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Hiker on trail: Information practices in the wild. A mixed methods approach to investigate real-time mobile technology use by long-distance backpackers

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ABSTRACT

Long distance hikers' information practices are considered via an 'in-field' methodology that generated rich experiential data. Participants documented and reflected on their experiences and use of mobile digital technology while undertaking a two-week coast-to-coast walk across the Scottish Highlands. Empirical evidence on the adoption and use of mobile digital technology by backpackers, and the implications this has for their practices and interactions is scarce. "Research in the Wild" (RITW) mixed methods facilitated exploration of how and why mobile digital technology is employed via analysis of in-field video-logs, interviews with eight participants, and a survey. Analysis of the research interview data provides insights into fieldwork participants' reactions to, and experiences with, the methods employed. The affordances and issues of the approach are discussed, highlighting the benefits and challenges of mixed methods for Human Computer Interaction and Information Behavior research in the arena of outdoor recreation.

1. Introduction

Backpacking refers to the pursuit of taking long walks in nature, typically over a number of days, weeks or even months, whilst carrying all necessary equipment to survive (e.g., food, shelter, and cooking systems) (Mueser, 1997). The burgeoning popularity of outdoor recreation is evinced by figures noting that 57.8 million Americans (19%) said they hike (Outdoor Foundation, 2021), while the National Parks Service recorded 1,952,900 wilderness campers in 2021 (National Park Service, 2021).

Although such activities have been pursued by humans throughout their existence, the recent advent and frequent use of scaleable electronic technologies, such as Global Positioning System (GPS) units, Internet-connected smartphones, satellite-based personal locators, and smart watches, has potentially irrevocably changed the lived experience and people's enjoyment thereof (Borrie, 2000; Martin, 2017). These devices permit backpackers to navigate complex environments without needing to first gain experience and knowledge of outdoor and survival skills. While such technologies clearly offer benefits, there are concerns that over-reliance may cause backpackers to psychologically distance themselves from the activity itself and may even lead to dangerous situations arising due to a lack of knowledge (Shultis, 2012).

The popular outdoor pursuit of backpacking is profoundly changing as the community embraces modern digital navigation and communications technologies. However, in Library and Information Science (LIS) and Human Computer Interaction (HCI) there is little empirical evidence on the adoption and use of consumer electronics by backpackers, nor the implications this has for their habits, practices, and interactions. Extant HCI studies have largely focused on designing and deploying new applications, sometimes generically related to nature travels (Pielot, Kazakova, Hesselmann, Heuten, & Boll, 2012) rather than specific to backpacking (Biedermann, Aleksejeva, Mikkonen, & Wilde, 2018; Häkkilä et al., 2017). Systematic empirical research on the use of off-the-shelf technologies is not well represented in the literature. Work to date has been either largely theoretical in nature, based on only surveys or interviews, or derived from auto-ethnographic accounts of a single

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researcher (Dix, 2017, 2018; Mueller & Pell, 2016) and has not investigated community use of such technologies in long-distance backpacking contexts (Shultis, 2012).

This article is framed within a research project to investigate the information behavior of long-distance backpackers, particularly in relation to the use of technology in the field, on the TGO (The Great Outdoor) Challenge, a coast-to-coast crossing of the Scottish Highlands in the UK. The project examined the following research questions:

1) What is the role of mobile communication, mapping and health tracking technologies in thru-hiking?
2) How and why backpackers use technology when planning and undertaking their journeys?
3) What is the wider impact of technologies on user experience and hiking as serious leisure?

Various information science perspectives, including human information behavior (HIB) (Chang, 2009; Savolainen, 2007; Tinto & Ruthven, 2016) and Human Computer Interaction (HCI), are used to consider increasingly ubiquitous information and communication technologies. Within research into social dynamics (Hall, Widen, & Paterson, 2010), backpacking is an original context for what Stebbins (2015) and Hartel (2005) frame as serious leisure, as discussed in Section 3.1.

The study builds upon the work of Harmon (2015) and Dix (2017) by extending the planning phases they discuss into a multi-user study of a specific social group, developing rich insights into individual and group strategies for technological interaction throughout the hiking experience. It also has some resonance with the work on smartphone use that has reported on smartphones being commonly used for communication, navigation, feeling safe, boredom alleviation, and photography by the long-distance hiking community (Lepp, Jeff, Kensey, & Daniel, 2021).

