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Table of Content

Gordon A. Gow
Nuwan Waidayanatha
Chandana Jayathilake
Helen Hambly
Timothy Barlott
Mahmuda Anwar

Tunazzina Sultana
Angela Locoro
Federico Cabitza

Tabea De Wille
Dr. Chris Exton
Reinhard Schäler

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Pei-Yao Hung
Mark S. Ackerman

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Impressum

Fostering Inclusive Innovation for Agriculture Knowledge Mobilization in Sri Lanka: A Community-University Partnership Development Project

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Abstract. Mobilization of scientific and indigenous knowledge in support of sustainable agriculture has been identified as a vital activity that faces numerous challenges today, yet constraints and limitations on traditional agricultural extension methods as well as high costs of information provision have been cited as barriers to improving the livelihood of farmers in developing countries, particularly those residing in the lowest socio-economic category known as 'base of the pyramid'. Information and communication technologies (ICTs) have long been regarded as forces for positive change in agriculture and rural development despite a track record of modest success with many initiatives. This paper describes the approach and initial results of an ongoing initiative involving researchers from Sri Lanka and Canada to create a community-university partnership intended to establish local capacity for inclusive innovation using low cost ICTs that can support knowledge mobilization within agricultural communities of practice. Initial results of the project point toward 'technology stewardship' as a promising approach for building capacity for local innovation through a community-university research partnership.

1　Introduction

Knowledge mobilization in support of sustainable agriculture has been identified as a vital activity that faces numerous challenges today (Aker, 2010). Information and communication technologies (ICTs) have long been regarded as forces for positive change in agriculture and rural development despite a track record of modest success (Duncombe, 2012). Among other things, ICTs are considered, particularly among frontline development practitioners, as important tools for mobilizing knowledge because they can lower transaction costs associated with information seeking or because they can introduce new ways to enhance farmer training through the use of audio visual media and Internet access (Farm Radio International, 2013). Most recently, the mobile phone has been the subject of intense focus within the ICT4D (ICT for Development) community because it is seen as a low cost, widely available communication tool that holds considerable promise for knowledge mobilization in the agriculture sector (Qiang, 2011).

Recent attention in the ICT4D community has also turned toward the importance of promoting change at the grassroots level with direct participation of technology users in what Heeks' (2013) has termed 'inclusive innovation.' Heeks' defines inclusive innovation as a process that empowers users to participate directly in the conceptualization and implementation of new ICT initiatives (Heeks et al., 2013), which may in turn encourage individual users of technology to further innovate using ICTs in ways that will fit their own needs (Pant & Hambly Odame, 2009). This approach shares features with 'participatory design' in the field of community informatics (Carroll & Rosson, 2007).

New opportunities to promote inclusive innovation have opened with the availability of several low cost, open source software platforms that enable customized services for text messaging, crowdmapping, and interactive voice response systems. Despite the possibilities these systems offer, enabling effective use of the technology (Gurstein, 2003) and building capacity within local communities to innovate with them remains a significant challenge for ICT4D projects in Sri Lanka and elsewhere (Kleine, 2013).

This paper describes the approach, initial results and possible next steps of an ongoing initiative involving researchers from Sri Lanka and Canada to establish a community-university research partnership intended to create local capacity for inclusive innovation using Free and Open Source Software (FOSS) to develop communication services that can support knowledge mobilization within agricultural communities of practice. The paper describes a series of relationship building activities based on a participatory design methodology that eventually led to a 'technology stewardship' model that was piloted through a set of communication campaigns carried out at several locations in Sri Lanka in 2014.

2 Project Background and Objectives

The University of Alberta, Wayamba University of Sri Lanka, LIRNEasia, and the University of Guelph have been involved since 2012 on a partnership development project funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). The primary objective of the project has been to establish a community-university research partnership to explore the potential for low cost ICTs to enhance knowledge mobilization practices within agricultural communities of practice in Sri Lanka. To this end, the partners have been conducting various activities to build relationships intended to encourage and support community-based inclusive innovation using low cost ICTs, particularly for smallholder farmers.

The project moved into a new phase in 2013 with working relationships established between the university research team, the Sri Lanka Department of Export Agriculture (DOEA), Rangiri Radio, and the non-governmental development organization Janathakshan. This phase of activity was intended to introduce participatory design through a set of small-scale pilots, or 'communication campaigns' as they were termed in the project.

For our purposes a campaign is defined as a limited duration activity that has a specific objective with respect to needs of the community to whom it is directed. Each campaign is an intervention intended to serve immediate needs identified by the community. The campaigns also provided an opportunity to collect data through interviews, surveys, and tracking usage of the system through software records. A campaign involves several key participants: a sponsoring organization, such as DOEA who agrees to work with the research team to identify and define the parameters of the campaign. It also includes a 'technology steward' who is involved in operationalizing the ICT component for the campaign through his/her involvement in the participatory process and rapid prototyping with the community. The technology steward also plays a leadership role involving the community in the campaign by promoting it, encouraging people to participate, and providing oversight and support for various activities associated with the. A campaign could include various possibilities, or some combination, such as providing timely and targeted information to the community (e.g., market prices); providing moderated peer-to-peer communications services (e.g., peer Q&A forum); community-based data collection (e.g., responses to specific questions). The four campaigns included in this paper (identified by sponsor name) were: Janathakshan (Eastern Prov.), DOEA-North (Central Prov.), DOEA-South (Central Prov.) and Rangiri Radio (Nationwide).

The final phase of the project, now underway, involves a period of reflection and comparative analysis of results from the communication campaigns to develop a set of retrospective case studies (de Vaus, 2004). The partners are working together to refine a 'technology stewardship' model that will build on the

strengths of the communication campaigns and create future opportunities for further collaboration on agricultural extension programming in partnership with local university, government, and non-government partners. As part of this capacity building objective, the project partners are now beginning to work together to plan out a training strategy that will provide community stakeholders with resources and support necessary to encourage inclusive innovation with low cost ICTs to address emergent needs and to promote enhanced, cost-effective knowledge mobilization practices.

3 Participatory Design and Rapid Prototyping

Central to our overall objective is a participatory design intended to foster inclusive innovation through rapid prototyping. This method draws from and shares features with Blake and Tucker's (2006) 'Socially Aware Software Engineering' approach, but is distinct in that our project is not focused on software coding per se but instead adapts the user-friendly Free and Open Source (FOSS) platforms FrontlineSMS (text messaging), Ushahidi (crowdmapping), and Freedom Fone (interactive voice response) as its starting point.

Through our workshops and field visits we have demonstrated that FOSS platforms such as FrontlineSMS, Ushahidi, and Freedom Fone are well suited to rapid prototyping, making it possible to design and test a communication service in real-time with the direct involvement of community participants. This rapid turnaround time makes it possible for participants to immediately experience an implementation, creating the opportunity for direct feedback and, moreover, to provide the community with a working beta version of the system (Gow, 2013).

For example, early in the project, the team met with farmers in Maha Oya who raised the need for tracking and alerting of elephant movements in the area (elephants cause problems for farmers by destroying crops and buildings). Over the course of a two-hour meeting, the research team was able to work with the community to create and demonstrate a peer-to-peer alerting system using FrontlineSMS and a reporting system that could help community members to track elephant movements using the Ushahidi (Jayathilake & Gow, 2013). At the conclusion of the meeting, a beta version of the system was made available to the community for further experimentation.

Similarly, the team has been able to quickly demonstrate and prototype ideas for enhancing farm radio broadcasting in the North Central and South Central Provinces Sri Lanka by using text messaging to create new forms of interactivity between broadcaster and audiences using mobile phones to create what Hambly Odame (2012) has termed 'Radio+' (radio plus) service. Radio+ combines new, social media with radio, to offer listeners active opportunities for engagement in broadcasting to a wider audience, or in 'narrowcasting' to a specific social group or audience (e.g. youth, women farmers, etc.). Demonstrations and prototyping of

Radio+ was carried out at our practitioner workshops as well as during field visits with six regional radio stations in Sri Lanka (Hambly Odame, 2013).

In conjunction with the rapid prototyping activities, research partner LIRNEasia has taken a lead role to develop and distribute 'turnkey' ICT packages that enable the team to quickly deploy low cost ICT platforms in rural and remote communities. These are self-contained units comprised of a mini-PC and screen, GSM modem, and pre-loaded software (Waidyanatha, 2013). The turnkey packages were tested during field visits in September 2013, with a number of resulting observations that will lead to further refinements (Waidyanatha, 2013). In combination with the turnkey packages, the project has also created a series of bilingual video clips that provide guidance on how to set up and use FrontlineSMS for various types of applications.

4 Promoting Technology Stewardship as Community Practice

One of the key observations emerging from our rapid prototyping activities is that while the FOSS platforms are important to the participatory design process, by themselves they are not sufficient to foster the development and deployment of new services and we soon recognized the need for intermediaries to engage communities in the process. Intermediaries play a role in part because of their familiarity with the kinds of social practices prevalent within their community (Shove, Pantzar & Watson, 2012). This is an important consideration in light of recent studies that have shown that adoption and use of digital information services is closely related to how well these services align with the everyday social practices of people (De Silva et al., 2013; Zainudeen & Ratnadiwakara, 2011). To foster this alignment, we sought to enroll competent 'community knowledge workers' (Grameen Foundation, 2013) or 'technology stewards' as key participants in the campaigns.

Technology stewardship is a multi-faceted role that Wenger and his colleagues (2009) have identified exists within communities of practice. The role is important for bridging social practices with technological solutions that are appropriate for the community:

> Technology stewarding adopts a community's perspective to help a community choose, configure, and use technologies to best suit its needs. Tech stewards attend both to what happens spontaneously and what can happen purposefully, by plan and by cultivation of insights into what actually works. (p. 24)

Technology stewardship should not be confused with 'IT support.' The tech steward has a leadership role that involves several streams of activity and a diverse set of skills and interests:

- An insider's understanding of the community;
- An awareness of technology developments and opportunities;

- The ability to make informed choices about technology choices and initiatives;
- The ability to assist with adoption and new technology practices;
- The ability to help community members integrate new technology practices into everyday social practices;

On the one hand, tech stewards are a broker between a community and the technological resources available to them. In our case, the technology stewards perform this brokering role in the participatory design process. On the other hand, because technology is often seen as a response to a perceived need and because the tech steward identifies with the larger values and direction of the community, the role is also one that helps give voice to challenges and aspirations that may have implications extending beyond immediate technological solutions. For example, the steward assigned to the Janathakshan-sponsored campaign in the Eastern Province helped the community articulate to us the challenges faced as a result of recent drought that resulted in many young men leaving their farms to seek work elsewhere. This not only impacted the outcome of the campaign but raised other issues that clearly touched on concerns outside the scope of the project.

Technology stewardship, therefore, is a multifaceted role that requires a diverse skill set that includes technology training and digital literacy, training in participatory design and community engagement techniques. Stewards do not necessarily have to live in the community in a physical sense, but they do need to have contact with the community on a regular basis and be trusted by the members of that community.

Enrolling technology stewards into the project involved a multi-step process. We first worked closely with the sponsoring organizations to identify suitable individuals for the role. For example, in the case of the DOEA, Extension Officers stepped into the role because of their connections to the community and a perceived opportunity for the technology to improve communications between the Department and local farming groups. Rangiri Radio assigned members of its staff to assume the role in conjunction with their regular duties.

All of the technology stewards were trained by the research team to use and customize the software platforms and were also introduced to some basic participatory research methods intended to help them engage with their communities in both promoting and sustaining the use of the new services that they would be introducing with their communities during the campaign.

Initial results from the campaigns show that technology stewards do indeed play a key leadership role helping communities adopt and use new communication services, even when those services involve familiar technology like mobile phones (Waidyanatha et al., 2015). The technology stewards were able to carry out activities related to the campaign objectives and encourage

adoption and use of the service when they were consistently using the system themselves.

The technology steward in the DOEA North campaign was an Extension Officer working the area and familiar to the community. He proved to be a keen user of the system and sent over 700 messages over the course of several weeks, providing farmers with reminders of upcoming meetings, information on crop disease and other best practices. Relatively few farmers used the system to reply or ask questions. Further efforts by the technology steward to encourage input from farmers were constrained by their reluctance to compose text messages (as contrasted with reading messages sent to them). In consultation with the community, the technology steward suggested to the research team that a voice-based system might overcome some of these barriers and the project team is now working with DOEA to launch a follow-up campaign that will include Freedom Fone (a voice-based messaging system).

The DOEA South campaign under-performed when compared to its counterpart in the North. In the DOEA South campaign the tech steward role was shared between two Extension Officers, resulting in a split in responsibilities. Our initial observations suggest that this made it difficult for either steward to coordinate their actions and to develop as sense of ownership of the campaign as one steward was responsible for managing FrontlineSMS, the other for prototyping with the community.

The Rangiri Radio campaign received full support of the station management who saw it as a way to enhance its radio programming. Listeners were asked to text in song requests or other questions. The software records show hundreds of incoming messages each day of the campaign, which pushed the capabilities of FrontlineSMS to its limits. However, the technology steward did not initially use the system for their farm radio program, instead opted to introduce it with their popular music shows.

This of course opened up the question concerning situations in which a technology steward uses a system in ways *not* initially intended by the sponsor or the research team. Provided of course the uses are consonant with the wider community of interest, it may be important to let the technology steward explore innovation in ways that may not immediately respond to a particular need but instead lay the ground to prepare the community for the introduction of other campaigns. In this case, the Rangiri Radio campaign was seen to be offering its listeners a new form of interactivity in a compelling format (song requests) that could then be subsequently introduced into its farm radio programming.

In the case of the Janathakshan campaign, the tech steward had comparably little support from the sponsoring organization in part due to changes that took place with the sponsor during the campaign. However, he was able to send out a large number of messages initially in an effort to get farmers to self-subscribe to the system but had modest uptake from the community. This outcome may be

partly explained by survey data that we collected on use and adoption of technology in the community that showed a relatively low level of prior use of text messaging. This was compounded by social and economic challenges stemming from post-war conditions in this northern region of Sri Lanka, as well as literacy barriers for Tamil speakers trying to understand messages composed in phonetic Tamil using the limited character set available on their mobile phones.

5 Conclusion

With the conclusion of the campaigns in fall 2014, both DOEA North and Rangiri Radio expressed interest in continuing with the project and expanding beyond FrontlineSMS to begin experimenting with an interactive voice response system using Freedom Fone. Technology stewards in both cases remain actively involved in a broker role as they liaise with their communities to introduce this new service. In the less successful cases, our initial analysis suggests that we need to examine more closely two key considerations: if and how technology stewardship can be effective as a shared responsibility within a community, as in the DOEA South campaign; and to what extent a technology steward may need to engage in preparing a community for the introduction of a new service (e.g., basic technology literacy workshops) as in the Janathakshan campaign. This kind of training can also be helpful to identify and address unforeseen systemic issues in the adoption and use of the technology by the community.

Project partners are also considering the possible benefit of designing a more formal training program for technology stewardship. The DOEA has expressed interest in expanding the campaigns to include other Extension Officers in other districts. As such, there is an opportunity to examine how the research partners could play a role in developing and delivering a stewardship curriculum that addresses both technical and community engagement aspects in its curriculum, all with a view to building community capacity for local innovation with low cost ICTs.

6 Acknowledgments

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Investigating opportunities and obstacles for a community-oriented time accounting social media in Bangladesh

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Abstract. This work-in-progress paper presents a survey report that investigates the opportunities and obstacles of a money-free service exchange system on the Bangladeshi urban population that would allow using basic mobile phones, rather than internet-enabled smartphones, to mediate all the necessary online interactions. We investigated the knowledge and the general attitude of people towards these kinds of systems, the technology and culture-related readiness to adopt these patterns of exchange, and the general attitude to join communities of people engaged in such systems. We report the results of a questionnaire-based user study and discuss them.

1   Introduction

While it is well known that social media (including social networking technologies) can trigger the creation of new communities, the so called Web-based or virtual communities e.g., (Hawn, 2009), whose members use the social media to share content, exchange messages and organize both distributed cooperative efforts and social activities like discussions and deliberations (Loader and Mercea, 2011) it is less debated how social media can influence the so called community epimorphism (Jankowski, 2006), i.e., the transformation of a community from a type with some characteristics to another type (e.g., a

community of place or interest into a community of practice) (Qualman, 2010), as well as the impact of these tools in increasing the sense of community of people living in the same area (Wellman et al.,2002).

In this paper, we focus on this latter phenomenon, and we address how even "lightweight" social media, like those accessible from mobile phones with just texting capabilities, could support the positive impact of initiatives aimed at increasing the inner social capital and the wealth of communities of place and of its members as well (Rippin, 2005). In particular, we address the potential of transforming a group of people living in the same urban area of a fast-growing developing country as Bangladesh into a community of people who are bound together by an alternative currency schema like a Time Accounting system (TAS), also known as Time Banking system (TBS).

