Displaying Locality: Connecting with Customers and Visitors In-Situ via their Mobile Devices

Chris Greenhalgh, Alan Chamberlain, Mark Davies, Kevin Glover, Stela Valchovska, Andy Crabtree
The University of Nottingham
School of Computer Science
Wollaton Rd, Nottingham, UK
+44 115 9514251
{firstname.lastname}@nottingham.ac.uk

ABSTRACT
A large and growing proportion of the general population in the UK and similar nations routinely carry smart phones and access the Internet while on the go. However, especially in rural areas, mobile Internet access can be intermittent and slow, and the particularities of the immediate locality can get lost in the non-geographical vastness of the Internet. In order to understand more about the opportunities and challenges of connecting with customers and visitors *in-situ* on their mobile phones we extended a media authoring and distribution research system to support both Internet-based and off-Internet situated displays for discovering and downloading local multimedia content. Within a broader participatory process, we ran a workshop with members of the community of a small countryside town, working with participants to understand the local relevance of this kind of system. The ability to work off-Internet was considered important in some specific rural situations. The local and situated character of the system led to a proposal to establish a town-wide network and a common identity through such a system, and through this to steer visitors from entry points (e.g. significant tourist sites) to other sites and enterprises within the town.

Categories and Subject Descriptors
H.5.2 [User Interfaces] User-centered design.

General Terms
Human Factors

Keywords
Participatory design, situated displays, smart phones, mobile internet

1. INTRODUCTION
A large and growing proportion of the general population in the UK and other post-industrialised nations routinely carry smart phones, tablets and other internet-capable devices. In Great Britain a majority of the adult population now access the Internet from a mobile phone [9]. This appears to present a key route to

connecting businesses and cultural sites to customers and visitors. Mobile Internet promises access to a universe of information, applications and services at any time and from anywhere in the world. However almost half of adults using the Internet 'on the go' in Great Britain report 'frequent problems with a network signal' [10]. And the almost boundless nature of the Internet can obscure the handful of things that might be most valuable here and now. One might even wonder if it is worth *going* somewhere at all when 'it's all on the Internet'.

The work presented in this paper is concerned with the possibilities of connecting with customers and visitors through their mobile phones when *in-situ*, i.e. while in the *place*, such as a cultural site, a shop or a cluster of such places. This was inspired, at least in part, by earlier field work [3] charting some of the challenges faced by micro rural enterprise (i.e. rural enterprises with 9 or fewer employees, see section 3). This work is framed by: the desire to provide some (direct or indirect) benefit to small local enterprises; a focus on the local physical embedding of any supporting technology; a conservative (cautious) view of the availability, reliability and speed of mobile internet access; and a participatory approach to research 'in the wild' [13], working with a community of potential users and interested parties in a small town.

We designed and implemented a prototype system (presented in section 4) to act as a technology probe [7] and basis for future 'in the wild' deployments. This prototype system was based on an existing open source system, PlaceBooks, [2], which allows web-based authoring and mobile viewing of relatively simple multi-media e-books. Reflecting our interest in the local and reservations about mobile Internet access we extended this to encompass two situated displays options: one requiring Internet access and one capable of distributing selected content completely independently of the Internet.

We organised a community workshop involving a number of different potential users and local stakeholders based around this prototype system (see section 5), in order to surface and explore opportunities and challenges of using this kind of technology in the context of a small town in a largely rural area. Findings from this workshop and follow-up activities are presented in section 6.

2. RELATED WORK
The Wray Photo Display (later WrayDisplay) [15] is an interactive display deployed over several years in the small village of Wray, initially in the village hall, and later in both the village shop and café. This work is largely oriented towards the local community, initially sharing local photographs and later events and adverts. Within the café setting the display became more of a "public face" of the village. However, while the photo display

allowed photos to be uploaded from phones via Bluetooth, the locus of interest is the situated display itself, rather than facilitation of mobile phone use. Wray itself is a small village with about 500 inhabitants. We have been working in a small market town and former county centre of government of about 4000 inhabitants and some of the challenges and opportunities are quite distinct.