2. Problem statement

Prior work in this project reports study findings based on the original research questions (Hyatt, Harvey, Pointon, & Innocenti, 2021). A mixed-methods approach based on analysis of survey, interview, and vlog data, facilitated understanding of people's perceptions of mobile digital technology use on the trail before the TGO, and triangulated this data with a "Research in the Wild" (RITW) approach (Rogers & Marshall, 2017), yielding in-context data and offered research insights via post TGO interviews. In-situ research was carried out using daily in-field vlogs with multiple subjects in real-world settings, facilitating the capture of sufficient, representative, and useful data without overly impacting on participant experience. This approach also demonstrated how new technologies were adopted holistically, as opposed to whether they "match specific usability or design criteria" (Chamberlain, Crabtree, Rodden, Jones, & Rogers, 2012).

There are challenges in the execution of this type of mixed methods approach due to the complexity of the field experiment and the fact that it took place in real-world conditions. Yet there are benefits of these methods for HIB and HCI research in the arena of outdoor recreation. Moreover, as Rogers and Marshall (2017) put it, an "in-the-wild" approach, instead of laboratory experiments, afforded high levels of 'ecological validity' (p. 3), and facilitated an investigation of "user experience phenomena that differ from those derived from other lab-based methods" (Rogers & Marshall, 2017, p. *x*). The methods used, and more specifically, the affordances and issues of using a mixed-methods RITW approach in this research context are reflected upon by:

a) examining the research design.
b) conducting a previously unpublished analysis of post TGO Interviews and vlog data, focusing on how the participants reacted to the methods.
c) discussing the methodological actualities in the field from both the researcher and participant's perspectives.

3. Literature review

3.1. In-context research

Research methods around human information behavior (HIB) have initially moved from a system-centered approach, in which the contextual variables of particular systems were investigated, to a user-centered but context-independent approach. These viewpoints then converged into "In-Context Research," a user-centered and context-dependent approach formally defined in 1996 (Fidel, 2012). In-context research has since been adopted not only by the library and information science community, who originally established it, but also in information retrieval and HCI, where it has further developed into RITW.

In-context research allows in-depth analyses of fluid, situational contexts and their relationship with the studied phenomenon, while preserving the flavour and complexity of human information interaction. Although in-context studies aspire to yield empirical results, they often include conceptual inquiries lacking practical implications. Qualitative studies can usefully contribute to methods and techniques adopted for in-context research by providing a rich and flexible palette of tools.

Backpacking, the subject of the study, fits the conceptual categorisation of a "Nature Challenge Activity (NCA)" proposed by Stebbins (2005). It is also an uncharted type of serious leisure, which would benefit from the interdisciplinary lens suggested by Hartel (2005) for studying information behavior in original contexts. Stebbins' NCA concept was considered further by Davidson and Stebbins (2011) in an exploratory desk-based study on the outdoors. The types and dynamics of information activities in serious leisure have been discussed by Hartel, Cox, and Griffin (2016) in a conceptual and methodological paper testing Hektor's model of information behavior (Hektor, 2001). While appreciating how such models support comparative and more precise research insights in serious leisure, the authors also noted the need to further examine embodied information in the field.

Mobile digital technologies provide increasingly convenient ways to obtain and share information, offering backpackers a range of support tools. These technologies are the subject of HCI studies, which frequently use software tools for data collection in a variety of ways (Lazar, Feng, & Hochheiser, 2017a). People often share information essential to the task at hand while mobile (Sohn, Li, Griswold, & Hollan, 2008). The increase in everyday information sharing creates a sense of being connected, fostering communities, and improving friendships and relationships (Savolainen, 2007; Tinto & Ruthven, 2016). The behavior of backpackers is often shaped by information and communications technology, and these tools can support access to key information sources in situ. The availability of information in context will significantly affect the way it is used, shared, and communicated. Timely access to information has a role in decision making, which can directly impact a backpacker's well-being.

Early and largely anecdotal work on the recreational use of mobile digital technology concentrates on land management and wilderness issues. Ewert and Hollenhorst (1997) contend that "less experienced participants who place a greater dependency and reliance on mobile digital technology" (p. 22) will become the norm in outdoor recreation. Borrie (2000) suggests that mobile digital technology supplants wilderness experience. Similarly, Dickson (2004) explores the tensions between space, connectivity, risk management, and authentic experience. In a survey of climbers' cell phone use Attarian (2002, p.29) suggests that technology "may also create a false sense of security, especially if climbers believe that help is just a phone call away." In a critique of the appropriateness of backcountry technology, Pohl (2006, p.147) suggests that "responsible simplicity" might mitigate backcountry mobile digital technology use. Shultis (2012) concludes that studies of technological impacts on wilderness would benefit from an interdisciplinary or mixed methods approach. Dustin, Beck, and Rose (2017) contend in general that "smartphones are antithetical to a

wilderness experience," while Martin (2017) summarises much of the extant literature, noting that mobile digital technology has brought inextricable change to outdoor recreation. The largely theoretical Association for Computing Machinery (ACM) 2017 Technology on the Trail workshop considered "developing ways for technology to support positive and mutually beneficial connections among people" (McCrickard et al., 2018, p.365).

