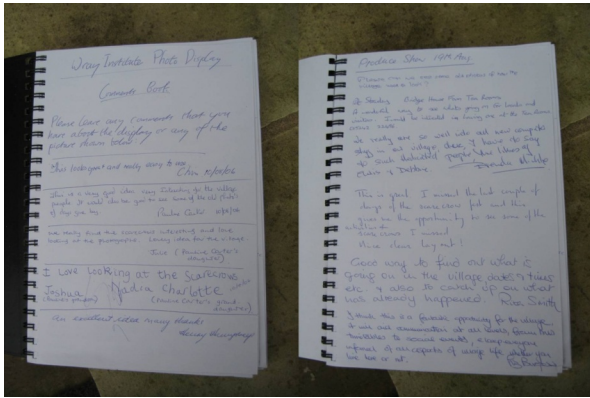
Figure 4: Comment book entries.

3.2. Prototype Description

The use of a functioning prototype to probe the community has been central to our work in Wray. When initially deployed in August 2006, this was simply a repurposed prototype that had previously shown potential for community interactions in a workplace environment (Cheverst et al., 2005). This offered limited functionality: a touch screen display connected to a concealed computer, displaying ten thumbnails at a time, with controls to progress backwards and forwards through the image collection. A basic web interface was provided for a designated administrator to upload photos, but it was generally intended that users would upload and download photos using Bluetooth mobile phones. This was deployed in the village hall, which we identified with participants as a central social space in the village that already housed notice boards and photographs, as well as the Computer Club.

During the first month of deployment, functionality was rapidly upgraded based on initial feedback from community members. For example, the ability to select a single image and view it at a larger size was added in response to an elderly resident who could not see the thumbnails clearly enough to identify herself and the web interface was made publicly available after the Bluetooth functionality went unused. As the quantity and variety of content increased, we also provided categories that could be created by individual users, allowing the community to organise the photos. Due to plans to renovate part of the building, our contact decided to move the display to the village post office, where it gained considerably more exposure due to the very public and accessible nature of the location.

Figure 5: Screenshots showing the gallery interface and a single image view.

After a year of deployment we began considering further upgrades based on the feedback and log data gathered. Foremost amongst these was the ability to comment on photographs using both the display and website and to browse photos using the web interface. This was coupled with a complete redesign of the display interface (Figure 5) and website to increase usability and the addition of subcategories to suit the further increasing number of photos. Most recently, the ability to send photos from the display as 'digital postcards' (Taylor and Cheverst, 2008) has been deployed based on a suggestion from a resident.

4. Overview of Feedback and Usage

Results from the probe have largely been qualitative observations and feedback received from residents through the comments book, at community events attended by researchers and at organised meetings, although data has also been collected in the form of log data showing display interaction and the contents of the display itself, including images, categories and comments. We have resisted the temptation to install a webcam with the display for continuous observation, recalling residents' past privacy concerns and fearing that this might discourage interaction, although CCTV cameras are already installed in the post office. Likewise, we have refrained from observing users in the post office itself, where our presence would be conspicuous and potentially deter interaction altogether.

4.1. Feedback

Feedback in general has been extremely positive and residents have particularly praised the potential of the display to help their community and the ability to view historical photographs. As of August 2008, approximately 70 comments have been

written in the comments book, with additional feedback being received by email via our contact in the village and through interaction with residents at community events. While around half of these were general positive comments, residents quickly began to suggest possible content and features for the display. Early comments requested that historical photos of the village be uploaded ("it would also be good to see some of the older photos of days gone by", "please could we see some old photos of how the village used to look?", "would be great to see some of the historical pictures of the village"), leading to the addition of an old photos category; this has been by far the most well-received addition to the display, with one resident writing that the display was "a great way of recording a living history of Wray".

Several community members have commented that the display allowed them to see photos of an event that they missed, allowing some feeling of participation ("I missed the last couple of days of the Scarecrow Festival and this gives me the opportunity to see some of the activities and scarecrows I missed"). This support for those absent from the village extends to former residents and those with historical ties to the village have discovered the display either through the web or while visiting Wray. In one reported case, a pair of adult visitors who used to holiday in the village as children found photos of their mother as a child while she herself was visiting and website users from as far away as Canada have regained contact with the community.