Snap and Grab [8] is a public media sharing system that allows someone standing at the screen to download and upload media from and to the situated display (at no cost). The system was evaluated in a township in South Africa and targeted users with a feature phone (only) who did not have other digital connectivity, to see how their patterns of digital media sharing would develop. StoryBank [4] is also a media sharing system based around a situated display and developed and evaluated in a rural African setting, and also allows (loaned) smart phones to be used for on-phone authoring of multi-media presentations. Both systems completely avoid the need for Internet connectivity, and in neither case can potential users be assumed to have their own smart phone. In the setting that we are considering, however, smart phones are common, and the mobile Internet is a significant if unreliable part of the context of use and people's expectations. For the purposes of this initial probe we have also limited the support for content contribution and feedback (e.g. comments and ratings). In part this is to avoid a perhaps premature commitment to a particular model of contribution and feedback, but it is also in the interests of parsimony and avoids or at least defers dealing with problems of (e.g.) consistency in the face of intermittent or no Internet connectivity.

QR codes and other phone-readable codes provide a relatively simple and nominally ubiquitous way for a camera-phone user to enter a URL or other short text into their phone, e.g. [5]. Marketers have been embedding such codes in many kinds of print and display media, often to provide access to product related or complementary information or special offers, or as part of customer loyalty scheme [12]. However, the use of QR codes remains dogged by long-standing issues [14] such as the lack of standard/pre-installed readers on most current smart phones. Using short-URLs avoids the need for a code reader app, but requires painstaking entry of random strings. On the other hand, the use of targeted search depends on user choice of search provider and on-going payment to the search provider (e.g. for AdWords) and may be at risk of poisoning (e.g. by competitors).

A typical PlaceBook most often resembles a mini-tour guide or local story. From landmark systems such as GUIDE [1], a plethora of digital systems and applications have aimed to complement or replace paper travel guides, offering local information, maps, recommendations for eating, accommodation, things to do and local stories. Outside of the research space, digital travel guides are now delivered either as web sites or increasingly as mobile apps for smart phones [6]. Web-based guides include the websites of established guide books such as Lonely Planet, tourist information sites, locally created sites and collaboratively created guides such as WikiTravel. Unlike most web sites, mobile apps, once they have been downloaded, can be used without an Internet connection and can also offer a tailored and more fluid user interface for mobile use. Compared to a typical tour guide a single PlaceBook is only a fragment, e.g. one location, one walk or one particular topic of interest. A PlaceBook can be found and viewed online, but it is also designed to support downloading and offline use. In some ways it sits halfway between a simple web page and an app.

3. CONTEXT AND APPROACH

Our initial field work [3] in a small market in a small Welsh town charted some of the design challenges for micro rural enterprise. Although many of the businesses encountered did not desire substantial growth, they did want sustainability, typically "a few more customers" and "more footfall" to "make it pay a bit better". Significant consumer (customer) motivations included the wish to support specifically local business and positive perceptions of quality in local products/produce linked to notions of *home-grown/home-made* and developing relationships – including friendship – with sellers.

While many of the challenges and implications discussed in [3] are applied most directly to online digital services (e.g. web presence), some relate more to in-situ customer and visitor experience. In particular the fieldwork highlights the frequent use of *physical media,* such as banners, posters, leaflets and flyers by micro-businesses to promote themselves, and suggests that these might be used as points where digital information (such as related provenance, history and culture) might be "embedded" in the local environment. It also suggests that within this context situated displays might support discovery of local brands and enterprises.

This fieldwork emphasised to us the importance of locality and the sense of the local in any possible intervention. It also suggested to us three specific opportunities to explore in terms of the potential of engaging with customers and visitors in-situ. First, whether it would be possible to increase footfall at particular sites (e.g. a shop or a market) by "steering" people there through media given to them at other nearby locations. Second, the importance of relationships and "stories" (e.g. of the history of the business) and hence the need to support a narrative voice, not just "objective" information. And third, the potential importance of physical embedding and in-situ discovery of digital resources.