Time Banking (Bellotti et al., 2014, Seyfang and Smith, 2002, Seyfang, 2004, Marks, 2012; Bellotti et al.,2013) develops a community where people co-produce value and exchange services on an informal and non-monetary basis; in this system time, which is spent for executing the service, is considered as currency. In a typical TBS a user can login to its website to advertise her skills and availability and browse services offered or make a request for a service. Nowadays, this kind of organization is spreading quickly in the developed countries, especially for tackling social exclusion and building neighborhood engagement seen as principal elements of sustainable communities, and for allowing lower-income and unemployed participants to gain social capital (Collom, 2007): in this sense TBS is a grassroots innovation which claims to meet these goals (Seyfang and Smith, 2002).

IT designers and researchers are emphasizing the design requirements of this type of exchange systems, in order to increase the community centered support of IT devices, and mobile technology in particular, for community development and sustainability (Bellotti et al. 2013, Han et al. 2014, Han et al. 2015). Despite many analogies between western countries, which are mostly affected by an unprecedented economic default, and developing countries, which are experiencing an economic growth and an unprecedented social well-being, the adoption of systems like TB in these latter is negligible. We address this general matter in the case of Bangladesh. This South-Asian country has a population of 165 million and, since its independence (in 1971), has increased more than twice, while keeping a 1.3% growth rate. Unfortunately, the 35% of its total population lives below the poverty line; moreover, while unemployment rate is relatively low (4.8%), Bangladesh presents a very high proportion of people, i.e., 40%, who are underemployed, especially women: indeed only 2 workers out of 10 are female. Underemployment, that is the condition where many participants in the labor force work only a few hours a week at low wages, is among the reasons why per capita income as of 2013 is US $1,044, that is quite low compared to the world average ($8,985). In Bangladesh, 6.9% are aged 60 years and over among the total

population and the size and share of the elderly population are increasing over time. It is estimated that the elderly population is going to rise from 6.05% in 1970 to 9.30% by the year 2025 (Hossain, 2005). It is also projected that the growth of the elderly population will be over 200%, going from the current 7 million to over 17 million by 2030. This change in demographic profile is taking place along with many other changes in society, for example modernization, change in family structures (from extended to nuclear type), and urbanization. Moreover, in the urban areas, women's participation in the labor force is increasing which results in a serious problem in the field of elder care and, in general, in family support, due to the changes in social and cultural values (Jesmin and Ingman, 2011). Against this background, and anticipating the fact that such a system could help address the problem of unemployment and underemployment in the younger strata of Bangladeshi population, aid women family time balance and support, involve more and provide care for elder people, we address the following question "Will a TAS initiative be feasible in Bangladesh?" In particular, the main goals of our study were to assess the familiarity and the general attitude of Bangladeshi people with the main logics of service exchange systems like a TAS, to assess their e-readiness (Dada, 2006) towards the adoption of a supporting technology like mobile phones, which are used by almost two third of Bangladeshi population[1],and to detect the technology and culture-related fostering factors or obstacles towards the actual use of mobile based social media to support a service exchange system. In the following section, we discussed the methodology which then followed by results and discussions.

2   The methodology

In May 2014 we undertook a questionnaire-based user study to investigate the attitude of people living in a large urban area in Bangladesh towards potential engagement within a Time Accounting initiative. The main idea was to exploit this fast and relatively inexpensive technique to get a number of themes and indications to further elaborate on and discuss in the exploratory focus groups.

The questionnaire items were initially conceived in English by the authors, and they were then translated in Bengali by one of them who is native speaker; the questionnaire encompassed 40 items whose wording was adapted after two large pilot tests that involved respectively 55 and 221 people and were undertaken in August and December 2013 among the students and faculty members of the University of Chittagong. The preliminary results coming from this pilot phase were used to fine-tune the definitive questionnaire to be administered to a sample

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[1]   Ministry of Science and Information & Communication Technology, People's Republic of Bangladesh, available at www.btrc.gov.bd, last accessed June 2014

of the Bangladesh population that we wanted to be as random as possible and vast enough to bring representative findings.

The definitive version of the questionnaire was conceived to be completed in approximately 12-15 minutes, in order to minimize fatigue bias and make it suitable for short interviews, either by phone or on the road, as well as for self-interviews, mainly through online forms. In order to maximize the representativity of the results, we adopted the surveying technique of the Computer-Assisted Telephone Interview (CATI, see, e.g., Berg et al., 2004) involving a specialized firm established in Bangladesh that employed local interviewers. These received a brief training on how to ask the questions, how to propose the alternative options to respond the closed-ended items of the questionnaire, how to fill in the electronic forms that we prepared, and also how to possibly clarify some passages and statements in the questionnaire to the interviewees, if necessary.

The CATI phase was then aimed at getting a random sample of respondents from the owners of either landlines phones and mobile phones in Chittagong[2]. Since in doing so the appointed firm had difficulties in reaching elderly respondents (that is respondents older than 64), some interviews were also carried out on the road and the collected responses were later reported on the online forms.

Categorical Variable	Options	Value
Age	Below 25	56%
	Between 25 and 44 years	27%
	Between 45 and 64 years	13%
	Above 65	4%
Gender	Male	50%
	Female	50%
ICT familiarity	Low familiarity	28%
	High Familiarity	72%
Hardware Availability	With hardware	90%
	Without Hardware	10%
Mobile Budget	Below Tk 500 (€5)	43%
	Above Tk 500 (€5)	57%
Employment	Employed	42%
	Unemployed	58%

Table 1. Descriptive Statistics of the Respondents' Characteristics. Percentage values were rounded to the nearest decimal.

In order to keep the margin of error below the conventional threshold of 5%, we completed the collection phase when we got 445 questionnaires. However, at a closer analysis by the authors some of these questionnaires had to be discarded for

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[2] Chittagong counts almost 7 million inhabitants, but just 300,000 distinct landlines. For this reason we also contacted a number of mobile phones.

data quality problems, so that we finally got 414 complete cases, associated with a 4.8% margin of error (at a confidence level of 95%). These cases were finally weighted so that their distribution became more similar to that of the urban Bangladesh population with respect to both gender and age, according to the 2011 population and housing census (Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of Bangladesh). Consequently, in regard to age we got 56% of respondents younger than 26, and 83% younger than 44; only 4% were older than 64, as in Bangladesh official statistics. Table 1 summarizes the categorical variables of our study.

3   Results and Discussion

A very high proportion of respondents (90%) claimed to use at least one digital device connected to the Internet for personal purposes; notably, exactly 2 respondent out of 3 (66%) declared to possess a smart-phone; moreover almost 1 out of 2 respondents (43%) claimed to use both personal computers and a smart-phone. More than 83% respondents have an Internet connection, which is considered fast and reliable enough for their needs, and almost half of them have a flat connection. We evaluated the degree of familiarity with ICT and services accessible through Internet in subjective terms on an ordinal scale, where 1 denotes no familiarity at all, and 6 denotes high familiarity. In this respect, we found that 72% of the respondents declared a good familiarity (i.e., a value greater or equal to 3) and in particular 42% of them chose the highest degree of familiarity. Since ICT familiarity is a precondition for considering the substantiality of TAS system, this could be inferred that Bangladesh has a solid ground or foundation for considering the feasibility of a TAS system in terms of ICT familiarity.

With respect to the frequency of texting messages, the result showed that texting message is a common practice in Bangladesh. Almost 1 out of 2 of the respondents claimed to text at least one message per day to their contacts, and 1 out of 8 (12%) said to send more than 5 messages per day. This confirms the evidence regarding other uses of mobile phones than simply calling and texting: 76% of smartphone users claimed to use different applications like home banking, weather forecasts and news reading, and an even higher percentage (89%) use a free messaging service (like e.g. Whatsapp, Wechat or Facebook Messenger). These elements are useful to speculate the potentials of a TAS in terms of readiness of the prospective users of an online platform that could put them in communication and mediate information exchange. We also collected information regarding the economic sustainability of a TAS as this system could require that the prospective users exchange more SMSs upon payment or if they use a basic feature mobile phone rather than a smartphone as a tool for using the system. In this regard, we detected that the 43% of the total respondents said that their

budget for mobile phone was less than 500 Bangladeshi Taka (approximately 5€ in 2015) per month. Since, the result did not show any significant correlation between the age and the mobile budget or between the employment status and the mobile budget, this can be inferred that irrespective of their age and employment status people are habituated with texting message and people's income does not have any effect on their text message behavior as text message service is usually considered as one of the cost effective and expressive modes of communication through mobile phone. It was found that the younger respondents (below 25 years) are more frequently texting messages than the other respondents[3], which is more similar to our conjecture that younger are usually more used to texting messages through mobile phones that indicates a probability of the involvement of young people in a TAS system which is mediated through mobile phone's text message service. In connection to the opportunity, the survey result showed that the younger respondents (below 25 years) scored higher, on average, than the other respondents (above 25 years) about the fact that personal relationships or knowing more people personally helped them to get employment[4]. It is intuitive that younger people are in search of a job more than adults; knowing more people personally would help in any way, as for favors that one can get from social networking, which can help to find an employment, and for obtaining an endorsement for a job, and so on. In this regard, the TAS idea can be seen as a way to increase personal acquaintances, to give more visibility to one's own skills and competencies, and also an opportunity to ask availability (i.e., time) to other experts in order to learn from their experiences the essentials secrets of a manual craft or a digital competency. In this connection, the result showed a general belief among the respondents that manual competencies can be acquired much better through imitation rather than with study on written resources[5]. The survey also showed that 75% of the respondents expressed a strong feeling to belong to their community of place (be it the city block or neighborhood), and a clear tendency in the responses was found about a positive attitude in giving help to neighbors[6] or strangers[7], if they needed or asked for it. This existing social capital base is considered as an opportunity for the feasibility of a TAS system since such attitude is a prior need for the success of the system. In addition, we found that respondents with a higher ICT familiarity expressed a stronger willingness to help others[8]. We also found that the respondents trusted friends more than any online

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[3]   Mann-Whitney Test U (408)= 17304, p<.00

[4]   Mann-Whitney Test U (403)= 16958, P<.01

[5]   Binomial Test (prop .01 vs .99), p=.000

[6]   Binomial test (prop. .98 vs..02), p<.001

[7]   Binomial Test (prop. .65 vs. .35), p<.001

[8]   Mann Whitney test, U(399)= 4563, p=.009

system recommending the abilities and virtues of strangers[9]. This trend is very clear and reasonable in a context where people consider friend as someone from whom they expect help at emergency just after their family members. Notably, we found a general trust in a system where the members were specifically requested to provide a feedback for each interaction occurred within the network, and this feedback were used to build a reputation of each member[10]. Furthermore, with respect to opportunity, the survey result showed that 74% of the sample declared they could join one, if it were established in their community; most notably, this positive attitude was stronger in case of stronger ICT users[11]. In addition, we found that the respondents with high familiarity with ICT scored lower, on average, than the other respondents (low familiarity) about feeling weird or inopportune to claim time credit for having helped a stranger, i.e. the higher the familiarity with ICT, the more positive the attitude towards the core idea of TAS, i.e. towards adopting with exchanging service to strangers[12].This could be explained in terms of a stronger familiarity with a sort of virtual connection that makes whom one is in contact with less "stranger": in a way, who writes emails to someone she does not know, or sees someone as a professional contact of hers on a social network (e.g., LinkedIn), or as either two- or three-grade apart node in her network of acquaintances (e.g., in Facebook or LinkedIn, as friend of a common friend) could perceive a stranger in a different way than people not using those social media or communication tools, perceiving strangers as more connected than those actually are, thus creating a sort of illusion of proximity. This illusion could facilitate the idea of being helped by people that are not known but that yet are members of the same virtual community, as a TAS would be. This means that social media, in creating virtual social networks (on the Web) and sort of virtual (yet weak) ties between its members, could actually foster human social networks, by tearing down the barrier of natural diffidence between strangers. In terms of opportunity, the survey also showed a highly positive attitude of the respondents towards the basic mechanism of TAS like helping others under TAS, describing skills for the system, certifying or confirming the services of others.

In terms of obstacles, the result showed that very few people knew of initiatives of TAS and complementary currencies (96%) or were familiar with these concepts. Moreover, the respondents expressed a significant wariness towards asking for help to strangers for the typical services provided within a TAS, e.g., small errands. The 85% of the respondents from the sample expressed a strong feeling of belonging to a religious community established in their city, i.e., the mosque parish or the temple community; and the result showed a negative

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[9] Binomial Test (prop. .89 vs .11), p=.000

[10] Binomial Test (prop. .59 vs .41), p=.001

[11] Mann-Whitney Test U(404)= 3837, p=.001

[12] Mann-Whitney Test U(400)= 4654, p<.05

correlation (though very weak) between this feeling and the attitude to become a TAS member. The findings indicate that the samples are not only unaware or unfamiliar about technology mediated service exchange system like TAS but also they are uncomfortable about asking help to strangers for the typical services through a TAS. Since these kinds of systems exist in the western countries and are spreading steadily over there, and they are formed basically for mitigating the social exclusion problems in the western society, it is not contrary to our conjecture that the most of the people are unaware about such systems. Moreover, in a society where community feeling is stronger comparing with the western world, it is also not surprising that people might have a moderate attitude towards an unknown system. Hence, we can summarize in Table 2 the opportunities and obstacles that a TAS may encounter in case it is introduced in Bangladesh.

Opportunities	Obstacles
-Connectivity	-Unawareness of system
-Convenience in mobile phone texting	-Wariness to stranger's help
-Younger inclusion	-Religious users untrust
-Social Integration	
-Conformity with TAS transaction	
-Positive attitude to system friendliness	

Table 2. A Summary of the Opportunities and Obstacles Discussion.

4   Conclusions and future work

The initial results of our work indicate that a TAS system is feasible to some extent, as the identified obstacles can be counterbalanced by the opportunities. These findings give us a positive picture of the attitude of the Bangladeshi people towards the idea of a TAS and the degree of their e-readiness towards the adoption of a supporting technology. However, a precise decision on the feasibility of a TAS in a developing country context is depending on further investigation. For example, by grouping the respondents according to different areas and by carrying out a series of focus group discussions, to help us get a deeper understanding of the particular feedbacks, of the key themes, and of the issues of controversy related to the feasibility of a TAS in Bangladesh.

5   Acknowledgments

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Multi-language communities, technology and perceived quality

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Abstract. With thousands of language communities worldwide with ever growing access to technology and internet communication, the demand for translation of content has been growing steadily. Technology like machine translation and computer assisted translation, among others, offers partial solutions for increased production of translated content. However, other challenges like the question of how quality should be defined and measured require active, practice oriented and purposeful collaboration of translation and localisation communities.

This paper outlines on-going PhD research to investigate quality perceptions related to volunteer translations, as well as how translation quality is defined, measured and managed in volunteer translation communities.

1   Introduction

With the ubiquitous presence of the English language on the web it is easy to forget that there are in fact thousands of languages used throughout the world by their respective language communities. (Lewis et al. 2015) While contact between language communities and subsequent translation of content is certainly not a new phenomenon, the increased use of technology has not only increased demand for translation of content and localisation of software, but also offers partial solutions for increased production of translated content. Such solutions like computer assisted translation and machine translation, among others, are already utilized

within the translation and localisation industry to varying degrees. However, productivity is only one part of the equation.

One of the great challenges in today's translation and localisation industry is quality. Apart from the question of how to achieve quality and balancing it against cost and time, the difficulty is in how to define and by extension measure quality due to a lack of a single, objective, agreed upon measurement approach. (Drugan 2013)

While numerous attempts to define and measure localisation quality have been made, progress has been slow on an industry-wide level as well as in academia. (Drugan 2013) One explanation can be found in the great diversity of organisations, individuals, contents and projects with diverse needs and requirements. (Drugan 2013) An opportunity to move towards a solution to these challenges can be found in the technological advances made that enable social localisation and translation crowdsourcing since they have the potential to enable open, collaborative decision-making. (Dombek 2014) However, the mere introduction of technology is unlikely to produce the desired results without the active, practice oriented and purposeful collaboration of its users.

One platform that offers both, a technological solution and a large, focused user community is Trommons (Translation Commons). Due to this combination, the platform and its focused user community has the potential of being used to define localisation quality and ways to achieve and measure it. Trommons is an open source, web-based platform that connects more than 8000 registered volunteer translators with communities that require their services free of charge through nearly 200 non-profit organisations registered on the platform. However, the members of the user community communicate and interact with each other very little overall. As a result, Trommons offers the rare opportunity to trace perceptions of quality in volunteer work prior to knowledge management mechanisms, during their implementation as well as their effects. In order to preserve the autonomy of the community and thereby not impair motivation, the instrument proposed for managing knowledge is that of a Community of Practice (CoP) (Wenger et al. 2002), which will in addition allow comparisons between how the localisation industry views quality from a generally top-down perspective compared to a bottom-up approach with involvement of a community of practitioners as a whole.

This paper introduces on-going PhD research that utilizes these opportunities.

2 Overview of PhD research

The focus of PhD research and primary research question is the impact of a quality focused CoP on the perceived translation quality of volunteer translations. Research will be presented in a series of papers, which have the following focus areas and will be focused around the Trommons community.

Focus area 1: To what extent does the community have a shared understanding of localisation quality as well as a shared terminology to describe localisation quality?

Focus area 2: How does information on translation cost change reviewers' perception of quality? What attitudes and emotions do reviewers and buyers have towards translation based on the information on cost they have?

