Towards the Implementation of an Internet-based Neighbourhood Watch Scheme

Impacts of Inclusive Technologies on Societies

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***Abstract*—In this paper we discuss the current state of our work regarding the development and planned in-situ testing of a computer-based system to enhance community relations through the Neighbourhood Watch scheme. The system is intended for use in a community to help the residents interact with each other more easily and to encourage the reporting of suspicious behaviour or crime. We discuss some details of the system and how we plan to test it in the field using an iterative process. We also discuss the possible implications of the work for the future.**

Neighbourhood Watch; communities; interdisciplinary research; information sharing; security/privacy/trust

I. INTRODUCTION

Communication technologies have become so ingrained in our everyday lives that many of our social interactions are facilitated via technology rather than taking place face to face. This trend is made even more palpable with the prevalence of mobile devices – smartphones, tablets and other handheld devices. This ever-increasing reliance on communication technologies (mobile devices in particular) calls for careful investigation into the effects that these changes to communication protocols have on our society, as well as on ways to utilise these systems for the benefit of society.

We are currently preparing an interdisciplinary research proposal to investigate the impact of a socio-technical system on society, and vice versa. We will focus our research on an empirical case study involving the Neighbourhood Watch (NW) scheme, by adapting this scheme to the internet age in order to attract more participation from a wide range of age/ethnic/educational groups in society.

This rise in social computing has resulted in a shift from producing technology artefacts for a consumer culture, to producing "tools" to allow people to actively contribute to real problems in their environment. Jenkins [16] and Fischer [10] outline the role of technology to provide opportunities to engage people in worthwhile social activities. In designing a socio-technical system to support participation in a NW scheme, we realise technology is required but not sufficient. Our work endeavours to achieve a positive contribution of new technologies to the society through careful iterative design and implementation of a computer-based system for supporting the NW scheme. Through the requirements gathering and iteration of the design, we seek to further understand the relationship between the technology and the behaviour changes required to increase participation in the scheme. In order to achieve this goal, close interactions with various stakeholders (such as NW scheme coordinators and participants, local police, as well as system developers) will be carried out, with important decisions being taken after careful consideration and discussion with these stakeholders. We need to understand how to design for community network parameters such as responsiveness of the community to the needs of its members, engagement intensity, role distribution and what implicit and explicit reward systems exist for the community behaviours we wish to see develop [14].

The research focuses not only on the technological aspects of the problem, such as how to build trustworthy systems which are secure, available and perform acceptably, but also on the social aspects of the problem, such as how to build systems which are usable, trusted, and moreover have the desired social impact. The success of this research will pave the way for more general investigations into the relationship between technological systems, behaviour change and social participation.

This paper outlines the progress that we have made, from the initial ideas, reviewing the literature, involving researchers from computing science and psychology backgrounds in transforming the ideas into a project proposal, participation of several local NW coordinators, and a group discussion with potential volunteers. We outline our approach and the issues to consider as we move forward with our research.

II. SOCIAL NETWORKS, TECHNOLOGIES AND SOCIETIES

Social networks, such as Facebook and Twitter, represent platforms on which social relations between people can be created and maintained online through social interactions, building virtual communities based on some common set of values. These social networks can, but need not be, based around geographical proximity. Access to these social networks is becoming seamlessly integrated in a variety of devices that are now pervasive in our lives, including smartphones. For example, we have developed an iPhone application that allows friends and family to track one's location – with adjustable levels of privacy depending on the

trust that the user has on each particular friend or family member [1].

These new technologies change the patterns of interaction among people, including how it is conducted, as well as the frequency and the nature of the interaction itself. Exploited correctly, they can make a positive tangible impact on society, for example they can be used to improve local communities' collaboration through the NW scheme.

A. Neighbourhood Watch Scheme

The Neighbourhood Watch (NW) scheme started its life in the US in the 1960s, in the aftermath of the Kitty Genovese murder in New York [20]. The scheme became popular in the UK (http://www.neighbourhoodwatch.net/) in the 1980s and it provides an opportunity for people from local communities to work together with local authorities, such as the police, to improve certain aspects of a neighbourhood, such as safety or aesthetics. It is not simply the case that people get involved with these schemes because of fear of crime but rather is an extension of their general tendency to volunteer and to take part in community-based activities [18]. These improvements can increase the quality of life of the people within the neighbourhood, enhancing their physical and emotional well-being. One aspect of this emotional well-being is the reduction of the fear of crime [3][9][11]. On top of encouraging community spirit among the people involved, the scheme can help them in protecting themselves against crime, or the fear of crime, through information sharing [26] – tips or reports on suspicious activities, and close collaboration with the local police (through schemes such as Neighbourhood Policing [19] and Neighbourhood Partnership [27]). An independent review regarding crime statistics also indicates the necessity of sharing local crime data between the police and local communities [22]. In particular, this is important for increasing the communities' trust in local crime statistics (since national statistics tend to be somewhat skewed for a particular community), and for improving the police's ability to respond to crime (through more accurate local information). Nonetheless, research has shown that the influence of NW schemes on actual crime levels is debatable. One review suggested that NW is associated with a 16-26% reduction in crime [4]. However, the effect of such schemes on the perceptions of those involved are more tangible with participants in the scheme reporting reduced fear of crime, which is an achievement in itself [23]. It is not a straightforward relationship between crime statistics and information and perceptions of safety. These perceptions are also related to social participation in the form of neighbourhood involvement [13] and satisfaction with the neighbourhood environment [2].