After reviewing a range of possible technologies we selected PlaceBooks as the basis for a technology probe. PlaceBooks is an open source research system [2] which has a simple authoring interface that can be used to assemble a textual narrative around images, video, audio and, perhaps most importantly for our purpose, maps and trails. However PlaceBooks in its existing form did not support physical embedding, e.g. through QR-Codes or situated displays. Consequently we had to extend PlaceBooks, as described in section 4, to allow us to also explore this. Our goal in this process was to develop a prototype that was sufficient to provoke and ground a response from the community that we were working with, and to support follow-on use "in the wild".

4. PROTOTYPE SYSTEM

The prototype system that we have developed is based on PlaceBooks, an open source[1] research system developed to "promote engagement with rural places… a solution that enables users to combine a rich array of digital media including maps, routes, audio-visual media and text." [2] The original version of PlaceBooks comprised a web interface, including an online editor, and an Android smart-phone app. We have modified and extended PlaceBooks to create an interface that is suitable for use on a kiosk device or situated display, and created a second independent kiosk system that can be used without an Internet connection. We briefly describe each part of the prototype system below. Figure 1

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[1] https://github.com/horizon-institute/Bridging-the-Rural-Divide--Placebooks (license Affero GPL v.3)

gives an overview of the architecture of the new system and figures 2 and 3 show representative screenshots.
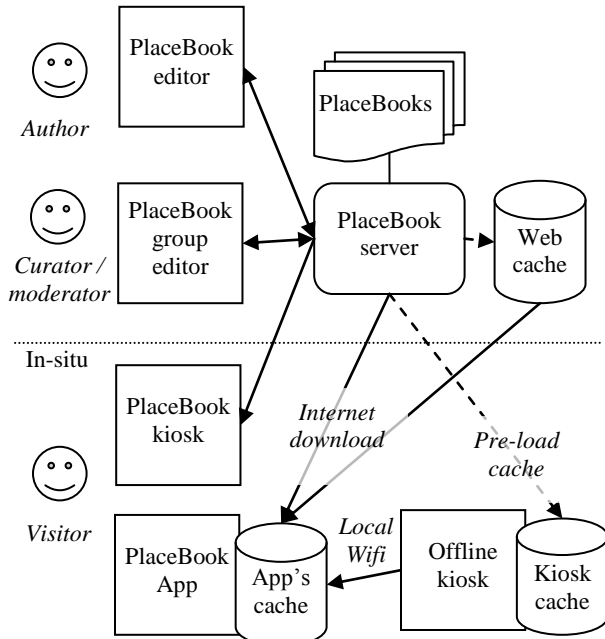

Figure 1. Prototype system architecture

4.1 Web Author

We rely on the PlaceBooks server primarily as an authoring environment. We have not changed the PlaceBook content model: each PlaceBook comprises a number of two-column pages, where each column can contain title(s), blocks of text, a map, images, video and audio. The editor shows a page of the PlaceBook and a palette of content types that can be dragged onto the page (see figure 2(a)). The editor also allows content items to be located on a map, appearing as a map-pin. A PlaceBook thus occupies a mid-point between a simple web page and a more complex interactive app, both in terms of "reader" experience and also in terms of the complexity of authoring.