3.2. Research in the wild (RITW)

Human-computer interaction research has, in recent years, increasingly been conducted "in the wild", where studies are situated in naturalistic settings to better understand how mobile digital technology can be and is used in the real world (Rogers & Marshall, 2017, p. 1). This is in stark contrast to more "traditional" laboratory-based studies, in which the context of interaction between people and mobile digital technology, and the tasks they perform, are necessarily contrived. What a RITW approach may lose in terms of repeatability and control over nuisance variables (i.e., factors that may impact the phenomena of interest but which the researchers are not specifically interested in) it gains in terms of ecological, and to some extent external, validity. These forms of validity refer to the extent to which the observed behavior mirrors that which would be observed outside of a scientific study (i.e., "in the real world"), and the extent to which findings can generalize to other people, situations, or contexts. This is because the situations in which participants find themselves are not contrived but are real and relevant to them and, thus, their behavior with the technology is not affected by artificial scenarios or tasks. It can be used to understand how people's lives and activities are impacted by a specific technology (or technologies), what people do when encountering a novel technology in a real-world setting (Crabtree et al., 2013), and how they make sense of it in that context of use. The RITW approach is said to be agnostic of methods or theories, places importance on the setting and context, is well suited to inductive research, and is increasingly being used to show 'impact' in terms of how new interventions have made a difference to a community (e.g., Balestrini et al., 2017).

Motivation for the use of such an approach comes from studies that have compared RITW-based methods with more "traditional" lab-based approaches. People often approach and use systems differently in the wild compared with in a lab setting (e.g., Brown, McGregor, & Laurier, 2013; Brown, Reeves, & Sherwood, 2011; Peltonen et al., 2008). System usage is often quite inventive or creative in real-world settings, where people use technology in a manner that was not envisaged by the developers or researchers; however, in context people can also become frustrated in ways that are not evident in lab-based studies, particularly in situations where the researchers are not at hand to guide or give instructions (Marshall, Morris, Rogers, Kreitmayer, & Davies, 2011).

Qualitative and ethnographic methods to investigate in-situ mobile digital technology use allow researchers to explore how the technologies impact user behavior and to identify and explain unanticipated phenomena and usage patterns (Rogers & Marshall, 2017, p.29). Video data is commonly collected and analysed using video interaction analysis and qualitative coding; such data can encompass screen recordings, short video logs (diaries) and video recording of contextual information using a wearable camera to obtain a detailed and triangulated understanding of in-context use (Brown et al., 2013). Using such methods in potentially unpredictable and "real-world" situations of course brings many challenges, which are rarely reported in the literature (Rogers & Marshall, 2017, p.69). Among these are practical challenges, such as dealing with the unexpected, handling data collection in such an uncontrolled (i.e., outside the lab) context (Kjeldskov & Skov, 2014), and numerous logistical challenges; not to mention ethical considerations and gaining consent.

4. Methods

In May 2019 a study on backpacking and mobile digital technology use on the long-distance TGO hiking event was carried out in Scotland, UK. An ethically approved multi-method research approach was employed.

In keeping with previous RITW studies, a wealth of diverse data was collected. Data were collected both off-site (online survey $n = 116$) to understand people's perceptions of mobile digital technology use prior to the TGO, and on-site (pre and post TGO interviews, vlogs, smart watch log data, bookmark data from mobile phones, GPS tracks, inReach messages), to understand the lived experience of participants in a specific, in-context situation.

The research approach is aligned with Fidel's In-context research (2012), and Rogers and Marshall's RITW (2017). This allowed observation and understanding of participants' in-situ use of technologies they were familiar with, as well as technologies that were new to them. As suggested by Rogers and Marshall (2017), and in contrast to more "typical" user-centered ethnographic approaches, the use of digital technologies in-situ was observed to understand how this use could lead to future design decisions; such design implications are not developed entirely by observing existing practices, but rather by requesting participants to use specific technologies, and to consider their in-the-wild use thereof. This multi-method approach provided the opportunity to collect distinct and rich accounts of their journeys, to triangulate findings, and to ensure some level of redundancy to mitigate against data collection issues.

RITW typically employs a mix of diverse quantitative, qualitative, and experimental methods as required by the research aims and context. There are several, developing definitions of mixed methods research (Creswell, 2010; Creswell & Tashakkori, 2007), as well as varied combinations for mixed methods studies, as discussed by Tashakkori and Teddlie (2010), and Leech and Onwuegbuzie (2009). In this study, a hybrid exploratory design, including quantitative, qualitative, and in-field experimental approaches, was used (Cresswell & Plano Clark, 2007). Quantitative participants characteristics were used for purposeful participant selection in the qualitative and in field experimental phases, which build upon the initial quantitative results (Creswell, Plano Clark, Gutmann, & Hanson, 2003).