Focus area 3: How is translation quality defined, managed and measured in other volunteer translation communities? What is the process through which the volunteer community defines and discusses these areas with the implementation of a CoP?

Focus area 4: How is cost-based perception of quality influenced by additional information on processes and guidelines, generated through the CoP?

Potential alternative for focus area 4: How is cost based perception of quality influenced by additional information on processes and guidelines, generated through a survey of quality definitions in other volunteer translation communities and those used in the localisation industry?

3 Past research

To answer question 1, feedback comments provided by volunteer and partner organisation reviewers for volunteer translations on Trommons were labelled to categorise the quality issues described. The number of occurrences of those labels was then used for further quantitative analysis.

Feedback comments that use label names, synonyms of the names and terminological subsets were labelled in a separate step. The number of occurrences of such labels was then contrasted with the findings for the first research question to show quality issues that reviewers tend to describe in more definitive terms vs. those where they use descriptive phrases or a wider range of terms instead.

Through the analysis of feedback comments we showed a degree of shared understanding of quality aspects. Some (stylistics, grammar, spelling and

terminology) were mentioned significantly more often than others (design, verity, register, and the aspects of accuracy that concern missing or erroneously added text). Of those that were mentioned more frequently, stylistics stood out since the terminology used to describe such issues was significantly less consistent and precise than for grammar, spelling or terminology.

These findings were consistent with O'Brien (2012), who showed in her analysis of eleven Quality Evaluation models that the highest level of consensus was found for the category which commonly included grammar, syntax, punctuation and spelling. The "Style" category was present in seven out of eleven models and ruled out explicitly by one (J2450). "Of the top four 'Language' errors, 'Style' is the one with the least consensus across models." (O'Brien 2012)

4   Future research

To answer question 2, a future study will consist of two parts: A survey questionnaire and a translation evaluation part. In addition to basic demographics (level of involvement in the Trommons community, experience in localisation and language background of the participant), the survey questionnaire will provide an opportunity to gain insights into attributions, emotions and "naive theories" (Deval et al. 2012) towards translations depending on the information participants have about them.

In the context of discount stores, Zielke (2014) has shown that emotions, which can be positive (getting a good deal) or negative (shame or guilt felt through not meeting personal goal of social responsibility) mediate the impact of price perceptions and expectations on shopping intentions. (Zielke 2014) These emotions and cognitions can be influenced by attributions or causes ascribed to low prices and "(…) may help to understand differences in value perception and price-elated emotions." (Zielke 2014) Among the attributions and emotions, value perception, guilt and inferior quality as well as shame and efficiency attribution have considerable total effects.

> While "(t)he inferior quality attribution always had the strongest total effect, independently of the customers' price consciousness. Furthermore, the level of the inferior quality attribution is similar for less and highly price conscious customers. This underlines the importance of research on price-quality inferences." (Zielke 2014)

Such inferences are commonly made without consumers having the complete information necessary to form judgements. To compensate for this, a variety of strategies are used to fill in gaps to make judgements and choices. (Deval et al. 2012) Depending on the theories consumers have about certain attributes, they

will make different inferences from the same information. Based on the theory formed,

> "(…) participants formed more favourable product evaluations when the advertisement featured a high price versus low price when quality was primed, but the reverse pattern was obtained when value was active." (Deval et al. 2012)

Rather than repeating the study conducted by Deval et al. (2012) in a new setting, we will gather information on attributions, emotions and inferences through a survey questionnaire.

However, since the volunteer translations are free rather than low-cost and since they are produced by volunteers whose motives can be assumed to be altruistic, free translations will be introduced as an additional variable to low-cost translation. The expectation is that the free volunteer translations will be viewed in a more positive light than low-cost translations and that attributions will be more positive.

The second part of the study will present participants with multiple translations which were done by expensive, low-cost or free volunteer translators. Participants will be asked to evaluate the translations and select their preferred one, as well as rank translations according to quality. No guidelines on quality or definition will be provided. Some of the translations will include information on cost, while others will have no such information as a control set. The expectation is that the information on the cost of translation will impact the perceived quality of participants and that both, expensive and volunteer translations will be favoured over low-cost translations.

Question 3 will be investigated through case studies and literature research for other volunteer communities. For the Trommons community, a CoP has been suggested to a part of the community and its formation will be supported as far as possible by the authors. The process of forming the CoP and discussions around quality definitions and measurements will be observed and recorded for a further case study.

However, the potential limitation of this approach lies within some limitations in CoPs themselves. One aspect is that CoPs cannot be formed or established but its spontaneous emergence and development can be supported. (Roberts 2006) This means that potentially, no CoP will be emerge for the Trommons community. In addition, the predispositions of the CoP members might impact the direction the discussions take related to quality. (Roberts 2006) These predispositions could lead to the CoP becoming static or great diversity leading to conflict. A lack of diversity could lead to oversimplification and unimaginative solutions. Some, but not all, situations can be positively impacted by providing new impulses or encouraging conflict management.

Finally, a challenge to the CoP could be that of spatial reach. This is especially relevant when considering the differences in managing hard and soft knowledge. Hard knowledge can be easily articulated and captured while soft knowledge is based on experience, internalized work knowledge and tacit knowledge like how to use a word processor. While managing hard knowledge is well established, sharing of soft knowledge poses greater problems. (Hildreth et al. 2000)

Within traditional CoPs, practitioners use story telling in order to exchange information, help newcomers move from the periphery of the CoP to being a fully participating member of the community and in order to solve problems collaboratively or in short, to share soft knowledge.

To some extent, it is possible to record this soft knowledge and transfer it to a distributed environment, but it may not be as simple since the listener needs their soft knowledge to interpret the stories. (Hildreth et al. 2000)

One advantage the Trommons community has in regards to spatial reach is that the domain (translation/localisation) does not require situated knowledge creation and problem solving; instead it is inherently suited for a distributed exchange due to its contents generally being written text in digital format. However, it could be expected that facilitation of participation might pose a challenge in the creation and evolution of the CoP, as well as in the development of a sense of trust and identity. In addition, where a local CoP will face a natural element of peripherality with newcomers joining on the periphery and moving to be participating members as they gain knowledge of the domain and trust within the CoP, a distributed CoP for Trommons would also face physical and temporal periphery, which would likely have an impact on the notion of participation as well as the manner in which knowledge is shared and developed. Depending on whether the CoP will be successfully established and generates output that can then be used for further research, question 4 will be answered by repeating the study outlined for question 2, with either of the following variables added:

4.a - Participants receive information on the quality definitions formulated by the Trommons community, and will be asked to evaluate perceived quality based on whether the translator has used the quality definitions for their work or not.

4.b - Participants receive information on quality definitions based on those formulated by other volunteer translation communities as well as standards commonly used in the localisation industry. Participants will be asked to evaluate perceived quality based on whether the translator has used the quality definitions for their work or not.

We welcome and appreciate thoughts on the research outlined, especially on the questions we are asking and the approach used to answer them.

5   Acknowledgments

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Community in dementia care and the role of familiar technology

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Abstract. People with dementia living in publicly-funded long-stay units constitute an in-between community: one whose members do not (typically) wish to reside alongside one another, but whose circumstances dictate that they must. This paper discusses, with reference to a longitudinal ethnography exploring life in dementia care, the tensions which are created by this sort of in-between living, the novel ways of being which community members negotiate with one another, and ultimately, the potential for moments of connection and belonging in community, which are, in the care unit, very often mediated by everyday technologies such as television and music players.

1 Living with transition

Common conceptualisations of community entail a group of people who are united by common interests or circumstances; moreover, the word can carry a connotation that the community itself is something that is valued by its members or something which is entered into voluntarily. In terms of HCI projects interested in community life, McCarthy & Wright (2015) warn against reified notions of community – community, they suggest, is constituted by the lived experiences of its members, in the ways of being which these members perform, always in dialogue with each other. Using Probyn's notion of 'outside belongings', they describe how the experience of belonging in community is often one which is more complex than a notion of being on the 'inside' or the 'outside' – an experience of life in community may see people living 'in between', instead.

Unable to live independently or with families or friends, people with dementia are often placed into care as the condition progresses. In Ireland, a large percentage of those living with dementia who do not live at home live in publicly-funded care units (Cahill, O'Shea & Pierce, 2012), which are typically not built for the purpose of housing those with dementia, and which, in recent years, have suffered from a lack of resources. Although such care homes tend to provide a safe, warm environment, concerned with the health of its residents, and offering appropriate medical care, life in such situations can be dissatisfying for people with dementia.

One of the primary issues with life in care for people with dementia is the experience of living communally with strangers, usually for the first time in their lives. Compounding this experience is the nature of the condition itself: not only are residents waking up every day in an unfamiliar environment, surrounded by others, but the cognitive deficits inherent to the condition mean that residents also do not tend to have the ability to remember where they are, who these strangers are, and thus life in care can occasionally be alienating, distressing and unsatisfying. In this setting, although these residents are indeed a group of people united by several similarities – age, disease, and most notably, geography – and who spend much of their lives alongside one another, it is difficult to consider them as a coherent and conventional community.

2 Life in care: insights from the literature

Previous ethnographic research into the lived experience of residents of dementia care indicates that residents of care homes can often, at first, be unhappy with their placement in the care home, resulting in a period of restlessness which can last several months and see the resident engaging in 'challenging behaviour' – in particular, an often incessant search to escape the unit (Amieva et al, 2010). This period is also characterized by a lack of engagement with other residents, or indeed a sense of exclusion from other residents; however, after some time in the home, residents tend to acclimate somewhat to life in care. A paper by McColgan (2005) describes how residents in dementia care use creative 'resistance strategies' to navigate a life in care that's lived communally and not necessarily under their terms. This includes pretending to be asleep in order to not have to talk to certain people, refusing to characterise themselves as belonging to the care home, and claiming certain space in the home for themselves.

Much research on social interactions in dementia indicates that having a healthy, active social life (including meaningful participation in community life) is protective against dementia (Padilla et al, 2013); however, relationships tend to dissolve after a diagnosis of dementia, which has led many researchers to conclude that people with dementia suffer from deficits in social cognition which render the formation of new relationships extremely difficult if not outright

impossible (Snowden et al, 2003). Research such as this suggests that life in care may be bleak indeed; however, work by Sabat & Lee (2011) challenges the notion of a deficit in social cognition and instead posits that relationships in dementia are simply experienced and formed in different ways than before the condition. They illustrate this with evidence from an ethnographic study of life in a care home, where two female residents form a sustained companionship which is enacted in unconventional ways – for example, these ladies do not know each other's names, but save seats for each other at teatime as a matter of course. Meanwhile, other residents enact community, but in performative, ineffable and less explicit ways – one resident apologises for blocking the view of others at a film screening by miming sawing off her head, for example. However, social life in dementia care can lead to the formation of in- and outgroups: research by Sandhu et al (2013) has indicated that relationships in dementia care form along lines of 'functional similarity' – that is, residents who are at similar stages of dementia will tend to form relationships, while those whose dementia is more progressed will be excluded.

Some design research has attempted to engage with the problems that are often concurrent with living life in a nursing home – projects such as the Photostroller (Gaver et al, 2011) and the interactive art exhibition Tales of I (Wallace et al, 2012) have created technologies which aim to facilitate and create spaces for sharing and 'chat' for people living in nursing homes. The project that this paper begins to describe builds on the knowledge these contribute, but in contrast to these papers, this project is interested in naturally occurring moments of community for people with dementia in the nursing home, informed by extensive ethnographic research. Such an understanding will serve to enrich any future design research in the home with a fuller understanding of configurations of community for these residents as it existed prior to any design intervention.

Being with others at this time, as mentioned above, is particularly difficult: not only is it a time of illness, and for many, a time of separation from family and friends, but, with the transition into care, it is also now a time of change and upheaval – leaving a family home to live communally with strangers. Literature indicates that this does not necessarily mean that the experience for every resident is a lonely one; however, work has tended to focus on single experiences or on 'pockets' of relationships in care. The remainder of this paper will discuss a doctoral research project exploring the experience of belonging in dementia care with regard to residents' participation in community, how this sense of belonging and unbelonging in community unfolded and ultimately how it was facilitated through the use of everyday technologies in the care unit.

3 Method

3.1 Setting

The dementia care unit ('St Eithne's') involved in this study was a publicly-funded long-stay unit in a community hospital The ward consisted of a large parlour and a day room, two outdoor gardens and two communal dormitories where residents slept. Throughout the course of the ethnography, 8-10 full-time residents lived in the unit, with 3-5 day residents visiting for 6-8 hours a day, 2-3 days a week.

3.2 Design

This study used ethnographic methods in order to capture a deep insight into life in dementia care. I entered the care unit for 4-6 hours, 2-3 times a week across a period of about a year (2013-2014). In these settings, observations were made of daily life, carers were informally interviewed, and creative workshops were held within the unit.

4 Enacting community in dementia care

The following sections will detail some of the thematic evidence which emerged from the research concerning the experience and enactment of community life in the dementia care unit.

4.1 Community as given: tacit responses to communal living

Although some residents (particularly new and anxious residents) were occasionally dissatisfied with life in the care unit, as a whole, residents tended to 'get on' well with each other. Although there were occasionally certain underlying tensions regarding some aspects of communal living (i.e., sharing a dormitory) or carer intervention (i.e., being helped to bathe by a carer), the mood of the unit was seldom adversarial or unpleasant.

Instead, the 'feel' of life within was one of quiet amiability – residents tended to co-exist with one another happily enough, but did not often engage with one another beyond everyday chat. Most days were spent passively, watching television for much of the day, or occasionally carrying out group activities organised by carers (i.e., painting or baking). Residents would also display social niceties to one another – for example, one resident would pull a chair out for another to sit in, would say 'please' and 'thank you', and at mealtimes, residents

would ask to be excused from the table. Although such interactions may not seem particularly communicative, they are indicative of the sort of community which residents saw themselves engaged in: one which is respectful to others, but not necessarily close.

4.2   Friendships formed in dementia care

Despite this lack of closeness in everyday interactions between residents, certain friendships did form in the unit. Perhaps the most developed friendship I witnessed during my time in the unit was one between Val and Moira, two female residents who had been in St Eithne's for several years by the time I entered the setting. Moira was a particularly nervous resident – she withdrew from almost all social interactions with other residents, and having become settled in the unit, disliked change in her environment. Val, on the other hand, was a vivacious resident who easily engaged in chat and prized her independence. Nevertheless, Val would 'take care' of Moira in many ways – she would gently coax Moira into participating in larger group activities, but if Moira were unwilling to engage, she would remain sitting with Moira to provide companionship. The two sat together almost every day, and Val would frequently read aloud the paper to Moira, who was had problems with her sight.

4.3   Unbelonging in the care unit

Much like the findings of Sandhu et al (2013), and although the mood of the unit was typically amiable and peaceful, certain residents in the unit faced exclusion from the larger group due to their dementia being at different stages, or due to behaviour that they exhibited that was strange or irritating to the larger resident group. This exclusion affected two resident subsets who, because of this, constituted de facto 'outgroups': those who were new to the unit and those whose dementia was particularly severe.

Residents entering the unit for the first time were often unsettled and frequently tried to escape the unit. During my time in the unit, one resident, Yvonne, was particularly affected by her move to St Eithne's, and would spend much of her day attempting to escape the unit, or believing that the unit was her family home and thus interacting with the unit as though it were her own house. This behaviour disturbed and irritated the other residents as she weaved behind their chairs to try windows and began to close doors so as to prevent her cat from getting out: the larger resident group would shout at Yvonne and tell her to 'get away', which upset and alienated her from the group further.

Residents whose dementia had progressed to a severe stage were also often excluded from the larger resident group due to difficulties in verbal communication; often, these residents had illnesses as well as dementia, which often saw their behaviour being similarly 'disruptive' to the status quo of the unit.

Early in the ethnography, one resident, Lizzie, was often in pain and would call repeatedly for the nurse; not understanding this pain, other residents would scold her for raising her voice and even threaten to hit her if she would not be quiet. Other residents who were blind or had trouble communicating verbally were not as forcefully excluded from the larger, more settled resident group, but nevertheless, did not participate in group activities as much, and spent a significant amount of their time alone, except for carers.

4.4   Community 'moments': music and togetherness

The previous sections have described the community of residents in the unit as a somewhat fractured one; although willing to engage in low-level community interactions, individual differences in dementia meant that meaningful participation was often experienced only in one-on-one interactions between smaller groups of residents. Although I had initially run some art workshops with residents, I found that residents did not tend to engage with these activities. During the course of the ethnography, however, it became clear that residents engaged much more with music than art: they both seemed to enjoy music much more and it prompted an engagement with each other that had been hitherto lacking. What is more, this engagement was facilitated and mediated by everyday technologies within the unit itself – a TV and DVD player combination as well as a music player as well as a small media library of about five DVDs and ten CDs. The final sections will briefly describe some of these interpersonal and community interactions that occurred within this space.