B. Motivations

In the internet age, the impact that institutions such as NW schemes can bring to communities has not been realised to the fullest, most noticeably due to the lack of participation from certain groups in society, especially from young people. It has been suggested that participation was more likely if the head of the household was a professional over the age of 60; whereas membership was particularly low where the head of the household's age was less than 30 [21]. Among other findings, [21] also indicated that participation in NW schemes was highest in "wealthy areas" and lowest in "council estates and areas of great hardship". This reduced participation can lead to an increase in the fear of crime, with people being subjected to fewer sources of local information (directly from people in the area that they can trust), and more from the media leading to their decision-making being influenced by inappropriate information. The spread of internet technology (e.g. the website for information on local crime and policing in the UK – http://www.police.uk/) has reached a stage where it can serve as a very attractive vehicle for expanding the reach of the NW scheme to everyone, in particular to groups such as young people, older adults (over the age of 65), the home-bound, and households in deprived areas. Indeed, research has indicated that social participation in later life is a key factor in successful ageing, influencing such factors as cognitive functioning and life-expectancy [7].

In a sense, one aspect of this proposal is to design a new NW scheme for the future that will be more inclusive to every group in society. By facilitating NW activities through the use of some online tool and by making this tool appropriate for different platforms and personal circumstances, it is hoped that participation in the NW scheme from a wider spectrum of society can be realised.

Moreover, the prevalence of UK government budget cuts in the recent years means that there will be reduced police resources available in the next few years [5]. In turn, these diminishing resources mean that fewer resources can be assigned to NW schemes, as well as on other schemes focusing on the reduction of fear of crime. For example, it has been shown that officers on the beat in an area do little to impact on crime levels but have a positive effect on the perception of crime [11]. Instead, alternative methods need to be found to reduce the fear of crime, for example by empowering people in communities to take responsibility for the community, rather than placing all the power with the police and centralized authorities [25]. Indeed, more than fifteen years ago research suggested that the growth in NW schemes may have been as a result of a withdrawal of state intervention in the policing of civil life [23]. Therefore various approaches for improving local community engagement – such as those suggested in [8] and [12] – need to be explored. Another interesting aspect in the UK is the introduction in 2012 of elected regional law enforcement officials [28]. It is not unreasonable to expect that this will change the relationship between police and local communities, in particular regarding how neighbourhood partnerships may play a role in this new landscape.

III. PROPOSED STUDY

We propose to conduct an empirical study to investigate the social impact of a technical system and use the results of this study to enhance the technical system. In turn, the improved technical system will be fed back to a selection of the community in order to improve community relations. It is hoped that, if successful, this system could be employed on a

larger scale in order to foster a better society by improving many communities across the country.

In the first instance we will use the NW scheme as our case study. By increasing participation in NW schemes across a wide range of groups in society (such as age, ethnicity, education), we aim to increase the likelihood of participants to report crimes and suspicious behaviour in their community as well as reducing the fear of crime in the same community.

We will focus on ways to deal with crime, the perception of crime, and harm reduction in the community. From a technological point of view, the issues mostly concern how information sources must be treated, with any potential outcome revolving around a system that is trustworthy. From a social point of view, quantifiable positive outcome is manifested as the reduction of the perception of crime, but if this does not materialise, we aim to provide justifiable rationale on why it does not happen and whether this is caused by technological or social problems or both. For example, this could be due to the different attitudes of various age/social groups towards wide-ranging technologies, or it could be due to usability issues of the developed system.

At the same time, we also aim to increase social inclusion through technology, in particular among older adults or other isolated groups. We envisage the proposed system to be used to promote interaction among community members, facilitating and improving face-to-face contact among them.

