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Walking: A Grounded Theory of Social Engagement and Experience

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Although growing numbers of researchers are studying the role of social engagement in ubiquitous technologies and applications, few frameworks have been proposed that attend to the lived experience of the individual and social dynamic within which it is intimately enmeshed. We present empirical insights using grounded theory from data gathered during a 102-day walk of the second author around Wales. This study inductively developed a substantive social engagement framework of the Walking experience that appears to be simple and flexible. The main aim of this paper is to present the developed framework, where even apparently 'solitary' walking is set within a rich technical and social matrix. The primary characteristics of this framework, namely accuracy of social judgements, accountability of decisions and actions, enhancing self-esteem, and satisfying intrinsic motivation goals, are in line with social user experience and show promise of being useful in ubiquitous technologies, regardless of user activity.

RESEARCH HIGHLIGHTS

- We describe a grounded theory (GT) framework concerned with the social engagement process central to the experience of walking.
- We provide empirical evidence from data gathered during a 102-day walk of the second author around Wales. We apply the Glaser approach techniques of GT to elaborate the social engagement transition and experience of walking.
- The framework culminates in four main themes: accuracy of social judgements, need for decision accountability, enhancing self-esteem and satisfaction of intrinsic motivation goals. We found that apparently 'solitary' walking is set within a rich technical and social matrix.
- We aim to extend the framework for other types of interactive systems, in particular ubiquitous and wearable devices for activity tracking and health applications.

Keywords: field studies; social navigation; grounded theory; walking experience; user experience; social engagement

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1. INTRODUCTION

In this paper, we consider the social experiences around walking. This is a somewhat paradoxical area where walking is variously seen as an individual or even solitary practice focused on nature or spiritual reflections, or as a collective experience from Aristotle's Peripatetic School to the Kinder Mass Trespass and numerous walking clubs today. This paradox was summed up by a walker, who had been on a long-distance expedition with between a dozen and a hundred other walkers at a time. He told one of the authors that his best times were when he was with other people but walking alone.

Research in HCI stresses the importance of social context and technology use to support users' and communities' needs in education, health and in facilitating organization of social groups for collective action and social change (Massung *et al.*, 2013; Wulf *et al.*, 2013). However, we lack sufficient insight into the rich social engagement processes of these interactions; the ways the context itself enables individuals and groups not only to construct a social user experience, but also to achieve social effects, such as to influence decisions and actions on the move.

Although there is extensive literature on social interactions around technology, the topic of walking engagement as an experience is less well studied. To ensure a comprehensive social experience, some common questions should be answered. What is an effective and applicable framework for social engagement? What should be its features and main activities? And ultimately, what should be the level of abstraction of the social engagement framework? This paper stands as a step towards addressing this need. Drawing on HCI and socio-psychological research findings, we report on a longitudinal research study of a walker's experience in facilitating social engagement process.

Walking itself presents a novel approach in HCI suitable to address social engagement challenges (see also Dix, 2010, for the use of single person studies in research and design). We situate this work within a grounded theory (GT) analysis (Glaser and Strauss, 1967; Strauss and Corbin, 1997) of the walker's qualitative data blog entries and audio recordings during the 102 days of the journey around Wales. Dix (2017, in press) describes the ontological and methodological challenges of 'research in the wild' based on this 102-day journey: low on systematicity, high on subjectivity, more about uncovering questions than finding answers. The walker—second author—carried a variety of different technologies, apps and devices during the journey, transferring data, uploading stuff to the web, capturing physiological data and in general 'tending' technology. The challenges include the very practical experience of using these things (or failing to!) on a day-to-day basis. In addition, observing and interacting with local communities, groups (e.g. fellow walkers), and individuals revealed particular social effects in the form of stories/narratives and actions, and their interplay with individually motivated goals. This is of course an extreme walking experience, but in line with work in many areas, not least Garfinkel's breaching experiments (Garfinkel, 1984), the weird, extreme, broken or out-of-the-ordinary can make apparent issues that usually pass below our notice, and in so doing cast light on the ordinary.

1.1. Roles and research process

The two authors took varying roles at different stages of the research, which are important to understand the different outcomes and their validity. These are summarized in Fig. 1, where the first author is denoted as 'third-party researcher' and the second author as 'walker/participant-researcher'. Initially, the participant-researcher (second author) undertook the walk around Wales (1), over the period April–July 2013. The reasons for the walk are discussed in section 2.3, but the two crucial elements are (i) electrocardiography (ECG) of the key foci was technology for the walker and (ii) the third-party researcher was not involved at all at this stage. The outcomes of this included blogs, other extensive data such as ECG recordings (not used in the analysis in this paper) and also during and after the walk numerous academic talks and several academic reports (inc. Dix, 2013, 2017; Morgan *et al.*, 2014).

Although it is common for walkers to keep diaries or blog, the volume of recording for this walk was unusual (~2000 words a day), partly because one of the research objectives of the walker was to keep a record. This is of course not a typical walk, if indeed any long-distance work is 'typical', as the blogs are written from an academic viewpoint; however, the walker attempted to create as honest and complete an account as possible. The blogs were chosen as an object of study by the third-party researcher (first author), partly due to the unusual volume, and partly due to availability, as they are in public-domain, and the walker was a previous research collaborator. However, for the purposes of initial GT analysis (2), the third-party researcher did not interact with the walker, so that the inductive analysis of the blogs could be as open and objective as possible. The themes arising from this analysis of this are presented in sections 3 and 4.

The success of this third-party analysis was evident in that when the themes were presented to the walker (3) they were surprising as they showed a strong social focus in contrast to the walker's subjective recollection of a largely solitary experience. The third-party researcher's background (social psychology) could have promised this, but in fact it was evident to both that these themes were strongly represented in the written text.

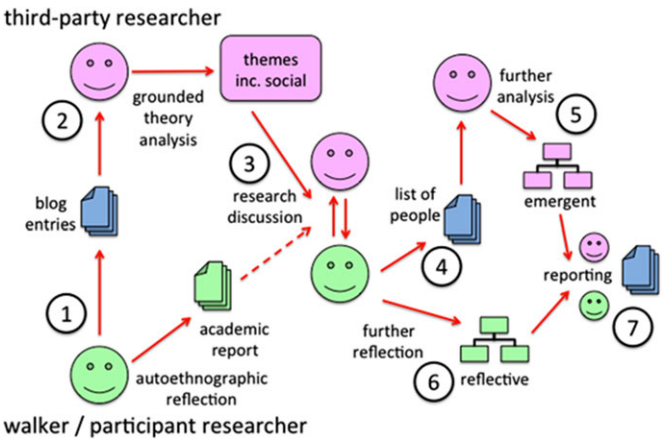

Figure 1. Walker/participant-researcher roles and research process.

These discussions prompted the walker to reflect on the social contacts of the walk (4), which led to a list of 23 kinds of people connected to the walk (see Appendix B), some reported in the blogs, others not (for reasons that become clear in section 5). This list was then used by the third-party researcher for further analysis (5) and also by the participant-researcher to prompt further reflection (6). The resulting high level concepts and categories were finally collaboratively synthesized as reported in sections 5 and 6. Note too that these later stages were richly informed by external literature helping us draw lessons that are wider than the unique experience analysed. In summary, the methodology involved a combination of third-party 'objective' analysis and first-party subjective accounts to create a more elaborate and rich outcome than either would have achieved individually.

This paper presents the following contributions: First, we provide a description of a substantive social engagement transition and experience framework, its structural characteristics and required activities. Second, the walker's narratives elucidate the potential design qualities of 'the social' as performed through everyday interactions with individuals, groups and unexpected situations, with emphasis on the particular effects these have on the walker. Lastly, the full evidence for the generalization comes not from the data gathered or the experience in itself, but more from the reasoning that draws on wider sources of personal and academic knowledge prompted by the specific instance.

The rest of this paper is organized as follows: The next section provides a short description of the social and embedded experience, technologies to support walkers, and challenges while walking around Wales. In section 3, we describe in detail the various data collected and research methodology employed. Section 4 presents the analysis and study results, whereas section 5 further elaborates on the role of people to facilitate social engagement. Section 6 outlines the main layers of walking experience at the individual, social, and community level. Lastly, we draw the main conclusions and suggest future research directions.

2. USER EXPERIENCE AND SOCIAL ENGAGEMENT

So far, a small number of social engagement and experience frameworks have been proposed for ubiquitous systems. Most of the related publications primarily have described the introduction of social media/networking and sharing features to particular ubiquitous technologies and applications (e.g. Zhang *et al.*, 2014 on social commerce, Karapanos *et al.*, 2016; Kaur *et al.*, 2016) and examined the main challenges, user motivations and barriers of use. Although there are several studies providing recommendations and lessons learned to facilitate the social interactions of individuals with groups augmented by technology only, a few structured experience frameworks can be considered. At the same time, there are several criticisms against the proposed frameworks, most of them concerned with complexity of use as well as the inconsistency of their nature in dealing with social context.