4.5   Group participation

Carers knew that music was important for residents, and thus would put on particular DVDs for residents almost daily. Music could enliven a previously passive room by virtue of the participation of some becoming the participation of all – one resident in particular, Claire, enjoyed singing along to music, but in particular, enjoyed encouraging others to do the same. She would cheer and applaud as residents listened to music, shout out 'yoohoo!', and attempt to get other residents involved as well. Though initially her behaviour seemed to be amusing to these residents, it would often spur them on to sing, cheer, and applaud in the same session.

Group participation in music sessions, however, could be something even more subtly contagious than the participation spurred on by Claire: once one resident began to sing, it was likely that other voices would join. This carried over into more subtle, bodily participation such as touch and tapping.

4.6 Tapping, touch and dancing

As verbal communication wanes in dementia, other forms of communication tend to rise to the fore. In the music sessions I observed in the unit, engagement with familiar music saw residents participate and 'tap along' using their fingers and their feet. During these music sessions, residents would tend to seek each other out by reaching for each other's hands and swaying along to music.

Music also acted as a 'script' for activities and interaction which otherwise would not have happened in the unit – one day in June, Claire and another male resident, Larry, got up from their seats during a viewing of 'Singin' in the Rain' to dance together for several minutes before collapsing into their seat and chatting for the remainder of the film. These two residents had not met each other before, and though Claire was enthusiastic about music, they were both typically introspective. However, music allowed for a performance space for the two which not only allowed them to engage in an activity together, but which also allowed them to connect afterwards.

5 Discussion and conclusions

There has been some design research that has centered around attempts to facilitate social connection in institutions meant for elderly people or for people with dementia; however, this research has focused on the creation of new technologies which, while offering several outstanding benefits in terms of the range of interactions possible, is still typically unfamiliar to residents. Beyond this, although these technologies often facilitate reminiscence, they do not tend to engage residents in participative activities and their use remains relatively individualised.

This paper positions people with dementia living in care as a certain kind of community – one, perhaps, which is occasionally fractured and whose members do not necessarily wish to live with one another. The following observations, we feel, may serve to flesh out the design space in these settings:

(1) 'Conventional' community in care is tacit and performed by residents, but not necessarily felt or highly intentional;
(2) Friendships can form – and persist – in care, but these friendships are unconventional;
(3) 'Unbelonging' in community is frequently experienced by certain members of the resident group – however, this is something which shifts and changes;
(4) Gathering around familiar technologies – i.e., music, television – is frequently active and participative for residents of care.

The importance of music for residents within St Eithne's became apparent very quickly. For this generation, it is likely that music, dance, and singing were activities which were much more common interests in their youth than photography and art, which are often the centre of participative HCI projects with vulnerable persons. Moreover, the fact that interaction in this 'musicked' space was mediated by engagement with everyday technologies (available in many such units) such as televisions and CD players has certain practical implications for further design.

With a lack of staff time and resources, it is possible that the mindful use of everyday technologies in publicly-funded care units could improve activation and participation in activities for residents who otherwise spend much of their time passive, alone, or engaged only in individual activities. Sensitive and experience-centered design of new technologies which retain the familiarity of televisions and music players yet which place an emphasis on forms of participation such as performance, group interaction, touch, and inclusion of often-excluded others might indeed be a fruitful avenue for designing to enrich the experiences of residents of dementia care.

6 Acknowledgments

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Discount Expertise Metrics for Augmenting Community Interaction

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Abstract. Community members would benefit by finding others who can answer questions or provide assistance. We want to find new ways to help find people who have expertise by creating metrics that can easily estimate expertise. In this paper, we explore discount expertise metrics that are easy to obtain and use. We present one such discount expertise metric that uses people's browsing history to estimate technical expertise. In a study of 26 users, we show that this metric can distinguish experts and novices from others. We also validate this measure by comparing it to the ground truth about our users. We also discuss the possibilities in using measures like this, based on digital traces, to augment interaction within online communities, for example, gauging newcomers in a community of practice or evaluating people in a learning community.

1 Introduction

Expertise finding is important for communities of practice and communities of interest. These online communities allow people around the world to connect and work for common goals. In both, members often need to identify experienced colleagues or individuals with the right expertise to answer questions or provide assistance. For example, people can find answers to technical questions (Mamykina, Manoim, Mittal, Hripcsak, & Hartmann, 2011) or connect to other patients with similar problems (Civan-Hartzler et al., 2010; Huh & Ackerman,

2012). However, finding people with the right level of expertise can be challenging in these environments.

Existing approaches to evaluate expertise often lack the flexibility to adapt across time (e.g., by using a user's static profile) or are labor intensive (e.g., having profiles constructed from user content), requiring a considerable amount of content to be contributed by users. Many existing approaches have the issue of maintenance (Ehrlich, Lin, & Griffiths-Fisher, 2007).

We would like to develop a simpler way to measure expertise. We call these measures *discount expertise metrics*. In this paper, we examine one such relatively straightforward way to infer users' expertise that is based on online browsing. We targeted technical expertise, because that is a simpler case to study. In our approach, we identified several features from browsing history data that provided a good correspondence between an individual's expertise and the content she consumes, specifically pages she visits online for information.

We collected browsing history data from 26 participants, from beginners and intermediates to experts in natural settings (e.g., working on their own technical projects). In addition, we interviewed these participants to understand their programming experience. With the understanding of participants' experience and the data about programming related sites they visited online, we demonstrated that it is possible to automatically infer people's levels of technical expertise based on their browsing history.

In the rest of the paper, we first review the related literature and discuss why a new approach is needed to estimate people's expertise. Next, we present the study's research question and methods. Finally, we discuss the results and future work.

2 Related Work

Expertise finding has been identified in the literature as an important tool for facilitating interaction within organizations or online communities. A member in a community usually specializes in certain domains and thus acquires specialized knowledge that is hard to obtain otherwise. People looking for help are likely to find it beneficial to seek help from a person with the required expertise.

McDonald and Ackerman (1998) identified three types of processes during expertise finding: expertise identification, expertise selection, and escalation. Estimating people's expertise is a major component of expert identification. To help find a suitable person with the correct level of expertise, we need to estimate expertise of possible helpers.

To estimate expertise, three types of data and corresponding mechanisms have been proposed for expertise estimation. The first type of data contains descriptions about a person, i.e., the "profile" approach mentioned above, where the profile is manually produced by the person or others. This type of data usually

includes information about the person's expertise (e.g., topics that this person specializes in), generated by the person, friends, or colleagues (Farrell, Lau, Nusser, Wilcox, & Muller, 2007).

The second type of data used to estimate expertise includes artifacts produced by a person (e.g., documentation), the "artifact" approach. This type of data such as posts on an online discussion forum (Nam & Ackerman, 2007) might not directly specify what the person is good at, but by reviewing the data, people are likely to understand what kinds of topics or areas on which this person focused.

The third type of data for expertise estimation is generated from the interaction with others in the community or outside the community (e.g., email conversation or forum discussion), the "interaction" approach. This type of data emphasizes interactions concerning a specific topic or problem, and thus will often highlight a very specific area in which the people involved in the conversation specialized. The data enables the possibility of differentiating questions askers (less expert) from answerers (more expert). Various studies (Hanrahan, Convertino, & Nelson, 2012; Zhang & Ackerman, 2005; Zhang, Ackerman, Adamic, & Nam, 2007) have shown that discussions through email, online forum or online Q&A platforms can be used to analyze the expertise of people involved. These methods have the potential to match questions and people who can answer them.

While the above studies demonstrate how different kinds of data can be used to infer people's expertise, these approaches have several limitations. The "profile" approach requires people to contribute to their own profiles or others', thus requiring continuous effort to keep the data updated. The "artifact" approach requires people to spend a considerable amount of time documenting their work, which might not be always possible. The "interaction" approach has the drawback that estimates are not available for those who have not participated in the interactions. In addition, the use of interaction data can also raise concerns about privacy. These disadvantages might not disappear even for a hybrid approach (McDonald & Ackerman, 2000; Reichling & Wulf, 2009).

To address these limitations, our approach provides a universal way to estimate levels of expertise on different subjects using browsing history with the following advantages. First, many users of the Internet consume content but do not contribute. This type of users can be accommodated and an estimation of their expertise can be provided. Second, our approach provides continuous and updated estimation of people's expertise on different topics as long as they visit relevant web pages on the Internet. Third, applications using our approach for searching expertise do not require people to interact with one another. Using technical expertise as our target population, we seek to understand the pros and cons of such approach in this paper.

White et al. (2009) had a similar approach. They investigated how domain expertise, including that of computer scientists, might affect people's search behavior. Their definition of experts in the study was defined, however, as people

who visited a pre-defined list of sites about algorithms and programming, where as novices are people who look for information to customize their desktop computers. We are interested in uncovering more about how people's behaviors differ across more fine-grained levels of expertise, rather than using a dichotomy between expert and novice. As well, having predefined lists of web pages does not scale appropriately. Nonetheless, their way of defining experts seems to indicate the potential of an approach that uses the web pages as signals to estimate levels of expertise.

3   Method

The research question, then, we seek to answer in this project is: Can we use the digital footprints (e.g., browsing history) to estimate levels of technical expertise?

We specifically looked at programming. In order to verify our assumption that people at different levels might exhibit different site visit patterns, we recruited people from the Ann Arbor area through presentations in college programming courses for non-computer science majors, local programming meet-ups, email lists, and snowball referrals, to recruit participants with various levels of experience.

Through this approach, we collected browsing history from 26 people (11 male and 15 female), from beginners, intermediates, and experts in programming and other technical tasks to participate in our study. The majority of them (24) consisted of students, including undergraduate, master, and Ph.D. students with diverse majors, ranging from Russian, economics, to computer science. Two were professional programmers. We provided them with the software we developed, BrowserHistoryTool, shown in Figure 1. Participants could use the tool to clean their browsing history and submit the cleaned data to our server, so as to minimize their privacy concerns. This software allowed users to selectively view and filter their browsing history records and to specify which records to upload to the server maintained by the research team.
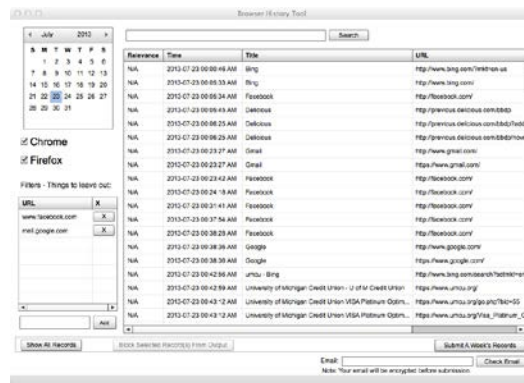

Figure 1. The BrowserHisotryTool for participants to clean and upload their browsing history.

With the tool, we collected between 2 and 4 weeks browsing history from each of our participants. In total, we obtained 201,700 records. The records consisted of 1) URL, 2) title, and 3) timestamp of when each page was visited. The length of the period was selected under the assumption that programmers' levels of expertise would not change much during the period, and yet we wanted to obtain enough data to characterize the participants since some of them, especially the novices, might not perform technical work every day during the week. In addition, we had a 30-minute semi-structured interview with each participant to collect data about their programming and technical experience.

We designed the rating scheme for expertise as shown in Table I, based on earlier work (Zhang et al., 2007). This rating scheme considered technical education, internships, and professional experience. The ratings are cumulative, meaning that people who satisfied multiple criteria will increase their scores. The data were used by the research team to generate the ground truth of the participants' levels of expertise.

Level	Experience
+5	6+ year professional programming experience
+4	4+ year professional programming experience
+3	Computer Science (CS) training, or 2 - 3 years professional programming experience
+2	Electrical Engineering (EE) training, 1 year professional programming experience, or 3 - 4 years assistant/part-time programming experience
+1	Learning programming for the first time/year

Table I. Rating scheme for programming expertise.

As suggested by previous research on programmers' information seeking behavior online (Brandt, Dontcheva, Weskamp, & Klemmer, 2010; Hanrahan et al., 2012), people regularly visit the following types of pages during the process of programming (or debugging): Document, Tutorial, Blog, Library/Repository, Q&A, Forum, and Search. We reviewed 1000 randomly sampled records from participants' data and confirmed that these were the types of pages that our study participants visited.

The analysis consisted of the following steps: 1) labeling a subset of data, 2) training binary classifiers for each type of web page 3) labeling all the data using the trained classifiers, 4) extracting features (i.e., page types) from labeled data, and 5) creating classifiers for the users' level of expertise.

To acquire the training data, we iteratively obtained a random sample from our data and manually labeled each page until we acquired enough training data

(about 250 records for a category). After excluding non-English pages, we calculated the tf-idf vector for each webpage using uni-grams and bi-grams. The vectors were then used as input data for Linear Support Vector Classification to generate a binary classifier. We followed this approach to train the binary classifiers for all the page types (e.g., Document).

With each record being labeled with their page types (e.g., Q&A and tutorial), we computed the page counts for each type for each programmer. We then obtained a normalized vector representation from the page counts for each programming page types for each programmer and compared it to the ground truth as rated by the research team.

4   Results

At first, we attempted to create a classifier that used logit regression (similar to simple Bayesian classifiers) to determine the participant's level of expertise. However, the relationship between the level of expertise of a participant and the types of pages he visits is more complex than we originally thought.

Instead, we found that we could obtain a useful indicator by simplifying the problem. We defined a simple 'novice' classifier based on whether over 80% of their page visits were in the tutorial category. All participants classified as novices by this classifier, were rated by the research team as novices (level 1 or 2), as shown in row 1 in Table II. This gave us a conservative classifier, in that there were no false positives, although at the cost of having many false negatives (i.e., it missed people who should have been classified as novices). The results are consistent with our intuition that, for beginners, step-by-step tutorials would likely be useful for them as they are trying to figure out not only the practices but also the general knowledge of programming.

Novice Classifier	Ground Truth	Probability
Yes	Novice	4 of 4
No	Novice	4 of 13

Table II. The classification result by the 'novice' classifier. All the programmers classified as novices were also rated as novices by the research team.

Similarly, we were able obtain a classifier to conservatively identify people with high expertise. All the participants classified as experts by this classifier were also rated by the research team as experts (level 4 or 5), as shown in row 1 in Table III. This classifier primarily looked at code libraries and Q&A websites. One possible explanation is that experienced programmers would want to seek

libraries and packages written by others to avoid reinvention, and they are likely to consult Q&A websites for advanced and specific questions that are not addressed in tutorial pages.

Expert Classifier	Ground Truth	Probability
Yes	Expert	4 of 4
No	Expert	5 of 13

Table III. The classification result by the 'expert' classifier. All the programmers classified as experts were also rated as experts by the research team.

While we could infer whether a programmer was a novice or an expert, it was difficult to infer whether a programmer was what we called 'intermediate'. For programmers who were rated as level 3, their visit patterns were mixed. For example, out of 9 participants who were rated as 3, three of them spent over 60% of their visits on tutorial pages (2 of them over 80%), while 4 of them spent over 60% of their visits on library, repository, and Q&A pages. This is not surprising since intermediates consist of people who have left their status as beginners and are still in the process of being proficient in programming. As a result, their visit patterns would involve traits of beginners, but also display some traits of experts gradually as their expertise increases.

5   Augmenting Community Interaction

With these initial results, we would like to discuss a few opportunities that the similar expertise metrics might present for augmenting communities as we mentioned in the introduction. First, the metrics could provide an initial estimation before a new member initiates any interactions within a community of practice or a community of interest. When someone wants to join a community of practice, for example, existing community members could use the metrics to more easily gauge the expertise of a new member. This could smooth the process of entering a Q&A community of practice since the metrics could quickly create a representation of expertise using only the user's browsing history.

Second, similar metrics could track the progress of expertise development after entering into Q&A or learning (e.g., MOOC) communities to provide an up-to-date estimation. For instance, the metrics could help to track learning progress or expertise development as students progress throughout courses. As well, these metrics could be used to pair students for discussion or group projects based on their levels of expertise.

The above uses of expertise are available with any measure of expertise, but *discount* metrics of expertise allow many more people to be ranked for a community of practice or a community of interest. Since many users of the Internet consume content but do not contribute, discount metrics would lead these communities to be more inclusive.

Finally, it should be noted that similar metrics could be used across communities. The metrics could also help create ad-hoc networks of people. For instance, a platform might use discount expertise metrics to create teams of suitable programmers to solve technical problems or to facilitate collaborative problem solving.

6   Future Work

The initial analysis that applied logit regression, a form of linear regression, to the data suggested that the relationship between programmers' levels of expertise and their page visits might be more complex than a linear relationship. For future work, we want to consider ensemble methods such as boosting so as to develop better classifiers for level of expertise and also for programming-relevant web pages, focusing on hard-to-classify examples. It may also be possible to use the visible content (e.g., words) and the page structure (e.g., HTML DOM tree) as training data to improve our classifiers.

In this study, we could not use the search category because search engine optimization prevented us from obtaining the same content as programmers and the proportion of search queries did not correlate well with the levels of expertise. Future work could consider including factors such as search result snippets, search sessions, and longer-term search patterns or trajectories into new metrics.