A. How Will We Do It?

The proposed empirical study will gather data from volunteers through our links with the South Tyneside Neighbourhood Watch Scheme and with the Design Evaluation Tea Party organised by the Psychology and Communication Technology Lab at Northumbria University, both are based in the North East of England where we are located. The work will include:

- Initial requirements gathering from volunteers through focus groups and questionnaires.
- Design and development of a communication system that can be used to better facilitate the interaction and collaboration among NW participants, based on the requirements gathering study.
- In-situ data collection through the deployment of this NW software system at the participants' homes or as a mobile app.
- Assessment and evaluation of the NW software system's success/failure.
- Redesign and redevelopment of the NW software system based on the results.
- Further deployment and in-situ data collection, followed by second round of evaluation.

It is worth mentioning that the collaboration between Newcastle University's School of Computing Science and Northumbria University's Department of Psychology will ensure that the appropriate data can be gathered in the best and most rigorous manner. In this way we will be able to collect valuable data as measured by the software system itself as well as data gathered directly from the participants through the use of properly constructed questionnaires and interviews. Data from the system and the questionnaires can be quantitatively analysed whilst the interviews can be analysed in a qualitative manner such as by the use of Thematic Analysis [6].

We will also pursue collaboration with local police through our contact in the Centre of Cybercrime and Computer Security (CCCS) at Newcastle University – http://cccs.ncl.ac.uk/. Among others, this will amount to the improvement of police-communities relation, and in raising awareness of our system through local events hosted by the police.

B. Issues to Consider

There are many issues to consider when investigating the socio-technical challenges faced in transforming the NW scheme to the internet age:

- Issues concerning the *communication system* for the scheme, including: human-computer interaction (interaction devices, the design of the GUI), software and APIs, data formats, and scalable deployment in the field.
- *User perception* of the solution, including: perception of crime, trust in the system, how trust (and the network itself) develops, data mining, perception of the security of the system, and whether or not people would actually use the system.
- *Properties* of the system, including: authentication/authorisation/privacy problems, various levels of trust, threats faced by the system, as well as refinement of the properties we look at (e.g. based on technical definitions).
- Involvement of the *stakeholders*, including: system designer/developer, system user, local community, local authority (council, police), third party companies (e.g. security monitoring firms), insurance companies.
- *Psychological/social* factors, including: incentives vs. effort, information disclosure, misinformation, whether people are willing give up some privacy in exchange for security and whether this varies across ages groups.
- *Legal* issues, including: legal implications, decision support for local government and agencies/companies.

These issues will be addressed, and carefully analysed and evaluated through the iterative interdisciplinary approach that we will take in developing our NW software. We are aware that great care must be taken to ensure the highest likelihood of participant engagement with the research. As mentioned above, having users develop trust in the system plays a key part in the success of the project. Previous research regarding trust in online systems indicates the complexity and potential confusion which can be involved in this type of research [15]. Paper [15] also provides a framework to aid in conceptualising online trust. Other research highlights the relationship between trust, privacy and information disclosure in online systems [17]. We will of course use this previous work to guide our research.

IV. CURRENT STATE OF OUR RESEARCH

So far we have conducted meetings with several key stakeholders.

In March 2011 we attended the Threats and Trust in Cyberspace Conference (http://cccs.ncl.ac.uk/march2011-events.html), hosted by the Centre for Cybercrime and Computer Security, based in Newcastle University. We met with representatives from local NW schemes, as well as members of the local police service, all of whom were very keen to take part in the research. These contacts will provide a strong, real world grounding for the work and ensure any output benefits the communities into which they are placed.

A "Design Evaluation Tea Party" was carried out at Northumbria University to gain the opinions of a group of potential users of this system. In this case, six older adults took part in a semi-structured discussion where their opinions regarding community interaction, perception of crime, and the usefulness of the proposed system were discussed. The participants gave their opinions on what types of information they would like to share amongst their close neighbours to improve the lifestyle of themselves and their neighbours. They also discussed factors which they believed would influence whether or not they would use the system if they had access to it.

These preliminary results will be followed up by a second Design Evaluation Tea Party to pursue the observations developed by the first Tea Party.

A. Early Results and Discussion

From our interactions with various stakeholders, in particular with the participants of the Design Evaluation Tea Party at Northumbria University, we have obtained several key insights into what the users of the proposed internet-based NW scheme would like to see and use in the system, as well as what features they are less likely to be happy with. These are summarised in Table I below.

TABLE I. FEATURES THAT USERS WOULD LIKE/NOT LIKE TO SEE IN THE SYSTEM

Like	Not like
Anonymity	Location tracking
Full control on which information to share and when	Always on
Facilitating physical interaction, e.g. inviting neighbours to visit	Including everyone in the neighbourhood automatically
Remote access of neighbourhood information	Responsibility to initiate or organise the NW scheme
Portable device	Confrontation

Anonymity seems to be one of the most important factors in determining the take-up of the system. People are happy to report problems in their neighbourhood (such as anti social behaviour, suspected criminal activity, or street light needing repair) if they can be sure that they will not suffer from any bad consequences (such as repercussions from the criminal). But at the same time, we will need to ensure that the information provided by them is *bona fide* and valuable, as there have been cases where people reported trivial things ("my snowman has been stolen" [29]), which obviously are detrimental to the success of the system. We are currently working on a scheme to get the right balance of anonymity and responsibility. We intend to use our proposed system as a trusted third party which can apportion the level of confidence one can place on the information coming from the user based on past history (data provenance), while at the same time filtering out specific details that allow tracing back to the source.