Therefore, adopting an empirical approach to study social engagement would be beneficial. We tried to focus on social engagement to inductively develop a framework grounded in the experience of walking. Although GT does not involve formulating a research hypothesis up-front and based on extensive literature review, application of literature review is not forbidden. However, Glaser (1978) strictly warned GT researchers about the adverse effects of conducting an extensive literature review in the same area of research during early stages of GT. Following Glaser's recommendation, the core analyst started this research by conducting only a minor literature review at the beginning. We primarily wanted to understand general concepts, terminology, and basic facts in order to be able to carry on with day-to-day data analysis.

2.1. Social and embodied experience

Understanding the specific characteristics of a social engagement process allows a fuller use of the 'social' as a design strategy in future-enabled technologies, as well as its value of having experience as a design focus (see also Battarbee, 2007; Buchenau and Fulton, 2000; Sanders, 2001). For example, Battarbee (2007) points out that existing approaches of designing for experience mostly treat individuals as central and only refer to social contexts by story-telling and not interacting with other people as the basis of making sense of the experiences.

In addition, Berman *et al.* (2008) and more recently Bratman *et al.* (2015) discuss the benefits of a 50-min nature walk in improving affect (e.g. decreased anxiety, rumination) and cognitive processes (increased working memory performance). Parker *et al.* (2012) also argue for a thorough understanding of the context in which technologies operate to facilitate and enable collectives to effect social change. Social media have been largely regarded as one space offering opportunities for alternative discursive modes, broadening participation in political discourse and activism, thus contributing to a change in the very notion of the public sphere, the modalities and spaces people are using to discuss their issues (Monroy-Hernández *et al.*, 2013).

Moreover, there is a growing interest in research that highlights the collective and social aspects of museum experiences rather than the individual. For instance, people extensively use museums as arenas to socialize without always positioning the exhibit as their primary concern (Heath and von Lehn, 2004). This has led to a shift in the kind of systems that are designed, from ones that are focused on individual interaction with the art to systems that are focused on social interaction among museum visitors (e.g. Aoki *et al.*, 2002; Berkovich *et al.*, 2003; Mentis *et al.*, 2014).

Mentis *et al.* (2014), in particular, built a probe system to explore sharing experiences through bodily interaction. The study focused primarily on feedback, group sharing/social features and level of engagement with the system, *but not the social engagement process and its effects per se*. Interestingly, the feedback provided was at the group level, rather than the individual–group interaction level. Indeed, Mentis *et al.* (2014) found that although users fully understood, appreciated, and used the system as a social tool, the predominant experience was that of personal interaction with system. In cases, where the social aspect interfered with the individual experience, users preferred to attend to the individual experience. In some sense, they sent theory expressions out 'into the void', not really caring about the effects they would have on their friends; a finding that appears to challenge Garfinkel's (1984) idea of mutual accountability as a pervasive organizing principle for social understanding and interaction. It became instead the result of their reflection with the system. Mentis *et al.* (2014) argued that this behaviour depends on the design problems of the system, the system being ill-fitted for experience sharing, or what we are seeing are novice behaviours around a new tool that users have never seen before.

At the core of this research lies the idea that people become advocates and living subjects for social engagement, and that experiences (with or without use of technology) affect in-context decisions and actions. This echoes early research by Terveen and McDonald (2005) on social matching systems to increase social interaction and foster collaboration or, again, Mentis *et al.*'s (2014) recent work exploring the dynamics of designing systems for sharing experience through bodily interaction. Users' attention was mainly set on their own reflective experience, rather than attending to the person(s) with whom they were sharing their experience.

Ruddle *et al.* (2011) also investigated that the effect of body-based information (such as proprioception) when participants navigated virtual marketplaces that were either small or large in extent focusing on necessary navigation strategies and support of navigation details in a virtual environment. In large and small environments translational body-based information significantly improved the accuracy of participants' cognitive maps, measured using estimates of direction and relative straight line distance but, on its own, rotational body-based information had no effect. In environments of small extent, full body-based information also improved participants' navigational performance. The experiments highlighted that locomotion devices, such as linear treadmills would bring substantial benefits to virtual environment applications where large spaces are navigated.

2.2. Technologies and products for walking

The use of technology during the Wales Walk (Dix, 2013) revealed a number of technical and social issues, either with the context of use (e.g. wet weather), the technology not being designed for contextual adaptation and/or appropriate visualizations and user interactions to deal with the tentative in/between adaptation, or simply lack of time. Twitter, as an example of social media, was virtually impossible to use mainly due to the tendency to discard messages, which was particularly frustrating. While cameras and audio recorder have had a low impact on the walking experience, maps (paper or electronic), GPS devices or phone apps were commonly used for navigation by people including experienced hikers (see Mason *et al.*, 2013).

There are many research and commercial applications focused on the act of walking. The most obvious examples are mobile tourist guides, which date back many years (Cheverst *et al.*, 2000). More recently this notion has been inverted by Hobbit (Posti *et al.*, 2014), which deliberately highlights routes that are infrequently walked or away from other users; this reflects the idea that those walking in woods and other rural locations do so deliberately to seek solitude, again inverting the focus on social networking and hyper-connectivity. Hobbit is also unusual in its rural focus; the majority of mobile application research has been targeted at urban areas, largely because this is where universities are situated. However, there is also an active industry in the production of devices (e.g. http://www.garmin.com, http://www.findmespot.eu/en/) and mobile-phone applications (e.g. http://www.viewranger.com/) that help navigate or capture experiences in the wild. While many are effectively standalone, others enable connections with social media and other information sources, such as Social Hiking (e.g. http://www.shareyouradventure.com/).

Similarly, there is a rapidly growing market in devices and applications to track and share sporting or health and fitness related activities. Some, such as Nike+, Jawbone and FuelBand can be used independently, but actively encourage sharing of activity data in order to encourage competition: '*Sync with your device, see your progress and compete against your friends*' (Nike website, 31/7/2014, http://www.nike.com/gb/en_gb/c/nikeplus-fuelband). However, detailed user studies have shown that, while social elements were appreciated, it is intrinsic motivation and individual goals that are the main determinants of behaviour (Spillers and Asimakopoulos, 2014). The mobile-phone-based research application HeartLink takes this a stage further enabling a live two-way interaction (Curmi *et al.*, 2013). HeartLink connects to a commercial chest-strap heart sensor and transmits live heart-rate information to friends and supporters. In turn they can 'cheer' the wearer, which is conveyed by vibrating the phone.

Within the socio-technical literature, walking has been predominantly the object of study, rather than used as the means of study. For example, space syntax theorists have compared actual walking patterns with those predicted by their methods (Kostakos *et al.*, 2010); ubicomp and mobile HCI researchers

have used movement patterns as part of the design of context-sensitive user interfaces and services (Cheverst *et al.*, 2000; Dix *et al.*, 2000; Pribeanu *et al.*, 2001); walking may be an integral part of an activity being studied, as was the case with Bidwell *et al.*'s (2013) work with solar charging in rural Africa; and health and well-being researchers have combined environmental and bio-sensors into many mobile applications.

In general, when mobile interfaces are designed to be used while walking, these are, quite reasonably, evaluated while walking, but where the *walkers are test users not researchers*. The subjective nature of walking has also been the subject of various applications and studies (e.g. Hobbit and HeartLink). Other researchers have simply used the evocative nature of walking, particularly of a familiar area, as a research instrument; for example, Stanton Fraser *et al.* (2013) used mobile blogging (moblogging) in order to reveal perceptions of urban spaces, while Bidwell and Browning (2006) used egocentric videos taken during walking to help elicit the *'sense of being in'* a place at a local natural landmark in tropical Queensland, Australia.

2.3. Walking wales

The Wales Coast Path, approximately 870 miles (1400 km) long, was opened in 2012. Together with the existing Offa's Dyke long-distance walk, which roughly follows the Wales–England border, this created a path around the entre periphery of Wales, a distance of ~1050 miles (1700 km). The second author chose to walk this for a mixture of personal and academic reasons. He brought a number of personal research goals including an interest in low-connectivity mobile interfaces (e.g. Dix, 1995). It also built on recent work on the remote island community of Tiree, including a project to support youth workers to connect with youngsters using a combination of web, social networking and SMS and the biannual Tiree Tech Wave maker festival (http://tireetechwave.org/, Dostal and Dix, 2011), which created a desire to understand more deeply how information technology (IT) scarcity affects marginal communities. In addition, the second author offered himself as a 'living lab' to the academic community at large, giving rise to a number of other aspects to the work including substantial bio-sensor data collection resulting in, *inter alia*, the most extensive ECG trace in the public-domain.

One of the most obvious features of walking is that it is slow (on average two to three miles per hour). For walking large distances, walking is unconscionably slow, but the very slowness creates its own pace and forces you to notice things in the environment and to experience places you might otherwise have missed. This was particularly noticeable to the second author in the Dee Estuary in the north east of Wales, a very depressed and not at all pretty area, but where important learning occurred. In other domains there has been an increasing appreciation of the value of 'slow'. This began with 'Slow Food' in Italy in 1986, but became more widespread with a broader 'slow movement' following Karl Honoré's '*In Praise of Slow*' (Dix and Phillips, 2006; Honoré, 2004).