Many residents have expressed the belief that the display might be also helpful for visitors and new residents moving into the village, giving an impression of the village's history and important community events. One email summed up the community's response particularly well: "The digital noticeboard has many advantages for the village. There are quite a few new people in the village and this gives them an insight as to what Wray used to look like [. . .] The flood photos are one way the old and newer village can be seen. Also the photos of the previous villagers [. . .] are invaluable in the history of Wray. It also gives information of important events in the village". In this we see many of the key elements of communities described by Mynatt et al. (1998): the notion of change or evolution in a community is evoked by the popularity of historical photos, while the popular sentiment that the display might help to integrate new members into the community suggests the existence of boundaries
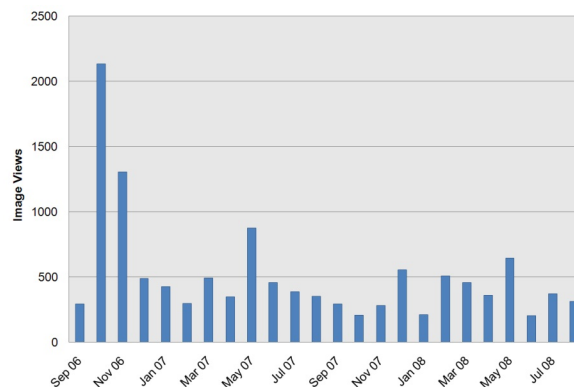

Figure 6: Images views per month.

and relationships defining membership of the community after losing touch.

4.2. Log Data and Display Contents

Our primary metric for usage of the display has been image views, defined as a user touching an image thumbnail to display a large sized image. Logs captured across a period of exactly two years from August 31st 2006 onwards show 12,391 images views have occurred, a rate of around 17 per day (sd. 16.88). However, as image thumbnails are reasonably clear, some users may browse the display without viewing an image full size. Logs show some 39,238 browse events where the user has touched a scroll button, averaging around 54 a day (sd. 52.19). Considerable viewing and browsing is taking place, but as evidenced by the standard deviations, actual usage varies greatly from day to day. This is corroborated by log data showing that image views and browse events often occur in sporadic bursts, where an individual or group uses the display for a prolonged period. Furthermore, usage has been impacted by both location and local events: Figure 6 shows image views broken down by month and activity can been seen to peak in November 2006 when the display was relocated to the more visible location in the post office, with smaller spikes occurring in May when the village receives a large number of visitors for the Scarecrow Festival and Wray Fair.

At the time of writing, 1,009 images have been uploaded by the community, equivalent to around 1.4 per day (sd. 2.48). Like other forms of activity, most of the images were uploaded in large batches and Figure 7 again shows clear spikes surrounding major community events such as the Produce Show
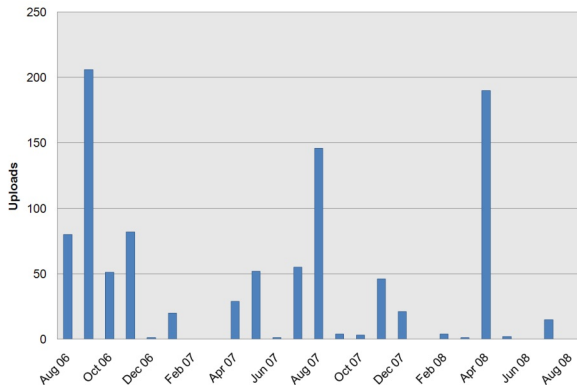
Figure 7: Images uploads per month.

Category Name	Total Images	Subcategories
Scarecrows	359	3
Village Events	281	6
Old Photos	190	0
Current Photos	91	3
Funny Videos and Photos	37	0
Wray Flood	35	0
Sticky Fingers Craft Workshop	11	0

Table 1: Categories created for the display.

(August) and Scarecrow Festival (April/May). Images have been uploaded by a relatively small number of users who take particular interest in the display. Early versions of the system did not attribute photos to the users who uploaded them, but the remaining 432 images were uploaded by just eight users, the vast majority of these by our main contact in the village, who contributed 356 images, while contributions from other users varied between one and 19 photos. Although a larger number of contributors had perhaps been anticipated, this seems to conform to the 90-9-1 principle (Nielsen, 2006), which stipulates that only 1% of online community users will contribute regularly, 9% will contribute intermittently and the remainder will 'lurk', consuming content without contributing. With 79 registered web users (and additional anonymous display users), our results map comfortably onto this ratio.