4.2 Web Kiosk

We have extended the PlaceBook server to support a kiosk-style interface for use on a dedicated touch-screen device (e.g. in a tourist information centre). There are several related elements to this support. First, the authoring interface allows PlaceBook "Groups" to be created; a group is a user-defined set of published PlaceBooks which are to be displayed together on the kiosk view. This provides a basic mechanism for moderation: while anyone can register with the PlaceBooks server and publish their own PlaceBooks, the owner of a group has complete control over what PlaceBooks appear in that group. Second, we have added a public group interface which allows only the PlaceBooks within that group to be browsed. Third, we have added a display option tailored for a kiosk view which includes only kiosk-relevant interface elements (e.g. it hides the Login link and prevents users navigating away from the kiosk view). Fourth, we have added QR codes to the group and PlaceBook views, which allow someone using the kiosk to view a group or PlaceBook on their own device. Finally, we have added a "Get it on Google Play" link in these views, so that someone using the kiosk can then download the PlaceBook app for offline use, or download the PlaceBook directly if they already have the app installed (see figure 3(a)).
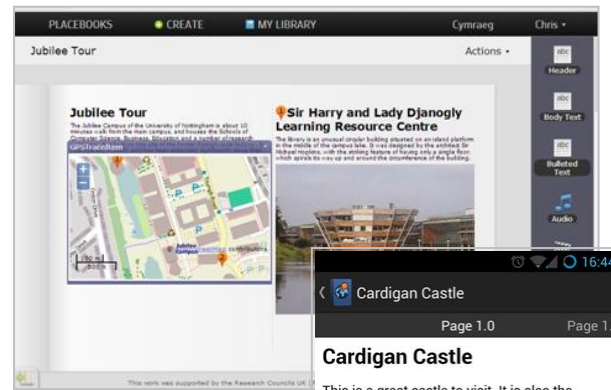
(a) PlaceBooks editor

(b) PlaceBooks mobile app

Figure 2. PlaceBooks screen-shots

4.3 Offline Kiosk

The PlaceBooks server is generally hosted on the Internet, and also requires access to online map services (unlike the PlaceBooks that are downloaded to the mobile app). We have therefore developed a second kiosk component which can operate with no Internet connection. This offline kiosk provides access to a pre-selected set of downloadable content which can include PlaceBooks, but can also include PDF documents, HTML5 (app cache) web apps and other files. The offline kiosk runs on a dedicated Android tablet, and incorporates a content cache, web server and QR-code generator in addition to the HTML/Javascript-based user interface (see figure 3(b)). The offline kiosk offers users two ways to download content: they can download it directly from the Internet if they have a connection (even though the kiosk does not), using a short-URL or QR-code that directs them to an Internet-hosted copy of the content; or they can download it from the kiosk itself, which operates as a WiFi access point (but only with access to content cached on the device). A user can also choose what to download on the kiosk itself or they can view the kiosk interface in a web browser on their own device (from the Internet or from the device itself) and select and download content directly from there. When downloading directly from the kiosk we avoid the use of content-specific short-URLs and QR-codes by using a dynamic landing page which links directly to the item(s) most recently viewed on the kiosk.

4.4 Mobile App

The existing PlaceBook app supports Android only. With an Internet connection it allows PlaceBooks to be found on the server (by text search or proximity) and downloaded to the phone for subsequent offline viewing (figure 2(b)). We have modified the mobile app so that a mobile user does not need to log in to download and view published PlaceBooks. We have also included basic support for viewing groups (from the PlaceBook kiosk group download link) and to allow the app to open and cache PlaceBooks downloaded from the offline kiosk or other web sites.

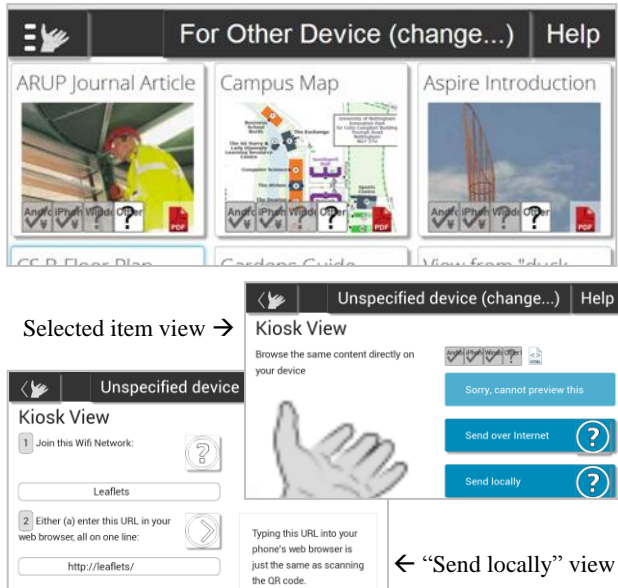(a) PlaceBooks kiosk (above)　　(b) Offline kiosk (below)