The outputs of the walk included, *inter alia*, more than 150 000 words of daily text blogs, which are analyzed in this paper focusing particularly on the ways walking become the site where social engagement and individual–group interactions are articulated and developed. That is, we analysed walking as a site for the production of the social user experience, reflecting and enabling the actions of the walker as well as social encounters (be it individuals or groups) through shared articulation of aims and achievements.

3. GT RESEARCH METHODOLOGY

This research methodology was developed by Glaser and Strauss (1967). It provides a systematic approach to inductively build a theory on the basis of data analysis (Glaser, 1978; 2005). It utilizes a *'systematic set of procedures to develop an inductively-derived GT about a phenomenon'* (see Strauss and Corbin, 1990). GT is a suitable method for qualitative researchers to answer questions like 'what is going on in an area', by generating formal or substantive theory (Adams *et al.*, 2008; Corbin and Strauss, 2008; Hoda *et al.*, 2010).

The study data comprising 300 pages of daily blog entries was retrieved through a dedicated blog posted between April and August 2013. Although there are many kinds of GT with different and approaches, the current study employed the Glaser version, also known as Pure GT; its precise steps used are described in this section (see also Fig. 2). The methodology for this study was chosen due to (i) focusing on walking experience interactions and behaviours of social engagement and (ii) offering a *'fresh perspective on a well-known area'* (Stern, 1994) by articulating HCI works regarding social engagement and the social experience of walking. Although the reporting of this analysis is being done jointly, the GT analysis was performed independently by the first author, with the second author acting effectively as data subject. In some ways this is just a form of single person study, with the same advantages of depth and disadvantages of breadth inherent in the technique (Razak, 2008).

3.1. Data collection

Typically, a GT starts with data collection and uses it as an ongoing activity to reach data saturation—the point at which no new concepts or information being obtained (Glaser, 1998). After finding some concepts representing the main participant's concerns or thoughts, data are collected and analysed via theoretical sampling, which means that the researcher can decide what data should be gathered in the next steps (Glaser, 1978). Data were carefully collated by the first author (core analyst) from blog and audio files, and were available for further

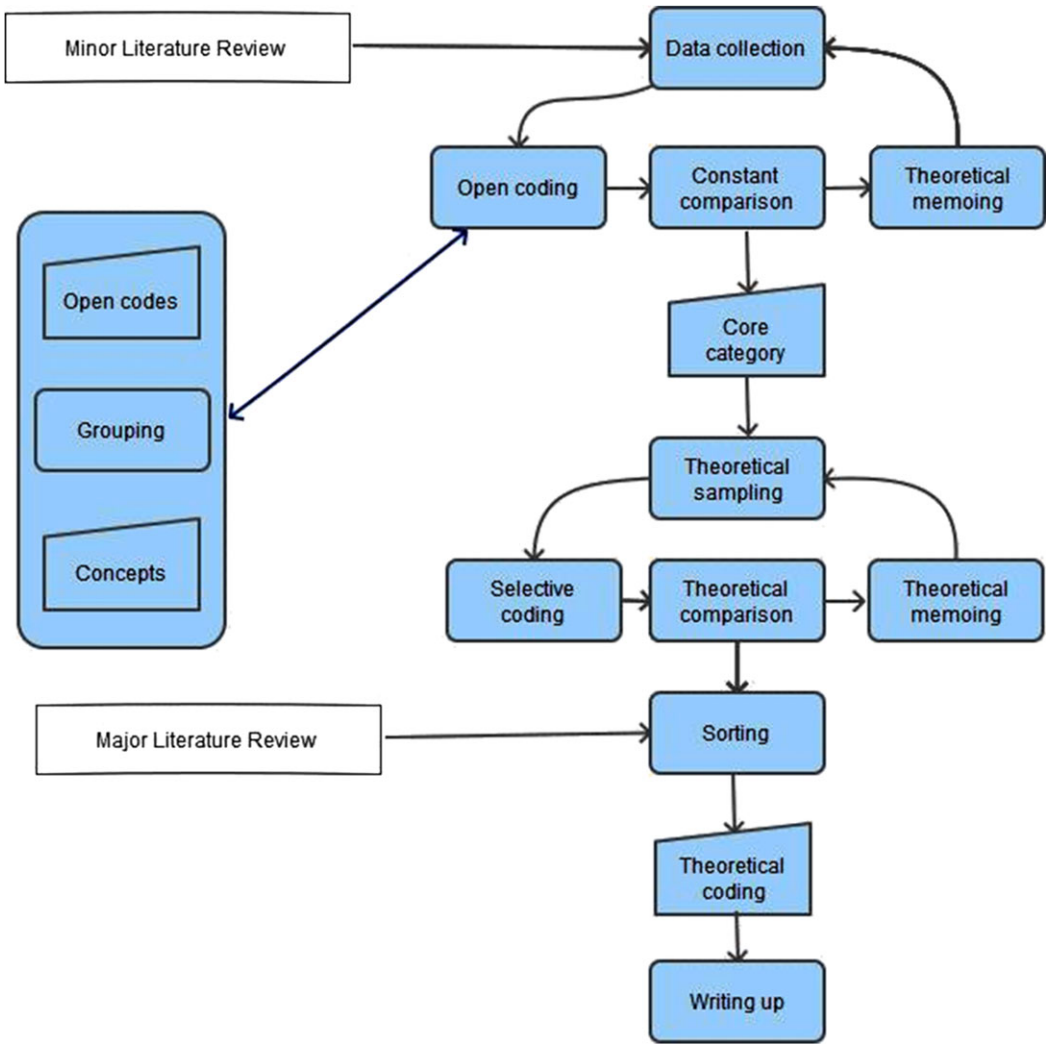

Figure 2. GT steps that have been taken in this study.

analysis. We should also point out that data and blogs were generated by the walker (data collector) for their own purpose, and not specifically in order to pursue the GT analysis. Later, we used the transcribed data for analysing and reviewing in several iterations to achieve the goal of constant comparison and identify issues of interest and further analysis as Glaser (1998) suggests.

3.2. Data analysis

The data analysis procedure, called data coding in GT, begins when some data are analysed and continues to provide an emerging theory (Glaser, 1998). Data coding involves *substantive* and *theoretical* coding as two different approaches. Substantive codes are the emergent categories and properties that conceptually describe the phenomenon under study, whereas theoretical codes are the emergent abstractions that model the integration of substantive codes as an interrelated set of hypotheses for resolving the main concern (Glaser, 1978; 2005). This means that by such codes, GT researchers are looking to find relationships between concepts and categories and modelling hypothesis (Glaser, 2005). Applying both approaches, we employed a multi-level coding process that is explained in the rest of this section.

3.3. Open coding

The first step of data analysis was open coding in which each transcript was analysed sentence-by-sentence or line-by-line for conceptual understanding of the context under study (Glaser, 1978). By employing this method, we were looking for *key points*. Immediately after finding a key point, a code was assigned to that key point. To differentiate key points made in subsequent day data analysis, these key points were

distinguished with a suffix D followed by day and key point numbers. For example, key point three made in day 3 appears as D33 (see Appendix A). This process is known as *constant comparison process* and the heart of GT (Glaser and Strauss, 1967).

Constant comparison technique helped us to achieve abstraction at a higher level by finding *concepts*. Applying iterative constant comparison on the emerging concepts helped to find *categories*. Each category is a higher level of abstraction, which encompasses a group of concepts that seem to relate to the same phenomenon. The final theory, as explained later, would be based on some or all of the emergent categories.

3.4. Core category

The end of open coding is marked by the emergence of a *core category* (Glaser, 1992). The core category 'accounts for a large portion of the variation in a pattern of behaviour' and is considered the main problem or concern of the participant or participants (Glaser, 1978). Once a category emerges, GT researchers need to identify its properties and related categories. They also need to show how categories vary dimensionally along properties (Corbin and Strauss, 2008).

In this research, in almost half of the research time analysis, the category *way finding and social navigation* seemed to be the core category, because it was the most common concern of the walker. Focusing on the core category criteria was helpful to verify whether this is really core. In this case, *way finding and social navigation* did not meet some of the above criteria. For instance, although it was a critical concern of the walker, it was not central. Also, by growing the amount of data analyzed, it did not account for the most variations in the data.

Continuing data analysis showed that the core category of this study on walking was in fact *Social engagement transition and experience*, whilst *way finding and social navigation* was a serious challenge faced by the walker author, which contributed to his main concern. Indeed, iteratively conducting constant comparison pushed the discovery of '*Social engagement transition and experience*' as the core category of this study, whereby way finding and social navigation coded due to further data analysis as '*accuracy of social judgements'* ended as one of its related categories. Once we established the core category, open coding was stopped. Afterwards, the coding process continued only for the core category and its closely related categories (Glaser, 1978). This process is known as *selective coding* in GT. Following this process, the emergent GT of this study comprised four major themes within the core category of *Social engagement transition and experience*:

- *Accuracy of social judgements* – This often concerns navigation, where people (remote and on the ground) help in way-finding; but also about situated social traces (e.g. worn paths, formal and informal signage).
- *Accountability of decisions and actions* – Whereas the previous theme is more about the advice and navigational aids given by strangers and friends, this is about the way in which common purpose and sense of mutual accountability shapes social interactions.
- *Leveraging self-esteem* – Various encounters with others help to build the walker's self-esteem, including being recognized from the TV!
- *Activating intrinsic motivation goals* – While 'intrinsic motivation' suggests non-social motivation, something driven from within, these internal drivers also interweave with various social interactions, both reinforcing the internal goals and encouraging other people.