The online survey data affords a representative overview of the demographics of the backpacking community and some understanding of their mobile digital technology use (see Hyatt et al., 2021). A subset of survey participants intending to participate in the TGO Challenge, and who indicated that they use mobile digital technology when backpacking were contacted via email to ask whether they would be willing to take part in a in the field study over the course of the TGO Challenge, as well as in 20-minute interviews before and after the Challenge itself.

After a series of communications with possible participants, and using a convenience sampling approach, a total of seven were recruited who, in addition to the second author, comprise the eight participants of the main TGO Study. Participants were walking independently from each other and included a backpacking member of the research team (P08, known to all participants as a research team member), who is also an experienced long-distance hiker (See Table 1). As a goodwill gesture

Table 1
Demographics of participants selected for the TGO field study.

ID	Sex	Age	Nationality	First TGO	Solo TGO
P01	M	35–44	British	Y	N
P02	M	55–64	British	N	N
P03	F	45–54	British	N	Y
P04	M	45–54	British	N	Y
P05	M	65–74	British	N	N
P06	M	45–54	British	N	N
P07	M	65–74	British	N	Y
P08	M	55–64	British	Y	Y

for their time and effort, each participant except P08 was offered an Amazon voucher worth £70 at the end of the study.

The smaller sample size, but considerably richer and more detailed, interview and recording instruments data from this subsample provides us with a more in-depth comprehension of how the introduction of modern mobile digital technology in the backpacking community has changed habits, practices and *mores*. The in-the-wild recordings also provide us with in-context evidence of both the positive and negative aspects of mobile digital technology in backpacking and how these systems and applications become part of the hikers' routines and thought processes.

4.1. Data collection

4.1.1. Pre and post challenge interviews

Based on the project's research questions, questions were developed for pre and post Challenge interviews. The interviews are an example of in-context research, especially the post TGO interviews as they reflect field experience.

A semi-structured approach allowed the 20-minute interviews to progress flexibly as a conversation. Interview recordings were transcribed, and the transcriptions sent to the participants to allow them to redact content. No information was redacted. P08 (the participant author) was interviewed by other research team members and did not code his own data.

Areas for discussion in the pre challenge interviews included: perception of each participant's own fitness and level of technological savviness; planning for the TGO Challenge, use of mobile digital technology in this process, and the perception of difficulty including any issues encountered; use of pre-prepared information and obtaining new information while hiking.

Areas for discussion in the post-challenge interview included: whether participants adhered to their planned routes and if the plans were helpful; what information was used during the TGO and why; how much participants used mobile digital technology during the Challenge, how they feel about the use of such devices for backpacking and how (un)supportive the technologies were and why.

4.1.2. Data collection during the TGO

To obtain in-context data about the participants' experiences and use of mobile digital technology during the TGO Challenge itself, it was requested that the participants collect data in a number of different forms over the course of their Challenge:

- Using a Garmin inReach device to track their GPS position and to send and receive messages via satellite.
- Capturing short screen recordings with a voiceover on personal mobile phones (vlogs) each morning and evening of the Challenge.
- Wearing a MiFit "smartwatch" to collect step and heart rate data.
- Logging any personal mobile phone browsing and search history.

Through pilot testing in the lab and in the wild, it was estimated that the research tasks would take each participant on average 4 minutes a day; subsequent analysis revealed that this was hard to achieve at times. Instructions regarding the conduct of the fieldwork were given to the participants (see Fig. 1).

Vlogs represent a form of journaling (Hyers, 2017; Lazar, Feng, & Hochheiser, 2017b). Participants were asked to use a screen recording application (and their chosen electronic mapping application) to talk through their intentions for the day for approximately 1 to 2 minutes every morning and to discuss how their day went for an additional 1–2 minutes every evening. The screen recording data, which was in the form of individual movie files, were transcribed to permit analysis.

The analysis of this recorded data grows out of the participants' planning activities each morning, followed by a reflection on those plans in the evening. The goal was not to provide a statistical breakdown of

Fig. 1. Research participant pack sent by mail ahead of the TGO with: a Garmin inReach (Fig. 2), a MiFit smartwatch, a detailed 10-page instruction guide, and a laminated pocket card explaining how to set up the devices and detailing what needed to be done each day (photograph by P. Innocenti).

Fig. 2. Garmin inReach at a wildcamp location, TGO, Scotland (photograph by P08).

mobile device uses, but rather to assess route planning and to better understand situational uses. The aim was to understand both in a broad sense how participants planned routes, how specific incidents of use unfolded on the TGO, and what contingencies were brought to bear in the context of use; for example, technical problems, GPS issues, environmental issues, social influences, and so forth. What was not originally anticipated, however, was that this data collection method would also provide the study with useful insights into how the research methods affected the participants' experience of the TGO and their in-context feelings towards what they had been asked to do.