Selected item view →

← "Send locally" view

Figure 3. Prototype situated display screen-shots

5. COMMUNITY WORKSHOP

In this section we describe the community workshop that we ran in order to surface and explore opportunities and challenges of using the kind of system presented in the previous section in the context of a small town in a largely rural area. Specifically, we wanted to explore workshop participants' responses to PlaceBooks as a content form, in-situ discovery through kiosks and other means, and potential use by visitors and residents. The workshop findings are presented in section 6.

5.1 Participants

Participants were recruited via email and word of mouth, including contacts from the prior fieldwork. A local social enterprise that had facilitated a previous workshop and the workshop venue (a public venue within the town) also passed on information to people that they thought might be interested.

Fourteen people attended, with a range of links to the community including local traders (including shop-holders and professional service providers), local residents, representatives from a government-funded business support organisation, a campsite/café owner, a representative from the local castle, the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) and people from wildlife-based organisations. Most participants' vocational roles included mediating communication between an organisation and members of the public. They already used and had relatively high knowledge of ICT. Furthermore, they were interested in the opportunities to extend their practice through the proposed tool. From an informal poll, a large majority

of participants had a smart phone of some sort with them, most routinely used it to access the Internet and more than half had installed and used mobile apps. Participants ranged in age from mid-20s to 60s, with equal numbers of men and women.

5.2 Setting

The workshop was held at a well-known local venue often seen as the centre of the town and regularly used by local community groups. We chose this venue as it was locally known, easy to find and Wi-Fi was available. The workshop started at 10am and officially finished at 12.30pm (with lunch). There was an opportunity for participants to stay on for post-meeting discussions. The workshop took place on Friday 7th February 2014.

5.3 Structure and Conduct

The workshop began with brief round-table introductions from all participants. One of the researchers then presented the prototype system using prepared slides incorporating screen shots of the system. This presentation covered each of the main elements of the system in turn as described in section 4 (web authoring, mobile app, Internet kiosk, off-line kiosk). These were further illustrated through brief walkthroughs of three local scenarios of use, including photos of the town and mock-ups of specific local content. There was opportunity to interject questions during this presentation, which was then followed by a time of open discussion, chaired by another member of the research team. Following a break for refreshments (and ad-hoc conversation) a further round of more structured discussion revisited some of the areas previously touched on but unresolved. There were several further ad hoc conversations over lunch. Links to the extended PlaceBooks editor and mobile app were circulated to participants following the workshop.

5.4 Data Collection and Analysis

Audio recordings were made of the workshop plenary activities (presentations, questions, discussions). These recordings were transcribed and analysed from an ethnomethodological perspective, i.e. with an orientation to people's everyday methods and the orderliness and social accountability of activity. Personal notes were also taken by members of the research team, both during and after the workshop. A range of other local materials were also collected, including leaflets, maps and photographs.

6. FINDINGS

The concept of a PlaceBook for visitors or customers was clearly something that workshop participants could relate to, with almost every participant suggesting a potential subject or subjects, often specifically related to their personal or business interests: the local beach, historical sites, Wi-Fi hotspots, galleries, walking to/from the local campsite, shopping, the local market, flora and fauna, places to eat, historical walks and long distance walks. The participants from the business support organisation oriented initially to the commercial possibilities of the PlaceBooks system itself, and then to its potential role in marketing local businesses. The representative of the RCAHMW saw that organisation as having a potentially important role providing content and perhaps also making PlaceBooks. In the following sub-sections we draw out some of the particular ways that the workshop participants oriented to PlaceBooks within their particular context.