These themes are examined in greater detail in section 4.

3.5. Theoretical memoing and sorting

After 3 months of data coding, on the basis of emphasized ideas and concepts, more detailed data were analysed and formed in one or more memos related to that week's data. This process is known as *theoretical memoing* (Glaser, 1998). Memoing is not optional and is the most significant factor in ensuring quality in GT (Birks and Mills, 2011). In fact, when we had an idea about the emerging open codes, concepts, and categories and their relationships, we wrote our idea as a memo and if necessary, we looked more data for the memos. It should be noted that we did not mix memos with the collected and analysed data. In addition, *sorting* is defined as the process of formulating the emergent theory and its related categories and links. This process was carried out when almost all codes had been saturated, and data collection was nearly finished. This step was very important, since it was the last step of the analysis process and helped us to explain each topic and *social engagement transition and experience* process in detail.

3.6. Theoretical coding

Theoretical coding or *theory building* was the last step of this study and was used to look for connections and relationships between the core category and other emerged categories, and to form the hypotheses that together explain the theory (Glaser and Strauss, 1967; Glaser, 1992). In this stage, the relationships between *Social engagement transition and experience* as the core category and other categories such as *accuracy of social judgements, accountability of decisions and actions, leveraging self-esteem, and activating intrinsic motivation goals* were formulated. As explained earlier, Fig. 3 depicts the emergent core category and its related categories; each including its own properties.

Glaser suggests several structures of theories, called *'theoretical coding family'* (Glaser, 1978). One of the most popular codes in this family concerns the process concept. He defined

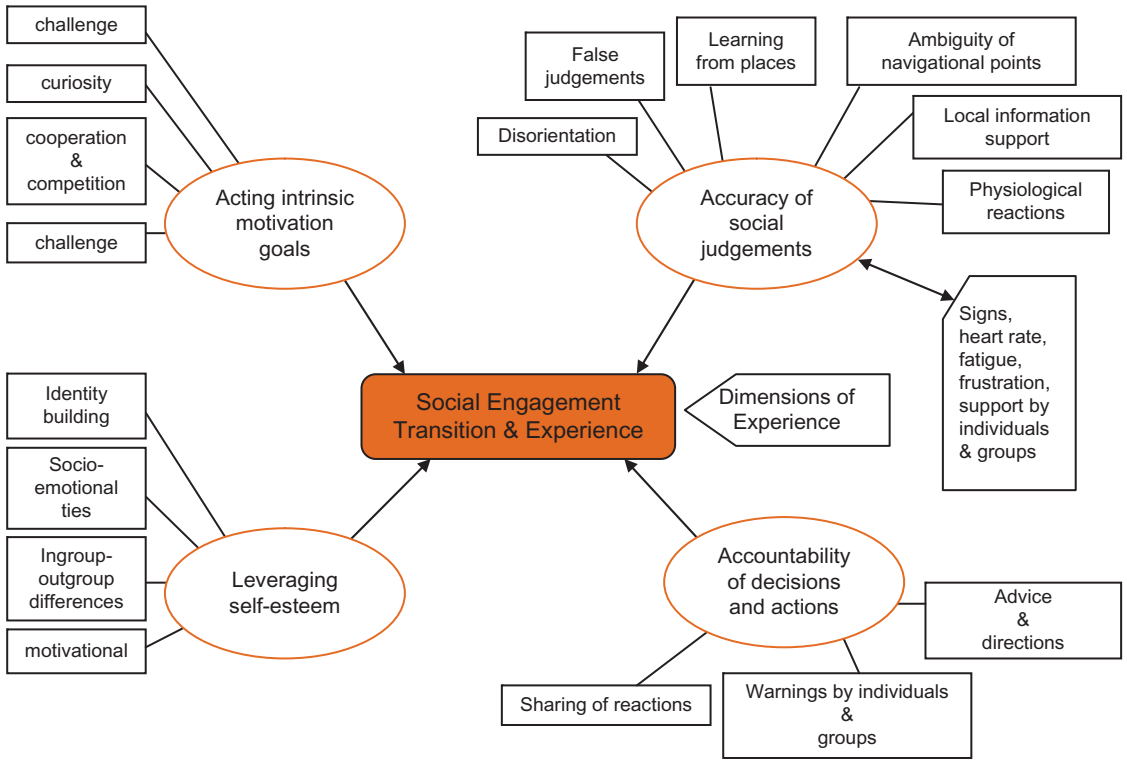

Figure 3. Core category and its emergent properties as the Social Engagement Transition and Experience Framework.

this family as *Process Family* at first (Glaser, 1978) and later he elaborated it and called it *Temporal Family* (Glaser, 2005). We used this coding family to formulate the emerging transition framework. This coding family demonstrates a category in the form of stages, phases, steps, timelines, conditions, actions, temporal ordering of work and so forth. An account of these themes was then written up illustrated by quotes from the blogs and, where appropriate, Dix's existing research reports (Dix, 2013; Morgan *et al.*, 2014).

Moreover, the second author (the walker) produced a list of different kinds of social contacts during or related to the walk. It is noteworthy that this task was prompted by the GT analysis following initial resistance of the second author to the idea of social experience being such a central theme for the subsequent analysis. Specifically, in the initial discussions the second author described the walk as largely a solitary affair, yet the list of social contacts ran to 23 different kinds contacts, and some of these were quite broadly defined (see Appendix B). Note that while some of these were explicitly mentioned in the blogs, and indeed will have given rise to the emergent theme, others were not mentioned and only listed by the second author on further reflection. This list was then used, in a similar way to the blogs (albeit much shorter) as raw data for a further round of GT analysis resulting in quite different, but complementary, categorizations of the social relationships and engagement, which were synthesized in the writing of this paper (see sections 5 and 6).

4. ANALYSIS AND RESULTS

We conducted qualitative analysis of the data set utilizing principles of the GT as described in the previous section. The empirical data were coded and four analytic themes comprising the social engagement transition and experience framework were inductively generated: (i) accuracy of social judgments (ii) nurturing accountability of walking decisions (iii) leveraging self-esteem and (iv) activating intrinsic motivation goals accomplished during the walk and due to social engagements. We report quotes from the day data set to illustrate discursive processes in temporal order. Through this, we chart the process in which walking formed as a social user experience capable of spontaneous and planned decisions and action. Due to the limited space, only the most important derived quotations that depict some parts of the framework are presented.

4.1. Accuracy of social judgements

One of the main issues is how much navigation depends on following alternative paths when signs are slightly ambiguous. At a major decision point, it is good to have *both* 'you're on the right track' markers and also 'not Offa's Dyke' ~50 yards down the wrong path! Confirmation and dis-confirmation are equally true for real world navigation and digital interactions, whereby social navigation and interactions help to deal

with issues faced in 'non-social' scenarios. Way finding is easy when there are long horizons, more difficult in woodlands, or crossing fields and stiles. The following passage from Day 80 illustrates the issues the walker faced in a vivid manner:

> *'Of course knowing you can get off a beach and finding where are two different things. Happily a couple are walking down the beach from that direction, so I ask them and they point out trees part way down the beach, where I will find a footpath pointing off the beach. When I get there I first find a tiny baby adder on the path; it does not move as I approach, so I think it may have died. I also realise that while this will connect with the footpath, in fact I can go a little further along the beach to where the coast path nearly meets the sea. Indeed, a few hundred yards on from the trees is another footpath post and this leads to two footpaths, each of which joins the coast path. From here it is another slow climb across the cliff contours, and then another drop down to a small sandy cove, between Ragwen Point and Gilman Point. It is nameless on my map, but a sign says Morfa Bychan' (day 80).*

Meeting encounters and engaging socially not only provided local information useful for navigation and orientation, but also increased cognitive accuracy of social judgments. The quotes from Day 18 illustrate route mapping as a result of group trust and reacting to signage disorientation.