In addition to actual photographs uploaded, data associated with the photos—specifically the way photos are categorised by the community and comments posted by users—are also a valuable source of data about the community and reveal insights into the use of photos in the village. As the screen layout limits the number of displayable 'top level' categories to nine, the choice of these categories and their relative popularity can, in part, be used to infer that elements of community life are important to the users. Table 1 shows how village events and historical photographs account for the majority of photos uploaded to the display and that the 'Scarecrows' category, containing images of the annual Scarecrow Festival, accounts for over a third of the images—this in particular speaks volumes about the importance of this event to the commu-

nity and the visual nature of the event.

Of 169 comments, 140 were posted from the Photo Display itself using the onscreen keyboard, reflecting the type of lightweight, casual interaction that this feature was intended to encourage. In the interest of simplifying use of the display, posting a comment did not require user attribution, so it is unfortunately not possible to tell how many individuals posted these comments. An additional seven users contributed the remaining 29 comments through the website, again typically in batches of several comments in a short period. Most of these comments are used to describe the content of the photos, particularly historical photos, often providing a list of names of those appearing in the image. Often this is left by the image's owner to act as a caption, but this is not always the case—some of these identifying comments are posted by a second user, where the original poster either does not have the information themselves or has not posted it.

5. Interaction around Community Photos

Through our investigation of the community and exploratory prototypes, we have elicited several insights into the ways the community uses photos. These include the role photos play in recording community history, sharing recent events and news, and integrating new members into the community. The observation of behaviour around the display has also been enlightening, both in helping us design more effective and usable displays, and in demonstrating how pairs or groups of individuals browse and discuss content together. This section will summarise our observations regarding usage of the display, its functionality and the role that photos serve in community interactions.

5.1. Interaction with the Display

While observing the display in use at community events, we often saw individual users spending long

periods of time browsing through the display and looking at many individual photos. Frequently, two or more participants would become heavily engaged in using the display, particularly when discussing historical photos. One observed interaction saw a new resident and a local history enthusiast discussing the history of the newcomer's house, while another saw three generations of the same family gathered around the display finding photos of relatives. These strongly correspond to the primary ways in which photos are used in the home, for storytelling and reminiscing with others (Frohlich et al., 2002). Despite the generally positive attitude towards the display, visitors at the Wray Fair deployments often appeared reticent over approaching the display and needed encouraging to interact, possibly indicating an element of social embarrassment (Brignull and Rogers, 2003). Unfortunately given the significance of physical placement on situated displays, it is difficult to infer to what extent this behaviour might be replicated around the usual deployment location.

Churchill et al. (2003b) identified common placements for notice boards, typically including places where people will wait, where they go to obtain information, or where they pass regularly, and while the post office may be visited regularly, some residents have described their transactions as "in and out", with little time to notice the display and any waiting occurring in queues away from the display. Although the original village hall location did occasionally see use as a waiting room for a visiting doctor, this did not expose a large number of residents to the display. Other locations suggested in the comments book have included one of the village pubs, or a small caf in the village, which might be considered to be more social spaces, but that may not be frequented by such a large proportion of the village's population.

5.2. Collocated vs. Remote Interaction

Due to the situated nature of the Photo Display, we consider most community interaction around the display to be 'collocated' spatially, if not always temporally—two users may interact with photos together at the public display at the same time or they might interact across time by leaving comments. Remote interaction is also supported through the display's website. Figure 8 shows various forms of interaction with the system on a time-space matrix, categorised as either collocated or remote, and synchronous or asynchronous (Rodden, 1991).

	Synchronous	Asynchronous
Co-located	Standing and talking	Viewing on the display Leaving comments
Remote	--	Viewing online Leaving comments Uploading photos Sending digital postcards

Figure 8: Time-Space matrix of Photo Display interactions.