6.1 PlaceBooks on the Web

For some of the discussion PlaceBooks were talked about in terms of web-based content that might be found, e.g. in a Google search, "if I'm coming from on holiday, and I want to download about

[the town] and make some decisions about [the town]". Here, together with standard website content, the potential benefit of (or business case for) PlaceBooks was seen as helping someone at a distance, before visiting, to plan their visit and indeed decide whether to come at all. Within this web context, participants sought to relate PlaceBooks to established modes of web use including respected sites, search, review, linking, and social media.

Having opened up the possibility of linking directly to individual PlaceBooks and groups participants sought to confirm that they could push or promote PlaceBooks via regular web-sites: "So for me the usability of this would be on our website, having a PlaceBook for the area that I make, which I link off". Social media were also seen as potentially important channels promoting PlaceBooks: "So once I've made a book…and I want to let everyone know about my book, can I just Tweet out a link to that book? Or, can I Facebook out a link?" (You can.)

6.2 Content and Control

The PlaceBooks prototype presented currently uses a single central server and registration is open so that anyone can create and publish PlaceBooks. This caused concerns that "there could be a complete lot of nonsense on there" and that "some other little pain in the neck comes up and makes a spoof one" (i.e. a spoof PlaceBook about my business). This was contrasted with the WikiTravel model: "you go in…they accept you as an administrator…there is only one [specific location] page…that has an advantage".

Within the open publishing model workshop participants were particularly concerned about how users would select between PlaceBooks about the same site or topic. To address this, participants assumed or anticipated the ability to "favourite" or "review" a PlaceBook, or some less specific ranking facility. These facilities are not in the current PlaceBooks system, although the ability to define "groups" allows manual moderation and/or recommendation.

Overlapping with these concerns about control and moderation were concerns with the visible authorship of a PlaceBook. Participants wanted authorship to be visible, and wanted to be able to identify if the author lived locally, or was the owner of a site/venue being described, and whether the PlaceBook was "official", for example produced by a recognisable organisation or brand. It was recognised that this might require an additional level of management: "it's similar to Twitter; you have to have verified accounts."

A strong theme that emerged in the workshop was "to see [the town] marketed as a, sort of, a unit, so that we've got united marketing of [the town], and that's going to benefit individual businesses, etc." This proposal received indications of support from many of the workshop participants. It was argued that forging this common town identity within PlaceBooks would need more explicit control: "So the [town] PlaceBook could be something which a town group, unified group could then monitor". As such, PlaceBook groups did not seem to offer a sufficient level of control, whereas a separate PlaceBook server for the town with accounts given only to trusted people did seem to be an acceptable basis for future use.

6.3 Using PlaceBooks in the Town

When discussing a customer or visitor already physically in the town the potential benefit of PlaceBooks was seen as guiding people to sites and services within and around the town. The

proprietor of a guesthouse suggested they might "with guests and stuff say, look, there is this you can download". A local shop-owner observed, "We feed everybody who comes into the shop this information verbally", but adds of the situated display, "I could see one of those on the desk... You know, we could say, you want to go to the beaches? Here's a little map of the local beaches, and maybe then you'd look at more detail." This kind of "sign-posting" is already an element of their everyday interaction with visitors, but they suggest ways that this might be translated to exploit PlaceBooks.

There were also more town-wide and systematic aspects to this that emerged. The local castle is currently being renovated and due to open to the public later in the year, and one workshop participant (the shop owner) suggested: "the Castle specifically…you are going to be a magnet for a great number of people coming into [the town], and my rather selfish point of view was, I would like to get some of those people who are interested in the history of the Castle and the surrounding town, who then maybe do a little tour of [the town]. And if I could feed them little spots along the way, or if we all could feed little spots along the way, then there's more chance of getting people not doing a one-stop-shop, visiting [the town] Castle".