> *'The trail follows closely the line of the old dyke for much of the day, this being one of the areas where it has survived the years. I had learnt from Janet that while the path followed the actual dyke where it was still extant (about 70 miles in total), in other parts the reasons for the placement of the path were not always about closeness to the supposed dyke route'. (day 18)*

> *'I felt some unease as the path took a turn eastward that was not marked on the map, but too[k] it first for a small dog-leg before returning to a northerly route, and then maybe a permanent path change since the map's last reprint. I was reassured by further "walk with Offa" signs I passed, but as the route took me further and further we[st], and down the far side of the hill along which the dyke passed, I came the realization that I had done something seriously wrong. I met a family on a circular walk at the bottom of the valley … the youngest member of the group, … showed me on their OS map and it confirmed my fears.'. (day 18)*

These decisions, physiologically and emotionally demanding *'Elation at discovering the true time and a bite of Wispa bar, and my fatigue fell off me, even the pain in my feet felt less bad as I set off up the hill out of Trevor'* (Day 21) led to following paths sometimes getting close to the goal, sometimes further away, like navigating a one-way system. However, *'the point of the traditional maze is not getting to the place where it ends, but the act of following it, and in doing so both we and the place are changed*' (Day 30). As the following example from Day 46 shows, the walker took a false decision by following the wrong path:

> *'The road mainly follows lanes and roads, except where it meanders a little to go round the end of an estuary. I follow a signposted path that shrinks from green lane to narrow track and eventually over a bridge and onto a dyke. There was no sign, so I turned left along the dyke and eventually, through a few parts reached the road again. It was only some time later that I realized the route could not be right and I should have turned right onto the dyke. At leisure I later looked at the 25000 OS map and it is 'obvious', which way to go on that, if not from the coast path map or (lack of) signage. Whilst gaining me some soggy feet, it did cut off a mile or so of walking, so not an ultimate disaster, but it did cost me the only actual moments beside the sea in the day' (day 46).*

Of particular importance is when SPOT tracker and family member (wife, Fiona) advised on way finding, where real-time 'self-other' tracking is crucial for changing plans and understanding of local routes in absence of good signalling.

> *'On the headland there was good signal, so I rang Fiona to say hello and she watched where I was using the SPOT tracker and satellite images. "you are going almost back the way you came," she said. Sure enough, looking back on my track for the day, I followed a route that took me within half a mile of the point with the bluff.' (day 49)*

The sequence of social engagement continues through the rest of Day 49 including advice from a campsite owner, '*There's nothing in Machroes … but about a mile inland there is a lovely pub where the locals go*'. Advice like this can be negative as well as positive, for example a man outside a pub in Abersoch who, *'gave directions us[ing] another B&B as a landmark*', but then said, *'but don't stay there'*.

Another interesting example where social encounters improved navigability and accuracy of social judgements, particularly towards the later stages of walking, is found in the excerpt quoted previously:

> *'Of course knowing you* can *get off a beach and finding* where *are two different things. Happily a couple are walking down the beach from that direction, so I ask them and they point out trees part way down the beach, where I will find a footpath pointing off the beach.' (day 80)*

Right from the beginning of the walk, it was evident that the social engagement transition should consider '*learning from places'* in its core, that lead to successful walking experience, often not considered in existing ubiquitous technologies and systems. The following quote highlights the learning process:

> *'Wending slightly into the town past the post office and funeral parlour, supermarket and Wetherspoons, eventually the path cuts back down an old church alleyway towards the river again. The church had a notice board, and on the notice board a small card with QR codes on it … and I'm not even in Monmouth yet. The card is by historypoints.org; I need to look them up. Although this was the only digital signage there were ceramic information plaques on walls across the town, both beautiful and telling in small snatches the history of the town. In particular I found that Chepstow and Wye mouth were not only the site of old border disputes (William the Conquerer's castle to subdue the Welsh, and not far off Caerleon where the Romans did the same for the Silures), but also a major centre for shipbuilding during the First*

World War, with workers being drafted in from as far away as the Clyde.' (day 3).

The analysis further revealed that accuracy of social judgements was an emotional uptake with different physiological and bodily reactions depending on the stage of the walk: frustration, fatigue, confusion, low blood sugar levels, and heart-rate variations.

'One last (I thought) climb up small lanes and mostly clear paths, to see views towards the sea ahead and Prestatyn appearing in the distance. It seemed so close, only seven miles as the crow flies, but a lot further by the meandering Offa's Dyke path. I felt on a roll, and wondered if I would be able to make it all the way to the close, otherwise I'd have a bit of the Dyke path to'finish off' in the next week. I wonder now whether low blood sugar was already clouding my judgement slightly'. (day 24)

The preceding quote refers to a period of solitary walk following on after the walker met and socially interacted with a rehabilitation group, which raised his spirit, despite the low blood sugar. In these moments, the support and information provided by local individuals and groups was evident.

4.2. Accountability of decisions and actions

The walking has also been consistently a reflection of reactions to the environment, places and fragilities that influenced decisions and actions. On a social engagement continuum, these natural breakdowns in services reminded the author of similar events and memories, of which community and various ingroups were collectively aware, and which formed part of their common decisional bonds. Solnit (2001) talks about the way walking, almost like a sewing thread, binds together, and so there is something symbolic about the way connections are made even by the planning of walking. This strong sense of accountability and determination to specific actions because of the people/place engagements appears in the following example:

'Although they had no rooms themselves, the lady behind the bar and a young man, who was obviously connected with the pub started to discuss options, rang once place and, when another lady came in, she started to look up the phone number of another option on the internet … a laptop on top of the (not alight!) woodstove under the chimney breast'. They asked about my walk, gave me a drink and food, and the lady behind the bar gave me her night's tips to go towards the charities. When accommodation was proving hard and I considered a taxi to Tal-y-Bont, they reminded me that the last train had not yet left'. (day 54)

The organization of interaction according to something socially meaningful that participants have in common and are accountable for is a feature that differentiates them from outside groups; this type of accountability operates when people take joint responsibility for something such as raising a child, when they share resources such as an ocean, food or a place, or when they act with compassion because they identify with another's suffering.

'The way is not totally clear, as there are multiple ways, but I am sure I am right…until I meet the ladies in black coming towards me. They had been shooed off the perimeter path, and then came to a post with two arrows both pointing towards the path I was coming from. I turn round and we go back together for a while, but then re-check maps and decide that the way they were coming from and I'd been heading for must be right. I set off at my slightly faster pace, and promise to come back to tell them if there is a problem. When I get to the end I realise the problem: coming out from the path it is obvious that one of the arrows means to join a roadway; however, coming, as they had, from the forbidden path, the arrows looked as if they are pointing the same direction'. (day 35)

Accountability can be as deep as intense love, or as superficial as sharing access to a drinking fountain or a highway. With respect to a given interaction, a set of people are either socially accountable, or they are categorically different. In this realm, warnings and advice given for way finding have supported better decisions and following the correct paths as the quotes suggest:

'Way finding is easy when there are long horizons, more difficult in woodlands, or criss crossing fields and stiles. I simply follow the long trodden pathway north, with occasional boggy patches, but largely sun-dried mud stepping stones where sections of stone have not already been laid down. How different this would be on a rainy day, perhaps with low cloud. Arry (dragonrun1027) warned me about this section, "watch the weather forecast", she said, "take the road route if it is bad". The ridge is flat in places (hence boggy), and it would be so easy to take the wrong path if the long line of it were not visible'. (day 6)

'He also advised me on the remaining way. It would take a few hours to go round the last headland, but it was an easy walk, but I couldn't follow my original plan to have a quick rest at Machroes before the last miles to Abersoch. "There's nothing in Machroes." he informed me, "but about a mile inland there is a lovely pub where the locals go'. (day 49)

'Also the people I met here could not have been nicer. On my way up from the beach a man standing outside one of the pubs gave me directions to the Angorfa B&B and Breakfast Cafe http://www.angorfa.com/ ('angorfa' means 'anchorage'), told me about shops, including a Spar that is below eye level as you go into an estate (maybe where local people live), and as he gave directions used another B&B as a landmark, "but don't stay there," he sad, but never explained why'. (day 49)

Even though the social relationships, groups and activities were incomplete, engagement was informed and specified accountability: with whom, where, when, or how particular decisions were implemented—or which action is to be used in which aspects of an interaction. Accountability appeared to provide one of the main prototypes and precedents that guide people in applying engagement that permits individual action.

4.3. Leveraging self-esteem

Maintaining motivation over a long period was bound to be hard. The second author provided relevant groups with conversational and semantic triggers that would support social engagement and, at another level, leverage his self-esteem to complete the walk.

> *'A group of cyclists passed me by, and one greeted me by name; it took a few moments to remember that this was because my name was on the back of my rucksack: "Alan Walks Wales"' (day 3)*

The motivating effect was perhaps greater still when unexpected:

> *'From here on the ridge gradually descends and ahead I could see a group … I greeted them as I passed and then one of them said, "are you Alan?" I thought they'd just seen the banner on my back, but it was not just that, "I saw about you on the TV", he said.' (day 24)*

Maintaining self-esteem or being motivated by the possibility of self-improvement of the interpersonal, social, or relational self depends on connections between people. The relational self can operate automatically to orient people in the particular social context (Chen *et al.*, 2006). The societal self represents social identities defined at the level of collective or culture (Brewer and Gardner, 1996). Besides these four levels —body self, inner self, interpersonal self, societal self, one can carve up the self in other ways.

'*Identity building'* was one of the most important characteristics for leveraging self-esteem of the walker, a rather continuous feature. This concept is close to socio-emotional ties developed during the walk, except that it is focused on places and historical memories that are relevant to the individual.

> *'A man and his son came walking along the cliff path, discussing where the Offa's Dyke path ended, the man said it went to the north of Wales, but didn't know quite where. Routes and destinations have been so much part of my consciousness that it is easy to forget that for the local person, it is simply a landmark. The man told me of the joys of living so close to a lovely part of the world, but fears that a long planned bypass for Chepstow would cut through this small strip of farmland between Sedbury and the cliffs en route to the M4. I assume they would have a flyover across Offa's Dyke'. (day 3)*

Leveraging self-esteem forms an important feature (see also Dunne *et al.*, 2010 on social networking sites through the portrayal of users' ideal image) in which social engagement transition and experience is defined and can be utilized to improve user interaction with ubiquitous technologies, especially mobile applications for activity and mood-tracking.