While the results generally aligned with our intuition, there were some interesting nuances about technical expertise that we noticed that we would like to follow up. For example, in our study, there were three programmers, identified as intermediates or experts, who exhibited behaviors belonging to what we expected from novices (e.g., visiting tutorial pages more) as they were learning a new programming language. To incorporate this variation, we have considered two additional studies: (1) a longitudinal study (e.g., 6-12 months) that could monitor the possible changes of expertise and (2) a study that separated estimating expertise for different programming languages. Combining these two approaches might allow us to better examine the nuance of how programmers' expertise might change as reflected in their browsing traces.

7   Conclusion

In this study, we have demonstrated the potential of using people's browsing history to provide a *discount expertise metric* estimating their levels of expertise. By collecting and analyzing the browsing history of 26 programmers, we showed that people's visits to topic-relevant web pages could be one useful indicator of their expertise. We discussed several opportunities of using these metrics to augment community interaction at different stages and for different purposes, for example, gauging newcomers in a community of practice or evaluating people in a learning community. Future work includes improving classification performance, performing a longitudinal study to monitor expertise changes, using programming language detection for estimating technical expertise about different programming languages, and analyzing query logs.

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9   Acknowledgements

Reflecting User-Created Persona in Indigenous Namibia – what NOT to do when working in foreign land

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Abstract. This paper presents the initial experiences and reflective accounts on the arrival of a European research colleague who recently joined our team of researchers working with Indigenous communities in Namibia. He aims to explore how communities across Namibia take on, understand and create persona artefacts of their own, and whether this may simulate or differ from persona as depicted in literature. We report on the first set of interventions in three pastoral locales where persona creation by Namibian Ovaherero was first attempted. We narrate this as a synchronous dialogue that recounts the blunders, protocol-breakings, misunderstandings, and also some breakthroughs obtained thus-far. Ultimately, we reflect on the importance of the preliminary preparation of the researcher and on the usefulness that local experienced researchers' guidance provides. We conclude drawing on a series of thoughts on how the overall experience has resulted thus-far.

1 Introduction

As modern technology advancements usually come from Westerly-biased settings, many researchers and practitioners equally tour the world deploying methods originated in such milieus. This is in sharp contrast with accounts where Occidental approaches have proven unsuited in locales such as rural Kenya (Walker et al., 2008) or pastoral Namibia (Winschiers-Theophilus, 2009). To palliate this phenomenon, researchers and practitioners may well strive to conceive and explore methods, tools and techniques that facilitate understanding and an effective communication of people's needs, requirements and aspirations regarding acceptable uses of technologies as experienced in diverse ethnic locales.

Here we describe and reflect on the initial experiences of a European researcher who has recently joined our research team working with Indigenous Namibian communities. His research proposal originates from the lack of empirical persona research in general (Nielsen and Hansen, 2014) and the greater paucity of persona in non-western settings in particular (Nielsen, 2012). He attempts to find out how communities in pastoral Namibia take on, understand and create persona artefacts of their own. This he positions as User-Created Personas (UCP) that ultimately aim to explore what goals of User Experience (UX) such persona creations may provide, and whether these may simulate or differ from personas a la Western (G. Cabrero, 2014).

In spite of the continuous guidance and support offered by local and other researchers, our colleague initially arrived to these sceneries with a strong wiring and an embedded sagacity based on his Western upbringing an experiences.

> "Despite the synergies created and the results obtained so far (G. Cabrero, 2015), my initial arrival to foreign land resulted in one of the most guttering and stressful experiences I have ever gone through."

We hence collectively reflect upon the blunders, protocol-breakings, misunderstandings, and the breakthroughs obtained thus-far. We ultimately attempt to offer an honest account on where to enter and not, and how to proceed without harming or interrupting, but constructing and progressing on the research.

2 Indigenous Namibia

There is an ample long-term body of HCI research in Namibian rural settings scaffold from and summarised in (Kapuire et al., 2015). These experiences allow researchers wishing to work in these settings to draw on previous findings and to attempt supporting current needs, while perhaps also exploring the still unknown. Lack of empirical persona research in triggers this exploration on how pastoral Namibians take on, understand and create persona artefacts, and whether these

may help to communicate needs, requirements and aspirations relevant to users and design professions alike. Ultimately, we aim to deploy the potential personas towards the development, design and deployment of an Indigenous Knowledge crowdsourcing system (Stanley et al., 2013), and also to compare whether they may simulate of differ from current persona depictions in literature.

It must be noted that at this stage in the research process we aim for exploration, alternatives and ideas on methods to deploy to engage communities in UCP, rather than to obtain complete upfront artefacts in one single attempt.

In October and November 2014 three studies, hence, were initially carried out in Okomakuara, Otjinene and Erindiroukambe - three Otjiherero speaking villages where Ovahereros are settled. These studies and the findings below highlight the importance of adopting a cultural openness, an understanding of the communities to work with, and a commitment to existing agendas from local research projects.

3 Face-loss in Okomakuara

This day-workshop was an event part of the PDC held in Windhoek in October 2014 where the aim was to co-design personas with locals in two complementary sessions: one on important things from past, present and future, and a second one where participants would design personas based on the above findings.

Eight local females in Okomakuara worked with two facilitators: Professor Brereton from QTU and our European colleague G. Cabrero. Sessions were filmed and audio recorded for further analysis, while five local researchers facilitated the sessions and six other researchers stood as observers (Figure 1).

Figure 1: End of the workshop in Okomakuara.

The first method was based upon *things of matter* to Professor Brereton in the form of family portraits introduced from a digital tablet, and accompanied by an oral explanation on who those photographed were, and why their importance to Brereton. Participants readily took on the discussion. Yet, introducing *nice* family depictions led to a pre-defined route whereby they equally stated *nice* things on their families, and no other issues of further relevance.

The session evolved into finding on other pleasant things in participants' lives. When asked about flowers, a participant conveyed these as providing her of pleasure in looking after, and contemplating them. Her daughter, also a participant, stated flowers as likable too. The rest of participants then followed this route in stating flowers as pleasant. Yet when further enquired, aside from mother and daughter, no one cultivated flowers. The session, hence, got entangled into common agreements and nice, not relevant things of matter.

Cabrero deployed a complementary method inspired on *Fantasy Personas* and their use of props to fantasize technological tools (Light et al., 2009). However, no props had been previously gathered, and this got repurposed as an oral recount of needs and aspirations participants envisage as things of matter.

"It was at this point one of the ladies referred to me asking if I knew who they were. Inside me, an initial sense of panicking unleashed as I started thinking I may have offended the participants in questioning them about things they would like to see changing in their lives at present.

So I then I responded assertively they were Hereros and waited, anxiously!"

The cultural reassurance led the mother above to rapidly state that since widowhood, it is now her brother who looks after her cattle as this is the traditional way. She nonetheless expressed a desire to get her cattle back, as she argued feeling hopeless in decision-making, and that she aspires to grow her cattle in numbers so she can make better business than at present. Her daughter, furthermore, stated a desire to own a computer to help managing the cattle.

Cattle are basic and traditional means of survival and trade for Ovaherero, as well as a means for the male to find recreation in its contemplation. However, in a changing society where values and logics evolve and the technological gap between elder and youth widens, the mother conveyed a desire towards a positive change in attitudes regarding male-female traditional roles in decision-making, while the daughter additionally hinted technology as apt for such change to occur.

Unfortunately, the above did not evolve into further detail as that day, and as life goes, there were two weddings in Okomakuara, and participants needed dressing accordingly for the occasion.

No persona hence emerged from this workshop, though it was an enriching and productive experience in approaching Ovaherero communities for the first time through co-design. Equally important, the methods provided dissimilar tangible

and implicit outcomes that inspires for future interventions including *nice* things for a start, but also to kindly search for further implicit cues.

4 Rapid-Ethnography in Otjinene

This weekend-long intervention sparked from an ongoing project funded by the Wikipedia Foundation. Three Wikipedians from Namibia, South Africa and Botswana aimed to go in the wild and collect first, to then appeal towards the value, thus the inclusion of IK oral tradition in Wikipedia (Gallert, 2014).

On the other hand, and inspired by Bødker et al. (2012) facilitation of users' testimonials and imagery through persona artefacts, the new researcher aimed to apply a rapid-ethnography (Millen, 2000) to collect data on things of matter at the Wikipedians' session, to then translate these into relevant statements and imagery, and ultimately propose participants to create personas based on such findings.

We run two sessions outside an elder couple's Homestead with a local researcher facilitating (Figure 2). These were documented for further analysis.

On the first day, Wikipedians run a three-hour focus-group. Questions revealed data on distribution and arrangement of the household, and that this belongs to the wife's realm, whereas external labour belongs to the male chores. Objects symbolizing the male elder's status also emerged in the way of (1)the chair he sits-on, (2)the hat he wears, and (3)the knife and (4)stick he carries with him at all times (Figure 3). The significance of the tree outside the Homestead also came from the discussion, due to the protection it provides; its provision of constant shade, and its importance in being a placing for important family gatherings.

Fig. 2: Wikipedia researchers and elders; Fig. 3: Persona-like elder portrait.

Besides they argued books as important and an unreliability of technologies for education, as these, they argued, can be modified unlike the printed book. They expressed a further concern on youth frequent encounters with alcoholic drinks.

The session finished and as planned, the European researcher went on collecting tangible objects either mentioned or implied in the above session: (1)tree branches to represent a tree; (2)an empty bottle of beer to portray alcohol issues, and (3)a used airtime voucher to depict technological needs.

On the second day foreign and local researcher revisited the elders for an hour-long UCP session where participants got first asked on the importance of the tree

"Being used to making abstractions in my daily life, I expected elders would agree and even repurpose the meaning of the branches as a depiction of the tree."

The elders reaffirmed the relevance of the tree while they were handed the branches and asked whether they would serve to depict the tree. They negated this appraisal arguing the tree as safeguarding and a vital part of their lives, whereas branches portray fire, thus also danger. When enquired on youth alcohol encounters, they were alos presented with the empty bottle of beer. They claimed an empty bottle not being suitable to portray alcohol issues, and concluded empty bottles as dangerous for they can cut and also cause fire. The telephone voucher got an similar result and the local facilitator decided to kindly end the session.

No personas emerged and the rapid-ethnography sank against cultural misunderstandings in abstractions of objects presented like branches for trees and emptied bottles standing for booze. Thus, relationships object-meaning, *signifier-signified*, did not serve the researcher's aims towards persona creation.

"Rather, this experience dissipated my aims in becoming a cultural broker due to lack of contextual knowledge and differences in understanding abstractions."

It can be concluded that motivated choices about what to study, who to observe, what activities to record, and how to analyze and integrate the data into valuable insights (ibid, p.280) are not enough in these locale, as they can readily lead to mistaken outcomes (Brereton et al., 2014) or participant disengagement.

Despite all, the female participant invited us to return to Otjinene once she had finished a dress she was sewing with her Singer machine (Figure 4).

Fig 4: Inside the homestead: showing a dress sewn with a Singer machine.

5 Rule-breaking in Erindiroukambe

This was a three-day trip where three sessions occurred in Erindiroukambe with 5 locals with experience designing with local designers; local designers themselves; a skilled designer familiar with the community, and the new European researcher.

Scaffolding from both, the lessons previously learnt and a plan previously drawn together with local researchers, UCP was the main aim of this session so as to then run a further scenario-based session where participants were intended to run the personas created towards the co-design of an Indigenous Knowledge crowdsourcing tool being developed by one of the local researchers [Colin's].

The UCP session lasted 3 hours and despite the initial plan, the novel researcher broke away from the established and begun an interview-like session aimed as an icebreaker where designing personas turned into findings on who the participants were and how they would depict themselves. As a result, participants ended-up stereotyping one another: first as Ovaherero, then as the funny, the naughty, the elder, the doctor[1] and the youngster respectively.

Stereotypes are shared across cultures as simplified, clichéd ideas functioning as social representations to categorized people who are alike (Nielsen, 2013). Note it is in applying *nothing but realistic stereotyping or a simplified outline of the user* (Katre, 2007) many hold prejudices on the value of persona (Williams and Brereton, 2014). It is then paramount to avoid stereotypes of flat characters with an only trait neither creating engagement nor identification (Nielsen, 2013).

Three hours over-talking eventually worn out participants (Figure 5), while no much relevant persona data emerged (Figure 6).

Fig. 5 & 6: Tired participants & 'Persona-Homestead': the holy-fire & a poo.

"When the session finished I learnt from my colleagues that the person self-described as "the naughty" was in fact "the doctor" due to his wisdom; whereas the one self-depicted as "the doctor" was, in actuality, "the goody" himself."

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[1] In this context a doctor is a person who acts as a savoir in the community. This person knows about cattle, car-fixing and other issues of daily life.

In the very early hours of the last day participants came back to the Homestead while all researchers except the new one were still in bed.

"I greeted participants while my colleagues still slept, and then proposed them to continue the persona co-creation where we left it on the previous day."

Participants agreed on this proposal and rearranged the materials in the sand.

"On questioning them about desires they may had on things of relevance, they pinpointed and drew elements in the sand with a stick such as a water-tap that portrayed the relevance of water towards subsistence. Since participants seemed engaged in the process, I then enquired on possible technological needs and they added solar panels to my request claiming with those they could watch TV and listening to music as well" (Figure 7).

At this point a local researcher emerged, learnt what was happening, and stated the session should stop as this type of exercise could be misunderstood as a promise in providing solar panels, something utterly wrong when this is not to be realized. The workshop hence came to an end with no personas elicited.
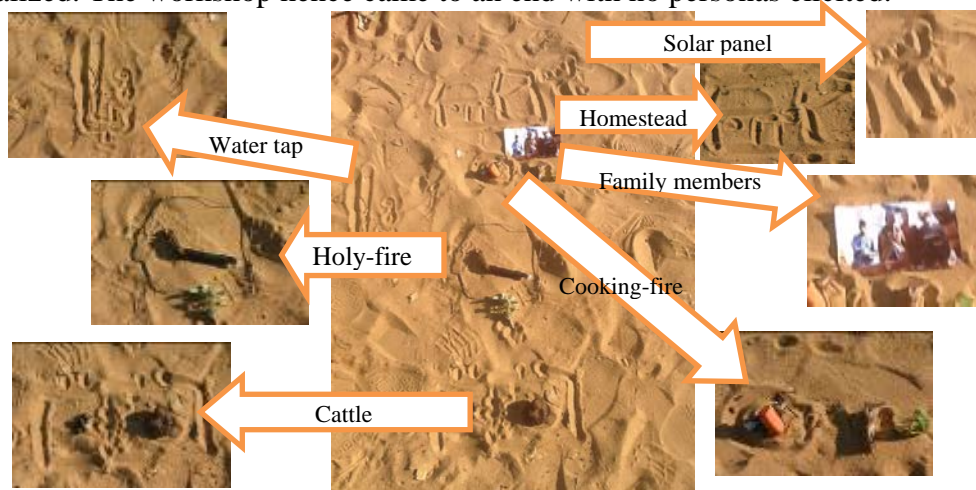

Fig 7: Personas in the sand: the augmented outcome from an illicit session.

6 Conclusions and further work

This paper reflects on a first set of interventions in different Namibian pastoral locales whereby UCP has been attempted. Blunders, misunderstandings, protocol-breakings, and breakthroughs thus-far let us draw the next set of conclusions:

"From this initial experience I learnt that in deploying foreign methods in localised cultures, one must first get well-acquainted with existing literature both, on the methods to deploy and in the locations to do so. As such, I have now found out that other researchers have already tested and re-designed artefacts such as persona for other settings (Chavan and Prabhu, 2011; Katre, 2007), and that research colleagues underwent similar past experiences (Rodil et al., 2012)."

By applying a stronger literature review, our new team member has found out, for instance, that persona research is currently, and uncontestably, being deployed following western procedures, and that this is, however, in sharp opposition to the

claim made by Chavan and Prabhu (2011) in that methods are subjective to the culture they originate in, and as such the data collected will get tainted if deploying the method in further locales with dissimilar values and understandings.

"Moreover, and provided there are local researchers at hand, it is of outmost importance to get on with them first, and then follow their guidance throughout."

The former occurs at present and the European researcher now knows and supports structures in place for his own, the team and the communities' benefit.

"Besides I've also learnt that if sensing you scratch the surface, and yet do not obtain fecund results, either end the session amicably before it is too late, or try and gently discover through suitable and localised means and solutions."

In Otjinene the Rapid-Ethnography ended before too late, and we then obtained better results in a subsequent session (G. Cabrero, 2015). In Okomakuara, however, by softly persisting relevant things of matter emerge in the one session.

"Based on the above learnings and experiences, I am happy to state I currently work in total communion with my local research team, while I try to keep my aims and those of the communities healthily, mutually and productively engaging."

7 Acknowledgments

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Using and appropriating the smart city for community and capacity building amongst migrant language learners

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Abstract. Smart cities promise citizens access to networked services to improve their urban living, whilst offering city planners and managers detailed and current information about how services are used to enable better provision and responsive developments. We explore two educational approaches that enable citizens to take advantage of network infrastructures found in smart cities and other highly developed urban environments, combined with domesticated mobile devices (smartphones) to meet their needs and build community. We focus on a group that is particularly at risk of exclusion: recent migrants to the city who are language learners. This group faces challenges of cultural, social and linguistic inclusion. Providing information resources and language learning via smartphones which are integrated into their daily routines, and leveraging a city's network infrastructure facilitates not only individual knowledge development, but also the opportunity to build communities. We suggest how technologies devised to support a top-down service provision model might also be used to enable a community managed knowledge repository triggering location-specific resources, the Open Beacons concept.