After the TGO ended, extracted vlog data were uploaded to YouTube, transcribed using its Subtitles/CC facility, and exported using the *.srt format in preparation for open coding.

Logistics for collecting smartwatch data and mobile phone browsing and search history were more intricate. The data recorded by the watches was supposed to be automatically uploaded to Google Health cloud-based service each day, permitting the researchers to later download and analyse it. However, despite this semi-automated data collection and upload method, very little of the recorded data appeared

in the cloud. Although this approach to data collection was piloted prior to the TGO, it seems that the software provided by the smartwatch manufacturer was unable to deal gracefully with situations where recorded data cannot immediately be synced with the cloud service (e.g., a common occurrence in the Highlands of Scotland where a data connection is not available).

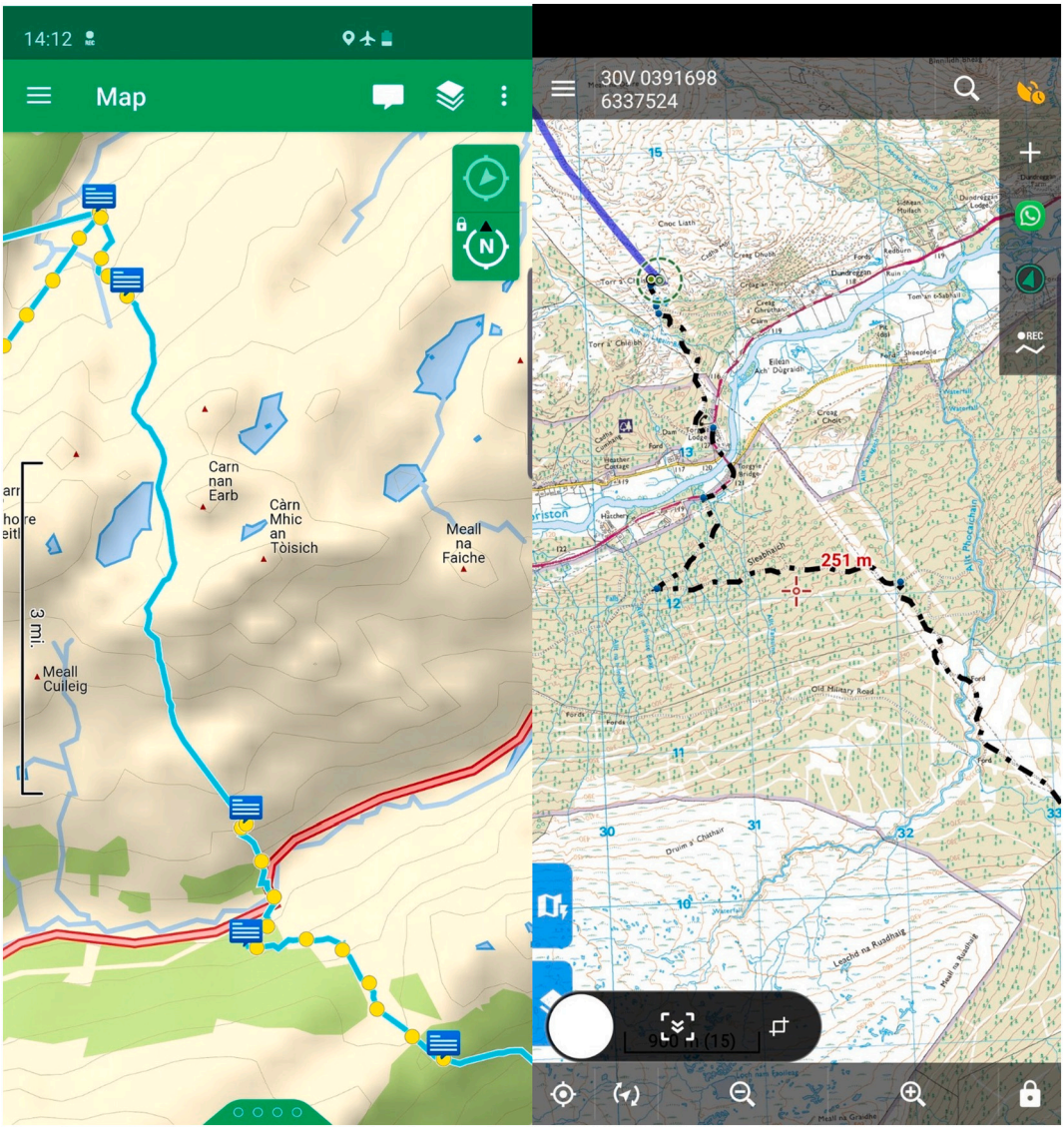
Issues in collecting participant's browsing history and bookmarks were also prevalent. A bespoke web-based tool was made to allow participants to view their browsing history and bookmarks and to redact any that they did not wish to be included in the analyses. Unfortunately, only three participants provided any usable data, and these were limited in terms of numbers of entries. As such, it was not viable to use these data sources for the analyses.