4.4. Acting intrinsic motivation goals

Social engagement reveals itself in the walking in the *sense of challenge and achievement* in connection to the walking initiative itself as well as with the place visited. This was amplified when difficulties had been overcome.

> *'I was soaked, I was exhausted, my feet hurt, it had been the longest day I had walked so far, and indeed would walk on the journey, twenty-nine miles, and probably the wettest, but I was not down. I was elated; I had challenged distance, I had challenged rain, and I had even challenged a recalcitrant cow and I had won'. (day 41)*

The intrinsic motivation goal led the author to cycles of encouragement and providing support and feedback for groups or individuals who would pass by. At the same time, the walker appeared to relate it to his self-esteem in order to attain the goal of completing the walk.

> *'As I'd climbed I'd noticed strips of plastic ribbon between posts that I'd thought were to encourage walkers to use the made-up paths rather than erode the grassy slopes. However, coming down I began to meet marshals for the annual fell race that takes the runners up Dinas Bran, not once but twice, before descending again to Llangollen. I met three, one after another, and each, from the oldest to the youngest, a teacher in the school, said that then they had been walking up the hill earlier in the day to lay out the route walking itself had been exhausting enough let along running. I told one about Arry and her multi-marathon run, and he gave me what change he had in his pockets for the charities I'm collecting for'. (day 21)*

This included sharing of achievement with those far away:

> *'It would be stunning at any time, but the combination of the light on the hillsides, sense of achievement at the day's travel, and fact that in every direction I looked out and down meant I literally felt on top of the world…and there was even mobile phone signal to ring home at last'. (day 21)*

Motives result from the interplay of person and situation; thus, social motives operate as person-in-situation principles. Belonging to a group helps individuals to survive psychologically and physically. People prefer to develop meanings that are shared with other people and places; it is not limited to unexpected events. Serge Moscovici (1988) called these shared understandings social representations (for an integrative overview, see Augoustinos, 2001). Importantly, *cooperation* appeared to motivate the walker's actions, which in returned increased his satisfaction from either receiving or helping others at various stages of the walk.

> *'So another night of lovely food, and Amir does not let me pay, "it is my small contribution to your walk," he tells me. He also says that if anyone goes to eat there and says it is because of then walk, he will put all the proceeds to the charities I am supporting. More than this, it is his warmth, which I cannot express in words, and is so deeply encouraging'. (day 81)*

Social relationships are the primary channel through which engagement is transmitted and conversely, engagement informs social relationships and interacting within a community or social network. During the walk, it has been revealed

that the walker received *recognition* from fellow walkers, which substantially increased his internal motivation and satisfaction.

> *'From here on the ridge gradually descends and ahead I could see a group who I was gradually catching up. As I drew near the group split, the larger part branching further along the descending ridgeline to the north, and three of them, with two dogs, following the Offa's Dyke down route towards Bodfari. I greeted them as I passed and then one of them said, "are you Alan?" I thought they'd just seen the banner on my back, but it was not just that, "I saw about you on the TV", he said. I'd given a couple of radio interviews early in the walk, but not spoken to anyone on TV, so they must have just reported using still images, I guess on the local news bit'. (day 24)*

Importantly, the walking experience highlighted preference for social learning from others, and an increased capacity for purposeful action. Specifically, the walker has also described a motivation arising from *curiosity* about the physical environment (at the sensory level) and when something about the experience or other people stimulated him to want to learn more (cognitive level).

> *'I have a moment of confusion at the end of the field as I'd been walking the right hand side of the ditch and from there the style ahead is hidden by hedgerow, but as I cross the ditch the way ahead is clear and I meet another walker, going the same direction, but only as far as Chirk, where I am hoping for mid-afternoon tea at the castle cafe. He is an experienced walker including many of the Scottish long-distance walks, and has a backpack, little larger than my day pack, but is his complete kit… I have much to learn.' (day 21).*

Lastly, the intrinsic motivation goals have been largely expressed as modifications to innate social-relational dispositions in accord with the precedents, and prototypes provided by the communities the author encountered in walking.

5. PEOPLE AND THE WALK

The original focus of this GT analysis was on issues of way finding and lostness/navigation, but the core categories that emerged from the data concerned social engagement. In some ways, the latter was unexpected to the second author as the walk was essentially solitary, albeit with the intention of making community contacts along the way. In response to this second author's personal reflection led to a list of more than 20 different categories of social contacts, from other walkers to academic collaborators (see Appendix B). This list was further analyzed based on context of engagement and other factors from the social experience literature and emergent themes from the GT analysis, resulting in Table 1.

Individuals and groups were important, as part of a variety of social engagement processes (time-location-durability, temporality) differing on:

(1) *When*: knew before, because of the walk, and during the walk.
(2) *Where*: on path itself, places on path, places 'off path', distant, virtual.
(3) *During*: face-to-face, walking together, remote, off-path, none or negative.

The number and quality of social interactions and acquaintances have been found consistently to have a strong and positive impact on the walking experience/social activity and engagement/involvement with places visited (see Table 1).

Regarding social interaction, we found that:

- A variety of people were associated with larger and more diverse core discussion, groups and information networks.
- Those who participated most actively in providing information about places, paths, and social media were more likely to interact with those from diverse communities and people met during the walk.
- Remote, technologically mediated contacts and those physically met on the walk were equally important. This was perhaps surprising given the very physical nature of the experience and some of the problems in using technology.
- Technology use is often associated with social activity in community spaces such as parks and restaurants, and a combination of online and offline channels are more and more common in such venues due to connectivity issues.

Although these outcomes did not explicitly include engagement, they do support the contention that the walking experience, even largely solitary walking, can enhance the amount and quality of social engagement, which has been implicated in a number of studies as a strong and consistent aspect of technology use and experience. Though social UX is inherently subjective, the walking study analysis indicates that there is agreement among people as to what constitutes social engagement and relatively simple and straightforward interactions/dimensions which are psychometrically sound. Research using these interactions has identified important predictors of social UX; including emotive and intrinsic motivation goals that appear to be relatively fixed; and behavioural and processing community goals that appear to be more amenable to change as a *direct result* of social interactions.

6. REFLECTION

As noted, the second author's reaction to the strong emerging social themes was initially sceptical, the walk often appeared to be a largely isolated experience, with some days hardly seeing any other walkers for hours at a time. However, the blogs and GT analysis told a different story where the social

Table 1. Contexts, peer groups, interaction strategies, group effects on walker and engagement present in the Walk.

Contexts	Peer groups	Interaction strategies	Group effect on Walker	Level of engagement
On-path	*WCP walkers*	Do introductions	Establish walker status	Solidarity (Moderate)
Off-path		Give re-assurance and help	Find or lose way	Tension release (High)
Distant		Encourage	Joke and laugh	Agreeing (Low)
		Conclude socially	Better knowledge of the landscape	
		Be cheerful		
		Express enthusiasm and elation		
		Showing attention		
		Showing comprehension		
Distant	*Events & organizations*	Do introduction	Establish walker status	Solidarity (Moderate)
Virtual		Be proactive & nurturing	Reward	Tension release (Low)
		Complement/praise	Increase satisfaction	Agreeing (High)
		Conclude socially		
		Express enthusiasm and elation		
		Receiving attention		
		Receiving comprehension		
On-path	*Family*	Give re-assurance and help	Find way	Solidarity (Moderate)
Off-path		Complement/praise	Joke and laugh	Tension release
		Encourage	Better knowledge of the landscape	(Moderate)
		Expressions of feeling after tension		Agreeing (Moderate)
		Express enthusiasm and elation		
		Showing & receiving attention		
On-path	*Friends*	Give and receive re-assurance and help	Establish walker status	Solidarity (High)
Off-path		Complement/praise	Joke, laugh and increase satisfaction	Tension release (High)
Distant		Encourage	Better knowledge of the landscape	Agreeing (Moderate)
		Conclude socially		
		Expressions of feeling after tension		
		Be cheerful		
		Express enthusiasm and elation		
		Showing attention		
		Showing comprehension		
Virtual	*Future data users*	Be proactive & nurturing	Increase satisfaction	Solidarity (Low)
		Conclude socially	Concur	Tension release
		Expression of feelings after tension		(Moderate)
		Express enthusiasm and elation		Agreeing (Low)
		Showing attention		
		Showing comprehension		
Virtual	*Imagined audience*	Do introduction	Reward	Solidarity (High)
		Be proactive & nurturing	Increase satisfaction	Tension release
		Complement/praise		(Moderate)
		Conclude socially		Agreeing (Low)
		Expression of feeling after tension		
		Express enthusiasm and elation		
		Showing attention		
On-path	*Local communities*	Do introduction	Establish walker status	Solidarity (High)
Off-path		Be proactive & nurturing	Give help and support	Tension release (Low)
Distant		Give re-assurance and give help	Reward	Agreeing (High)
		Complement/praise	Joke and laugh	
		Encourage	Increase satisfaction	
		Conclude socially		

Continued.