There is a considerable difference in perception between collocated and remote access to photos by those outside the community. Although residents frequently requested that the web application be extended to allow browsing, some residents were concerned about 'outsiders' being able to see the content, particularly photos of children, due to the potential for misuse of such images. The solution has been to allow content authors to tag photos as 'private', meaning they appear only on the public display and cannot be downloaded—29 images of children have been tagged this way since the feature was introduced in August 2007.

Remote and asynchronous interaction also introduces the necessity of moderation, due to concerns from residents regarding inappropriate content and our own concerns about the damage this might cause to the project and relations with the community. However, the choice of pre-moderation (content must be approved before becoming visible) or post-moderation (content is posted immediately and removed if reported as offensive) always presents a trade-off between the time taken for content to appear and the likelihood of inappropriate content being seen. Due to the highly visible nature of photos on the display, pre-moderation was selected. When commenting functionality was added, comments were initially unmoderated until several unsuitable messages led to post-moderation being implemented. To date, only one complaint has been received, regarding a scarecrow at the annual village fair that was deemed unsuitable and removed by a resident, but that had already been photographed and later appeared on the Photo Display. The of-

fended resident complained verbally to our contact, who promptly removed the photo. While it is interesting that the display formed a seamless part of a minor drama of village life, it also highlights the problems that differences in opinion can present to content moderation.

5.3. Photos in Communities

Photos play an important part in recording the history of communities and yet, while large collections of historical images and newspaper clippings appear to exist in private collections in Wray, only a small number of these that are displayed in the village hall and local pub are publicly available. Likewise, individuals may amass a large number of photos of contemporary community events that are never shared outside a small number of friends and family members. The addition of the Photo Display to the community provided a prompt for residents possessing these collections to make them public, which they appear to have done enthusiastically. Although existing online photo album services could certainly have provided a solution to these issues, these are not without their own problems (see section 2.1) and no such usage appeared to exist prior to the Photo Display's deployment. Perhaps it is the very public nature of the display and its salience, visible to residents during the day-to-day lives, which invites use, where online albums may be hidden from view.

We see photos of recent community events to be linked with notions of awareness, or "understanding of the activities of others, which provides a context for your own activity" (Dourish and Bellotti, 1992). Originating in CSCW disciplines, this is often referred to in task-oriented terms related to workplaces and group work, but it seems to us that knowledge of current local events is an important part of community 'membership', and several comments received from residents regarding the ability to see events they missed have reflected this. By providing more distributed forms of photo interaction, the Photo Display expands this awareness, allowing community members to 'participate' in community events and share the sense of community spirit, despite being physically or temporally separated from the event itself.

6. Challenges and Issues

As we stated as the start of this article, it is clear that communities present their own unique challenges that need to be considered when developing technology for use in a particular community environment. Although we believe our approach to this issue has been successful on the whole, some issues remain, such as difficulties in assessing the impact of a deployment on a complex environment, problems encouraging participation and concerns that our system is not yet as inclusive as we would hope.

6.1. Difficulties in Evaluation

Determining the effects of a technological intervention upon a community is a particular challenge, given the complexity of communities and the many variables that affect them (Cheverst et al., 2008). Although the success of the system can be measured to a certain extent by the amount of usage and analysis of the content generated, this does not represent the entire effect of a community system and ignores the wider impact that the system is intended to have. There may be appropriate metrics that could be considered in the future; for example, Chavis et al. (1986) provide the Sense of Community Index, while Hampton and Wellman (2003) used a variety of interesting metrics to measure the effect of technology on community involvement, such as the number of residents recognised and their average distance from each other.

The sporadic nature of our observations has also posed a challenge while evaluating. Although our logs show all button presses on the display, this leaves much to be desired when attempting to examine social interactions; we would wish to identify distinct users, identify users who looked at the display but did not interact, know how many people are stood at the display etc.

6.2. Working with Communities

Although the close participation of the Wray community during the design process is one of the main strengths of our methodology, it has also been the source of frustrations. We have often felt that participants are reluctant to share their ideas; in an email, one a resident suggested an excellent idea regarding digital postcards but worried, only half-jokingly, about "hoots of laughter" that her idea might receive. Our contact in the community expressed a similar sentiment: "the hardest bit is getting them to open their mouths at the right time and share their thoughts [. . .] they always think that nobody cares or is interested in them [. . .] as they are not clever or so they think". This has led

us to wonder whether this is a rural attitude, or one caused by the perceived difference between the participants and "clever" researchers that might affect participatory design in general.