6.4 Finding PlaceBooks in-Situ

In terms of finding PlaceBooks the focus shifted away from web-inspired models: "once they're here, through codes or whatever you've got, the standalones [i.e. situated displays], that's where I think it'd be really good, in town."

Considering QR codes in particular, one participant recounted her experience in a neighbouring town of setting out QR codes to support a walking tour. This had been successful in that at least some people had used the codes (or provided URLs). However "people went round and ripped all the QR codes off, because they decided they were messy". She concluded by expressing an ambivalence to QR codes which went unchallenged: "QR codes were a funny one, because you don't know how long they're going to be in fashion for."

Participants were more positive about the situated displays, with the shop-owner immediately volunteering to host one (see above), and others responding positively to the proposed town-wide aspect. The representative from the castle was interested in principle, but noted that the board of trustees as a whole would have to agree to host a PlaceBooks kiosk alongside the other planned on-site displays and would have to approve any content that it might host.

6.5 Off-Internet Opportunities

Within the town itself, the consensus was that mobile internet was "not great", but with "enough hotspots that you can get the internet". As such, participants saw merit in being able to download PlaceBooks, but more so "if you're going out walking round the coastline". The offline kiosk provoked interest from participants with a stake in more remote sites, for example a nature reserve or ancient monuments outside the town itself: "I like the idea of the, what are they called, kiosk things; I can understand that you've then got, you know ... a place with no access to the internet, and so ... you get people in a captive little bubble."

6.6 Preparing for Fields Trials

Our goal is to run public field trials deployments in and around the town in June-August 2014. The workshop highlighted some priorities for short-term development in preparation for this. At present the PlaceBooks mobile app only supports Android

devices; to resolve this we are developing a tool to convert each PlaceBook to an HTML mini-site using HTML5's offline (app cache) support, which should then be compatible with most smart phones and tablets. There are a number of improvements we would also like to make to the PlaceBook reading experience such as navigation within a PlaceBook. End-user tools for configuring and updating the offline kiosk are needed to support a town-wide network of situated displays.

Following the workshop we have been working with some of the participants to support their initial authoring of PlaceBooks and have set up a web site and forum to allow participants (and other interested parties) to continue the discussion and as a channel for technical support, bug reports, etc. The participants who have been most enthusiastic and involved to date each work in more remote rural locations (a nature reserve and a former field-study centre) where the off-Internet capability may be critical. They have also requested more interactive applications, such as collecting observational data or sharing photos and stories about a visit, which may require other service(s) to be delivered alongside PlaceBooks on the offline kiosk.

The vision of the town-wide network of kiosks called for "a unified town approach, because at the moment, we have several groups, traders, commerce, you know, various groups who work in different ways." We plan to hold a further focussed workshop and provide help with content authoring to facilitate this.

7. CONCLUSIONS

The prototype system that we developed based on PlaceBooks sits within a spectrum of technical possibilities: content is richer and potentially more situated than a typical webpage, but less interactive than a mobile app. On the other hand, it is much simpler to author than a mobile app. The web server provides a route to general web access, while the two kiosks provide complementary options for in-situ discovery of PlaceBooks with and without Internet access. Finally the mobile app supports discovery, downloading and offline use of PlaceBooks.

The concept of a PlaceBook for visitors or customers was something that workshop participants responded to vocally and creatively, articulating a range of ways that they could be accommodated and appropriated within the context of this small market town. We were surprised by the strength and clarity of the proposal to create and curate a town-wide collection of PlaceBooks, both to market the town at a distance, and to support and direct visitors and customers within the town. For at least some of the workshop participants this seems to be an established concern, and the PlaceBooks system and our involvement perhaps provide a specific occasion or impetus for them to advance this agenda within the town. Support for off-Internet use is a significant concern for participants working in more remote or isolated locations, but less of a priority within the town itself.

8. ACKNOWLEDGMENTS

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