Table 1. Continued.

Contexts	Peer groups	Interaction strategies	Group effect on Walker	Level of engagement
		Expression of feeling better after tension	Better knowledge of the landscape	
		Express enthusiasm and elation		
		Showing attention		
		Showing comprehension		

connections, although infrequent, were disproportionately extensive in terms of their salience and impact.

6.1. Onion layers of experience

In many ways, the subjective impression of the social nature of walking mirrored that of technology. The second author's impression was that he made little active use of technology beyond the camera and voice recorder. It was only when writing and preparing talks about the walk that he noticed the incongruity between the extensive data collected and the time 'tending technology' compared with his assertion that in the end he used little technology (Dix, 2013; Morgan *et al.*, 2014). Once the realization dawned, it was easy to list numerous ways in which technology was used in the *broader activity* of walking. In an almost identical way the social experience during the act of walking itself was very limited, but taking a broader 'zoomed out' view the rich matrix of social activities surrounding the walk became obvious (Fig. 4).

It seems almost perverse that someone who has written and taught about the wide socio-technical picture for many years could be so blind when viewing his own actions. Except that this is precisely the standard problem of expert knowledge, it is hardest to see when closest to it. So, the second author had the knowledge that broader activities are important, and that there was lots of technology being used, but both were tacit. As is so often the case (Dix and Gongora, 2011), it was the process of writing and preparing talks that externalized that tacit knowledge, and acted as a creative impetus. In the case of the social understanding it took GT analysis of the first person accounts to reveal this.

6.2. Dimensions of experience

Two ways to consider this broader matrix of connectivity are in terms of a virtual dimension and a temporal dimension.

The first, the virtual dimension, is an extension of the pervasive aspect of modern life: while few people were physically present as co-walkers; there were more people who were digitally connected. Sometimes this was synchronous; for example, the second author's wife was able to watch his movement in real-time through the SPOT satellite service, and occasionally even told him where he was when he rang

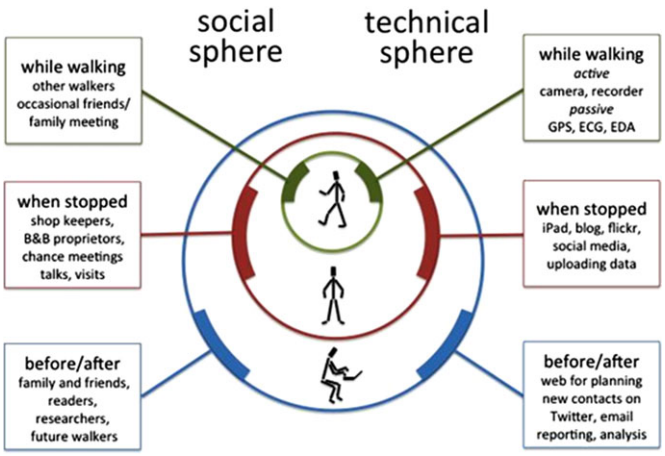

Figure 4. Spheres of social connections and technology use.

on mobile. Other digital connections were asynchronous, for example blog readers.

The most obvious aspect of the temporal dimension is the way the walk was sandwiched with preparatory activities before and activities related to reporting, analysing and reminiscing afterwards. McCarthy and Wright (2004) talk about the anticipation that precedes an experience and the recounting that occurs after. Like most academics writing about experience, McCarthy and Wright are focused on relatively short-lived experiences, albeit their online wine buying case study is extended in time. However, even taking the walk itself, 102 days is both long lived, but also punctuated with periods of eating, sleeping and some off-path times: going to a conference, two weddings, and visits to universities. It is more an example of extended episodic experience (Khalid and Dix, 2010), where individual episodes link together to create a long lived thread of experience.

6.3. Communities of experience

While friends and family joined the second author on parts of the walk, their principal connection tended to be digital during the walk itself. In contrast, interactions with people who lived along the path were physical, in shops, B&Bs, cafes, pubs, principally during the interstices of refreshment breaks and overnight stays.

We can think of these two groups as *egocentric* and *geocentric*.

> *Egocentric/people of life* – These are the walker's own *individual community*, linked to his *personal* existence. They are stable and long-standing, and largely geographically stationary but widely distributed.
> *Geocentric/people of the land* – These are the local community, people who live in the towns and places along the way. They are linked to a specific *place*. The relationships are typically fleeting, but the people themselves are largely geographically stationary and localized to the route of the path.

In addition, there are the more occasional meetings along the way of those who are also walking. These comprise a third group *tribocentric*[1]:

> *Tribocentric/people of the way* – The *walking community*, who are connected to the *path*, not any particular place along it. The meetings are fleeting and the people themselves geographically dynamic.

Contacts with this group, although largely temporary, have a particular intensity through shared experience. This effect is well documented in literature from Chaucer's *Canterbury Tales* to Emilio Estevez's *The Way*.

These two examples are both about pilgrimage, albeit one medieval and one very modern. The etymological roots of the word 'pilgrim' are in the Latin '*peregrinus*', a foreigner. In sedentary life the egocentric and geocentric circles overlap. In an expedition or migration, the fellow travellers are still part of the egocentric group. However, the sole walker is effectively a foreigner, continually dis-placed, and there is a shared experience in this voluntary and temporary exile. While the motivations of the modern walker are as diverse as those of the ancient pilgrim, there is a sense of common purpose, and they constitute a form of community of practice.

6.4. Background and future technology

The role of technology is somewhat paradoxical in this work. Some writers have emphasized the importance of walking as a disconnected experience. In particular, Ellie Harman's ethnography of walkers on the Pacific Coast Trail was partly an exercise of personal 'digital detox' (Harmon, 2015). She found walkers did want to disconnect and yet for many the smartphone with '*My Maps, My Music, My Everything*' (Harmon, 2017) was a central as were the connections back home through social media and telephone calls when mobile signal allowed.

In contrast, technology, was part of the initial purpose of the Wales walk, as outlined in section 2.3, and the walker carried a lot of technology, both off-the-shelf and bespoke—indeed taking an whole hour each evening 'tending technology'. However, the GT analysis of the blogs, reported in sections 3 and 4, ends up highlighting social rather than technological relationships. This is partly because of the practical difficulties of using technology, as outlined in section 2.2, both in terms of utility of devices whilst on the move and limitations of rural connectivity. The issues related to the latter for those who have to live with this day-to-day have been discussed elsewhere (Morgan *et al.*, 2014).

This said, there is hardly a section of this paper where technology does not impinge. In section 4 we saw the importance of the SPOT device and the relief of finding mobile-phone signal for keeping connected with home, the presence of historypoint.org QR codes, and the encouragement of the way TV reports of the walk meant strangers greeted the walker by name. Indeed, elsewhere in the blogs, there are similar accounts of Twitter connections:

> '*a local teacher and keen walker, who, she explains, as been following me and other Coast Pathers on Twitter.*' (Day 72)

In section 5, we discuss how technologically mediated social contacts are as important as physical ones, and the way technology is intimately intertwined with physical community places. Finally, earlier in this section we seen the close parallels between the way social and technological factors are found in the onion layers of experience.

Yet, this ubiquitous presence of technology seems *background*, to the extent that a reader of an earlier version of this paper (but one that included all the above), felt that there was little discussion to technology at all. There are probably two reasons for this:

- First the technology that did not work was rapidly abandoned, and the technology that did work was, in Weiser's (1991) terms, 'invisible'. Some of this was deeply embedded into devices (camera, voice recorder), some passive (GPS trace, bio-sensors).
- Second that the onion layers of experience meant that more explicit technological interactions took place outside of the central act of walking, and so did not get foregrounded in the blogs and hence in the GT.

Oddly the single most pervasive and invisible aspect of technology in the blogs is that they are blogs—created in the gaps between the walking itself, and often with considerable difficulties to upload in areas of low connectivity…especially photographs!

Regarding *future* technology, our main purpose in the paper is to offer a descriptive account of the social interactions surrounding the walk in order to inform future technology, but not to attempt to create such technological designs ourselves. However, the analysis both prompts potential areas

[1]From Greek '*tribos*' – a beaten track or path. http://biblehub.com/greek/5147.htm

for technology related to walking and also for ubiquitous technology more broadly.

In the context of the walk, we have seen the importance of social navigation and other social interactions, and one wonders if there are ways that technology could further advance this, especially given, as noted, virtual social connections were as important as physical ones. There were examples of this occurring, notably the way the walker's wife used the map generated by the SPOT device to guide the walker in the ground. In some way this use of off-the-shelf software is similar to HeartLink (Curmi *et al.*, 2017), which used a mobile-phone apps to relay a runner's heart-rate information to spectators, who could then offer remote encouragement. In both cases passive sensing on the active participant as interpreted by those at a distance using an interface (SPOT map, HeartLinkheart-rate display) and then information/encouragement passed back to the participant—supporting improvement of their self-efficacy and motivation per se (e.g. Asimakopoulos *et al.*, 2017).