1   Introduction

The emergence of high speed urban communications networks coupled with detailed data reporting and analysis has led to the reconceptualisation of

technology supported urban environments as 'smart cities': "places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems" (Townsend 2013, p15). Over the last twenty years the term has seen widespread global adoption (Hollands 2008), emphasising the value of data reporting within urban areas to enable strategic planning and management of resources and more effective provision of services for citizens.

The emergence of powerful personal mobile computing including smartphones and tablets, and the emerging Internet of Things promising networked computing embedded in domestic devices, moves the smart city concept from large scale urban infrastructure engineering to a more pervasive, personal level. Data traces left by people as they travel around the urban environment promises highly detailed modelling of citizen activity which can be used to plan and manage public services, enable surveillance, and target commercial opportunities. A networked environment may benefit citizens, but also leads to more reflective considerations of smart cities: "urban digital networks and ICTs ought not to be seen as neutral, banal, [or] benign" (Sadoway and Shekhar 2014). There has been a move towards considering how to reimagine the relationship between people and urban technologies to ensure smart cities are smart for the citizen, as well as the planners (Hemment and Townsend 2014).

One group who are particularly at risk of marginalisation in urban environments are recent migrants; new to the city and potentially excluded through linguistic, social and cultural barriers. However for this group, smartphones can be a valuable tool in enabling inclusion, providing access to information resources and language learning on a familiar device during daily activities (Kluzer et al. 2011). The networking capabilities of smartphones enable vulnerable newcomers to reach out to other citizens and build social networks and a sense of community. These require network access, and a smart city, with its emphasis on the provision of high speed, ubiquitous network connectivity, provides the ideal place to take advantage of these affordances (Gaved et al. 2012). In this paper, we describe two projects that have been exploring how smartphones might be used in the context of networked urban environments to support immigrants' and migrants' social inclusion and language learning needs. We recognize that smart city infrastructures imply more than network connectivity, however the smart city as an exemplar provides an increasingly common and highly pertinent context against which the social, ethical and technical challenges around citizens' negotiation of urban challenges mediated by personal technologies are played out. For the authors, this focus is of particular interest as our work is carried out against the backdrop of our university town being the recipient of major research funding to explore smart city solutions to support economic growth (http://www.mksmart.org).

The MASELTOV project has been exploring a range of services to support immigrants learning through their daily activities in urban environments, while the more recent SALSA project is investigating location-triggered language learning. Each project provides opportunities for citizens to take what is often presented as a top-down provision model of services and utilise them for their own community building purposes. Furthermore, these potentially enable grassroots appropriation of infrastructure for unplanned purposes and we describe one potential development, the Open Beacons concept.

2   Smartphones for smart city inclusion

MASELTOV (http://www.maseltov.eu) is a three year European Union funded project exploring how smartphones may be used by recent immigrants to Europe support their language learning and social inclusion. A central element is the development of a smartphone app ('MApp') containing a range of integrated services that the target audience can use in their daily lives.

The aim is to resolve immigrants' immediate needs, but also to enable reflection and further planning of learning goals to help them to become integrated into their new home and work environments, particularly in urban localities. As our target audience is likely to have work and family commitments, attending formal educational classes is often difficult (Kluzer et al. 2011). An app which can be accessed anywhere and uses the lived environment as a contextual resource may therefore provide a practical alternative or complementary learning aid. MApp includes navigation tools, language learning activities, a social forum, a translation tool, and a help radar that enables the user to find local volunteers and other community members who might be near to help with a problem. Underpinning the system is the concept of incidental learning, "unintentional or unplanned learning that results from other activities" (Kerka 2000, p.1), using situations occurring in daily lives as the basis for learning, recognising the power of authentic situations and personally relevant contexts to motivate learners.

A number of the MApp services require a network connection for optimal performance; for example the navigation service requires a connection to an internet based mapping service. The translation tool can offer offline translations of text within photos the user has taken by referring to a downloaded dictionary for word-by-word translations, but with a network connection can access online services for more complex translation tasks, such as the understanding of phrases and other similar lexical chunks. Some MApp services are explicitly social; for example, the social forum which enables a user to participate in an online community of fellow learners, and the help radar, which enables the learner to find a volunteer in the vicinity to come to their aid and resolve a problem (e.g. translating at the doctor's surgery). These social elements of the service have been well received: for example, in a 2015 trial in Milton Keynes, UK, in two weeks 17

participants made 468 posts, and resolved real life issues benefitting from community support, including managing a difficult health issue. MApp, therefore, best works in a location where the user can be assured of high quality network connectivity, which enables the full range of services and enables social interactions mediated by the app: peer support and community feedback are particularly valuable in self-directed, informal learning (Jones et al. 2014). While this is achievable in many places via 3G phone network access, our target audience of low-income earners has indicated a strong preference for free network access via WiFi, as connectivity via phone networks can be costly and hence adds an additional dimension of inequality for an already disadvantaged group. This finding has been echoed in other research exploring smartphones as personal learning environments, for example Aladjem and Nachmias (2014) found that while international travelers find their smartphones can "potentially turn a city visit into a personal, active, and collaborative learning experience" (p.160), a WiFi connection was identified as "a basic and critical need" (p.163).

A smart city, with a highly developed network infrastructure (including free or low cost city wide WiFi) is the ideal location for the use of MApp, which is targeted at economically vulnerable citizens (Gaved et al. 2012). However, our audience has expressed concerns of how their interaction data from apps on their smartphone may be tracked or used, a highly sensitive issue for vulnerable and marginalized citizens such as migrants (Taylor 2014), and of particular relevance when considering networked technologies operating within an environment where user/usage data is actively sought for analysis. The approach adapted by MASELTOV is to provide guidance within the app so users can understand which options they can switch on or off within MApp, and to understand the benefits and consequences of each decision. For example, users are asked whether they want GPS tracking enabled or disabled. An information box explains that this will record locational data (and this will not be shared with third parties other than to fulfil legal commitments), but enabling this function will enable higher performance of the pedestrian navigation service, and better locational accuracy to enable faster support from volunteers responding to calls via the help radar.

However GPS can only provide locational data outdoors, and other forms of location triangulation available on smartphones (e.g. from cellphone tower signal strength) are limited in their accuracy. Given the value of location- and context-sensitive resources, we have recently begun to explore how other technologies deployed in urban environments might enable highly accurate location-based learning, potentially support community building and take into account users' concerns around privacy.

3   Location triggered language learning

The SALSA project (Sensors and Apps for Languages in Smart Areas) is investigating how to effectively provide location-specific language learning activities for learners out and about in a smart city. The project was initiated in 2014 in response to a call from the 'MK:Smart' collaborative initiative exploring new technologies for smart cities in the UK; proposals were invited to explore key themes including education and citizen engagement.

Language learning educators identify that location-based and context-sensitive resources and activities are a powerful resource for learners (e.g. Edge et al. 2011). A number of approaches have been explored to enable accurate identification of location, however they need active input by the learner, such as manually entering the location into an app (Holden and Sykes 2011), taking photos of QR codes (Power 2012) or swiping RFID tags (Ogata and Yano 2004). These add a barrier to user participation, requiring effort and often very apparent engagement with a triggering object in the location. We were keen to provide a more discrete solution that could leverage the existing functionality of a smartphone and lower the barrier to use. Feedback from MASELTOV participants has indicated that requiring the active and obvious use of a smartphone to trigger learning resources (such as taking a photo of a sign in a public place) can deter potential users from taking advantage of potential learning opportunities. A recent emerging approach that provides accurate location detection and more discrete engagement is the use of Bluetooth beacons, and the SALSA project has turned to explore their possibilities.

Beacons are low cost devices broadcasting a simple identifier over Bluetooth LE that can be picked up by smartphones. They enable accurate identification of a smartphone user's relative location (to a few metres). A custom app on a user's phone triggers actions based on picking up a beacon's broadcast and can present content stored in the app on the phone, so no connectivity is required (and hence no network cost) for the user to access resources. In locations where WiFi access is assured, the app can also be programmed to command the phone to access remote web content. Furthermore, as the beacon is only broadcasting an identifier which is then interpreted by the app on the user's phone, no data about who is receiving the signal and acting upon it is collected, offering users an anonymous interaction with the smart city; which may be valued by a group such as recent migrants who are sensitive to privacy issues. The receipt of a broadcast from a beacon can be indicated in a standard app notification form, such as phone vibration, on screen message, or audio signal.

Beacons have primarily been developed for commercial applications, such as alerting shoppers to new products and special offers. However, there is emerging

interest in exploring their wider potential, including guiding visually impaired people to navigate metropolitan transport[2] and improving museum experiences (Nilsson 2014). Beacons could also provide the trigger for educational resources around the city, such as language learning activities. By identifying locations where language learners would benefit from contextually relevant educational resources, we can assist them while out and about in their daily routines. The app containing the learning resources can be downloaded at the learners' convenience in a location where there is free WiFi (e.g. library or community centre). On travelling around the city, the learner will be notified (similar to an SMS text notification) that they are in the proximity of a beacon, and invited to trigger the associated learning resources. These may be stored within the app on the learner's phone, or alternatively could also trigger links to web resources where we can be confident the learner will be able to access free WiFi. For example, while waiting at a bus stop, a learner might be notified of a nearby beacon which triggers a small language activity held in the associated phone app on purchasing a bus ticket and asking the driver about ticket options (e.g. 'single', 'concession', 'off-peak', 'season ticket'). On the bus, the learner might be notified that there is a beacon on board, which can link via the bus's free WiFi to a web based learning activity about the city centre, the final destination of the bus. Learning activities may be weighted to enable the majority of the resources and interactions to be carried out on the learner's phone when there is no network connectivity, however where access to the internet is available we might include a recommendation to share observations and experiences of the context with other learners, e.g. via a social network space.

We have been considering two metaphors of use: the 'radar' metaphor where the user is notified about what is around them at the time, and carries out a learning activity about the location, while in the location. However a learner might not be receptive to learning at the time: they may be talking to a friend or it may be socially inappropriate to engage in a learning activity on a phone. We are therefore also developing services based on an 'SMS' metaphor, where the learner can check notifications at a later time suitable for them (e.g. in the evening when relaxing at home) and be reminded of where they visited during the day, and notified of associated learning activities. In this latter mode, the user may be more likely to have more time and inclination to share their observations and experiences with other learners and build a community of location-focused learners sharing experiences and challenges in different locations around the city. We recognise the power of connecting learners with each other to share insights and generate content from their own experiences, as well as take advantage of existing content: the city as a resource for interaction and learning (Foth et al. 2011).

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[2] e.g. http://www.rlsb.org.uk/blogs/rlsb-youth-forum-set-a-new-direction-for-tube-travel

We are currently undergoing initial testing of our prototypes and first user trials and deployment will take place in Summer 2015. However, even at this stage, we are recognising that this approach to location-trigger learning may offer potential for community appropriation as well as community usage.

4 An Open Beacons approach: appropriating the infrastructure

As beacons only broadcast a simple signal, and the work of interpreting the signal is carried out by an app on the users' phones, this allows for the possibility that community developed apps could associate existing beacons with alternative resources from that provided by their official associated app (e.g. provided by the city council or a commercial concern). These resources might complement existing content, provide alternative content, or even conflicting content depending on what the community app developers and content providers choose. For example, a department store might operate a set of beacons across their store and distribute an app that provides detailed information about various products as a user passes by these beacons. However, an alternative app might be developed by community groups to use the same beacons' broadcasts to trigger similar descriptions but in a second language preferred by locals in the area; reviews of the products created by community app content providers could be presented; or fair trade activists might report on the provenance of the goods to identify which are sourced ethically.

This approach would require (1) capturing and recording the identifiers broadcast by active beacons in the area to be covered by the alternative, community derived app; (2) members of the community to record these identifiers of the beacons (e.g. to an online database with a web based interface); (3) the ability for members of the community to generate and upload their own data for each beacon listed along with metadata to enable interest-based searching; (4) the creation and maintenance of an alternative community beacon app that can be downloaded with the data from this database, perhaps with the opportunity to make selections based on some sort of filtering, e.g. allowing a user to download all beacons in a particular area, or retrieve particular types of data associated with each beacon, such as a in a preferred second language, or those with user reviews. Figure 1 shows a conceptual model of these elements.
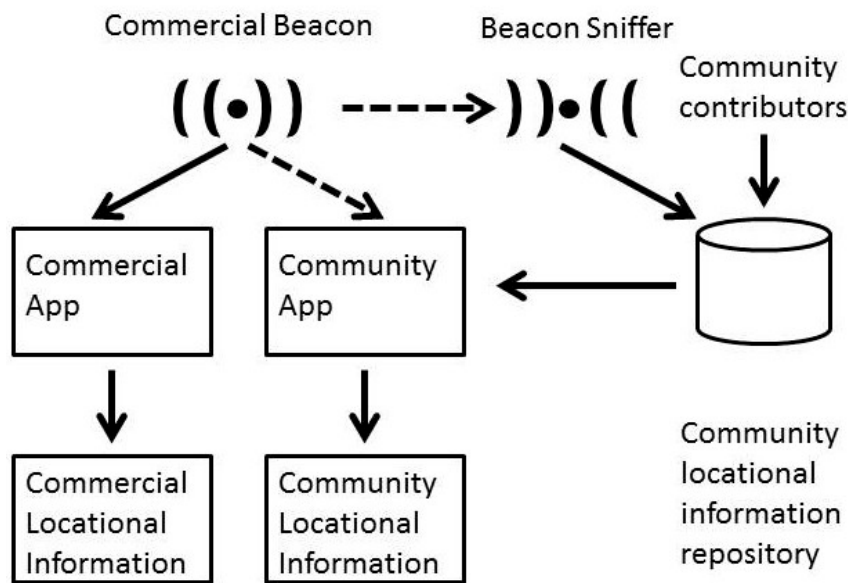
Figure 1. Appropriation of existing commercial beacons to support community developed alternative app

This 'Open Beacons' approach would allow the association of user generated content with existing beacons, as well as that provided by the original beacon provider. Given the opportunity for richer content provided by a user community, commercial providers themselves may enter their beacons and their associated descriptions into such a community app. For example, a city council that has provided beacons around a city to inform citizens about services (e.g. at the housing support office) may enlist the help of local community groups to enrich their existing content with complimentary content in other languages, as well as cultural guidance.

5 Conclusion

Emerging urban environments such as smart cities bring networked infrastructures which allow for near ubiquitous access to the internet and city-provided services, such as travel information, environmental data, and educational resources. While this is often approached from the perspective of city planners and managers, with the emphasis on achieving efficient and effective use of resources and leveraging the affordances of emerging information technologies and their resultant data traces, such services also benefit citizens both in terms of information provision but also enable community capacity building.

In this paper we have described two projects that explore how networked urban infrastructures can be used to support language learning for often disadvantaged and vulnerable citizens, recent immigrants, and shown that this can be used not

only to enable access to information but also to facilitate community interactions and mutual support.

Furthermore, we have identified that such infrastructures opens the possibility for citizen appropriations, and have described one approach we are investigating, the Open Beacons concept.

6   Acknowledgments

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Towards a participatory community mapping method: the Tilburg urban farming community case

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Abstract. Urban farming communities often consist of many disjoint initiatives, while having a strong need to overcome their fragmentation. Community mapping can help urban farmers make better sense of their collaboration. We describe a participatory community mapping approach being piloted in an urban farming community-building project in and around the city of Tilburg. The approach combines (1) a basic community mapping language, (2) a state of the art web-based community visualization tool, and (3) a participatory mapping process to support the community-building efforts. We outline the approach being developed and present initial results of applying it in the Tilburg case.

1   Introduction

Urban farming is an upcoming movement around the world, aiming to foster the practice of cultivating, processing, and distributing food in or around a village, town, or city. Characteristically, urban farming initiatives are small in scale and disjoint. However, urban farmers have a need for being involved in and empowered by engaging, informal practices that lead to the creation of viable tools and processes underpinning community practice (CITIES Foundation 2012). A project was started to intentionally strengthen and connect local urban farming communities in the Dutch southern province of Noord-Brabant. One subproject in and around the city of Tilburg concerns creating a participatory community

mapping method to (1) let the emerging urban farming community make sense of itself and (2) use that increased awareness to strengthen the community building process. Constructing and testing a first version of the mapping method took place in the period September 2014-June 2015. In this paper, we describe preliminary results on constructing and applying the method in the case of the Tilburg urban farming community.

2 Participatory community mapping

There is a multitude of definitions of community. Whereas communities used to be equated with traditionally tribes and villages, they are now more broadly seen as sets of relationships where people interact socially for mutual benefit (Smith 2002), often supported by online technologies to mediate their communication. Not all communities emerge spontaneously. When new communities are forming in uncharted territory, as in many urban farming cases, effectively and efficiently catalyzing this process of building a meaningful network of relations and interactions is of the essence. Their growth can be catalyzed and facilitated, although not forced, in a process of community-building.

