Mobile Age: Open Data Mobile Apps to Support Independent Living

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Abstract

We present design insights for developing mobile services for senior citizens which have emerged through substantive engagement with end users and other stakeholders. We describe the aims of the Mobile Age project, and the ideas and rationale for applications that have emerged through a co-creation process. A trusted data platform is proposed along with apps that bring open data and mobile technology to work for an underserved population.

Author Keywords

Co-creation; independent living.

ACM Classification Keywords

H.5.2 User Interfaces: User-centered design;

Introduction

Mobile Age[1] is an EU project with several partner organisations and trial sites around Europe. Each trial site is developing apps and services targeting older adults, principally to ensure they are beneficiaries of an increasingly digital society [3,10] but each with different focus. The project aims to mobilise mobile technologies and open data for the presently underserved older adult population. The specific focus

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[1] http://www.mobile-age.eu/

of the Lancaster research team and associated South Lakeland trial site is *independent living*: a) enabling older adults to access online government services they need to effectively perform activities of daily living, and b) providing tools to mitigate some of the risk factors typically precipitating transition to assisted living.

To inform the development of appropriate apps and services, we undertook a co-creation process involving University researchers, the non-profit group AgeUK[2]; South Lakeland District Council (SLDC)[3], and end-user 'older adults' (we have adopted AgeUK's banding for 'older adults', i.e. age 55+). It is intended to develop a research partnership between partners, so we base our activities on a framework developed across domains involving the hard-to-reach in technology innovation projects [4]. This is delivered through a traditional "plan, act, reflect" action research process [5] across an overlapping four phase co-creation process - formative, co-design, co-develop, and sustain engaging all partners in activities at each phase. We are at the stage of entering co-development, heavily informed by partners and users in cycles of iterative development.

The process has so far comprised of interviews with the partners and end users, two idea generation sessions with AgeUK and SLDC representatives, and a series of 9 ideation and paper prototyping workshops with end-users (activities listed in the sidebar). These activities informed the context in which the apps and services are to be deployed, helped to identify the problems we might address and their respective priorities for different stakeholders, and shed light on specific

[2] http://AgeUK.org.uk

[3] http://southlakeland.gov.uk

challenges of designing for older users. We outline some of these insights below.

Experience with Technology

One of the key challenges known at the outset of the project, which has been further illuminated through the engagement process, is to do with older adults' attitudes toward and competence with technology. In line with prior work in HCI ageing and accessibility research (e.g. [6, 13, 11]), we found that while our participants were not against the idea of using digital/mobile technologies, they lack confidence in their ability to use them. With a little time, money and energy, they described being highly discerning in terms of the tools they were willing to invest time in learning. These tools were typically those deemed high win/low risk: greatest benefit to the individual balanced against concerns such as security. In many cases, our participants expressed a preference for what they perceived as simpler ways of doing things—e.g. going into a physical shop, speaking face-to-face, using paper diaries and calendars. This was not purely out of habit, though having known pathways towards achieving goals played a role in determining which tools seniors thought appropriate (see sidebar on next page). More importantly, non-digital tools were perceived to be more trustworthy: not in and of themselves, but because of the confidence of the user. In other words, our participants tend to have greater confidence in their ability to use tools they had used for many years— notably those rooted in larger systems of organisation that they understood. Computer technology is sometimes seen as "frightening" -without an understanding of translatable UI principles, participants described being unable to problem solve when something unexpected arose during an interaction (e.g.

when a system update introduced changes to the interface), and unable to pick up and experiment with new technologies (cf. [2,6]).

With this in mind, the Mobile Age team identified several core, high-level design requirements for systems and apps for older adults:
- The UI needs to be consistent, intuitive and sympathetic to users who require reassurance.
- Avoid tech jargon; use plain English.
- Develop a training component (cf. [6]).
- Anticipate anxiety provoking interactions and devise mechanisms to prevent escalation/rejection.
- Ensure that value to users is high and risks are low; and communicate the value to potential users.
- Use intelligent analytics and context awareness to push information at the right time, rather than rely on the user searching for it.

Early Insight
Key features of the senior experience emerged through the interviews and formative workshop stages. The dominant theme was loneliness: many participants were widowed / widowered and therefore lived alone. They often shop purely for the social contact it afforded. Volunteering was similarly valuable as a form of socialisation; but volunteering also fit in with a strong ethic of social responsibility, which was universal amongst our participants. Their lives are busy and complicated, with most taking part in a host of activities to stay active, and memory decline was a universal problem; therefore, planning and organisation were critical. Money concerns were prevalent, as seniors tend to live on limited pensions (hence purchasing new technology was a real and often unreasonable investment of resources).

Having said that, we came to understand that there is no one "senior experience." The participants at workshops are mobile, for example, as they are capable of traveling to the workshops; they may be especially volunteer-minded, with a desire to contribute time to research; and they likely have a higher than average interest in technology, knowing that this was the topic of the workshops. In the end, we have so far taken our cues about what to develop from those who have participated- in doing so where possible we consider the value of interventions for those who were absent from the process through developing user stories.

The emergent themes were prioritized by users, and ideas inspired by those themes were explored with users, informing development of ideas taken forwards:

Community shopping. Participants expressed interest in online supermarket shopping, feeling that it would reduce their reliance on others and save them time. They explained that they were prohibited from using it because their weekly shop would fall short of the minimum cost for delivery. They were enthusiastic about the idea of pooling orders with neighbours— particularly because it would create an opportunity to socialise with people which would otherwise be lost by not going to the store. We chose not to pursue this because a similar app has been developed already [8], and we do not have a supermarket partner.