It is perhaps not too surprising that users are not so keen in being tracked geographically (in the simplest form, whether they are at home or not). We initially thought that this feature would be desirable because it would enable neighbours to more easily take care of each other. However, based on the feedback from the Design Evaluation Tea Party this appears not to be the case and we will revisit this feature and perhaps add more granularity to the level of location information used in the system so that the user can configure how much location information they ware willing to share and to whom, as we previously researched in [1].

It is also worth noting that the participants in the Tea Party prefer to have full control of the system, for example they do not like the idea of having a system that monitors them 24 hours a day, instead they prefer to have the convenience to turn it on and off as they wish. They also wish to be able to selectively choose who they will add (opt-in) to their circle, instead of having everyone in the neighbourhood automatically added as their contacts.

Participants also expressed a general desire for the system to be available via a mobile phone rather than a full computer or tablet computer built to resemble a digital photo frame. Some participants commented that they would not like to use a device which was connected to the mains power continually and that was 'always on'. Rather, they preferred the option of having a mobile device which they could turn on and off (as mentioned above), a device that they can also use to gain access to shared information whilst away from home. This being the case, we will ensure that our system will be multiplatform and users can interact with it purely from their mobile device if they wish to do so.

There is a risk that online social networking tools might actually exacerbate the problem with real social interaction and loneliness (for example, reported in [24]). We would like to avoid this with our system. As such, a feature to allow the users to indicate when they are open to visitors (or even, when they really would like to have a company) seems to be popular with the Tea Party participants. This will be coupled with other features to allow more community-fostering activities – such as asking neighbours if they need anything when someone is going to the shop – so that the technology will not cause negative effects to the well-being of its users. Indeed, this kind of interaction should ultimately lead to a higher amount of face-to-face contact between members of a community.

A further issue which emerged from the Tea Party was that of trust. It became apparent that the participants were making various trade-offs with regard to trust and security and that trusting someone and that person being a confidante were not necessarily the same thing. For example, a person may give a copy of their keys to a close neighbour, thereby

trusting them a great deal, but would not select this same person to share personal information with. This will be more closely examined in the second Tea Party in the near future.

Another point which emerged was regarding the concern of leaking information. One of the reasons the participants did not like the idea of a photo-frame type of setup for the system was regarding their personal information. Whilst they would trust the people with whom they had shared the information, they felt they had no control over the visitors to those people who might then gain access to their personal information.

A final issue which emerged from the Tea Party was that there was a general acceptance of the benefits of NW schemes but that one problem was that someone had to initiate and maintain the individual schemes. As these people (initiators and maintainers) tended to be older adults, over time their number has diminished. This may well be one of the reasons for the decline of NW schemes in general and one which we hope to address with our system (see below).

V. Summary and Further Work

This paper outlines a proposal to examine a socio-technical solution to facilitate NW schemes. The aim is to increase social participation in these schemes by utilising the latest communication technology and to understand the relationship between technology and participation. We have carried out preliminary studies as well as discussions with various stakeholders, and we are currently in the process of completing and submitting this proposal for funding from one of the UK research councils.

As mentioned above, a second Design Evaluation Tea Party will be carried out in the very near future and will examine some of the themes generated by the first Tea Party more closely. Specifically we will be looking at issues of trust and information disclosure and how this balances with changing needs over time. We will also present our current concept for the proposed system as modified by our findings from the previous Tea Party and seek feedback on this.

The benefits of the proposed system as we see it at the moment include:

- Unlike traditional NW schemes, no individuals from any community are key to the success or failure of the electronic system. We envisage the proposed system will help in lowering the barrier to setting up new NW communities, and at the same time facilitating sustainability as the system will take care of the burden of initiating and maintaining the scheme.
- News feeds fed by information from local police and authorities will be presented in an electronic newsletter, removing the need for a paper newsletter to be prepared, copied and distributed.
- Crime and antisocial behaviour can be reported anonymously to the authorities without fear of reprisals whilst at the same time safeguarding against multiple spoof reports.
- Communication and interaction within the community will be facilitated in order to enhance community spirit and reduce social isolation as well as helping fulfil the needs of individuals within the community.

The interdisciplinary nature of our research will provide a solid foundation for the design and implementation of the proposed system. More focus groups and evaluation through questionnaires will be carried out in due time in order to validate and assess the impact of the system.

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