Community-building is an iterative process in which community members increasingly become aware of what binds them, while that increased level of awareness in turn can inform and trigger new community building activities. For instance, in the well-known Cultivating Communities of Practice methodology, such activities as "building connections between core group members", "finding the ideas, insights, and practices that are worth sharing", and "identifying opportunities to provide value" are key when coalescing a community (Wenger et al 2002).

Such community-building exercises are examples of sensemaking activities. Sensemaking is an ongoing retrospective development of constructing plausible images from a social context (Weick et al. 2005). Formalization of sensemaking efforts helps to reduce ambiguity and to create common foundations for collaborative action (Vlaar et al. 2006). For communities, such formalization is not about abstract representations and algorithms. Instead, to support their sensemaking efforts, communities need languages to express and contest perspectives in principled ways. Furthermore, they need – Web-based and other - tools that are flexible enough to mediate, capture and add value to discourse between stakeholders, yet provide light-weight structure and computational support (Shum 2006).

A core communal sensemaking activity is community mapping: originally a cartographic exercise to map the geographical connections and common ground that local communities share. Such community mapping is an empowering learning and planning process, facilitating the storytelling of communities (Lydon 2003). However, community mapping has expanded beyond the geographical

domain. Another form concerns knowledge mapping, for example providing visualizations of argumentation and conversations (Shum 2006). These approaches focus on making sense of what communities talk about. A third main class of community mapping languages, tools, and processes are grounded in social network analysis methods, e.g. NodeXL (Smith et al 2014). Their focus is on what the community is and how its members interact.

Maps using a visual language in their representations have power, both by what they depict and what they leave out. Geographical community mapping methods stress strong community participation in the map making process. They focus on what people value and envision for the future, and are the antithesis of expert-led development (Lydon 2003). Knowledge mapping is also increasingly interested not only in the language, but also the process of how the knowledge gets captured. For instance, the field of "knowledge cartography" is just as much interested in how to engage participants and build meaning in a group as they are in the knowledge representations themselves (Selvin and Shum 2014).

Our focus, therefore, goes beyond producing meaningful and legitimate community maps per se. Our challenge is how to develop a participatory community mapping method that not only makes sense of the current state of the community, but also uses the maps to inform active community building efforts. In other words, how to weave the community mapping language, tools, and process through an iterative process of community-building?

Next, we outline our evolving participatory community mapping method which aims to address these questions.

3 Participatory community mapping

Ours is work in progress on a participatory community mapping method. The method is developed iteratively by refining and extending our community mapping language, tool use, and process. To this purpose, intermediate versions are presented to the community and its feedback is processed in the next version.

3.1 The mapping language

The mapping language needs to distinguish between *elements* (depicting socio-technical concepts of the community network) and *connections* (representing relations and interactions between those elements).

3.1.1 Elements

Based on earlier work (De Moor 2013), we distinguish the following elements:

- Participants
  - *Persons*

- o *Organizations*
- o *Communities/Networks*
- o *Roles* (to be played by participants, e.g. "Student")
- *Activities* (dynamic process outcomes, e.g. "Organizing an Exhibition")
- *Results* (tangible, static outcomes, like "Exhibition Stand" and "Report". Activities are outcomes as well, but being *processes*, they can also generate other processes and results and are a direct source of community building).
- *Tools* that can be used to support activities.
  - o *Physical Meetings* (e.g. "Bi-Lateral Meetings", "Network Meetings", "Presentations", "Conferences").
  - o *Online Tools* (e.g. participant websites, social media such as project apps, Twitter, Facebook).

3.1.2 Connections

As we have seen, communities are networks of relationships and interactions for mutual benefit (Smith 2002). Carroll and Rosson (in Caroll 2012, p.15) define a conceptual model of community consisting of collective identity, local participation, and diverse support networks. Four composite variables for community membership and participation can be mapped to the constructs of this model: Belonging (identity), Informedness (passive participation), Activism (active participation), and Associations (support networks) (Carroll 2012, p.90).

Building on their approach, we identified four types of connections to capture the root types of community relations and interactions. They are ordered in increasing degree of participant involvement:

- *Informedness* (being informed about activities of the community, but not being part of it)
- *Associations* (being an explicit member of the community in the sense of having made a commitment to participate)
- *Participation* (actual participation in the activities of the community)
- *Producing* (producing visible, measurable results as outcomes of the activities. This is the most involved kind of participation).

Note that we have not yet addressed the Belonging-construct, as our first priority was to make sense of the externally observable relations and interactions.

3.2 The mapping tool

Our mapping tool needs to be able not only to effectively visualize the connections between the elements, but also to afford various perspectives on the map. These perspectives are relevant to different sensemaking and community-

building needs of the community members and the network of stakeholders around the community. To this purpose, we chose Kumu[3].

Kumu is a web-based tool to track, visualize, and leverage community and network relationships. Kumu maps consist of elements and connections between the elements. Elements can, for instance, be visualized by their own colors, icons and sizes, and connections by the combination of color and width of their lines. For example, we represent *Informedness* by a thin blue line, whereas *Producing* is shown as a thick red line, indicating its much more involved community-building contribution.

On the map, one can define different *perspectives*, in which Kumu only shows those elements and connections of interest in the way desired. To define perspectives, one can apply specific *decorations* as well as various kinds of foci and filters. *Focus* allows one to home in on certain portions of the map. *Filter* is used to select which elements and connections should be made visible.

For example, a focus can be created for a specific participant or activity, showing only the direct (first degree) connections on the map. The resulting perspectives can be shared through customized hyperlinks. Such a link may be of interest to community members to see and share their specific role in the overall project. One way to use this option is for them to add that link to their own web sites, Facebook pages and LinkedIn profiles.
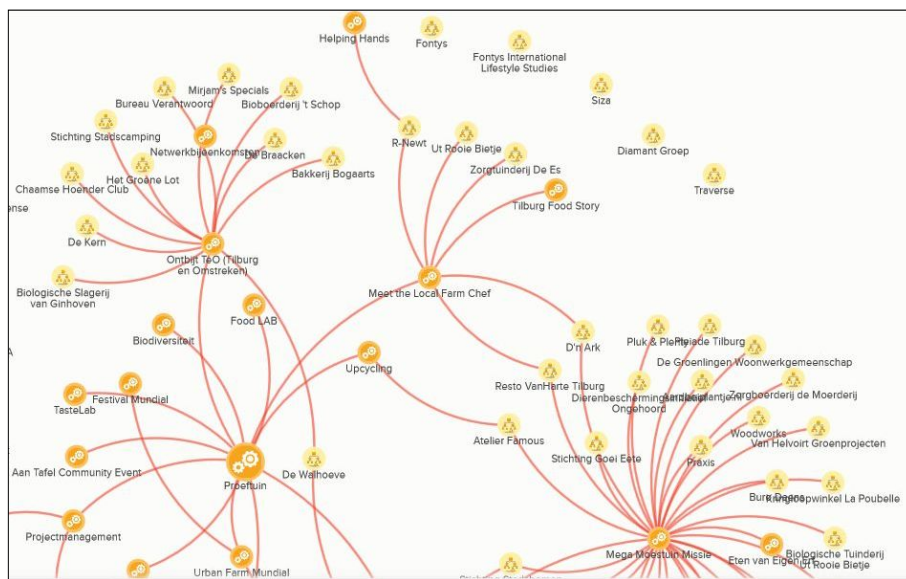

Figure 1. Applying a filter to the community map: showing in which activities the involved organizations participate.

An example of how filters are used in our community is to show the community managers which organizations are participating in what activities.

This means going to the Filter-menu and selecting the Organization and Activity-elements, as well as the Participation-connection between them (Figure 1). Another example is to use a filter to see how Activities and Results are related through the Producing-connection. This is a useful way for community managers to see "isolated" Results which do not have a producing Activity linked yet4.

3.2.1   The mapping process

Making the community mapping process participatory, implies maximizing the involvement of the community members in three sub-processes: capturing the data, interpreting the map and using the map. These sub-processes are still under construction. Here we share some of our initial lessons learnt so far.

3.2.2   Capturing the data

Making maps is an expensive process, time and quality control-wise. Ideally, participants update their own data directly. However, tool functionalities are complex. Learning how to use them has a considerable learning curve. Also, it is easy to "break the map". When editing the map, the inadvertent cutting of map branches can easily occur, for example. Therefore, a dedicated map maker-role has been assigned. The map maker prompts and collects the data from the community members, and gives them relevant feedback, for example the links to their own participant and activity perspectives.

   One important issue, to be confronted up-front in any participatory community mapping method, is to find the balance between map completeness and feasibility. Ideally, all participants, activities, results, and tools are modeled at the greatest level of detail. Customized perspectives can then reduce complexity and provide the most relevant viewpoints. However, in reality, map makers' and community members' time is limited. Trade-offs can be made in, for example, frequency and granularity. Only quarterly "official" map updates are made for our community, for example, with inofficial intermediate updates in between as time permitted. As to granularity, initially, the idea was to model all participants, including the individual persons involved. However, this was not feasible, given the numerous people taking part, often on a temporary basis, in the many urban farming activities. The procedure was then changed to just model the organizations, and only represent persons when they were participating on an individual basis.

   One practical issue in any community sensemaking project is how to motivate members to contribute and reflect upon their data. One approach used with the Tilburg urban farmers is to make it an add-on to regular project reporting responsibilities. Their regular progress reports contain a special section with map-focused questions. However, preferably, more intrinsic motivators are used. One way to do so, is by communicating and reflecting upon the map at regular project

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4 To see more background on the project, the full map and examples of various foci and filters, see
   http://bit.ly/1LBoVAu

78

meetings. What we found is that community members responded very strongly to "their map" being shown: first off all that they saw the map as a whole ("Finally, I see the big picture!") and secondly, a better understanding - and being proud of - their own role ("Cool to see how I am connected!"). Interestingly, quite a few members whose participation was not modeled sufficiently initially, supplied additional data after those communal meetings on their own initiative.

3.2.3 Interpreting and using the map

Three main roles are involved in the community mapping process: map makers, community members, and community managers.

Given the complexity of the mapping language, tool, and process, map making is not a trivial activity. So far, the map making has been done by the author. However, this is not scalable in the long run. Ideally, community managers or members are trained to become map makers. Various levels of map making literacy can be distinguished. The overall structure, layout, and functionality of a community map could be created by a "master map maker". Then, selected community managers/members could be trained to expand the partial "domain maps". They could focus on adding "more of the same" participants and activities, for instance, and filling out the data fields of the various elements and connections. This is another example of a trade-off between completeness and feasibility.

For community members, the main reasons to contribute to and use the map is to see the bigger picture as well as their own role in the community. For interpretation, particularly the overall birds'eye view of the whole map, and the direct perspectives (one degree of separation) on their own *Participant* and *Activity* focus-views have turned out to be useful.

For community managers, we have identified two main usages of the map: community management and accountability.

An example of management support is the filter view to identify "isolated results", mentioned in Sect 3.2. Such perspectives could help community managers start conversations with those responsible for the results to see what activities are needed to get them accomplished. Also, from the bird's eye view one can see which participants are hubs and who are at the periphery of the overall community network. This, for instance, helps community managers in setting the agenda for the next round of community activities by connecting "loners" to centers of activity. Interestingly, using the map also seems to increase the "self-management" of participants, as demonstrated by their voluntary submission of additional data. This may be explained by a developing sense of community as more relations and interactions evolve.

An unexpected usage mentioned not only by the community managers of the Tilburg urban farming community, but also by managers of other communities and networks we shared this with, is that of accountability. Many community and

networking projects have a problem to justify the resources spent on their initiatives, for example to their sponsors. Typically, such projects are evaluated on deliverables (the "Results" in our list of elements). Community maps like produced here help to show what arguably are the most important deliverables of all: the sustainable, lived network of relations and interactions making up the community network.

4 Discussion

We outlined preliminary results on the construction and application of a participatory community mapping method. Work is underway to mature the method by expanding and integrating the mapping language, tool, and process.

In the mapping *language*, the Belonging-construct (identity) in the community membership and participation model used (Carroll 2012), is not incorporated yet. Adding questionnaires in future map building iterations could help tackle this. To further expand the mapping language constructs and the so far only informal, visual analysis, further inspiration could be drawn from community and social networking theory and methods. For example, community bridges are community members who participate in more than one group through acting as strong ties (Caroll 2012, p.107). Also, our method could be enriched by finding ways to combine our social network mapping constructs with knowledge mapping constructs, like the actual types of conversations community members are involved in. A good case in point are community clusters: multiple topic conversation centers of activity around a few hubs, which are at the heart of community formation (Smith et al 2014).

Tool-wise there are other Kumu features that we intend to explore, including the (basic) social network analysis functionalities built-in. To extend that functionality, it might be worth using more advanced social network analysis tools like NodeXL[5]. Whereas Kumu focuses on empowering communities through its Web-hosted maps and advanced user interfaces like perspectives, NodeXL offers a more in-depth analytical toolset. Another direction we aim to explore, is to see how Kumu fits in an "ecosystem" of social media tools. One could e.g. use Twitter and Facebook to announce map changes and include links to particular perspectives in "meta-communication" about the maps like referral links from websites and mentions in organizational newsletters.

As to the community mapping *process*, the focus so far was on data capturing for map construction. The interpretation and usage of this data, however, is where the real community building happens. Using technologies like online maps for such active community-building purposes requires active participation of community members and managers, in various kinds and degrees. One resource

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[5] http://nodexl.codeplex.com/

for developing the operational and governance roles required, could be the Reader-to-Leader framework (Preece and Shneiderman 2009). The framework shows the detailed usability and sociability issues to be taken into account when getting people to participate more intensively in online social activities.

Our process-method has so far consisted of a number of researcher interviews with key community members and managers, plenary community presentations, and the collection of map data through a form-based questionnaire and individual follow-up mails. We aim to make it more community-driven by taking cues from proven participatory design methodologies. The oldest form of community mapping, geographical community mapping, has many practical lessons to offer to make it mapping *by* instead of for the community, e.g. breaking down categories of maps and special workshop formats (Lydon 2003). Also, knowledge mapping is getting serious about participation: away from abstract representations to "knowledge art": developing the human skillset needed to use digital (and non-digital) artifacts in real time to engage participants and build new meaning in a group (Selvin and Shum 2014). Finally, we aim to take cues from participatory socio-technical systems design approaches like the "Socio-Technical Walkthrough" (Herrmann 2009). It offers procedures for developing, evaluating, and improving diagrams of socio-technical systems, of which community maps could be an example.

5 Conclusion

We outlined preliminary work on a participatory community mapping method being piloted in an urban farming community case. Community mapping is a powerful instrument for community sensemaking and building. Many sophisticated representation techniques have already been developed in community mapping disciplines like social network analysis and argumentation mapping. However, to make such techniques optimally benefit real-world community building processes, they must be made more participatory. To do so, community mapping languages, tools, and processes need to be calibrated and aligned, so that they can best serve their particular communities. Much work still needs to be done in figuring out how to best design such socio-technical methods. With our approach we hope to make a contribution to this growing community-mapping, -sensemaking, and -building body of knowledge.

6 Acknowledgments

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Local Commons: A Visual Approach to Collective City Making through Situated Community Engagement

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Abstract. Due to the numerous possibilities of voicing concerns and the flood of data we are exposed to, local issues are sometimes at risk of being overlooked. This study explores Local Commons, a design intervention in public space that combines situated digital and tangible media in order to engage communities in contributing and debating different perspectives on a given local issue. The intervention invited the community to submit images of their perspectives on the issue, which were displayed on a public screen. Via tangible buttons in front of the screen, community members then agree or disagree on the displayed perspectives, creating a space for deliberation. In a user study, we were specifically interested in testing three aspects of our intervention, which are discussed in this paper: The difference that situatedness, visual content, and tangible interaction can make to urban community engagement.

Keywords. Community engagement; public displays; urban screens; civic innovation; situated technology; urban informatics; interaction design; tangible interaction

1 Introduction

The World Health Organization estimates that by 2050 approximately 6.4 billion people will live in cities – around 70% of the world's population (http://goo.gl/RvDB1V). With this growing density, cities will be prone to more and new issues and struggles, ranging from infrastructural challenges, such as

transportation and energy consumption, to social problems, like immigration, gentrification and the changing demands of demographics (Sassen 2004). At the same time, the increasing amount of digital technologies and networks available turns cities into multi-layered spaces (Wessner 2009) full of local community groups and socio-cultural diversity. Over the visible physical layers of buildings and infrastructure, an invisible digital layer emerges, which gives citizens new opportunities "to make their voice heard on a variety of issues" (Foth, Choi, & Satchell 2011).

In our study, we are interested in this hybrid approach that makes use of physical public space as well as situated digital technology, sometimes referred to as location-based services, or locative or urban media (Farman 2011; Gordon & de Souza e Silva 2011).