The use of prototypes with the community has proved both beneficial and problematic. On the one hand, it has been important to manage expectations and make sure the users understood that our approach required a simple but reliable system and so could not include all the functionality they might desire. We knew that the display must be reliable to maintain the trust relationship that we were starting to build with the community. Conversely, the use of prototypes has provided concrete examples of community displays that enabled participants to better imagine the possibilities of such technologies, as well as exposing them to various issues and challenges they might present.

6.3. Inclusion Challenges

While a stated advantage of a digital display is its ability to bring digital content to those without computers or Internet connections, the technology may still pose a barrier to use for these residents, given that their computer skills are likely to be limited. Although the public display itself requires little skill to operate, the use of web applications to control the display's content may cause a problem for such residents—in the past we have found that some participants are not comfortable with typical web application features. It is important that these users can take full advantage of the system's features and we are currently considering alternative approaches to accommodate users who may struggle in this respect. In addition to those who may be unable to use the technology, there may be residents who may simply be unaware of, disinterested in or even hostile towards the appearance of technology in the community. How to engage these members of the community continues to be a challenge.

The system must also not favour those who are already closely tied to the village. To date, work in Wray has been most focused upon members of the Computer Club who were willing participants and easily reached through our links in the community, although attendance at community events greatly widened the number of variety of participants. However, consideration must be given to how representative of the wider community this sample is and consider what other groups exist, how they interact with the rest of community and how they can become more involved in the project.

7. Future Work and Conclusions

In this article, we have described our work with public digital photo display deployment in a small rural community. From this study, we have gained insights into the role photographs play in the community, the potential for situated displays to support these interactions, the challenges faced by such deployments and the methods we can use in gaining access to the community and designing for their needs. Although we acknowledge that our observations have taken place within a single community, limiting the extent to which they can be generalised, our study contributes an initial investigation into the community setting, including techniques that might be used in future investigations to validate observations.

As evidenced by the large number of photographs displayed on existing village noticeboards, they play an important role in the community. While we have seen that the use of photos in the community often overlaps with home usage, particularly in terms of reminiscing and storytelling, they also act as a source of awareness of recent events and important community history, especially for those who have left the community. To a certain extent, this may be considered equivalent to sharing photos with remote friends and family, another popular photo activity identified by Frohlich et al. (2002). A final and perhaps unique usage of photos in communities arises from the integration of new members, through the use of photos to 'learn the ropes' and identify important aspects of life in the village. Current forms of community photo collection, such as an online gallery, are perhaps unsuitable for these tasks; in addition to excluding segments of the community who might not have access to the Internet or a home PC, knowledge of their existence may be poor even amongst those with access. By comparison, the Wray Photo Display offers the advantages of both existing public displays of paper photographs and web-based collections. Although the collection can be viewed on the Internet and digital photos easily contributed this way, community members can also interact with a simple user interface in a public place that is frequently visited by many residents.

It is important to note that the design of the display was only successful due to the continual input from members of the community. We have found our approach of a prototype deployment coupled with iterative, participatory design to be highly suc-

cessful in generating feedback from users, allowing gradual evolution of the system for the benefit of the community. From a relatively simplistic initial prototype, residents' feedback and observations of use have led to the development of a successful and fully featured prototype system. This approach has been especially useful in providing a concrete example of a situated display system and allowing users to experience real usage, enabling us to enter into more meaningful and detailed dialogue with participants.

Our main remaining goal with the Photo Display is to address inclusivity, particularly the challenge of transferring content onto the display. The need for digital copies of photos and the web-based upload method both present boundaries for non-technical users, running contrary to the stated aim of improving access to community materials. Unfortunately alternatives seem limited, and it may be necessary to consider an entirely non-technical solution to overcome this problem. In the past, for example, our contact in the village has scanned and uploaded photos for those who were unable to do so themselves. We intend to continue working with the community in Wray towards our goal of understanding the role that public situated displays can play within the community and assessing the suitability of our techniques. Based on our first prototype deployments, we believe considerable potential exists in both these respects.

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