Swap shop. Recognising that our participants had varied technological ability and skills in other areas, as well as a seemingly universal desire to help each other, we conceived of a service that matched people with a need to people who could help fill that need. This would replace an existing leaflet based system provided by

AgeUK, which advertises vetted services. The main feature lacking from this leaflet, our participants explained, was the ability to read/contribute reviews of these individuals. While it would be simple to develop a Rated.com type app, we felt that a) there was comparatively little benefit to end-users (this would not greatly improve their independence), and b) there was little research novelty in this idea.

Vetted information portal. Participants often raised the fact that it can be difficult to know which sources of information, and which sites, to trust (see sidebar). For example, it is not always clear which internet sites are genuine government sites. We explored the idea of a bespoke portal which could mediate interactions with sites that would be useful to them—ensuring that they could find the genuine sites of interest, and providing a consistent interface with which to view relevant content (e.g. removing the reliance on external websites which vary and change frequently). While not a project we decided to take forward, the basic concept is evident in the platform we will be designing (see Future Work).

Online banking. Despite the potential benefits of using online banking, older adults are resistant to using such tools [12]; and our participants are no exception. They are deeply anxious about the security of such tools, and doubted their competence in being able to use them well enough to avoid losing their money, either by pressing the wrong button or being defrauded by hackers. In particular, they noted the lack of an 'undo' button, and a perceived inability to recover from mistakes. One suggestion was for an interface that mediated contact with the bank's online system, e.g. inserting a delay between pressing send and sending the command, to enable users to cancel unintended transfers. This could be a significant improvement on existing systems and might entice holdouts to begin using online banking. Our decision not to pursue this route, however, was two-fold: 1) the risks to our participants and to researchers if we were to deploy a faulty app are great; 2) we would need to secure a bank as partner in development to gain access to their API and to ensure we were not breaching any laws.
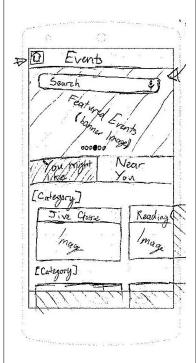
Future Work (Prototypes Taken Forward)
Some of the above is not uniquely insightful, but nevertheless we plan to continue the co-creation process in the most promising directions to gain further insight into co-creating with older adults. We plan to initially develop a trusted space umbrella platform that will support two initial apps. At the moment, these are raw ideas, we will work with our end users to resolve the specific details of how they will work.

Trusted space (platform)
Trust in technology is a prominent theme that was discussed during the co-creation workshops. Participants were security conscious, and, when asked, wanted to share a minimal amount of information with service providers (cf. [7]). This also translates to a reluctance to share personal information on social networks. Mobile Age apps are therefore intended to be a trusted and safe space for older adults.

To that end, this platform will allow apps within this trusted space to share information between each other, when allowed by the user. The platform will collate analytics data from the apps which will then be reused by the apps, and broker the sharing of personal data and context information between apps. It is planned to do this in a transparent way, making clear to the users

Paper Prototype: Social Events App

This is an example of one of the paper prototypes used during the co-creation process. It depicts a homepage of the Social Events app created in workshop 6.

when this information is used and from where it is derived, giving the users agency and control, which in turn should foster trust in the system.

Social Events (app)
The combination of mobile sensor context data, some limited personal information, weather forecasts, open public transport and traffic data has the potential to not only raise awareness of events, but most significantly to present information tailored to the individual's ability to get to an event. We found many events are missed because people do not know how or if they can get to an event, or what the weather will be like – the effort of the logistics is great. By knowing what transport the user has available and the schedule of a user, events can be presented not by location or time, but by the ability of that user to get to an event.

Examples of events could be coffee mornings, dance classes, village fairs, etc. Our participants also informed us that it is difficult to know what is on due to the distributed nature of data sources – organizers tend to host and maintain their own lists of events. Here we will work with project partners to integrate listing into their processes, build an API, and scrape key sources.

This app is desirable by the Mobile Age project as it is 1) desired by our co-creation participants; 2) extensible, with future capabilities being able to easily demonstrate other Mobile Age platform functionality; 3) directly attempts to alleviate social isolation in older adults and 4) research novelty.

Benefits eligibility (app)
A recurring point raised by participants is that they do not know if they are receiving all the government

benefits they are entitled to. Whilst there are services available to assist with this, they are incredibly time consuming due to the repeated data entry required. The benefits app will use context data and the platform personal data store to remove duplicate data entry, and aim to simplify the process of discovering eligibility.

Other similar apps for accessing government services have been discussed and may be explored, for example an app for "flooding help" – services for citizens affected by flooding to reduce the pain of repetitive paperwork tasks, and allowing the citizen to share information one time, automating much of the activity. These apps will source data from the trusted platform which, user permitting, will be shared with relevant end-points (e.g. government services or departments). This information may be reused to allow the app itself to determine eligibility locally, without needing to share data until the point of application, retaining user control and agency in the data lifecycle. Also, when a user's information changes, the user could be notified automatically that they may now be eligible to receive new or updated benefits.

Conclusion
The apps proposed here make use of the unique capabilities afforded by mobile technologies and open data, bringing those to an underserved population. We initially allowed the exploration to go wider than mobile and open data, looking for the opportunities for these technologies, rather than imposing them. One of the most compelling components to emerge from co-creation is the novel structuring and presentation of information by personal context in the events app. However, possibly more significantly the co-creation of a "trusted platform" has the potential to improve trust

in digital services and retain user control and agency in the sharing of personal data. The co-creation process has driven the emergence of these ideas and the development of the apps proposed here, which have the potential to support independent living leading to improvements in the experience of senior adults.

Acknowledgements

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