Given the areas of low connectivity, one might also consider ways in which the people might help the technology. Technology such as Qraqrbox (http://qraqrbox.com/) and KioskNet (Seth *et al.*, 2006) allow locally sourced content in areas outside internet coverage and there have been various systems used and proposed to transfer data physically using buses or motorbikes (Pentland *et al.*, 2004; Seth *et al.*, 2006). Furthermore, Kortuem *et al.* (2001) proposed spontaneous content sharing between personal devices as people meet or pass. Walkers own devices could be used to spread updates to data in disconnected areas.

Walkers' egocentric contacts will tend to be technologically mediated through telephony or social media, and geocentric contacts do not necessarily need any technology as by definition they are spatially and temporally collocated. However, we have already noted there seems to be little in the way of obvious technology support for tribocentric contacts, those who share the path, but may not be in the same place at the same time.

For single locations, absent presence research (e.g. Gergen, 2000) has suggested ways in which technology could help create the sense of past presence for places, such as museums, that have many visitors, but may be empty at the moment when one visits. Tribocentric contacts suggest looking for ways that this or other kinds of spatial technology could be applied to paths. For long-distance paths such as the Wales Coast Path or Pacific Crest Trail on might, with suitable privacy protection, imagine ways to be in contact with those going along the same route, but ahead or behind one's own, in some way a very physical embodiment of Benford and Giannachi's (2008) temporal trajectories.

The onion layers model exposed the way that instantaneous use of technology during the act of walking are only a small slice of the overall technology supporting that experience. This was a descriptive account of walking, but looking more broadly at ubiquitous computing this offers a potential prescriptive heuristic for designing technology to support experiences, combining largely passive technologies during the central experience, with more direct interactions during preparation and post-experience reflection. This accords with theoretical accounts of preparatory and reflective stages of experience (McCarthy and Wright, 2004) and extended episodic experience (Khalid and Dix, 2010).

7. DISCUSSION

The walking experience described has been mainly devoted to the analysis of social engagement with local people, communities and groups building on existing psychological and group behavioural phenomena: social judgments and accountability of decisions due to group social processes, self-esteem and intrinsic motivation goals that are largely met via social interactions and relationships. The insights from this research on walking can be used to design apps and services leaning towards social interactions and relationships that shape interactions with technology. In contrast to the current bias of navigational/way finding apps (e.g. Yahoo/Google maps) to a road/plan well travelled (see Churchill, 2008), our work points towards interfaces where navigation technology is *designed around places and people/groups* as well as *individual achievements or intrinsic motivation goals*, thus augmenting spatial interaction. These design considerations would be especially relevant to route planning when people wish to visit others.

We argue that way finding and route finding are a matter of social engagement, where user experience is not always about getting to a destination, but indeed what and who you are to see on the way, and that can either change or enrich our perspective on the desirability of a destination (see also Churchill, 2008). Specifically, Churchill (2010) points to social, game-like location-broadcast applications like Foursquare (http://foursquare.com/) and Gowalla (http://gowalla.com) and how they change our relationships to the places we find ourselves in and the way we find those places: e.g. based on location and popular requests.

Terveen and McDonald (2005) state that social matching systems '*have the potential to increase social interaction and foster collaboration*'; they explore the nature of the design space, key research challenges, and the roster of appropriate methods and semi-automated matchmaking. While this and other work concerning digital social networks are in some ways very different from the physical experiences dealt with in this paper, there are also parallels and general lessons from both for social experience that now frequently bridges digital and physical worlds. Terveen & McDonald suggest that egocentric matching may be more effective that those relating to non-social factors, for which our geocentric communities are the closest physical match.

There appears to be no current digital equivalent to our tribocentric category, possibly because the privileging of the point or location over the line, which Ingold (2007) so eloquently critiques, is if anything more extreme in the digital world where networks have no underlying extensive space instead based on direct links traversed instantly with no lingering in the interstices. However, Terveen & McDonald do discuss 'paths' in the network sense of friends, friends of friends, etc. suggesting little apparent use for paths longer than two (friend of a friend or loose ties) largely because of the problems of finding introductions.

Interestingly, in the preparation for the walk, Dix introduced two academics working in the same institution (geocentric connection) who had a common interest in space and walking, but had not previously met. Furthermore Dix did not know them prior to the walk, but had himself been introduce to them by different acquaintances. That is, he brokered a social connection path of length 4 (friend of a friend of a friend of a friend), but only because of a shared interest - a combination of social and interest based connections, all performed through digital communications in relation to a physical event.

Our paper expands on this area specifying the social relationships more likely to support the *information needs* of users, and types of social engagement and interactions that are most likely to have a specific impact on users' behaviour and actions. In that sense, we expand on the relationship between individuals, and on the individual in relation to the different social groups in the walking setting. In this paper we particularly focus on the effects of social engagement, which can provide input into the problem of developing effective user profiles, and guide the design of social matching models, as well as facilitate interaction between users. Mentis *et al.* (2014) point out that because experience is embedded in a socially situated context, it is bound by one's bodily abilities as well as the affordances of the environment in which the body resides. Our bodies structure our experience and place limitations and opportunities on what we can experience, but they also structure our ability to express and share our experiences with others.

Dix (2013) points out that the one thousand mile walk around Wales was undertaken as a research journey similar to 'Research in the wild': methodologically challenging, dealing with unconstrained use, data collecting for the unexpected, creating transferable knowledge from particular incidents, and inevitably *'pushing the boundaries of professional objectivity'*. Rogers (2004) points out that the home, the outdoors, public places, and even the human body are now being experimented with as potential sites in which to embed computational devices. Crucially, this research provides new insights and a framework for the 'social context' (see Button, 1993; Heath and Luff, 1991; Rogers, 2004), how walking *enables social engagement and action* embedded in ordinary people's mundane acts; and how everyday ways of doing and saying, including the use of digital systems, constitute the social.

The seemingly mundane acts of sharing reactions and directions may be considered as explicit acts of social bonding and developing group trust/identity. These acts synthesized the 'path' and invited others to join improving social judgments and accountability of decisions while walking. This was particularly evident in the second author's visit to Roderic Bowen Library and Archives in Lampeter; a special exhibition was organized where the archivist had read the blogs written so far and responded to them by finding related archive items including an 19th century cure for blisters (UWTSD, 2013).

Identity, often understood as inert dwelling in the past, here is about the awakening of a set of 'ingroup' values, inscribed in personal and historical meanings, as well as social encounters which collectively refresh and enrich the identity itself (Castano *et al.*, 2002; Castano, 2004). In other words, social user experience provides a new perspective on old shades of identities, the exposure of individual and group values, allowing the discovery, and recognition, of social walking needs. Carroll (2012) and Han *et al.* (2014) further highlight how mobile technology, together with increased mobility, immediacy and social presence, shows a significant influence on local communities with respect to community identity, awareness and participation.

This study can lead to important questions in relation to data collection and its use in HCI studies. Walking communication opens avenues for different modalities of social expression and participation, embracing some of the diversity of everyday situations on-the-go, a space where people can formulate their social decisions, and importantly to experiment with actions outside traditional digital environments. In addition, self-tracking technologies that offer their users ways to quantify their everyday experience are especially well suited to defend one's cultural worldview and self-esteem. Their users can (i) represent themselves as a self-esteem enhancing device and (ii) affiliate with desirable in-groups via mouse-click or sharing information. This is striking because it has been demonstrated that avatars generally display one's personal (Bessiere *et al.*, 2007) as well as social identities (Guadagno *et al.*, 2011) and identification with virtual groups, a finding following the principles of social identity theory (Tajfel and Turner, 1979). The findings illustrate walking as a personal/individual and yet rich social matrix, not unlike a tech story. We suggest that individual and group discourses should not be conceived in opposition, but in dialogical relationship with one another, illustrating the diversity of ways people strive to achieve a positive social user experience.

8. CONCLUSIONS

The situated walking provided visibility for social engagement themes and expressions (sharing of reactions, judgments, positive self-esteem and challenge) and identities

relating to the issue of navigation that sparked interaction and relationships among encounters during the walk. In the context of walking, these were ways of saying and doing that allowed individuals and groups to begin to shape the social engagement as a possible reality for decisions and actions. This opens up avenues for nuanced ways in which we can conceive of social engagement in HCI, in particular designs and technologies appropriate not only for a walker, but also ubiquitous technologies and applications. We call for future work to look more closely at the mechanisms at play in the particular experiences of lostness and social judgments in navigation, and how other people and groups actually help the walker to apply correct decisions and actions.

Carrying out a GT study with data and narratives collected from the second author has proven very valuable. The inductive analysis of the data revealed themes that were evident in the data, but which were not apparent to the walker; but likewise insights and information were available from the walker as participant-researcher that would not be available to an external observer. This framework can also be implemented in real ubiquitous systems, where social engagement can be divided into multiple iterations. During each iteration, some social engagement practices will be selected and designers or teams can try to adopt them. The framework is flexible for use by designers and teams as it allows them to adjust their practices to meet requirements and accommodate system constraints. In some ways this is the same lesson as in traditional soft systems approaches to socio-technical design (Checkland, 1981/1998), but applied to a more personal and experiential domain.

SUPPLEMENTARY MATERIAL

Supplementary data is available at *Interacting with Computers* online.

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