4.2. Data analysis

Online survey data was used to develop methods for gaining further insights into participants' use of mobile digital technology, and are reported in prior work (Hyatt et al., 2021). Interview and vlog data were analysed here to gauge participants' reaction to these methods.

4.2.1. Analysis of post TGO interviews

Data from pre and post TGO interviews were thematically analysed using six stages (Braun & Clarke, 2006). Interview recordings were transcribed, checked for accuracy and completeness, and open-coded using Saturate, an online coding tool (http://www.saturateapp.com). Initial familiarization with the data included reading the transcripts several times and noting ideas. Interview data were then organized into meaningful clusters across the entire data set. Data extracts relevant to each code were collated and double-checked. Subsequently codes were collated, contrasted, and combined into an initial set of themes, gathering all data extracts relevant to each theme. Emergent themes were checked against the coded extracts and the original data set for coherency, consistency, and uniqueness. Each theme was then described by looking back at the data extracts, defining the theme and creating a brief narrative around the theme's story. In the final phase, the analysis was written up, weaving selected vivid data extracts within and across themes, and with an analytic narrative illustrating the story in relation to the study's aims and the literature. The analysis of both pre and post TGO interview transcripts were discussed in relation to technology use in Hyatt et al. (2021). Post TGO interview transcripts were open coded using NVivo in order to gather data on participants' impressions of performing their daily tasks with the chosen methods.



Figs. 3 and 4. Two examples of vlogs screenshots highlighting the use of mapping software for navigation and route planning (screenshots by P08).

4.2.2. Analysis of the vlogs

In addition to providing extensive in-depth insights around how information mobile digital technology in backpacking has changed habits, practices, and *mores*, the vlogs also provided contextual evidence of in-field mobile digital technology use in backpacking, together with how these systems and application become part of the hikers' routines and thought processes (Figs. 3 and 4).

The 131 mobile recordings were listened to several times by two of the research team members; the transcripts generated were open coded creating 17 codes. Category codes were then applied to the transcripts, producing five categories. These were printed out and read several more times. In total, there were 157 mobile digital technology-based instances, and each instance was grouped together and refined producing seven themes.

5. Discussion and implications

The methodological actualities in the field (for post TGO interviews and vlogs) afford fascinating insights on the benefits and pitfalls of an in-the-wild mixed methods approach.

5.1. Participants' reflections on the field study

Participants' feedback on RITW appear to meld well with the nature of technological interventions and their impact(s) on the community within the settings and contexts of the TGO study. In-field vlog and post TGO interview comments and observations provide insights into the practicalities and experiences of performing the fieldwork tasks and suggest potential considerations for future methodological development. These include more thoughtful design, testing, and implementation of automated data collection and making active in-field data collection easier for participants.

The post TGO interviews offered insight on participants' impressions of implementing the methodologies used in the form of daily tasks. In the following, narrative code excerpts taken from the post TGO interviews are flagged as (PTG) while those taken from the vlog data are flagged as (VL) and represent the in-field aspect of RITW (Brown et al., 2013).

Participants were enthusiastic about engaging with mobile and communications technology in backpacking, although they temper this with potential intrusion in the hiking experience. Many mentioned that integrating the vlogs and other technological interactions into their usual backpacking routines was problematic. Various comments reflect satisfaction with the mobile and communications technologies' utility in the field, with some suggesting improvements they would like to see in such devices.

Motivations to participate in the study included an interest in technology with P02 wishing '*To see what alternative technologies there are […] I've always been interested in technology, and just how far it can go. And this was a perfect opportunity for me to use this technology*' (PTG). P04 professed a similar view "*You might find things from other people that I'd go, 'Ah, okay. That's interesting. That might change the way I use technology.'*" (PTG). The question of quality of and influence on experience was also raised, with P06 stating '*you're asking people to potentially compromise the purity of their, it's a challenge. You're potentially going to intrude into their experience*' (PTG). Perhaps unsurprisingly this view is reinforced by P08 '*I tend to spend time thinking about the study rather than hiking*' (PTG).