Colleagues have called, "for an agenda to design the next generation of 'digital soapboxes' that contributes towards a new form of polity helping citizens not only to have a voice but also to appropriate their city in order to take action for change." (Foth, Parra Agudelo, & Palleis 2013). Such 'digital soapboxes' hence should not only approach place and technology in an integrative way but also involve citizens, communities, and their ability to produce and contribute information to a greater extent in order to give them voice. This also calls for public place to incorporate its traditional role again, as the space where discussions and social exchange take place (Habermas 1991). Alongside, citizens have to be appreciated not only as consumers of information but also as producers and contributors. Digital soapboxes hence not only have to support but also foster this conception of an active citizenry or smart citizens (Foth, Parra Agudelo, & Palleis 2013).

In this paper, we explore the benefits place-based digital and tangible media could have on the communication and deliberation of local issues. After reviewing prior works, we present our research approach that informed the design and development of the *Local Commons* prototype – a public display application located at a bus stop linked to two large tangible buttons placed on the ground in front of the display. The interaction with the intervention was twofold. First, it invited the audience to submit images of public places in the local neighbourhood they especially liked or disliked. Second, the community then had the possibility to agree or disagree on images displaying different perspectives on public places by stepping on tangible buttons – as a simple form of deliberation. We discuss our findings before we conclude by outlining our next steps.

2 Prior Works

Community Networks have been developed in order to support local governance during the 1990's as online communities focusing on 'public affairs' within a local area. They have been proven to provide a platform for gathering civic

intelligence, for developing people projects, and for fostering a public dialogue among citizens and between local authorities and citizens (De Cindio & De Marco 2006; De Cindio, De Marco, & Grew 2007). However, they showed to have limitations concerning the actual decision making process. Although connected to the local governments, the actual decision making power remained disconnected from the citizens and within the authorities (De Cindio & De Marco 2006; De Cindio, De Marco, & Grew 2007). To overcome this limitation, De Cindio et al. developed a software environment as part of an Italian agenda for promoting digital citizenship (De Cindio, De Marco, & Grew 2007). Ten municipalities in Italy's Lombardy Region therefore created an e-participation project called *Progetto e21* (http://goo.gl/a2Memz). The aims of this project were to identify critical situations, such as traffic or pollution issues, to ideate suitable solutions for these issues, to evaluate them and finally implement one solution through an e-participation framework that makes use of appropriate ICT applications. The software environment developed by De Cindio et al. rests on these aims. As the described aims foresee a decision making process through deliberation within the community, the created software environment, called openDCN, represents a so-called *Deliberative Community Network* (DCN), which is an evolution of traditional Community Networks (De Cindio & Peraboni 2011).

One of the main challenges faced by DCNs lies in their ability to spill over into the urban fabric. In response to this challenge, Schroeter developed and tested *Discussions in Space* (DiS) as a situated, urban screen-based community engagement tool (Schroeter, Foth, & Satchell 2012). DiS is a public civic feedback, discussion and opinion platform. It provides an in-situ tool for local governments to engage citizens, allowing them to contribute their opinion about official urban planning matters to large public screens. By consulting the public, planners and residents of the city are put on the same level. Especially residents who are generally difficult to engage, such as younger residents and time-poor professionals can be reached. Our study goes one step further in that we explore the use of visual contributions (photos) as part of the deliberative process, as well as the use of situated, tangible buttons in order to provide a simple and register-free polling interface.

3 Research Approach

Our more extensive review of the literature did not find many examples of projects that combine digital and tangible media. They are either completely digital or analogue (tangible). As both approaches showed benefits and backdraws, we want to find out if combining them may be promising. Hence the research questions for this study are:

(1) How can place-based tangible and digital media contribute in communicating local issues?

(2)   How can such an intervention be designed based on the findings of the literature review?

In order to answer these questions, we started an ideation process that comprised brainstorming and brainsketching.

3.1   Brainstorming

Brainstorming is a widely used and well established creativity and idea generation technique (Van Der Lugt 2002). The purpose of brainstorming is to generate and accumulate a wide range of ideas, without judging or evaluating them during this process. Thus it allows the participants to free their minds and hence to free their creativity.

Before generating ideas for situated interventions that communicate local issues, we decided to create a list of design principles and characteristics that would broadly outline the design space we wanted the intervention to sit in. This list should be brainstormed and hence reflecting not only the literature and related works but also personal interests and intentions. In turns, we named one characteristic or principle and added it to the list, without any additional explanations. We collected 22 characteristics, which were then explained and discussed. As the purpose of this method was to broaden up the design space, the collected characteristics are rather open than restrictive. Although brainstormed, these characteristics reflect the literature and our research interests and hence hail from different areas. During the discussion of these characteristics, we had to rename six of them in order to make them more expressive, but none of them were discarded from the list as we agreed on their respective contribution to the design space. The 22 final characteristics are as follows: *Tangible; Multimodal; Open; Minimal; Simple; Analogue; Graffiti; Collaborative; Subversive; Ephemeral; No screens; Democratic; Funky; Movable / Mobile; People come together; Challenge stakeholders; Fun to play with; No censorship; Follow-up; Integrate; Effective; Provide for serendipity.*

3.2   Brainsketching

Sketching is the archetypal design activity, the main tool for designers when it comes to generating ideas. A sketch does not only allow to physically represent a mental image of an idea, it actually fosters the generation of such mental images and stimulates creativity (Van Der Lugt 2002). There are numerous ways of creating sketches, using tools that range from pen and paper to Lego bricks. But what they all have in common is their intention: They invite suggestions, criticism and most importantly, changes. Here, we follow Van Der Lugt (2002) who suggests a technique that uses the qualities of sketching for generating ideas. This technique is called *Brainsketching*. Participants first sketch their ideas individually on paper. After a certain amount of time, the sheets of paper are

passed on to the other group members and the individual sketching continues. This procedure is repeated five times. After each round, the participants shortly explain their sketches to the rest of the group. By passing on the sheets of papers, the already present sketches can be used to build on top of them, serving as a stimulus for new ideas (Van Der Lugt 2002). We did five rounds, with each round limited to 120 seconds. In turns we roughly sketched an intervention that implements the chosen characteristics for each round: *Moveable and democratic; Fun to play with, challenge stakeholders, and no censorship; Analogue, collaborative, and graffiti; Provide for serendipity, follow-up, and funky; Subversive and people come together.* We produced ten sketches (one contained two ideas, hence there are eleven ideas in total) (Figure 1).
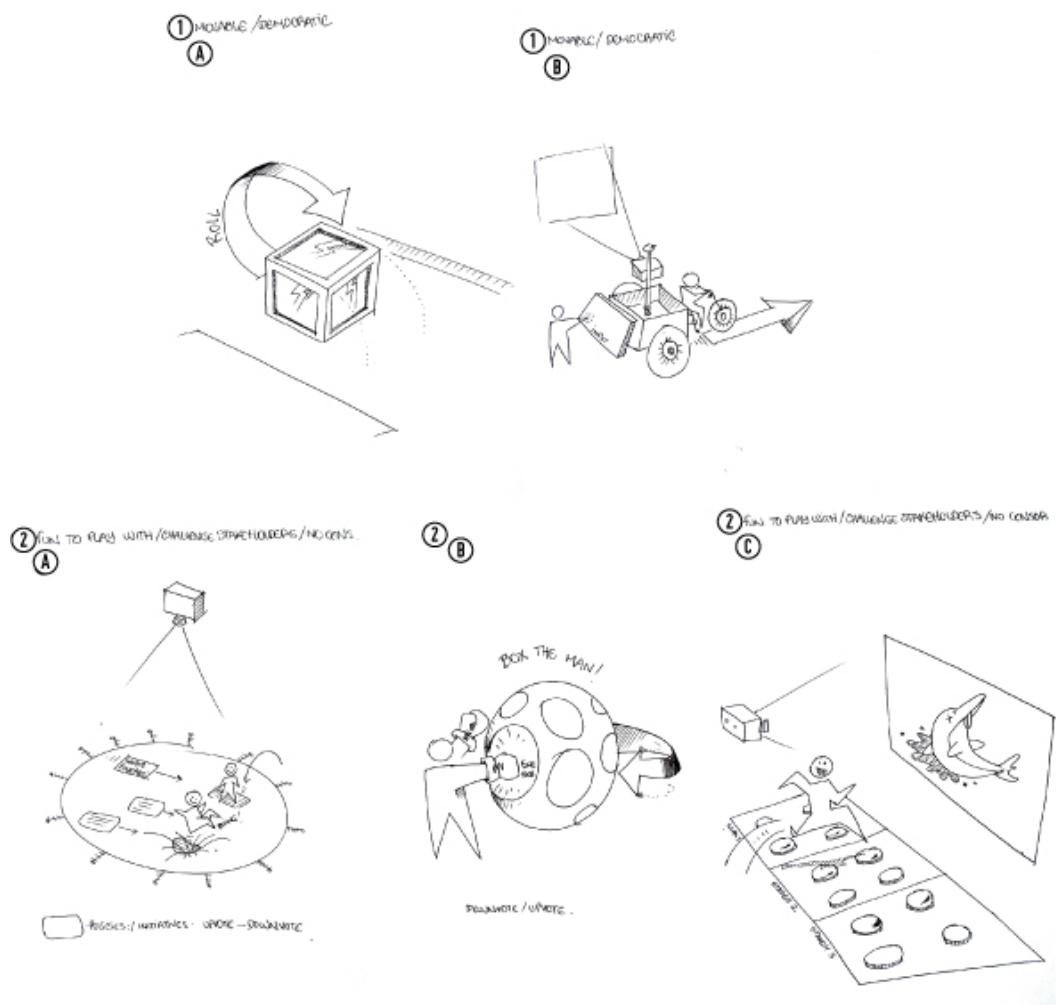

Figure 1: The first five sketches resulting from the Brainsketching session (revised rendering).

4 Prototype Design

Based on our ideation sessions, we developed a high-fidelity prototype (Figure 4). The public display presents two screens. The first displays the images and the questions (Figure 2); the second the button interactions. Whenever a button is pressed, a bar diagram represents the votes for the current image. This is augmented by a key stating e.g., "You and 7 other people agree with that," or "21 people don't agree with that!" This screen fades out after a certain amount of time without any additional votings and the first screen is displayed again.

The buttons (Figure 3) are made of wood and foam. They have a size of approximately 27 by 27 cm and a height of about 7 cm. Inside, we re-purposed off-the-shelf door bell buttons, which, connected to an Arduino, allowed us to detect button presses. For the visual input, we used the Instagram API. The interaction with Instagram was handled through the hashtags users can attach to their images. By using the Instagram API, all images tagged with a specific hashtag can be requested. In this case, the intervention queried Instagram for all images tagged with #LocalCommons. These images were then saved in an online database. Due to ethical restrictions, a moderation feature was added. After moderation, the accepted images were collected from the online database and saved in a local database that served them to the application for display.

Figure 2: The main screen displaying an image tagged #good

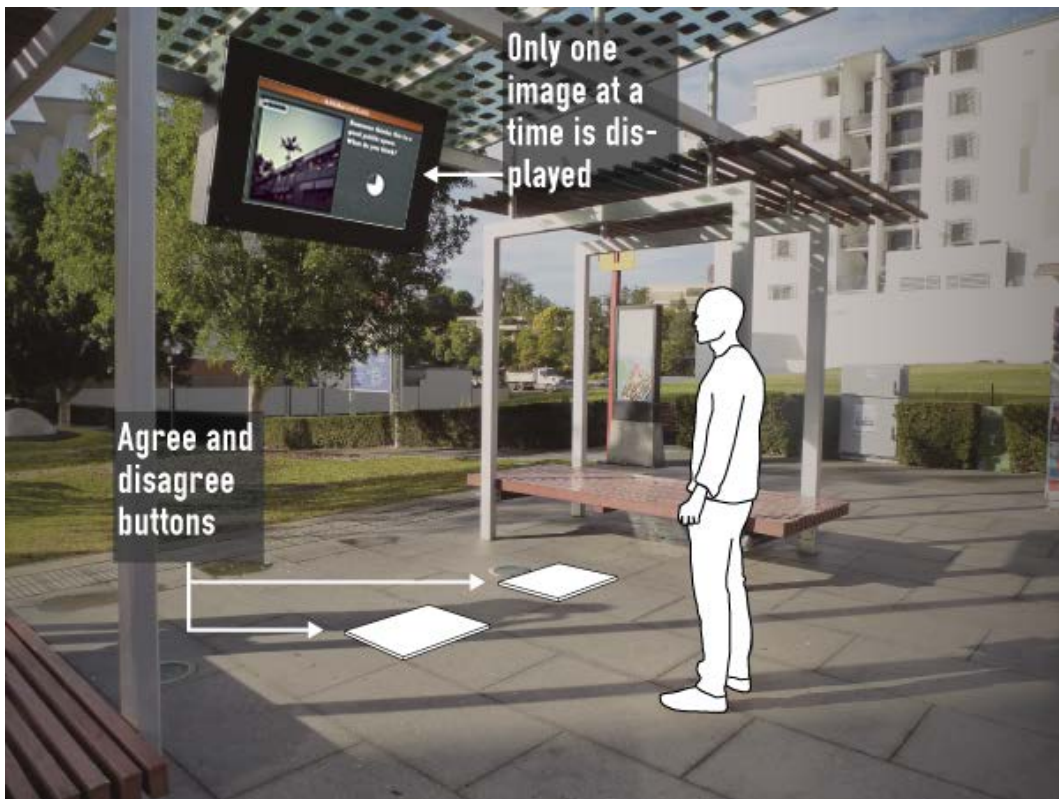Figure 3: The AGREE and DISAGREE buttons

Figure 4: Mockup of the Local Commons concept

5   User Study

The prototype user study was conducted in order to evaluate the underlying concept of the Local Commons intervention. This comprised the idea of comparing different perspectives, the relevance of the chosen local issue and the usability of the intervention. We tested the prototype with 5 participants. Each study participant had to perform a set of tasks and subsequently fill out a questionnaire. The questionnaire comprised six questions with Likert scales as an answer format. Throughout the study, the participants were asked to think aloud. The entire study was recorded on video and later on transcribed. The transcriptions were coded using a Dedoose, an analysis software for qualitative data. An expert field study complemented the user study.

6   Discussion of Findings

Our findings corroborate our assumption that there is merit in combining a situated approach with tangible elements. Especially Participants 4 and 5 were specific on this. They stated that if such an intervention was not physical and situated in public space, they would not use it. An online version of this intervention would probably not work for them. As Participant 4 stated: *"It works for me because it's physically in the place and can fit into my everyday routine. I would be less likely to use an online survey or something."* Participant 5 stated something similar and also Participant 1 made a comment which values the place based approach: *"So I just think that this is the perfect option for me to express my opinion on the place"*. Having the intervention anchored in public space combined with the tangible buttons brings several advantages according to the participants. First, through the occupation of physical public space, it makes it easier to perceive such a local issue. As Participants 5 stated in this context: *"I wouldn't even make it to that page,"* referring to an online version of such an intervention. The tangible buttons, that "spill" out of the digital screen, support this as they are the main elements that occupy the space and create a disturbance in the perception of that space.

Second, the tangible elements make the interaction with the intervention easy and intuitive. Participants 2 and 4 explicitly mentioned this. Participant 4 expressed this in the following: *"I think it is easy to use. Like I walked up and you guys were there and I said hello to you guys and then you didn't tell me anything to do, I just looked at the screen, it took me about maybe a minute to see what's going on, or less than a minute. And then it was intuitively to tap the button. So in terms of the usability, I think I felt pretty comfortable doing it."* The number of interactions from the log underpin this. Further, the interaction with the tangible elements was not only easy but also fun and engaging. Participant 4: *"it's like a*

game," Participant 3: *"interacting with the actual device at the bus stop was also quite fun,"* and Participant 5: *"I would just use the system to have fun."*

Third, the place based approach is the reason for the interaction. Because it is part of the everyday environment, people can pass by and interact if they want. Participants 4 and 5 elaborated on this. Participant 5 said: *"if I was waiting or coming to the bus that was here, and I knew about this, I would sit here and vote until the bus came."* He also stated: *"I would not go to a web site and hit the yes/no button over and over again."* Participant 4 emphasised the convenience of having such an intervention in public space: *"because it's on my way to things it's convenient and embedded in the place."*

7 Conclusions

This study explored the contributions of using a situated approach for communicating local issues combining digital and tangible media. Our findings underline the significance of designing for situatedness, embedding visual content as a feedback mechanism, and tangible interactions. We are studying the interrelationship between these three aspects by performing a larger field study with the general public. However this small scale pilot study did show that the usage of place, digital, and tangible media can be beneficial for communicating local issues and engaging the public.

We are finalising two follow-up studies. The first follow-up study further explores the combination of the situated approach of Local Commons with the idea of asking for decisions as very simple tasks even in complex deliberation processes. Examining the role that task simplicity plays in improving casual participation, this study focusses on a public polling interface using the same tangible button interfaces (Steinberger, Foth, Alt 2014).

The second follow-up study – *The InstaBooth* – is currently underway. It seeks to refine and test a telephone booth-inspired portable structure that captures citizens' past stories and present opinions, particularly opinions regarding the use and design of public spaces. The aim is to employ design approaches to engage local communities in a situated debate on the future of their urban environment. We use tangible and hybrid interaction such as multi-touch screens and media façades to facilitate face-to-face and digitally mediated discussions (Johnstone, Caldwell, & Rittenbruch 2015).

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