While the research team and the technologies used facilitated automation of many participant tasks, a technique employed in other RITW studies (Brown et al., 2013), things that the participants were directly asked to do, the recording of the vlogs, generated some interesting data. In the interviews, a number of participants noted that remembering to integrate the vlog recordings into the day-to-day demands of wilderness backpacking could be challenging, as the tasks lay outside the normal routines of long-distance walking. P02 noted "*I've got to give that….two minute piece to camera. And when I woke up two hours later, I thought, 'I still got to do that two minute piece to camera.'*" (PTG). P04 goes on to say that '*I think I was pretty lousy at some of the activities […] it's just when you get tired, you just forget about stuff*' (PTG).

Time, the environment, and the physical nature of backpacking were also factors, as P05 states '*You do a long day, you do an arduous day […] You lie down in your tent, and you forget*' (PTG). Such views were echoed in the vlogs by P03, P06, and P07 who noted that he '*Forgot to record anything last night, it was a very long day*' (VL), similarly to P04 '*Sorry* (researcher name) *for missing out the last few days […] I've just been so tired*'(VL). P08 (the participating author) also had a similar experience '*I forgot a couple of times to do the recordings […] it's easy to have your mind elsewhere*' (PTG). These reflections from participants that were truly in the wild are in line with Kjeldskov and Skov's (2014) contentions that true understanding of real-world technology use can be gained by 'going all the way' into the field environment.

Lack of familiarity with the equipment and its place within participants' normal backpacking routines was evident. As P05 notes, '*I forgot to turn poxy inReach off […] fingers crossed it will last all day because I've got leave in about 20 minutes so I hope I'll get enough charge in it in 20 minutes to get it going* '(VL). P02 had a similar experience: '*the only thing that didn't fail on me was my watch and the InReach Garmin which I actually forgot to switch on*' (VL).

These reactions and reflections to the in-field use of technologies under testing conditions over a long time period relate directly to real-world use, where communities (in this case the close-knit TGO community) consider the use of technologies in context, and their impacts and reactions to them (Crabtree et al., 2013).

The specific technologies and reactions to them were mixed; in some cases, they appeared to dislike the experience of doing vlogs; participants did not relate to them as part of their normal activity. As P05 recalled '*you just forget to turn the inReach on, because you're not used to having one with you. I mean, people that have them all the time just get used to having them on, but I never really use one,*' (VL). While P03 said '*using all the technology during the challenge was the easy bit*' (PTG).

Differing degrees of digital device experience also appeared to be significant. The setup and function of devices were of note to several participants, with P01 stating that '*it's all about the technology and how it's set up […] it doesn't work very well or it doesn't do quite what you might expect it to*'. P01's mobile phone had work-related specialist VPN software installed, which would not work with AZ Recorder, meaning no vlogs could be recorded: '*No, it didn't work because of the security update on the smartphone*'. P05's frustrations are apparent: '*oh you're working now! [..] gonna start all over again because this is a bit hit-and-miss*' (VL). P03 noted that '*The setup was stressful. I can't remember now what it was that I found stressful about setting up the In Reach*' (PTG), but later praised the device functionality; '*I absolutely loved it for the messaging. I can see its worth for being able to get help when required. Now, I know that it works in the middle of nowhere. It's magic. I love it*!' (PTG). P02 further notes the utility of the satellite tracker '*the InReach Garmin has picked it up much more accurately*' (VL) and P04 '*I checked the weather on my Garmin InReach and it looks like we're going to have a lovely day*' (VL).

Opinion varied on the MiFit watches. P04 mentioned that '*Wearing the watch I found really good*' P02 echoed this view: '*the MyFit was brilliant, actually, I have to say that MyFit went, pretty much only charged it twice in the whole journey*' (PTG). Others had less enthusiasm, P03 considered '*the wrist device as being interesting and clever […] but it was obvious from the start it wasn't*' (PTG), while P05 was '*…not sure whether all the information got through to Google …I wasn't 100% sure*' (PTG).

In concert with the power issues and anxieties noted in an earlier work (Hyatt et al., 2021), P02 got '*close to running out of power, with all the various devices that I had […] it begs the question, what sort of power you take with you? I took a small power pack, and I'll take a bigger one next time'* (PTG). This observation is echoed by P08 '*….what else did I have? Big power pack to power all this, that would be nice if it could disappear, but it won't*' (PTG).

The deployment of these technologies in the 'unconstrained

environment' (Brown et al., 2011) showcase how participants' behaviors and attitudes respond to that mobile digital technology, with P02 postulating: '*the devices we have, I'm absolutely certain over time can be made a lot easier*' (PTG).

5.2. Methodological advantages, limitations, and lessons learned

The chosen research approach and study design are not without limitations. Overall benefits of using a mixed-methods approach outweighed the challenges and weaknesses encountered despite the difficult conditions and inability to control the environment in which the research was taking place. A RITW mixed methods study design including participant involvement and researcher positionality yielded rich and plentiful insights into the information behavior of long-distance backpackers and their mobile digital technology use. Benefits and limitations are discussed below.

5.2.1. Data collection

Collected data were complementary, and data triangulation helped the researchers strengthen the validity of the research findings with different methods and different observers of the same phenomenon. Triangulation in mixed methods research is used in a variety of ways, which may bring forward different issues and controversies (Mertens & Hesse-Biber, 2012). A quantitative survey on the information behavior of the wider long-distance backpacking communities, was conducted which was then contextualized using semi-structured interviews before and after the TGO, and vlogs during the Challenge to understand the experience of participants in a specific, in-context situation. Triangulation was based on the integration of quantitative, qualitative and experimental data and methods, looking at possible variances and putting the data into a more comprehensive explanatory perspective.

Collecting as much data as possible was a contingency plan in case something went wrong. An expectation that the semi-automated data collection processes (e.g., from the smartwatches) would be the most reliable turned out not to be realistic.

The online survey was successful and provided a useful quantitative basis to the study. The pre and post TGO interviews were an excellent way to collect separate, distinct and rich accounts of each participant's journey. Vlogs also provided great in-depth insights into participant's habits, and useful in-context data, including evidence of use (Brown et al., 2011) and frustrations with the mobile digital technology that would be unlikely to arise in lab-based studies (Marshall et al., 2011). However, there were some issues with timeliness and consistency of capture by participants, and in some instances obtaining the data from participants was also challenging. GPS tracks and messages from Garmin inReach devices were mostly complete.

As mentioned in Section 4.1.2, data collection from mobile phone browsing and search history and MiFit smartwatches was largely unsuccessful. Clear instructions were given and a program was created to allow participants to view their mobile phone browsing and search history logs and redact data they didn't want to be included. Despite this, data were only received from three participants, and these had large gaps. Relying on a third-party tool (Google Fit) and a third-party service (Google Health cloud) to reliably record data and make it available online was challenging. This may have been compounded by the choice to use inexpensive smart watches not specifically designed for the demanding context of a multi-day hike through the Scottish Highlands. Furthermore, users did not always sync their smartwatch with their smartphone, often because they tended to keep Bluetooth off to preserve battery life or simply forgot. However, providing the participants the smart watches did yield some interesting and useful qualitative comments on their use of the devices.

When comparing the tradeoffs between the data collection strategies, particularly the conscious, consistent effort of recording the vlogs as journaling method (Hyers, 2017; Lazar et al., 2017b) and semi-automated methods (Lazar et al., 2017a) some useful reflections can be made. The research participants were asked to use an activity logging software, the screen recording application AZ Recorder, on their smartphone together with their chosen mapping application, to briefly talk about their daily intentions every morning and evening. These vlogs were shared with the research team (Figs. 3 and 4). The conscious effort required to record vlogs, especially in this RITW setting, raised some issues of compliance. As discussed in Section 4.1.2, some participants did not relate to vlogs as part of their normal daily activities (including P08, the participant researcher). The vlogs provided useful in-context, real-time evidence of in-field technology use, and facilitated the study of the participants' perceptions and impressions of what was important to them. Of the automated data collected, MiFi smartwatches were expected to record step and heart rate data. As discussed above, it was disappointing to discover that the system had not worked. Nevertheless, during the post TGO interviews, participants supplied some interesting and useful qualitative comments about the smart watches.

While the semi-automated data collection furnished an incomplete data set, the conscious, effortful vlog journaling furnished a complete set of in-field participant's commentary and reflection. Overall, the vlogs and interviews provided a fail-safe, both in terms of volume and richness of narratives.

5.2.2. Participant involvement and RITW approach

Equipping participants with new mobile technologies and then analysing their employment of the same is potentially problematic for a number of reasons (Crooks, 2019). In this context, due to the very personal and individual nature of the TGO challenge for participants, there is potential for mobile digital technology to detract from their experience.

The study adopted a RITW approach to investigate "user experience phenomena that differ from those derived from other lab-based methods" (Rogers & Marshall, 2017, p. x): in-situ research was carried out with multiple subjects in real-world settings, deploying potentially disruptive technologies new to some participants. Although it may have been more "naturalistic" to observe the use of the equipment each participant already had, this approach reduced the number of different variables at play and ensured the opportunity to study communications, navigational, and health tracking technologies by each participant. This approach also permitted more "standardized" data collection and ensured that all players could record daily vlogs. It is acknowledged that this decision does, however, limit the extent to which conclusions may be drawn about *adoption* of these digital technologies in this context. It may also limit how thoroughly RQ2 has been addressed, as technologies have essentially been imposed on participants, rather than just assessing the use of the digital technologies they themselves had chosen.

The study gave rich insights into mobile digital technology use, allowing better understandings of real-life, dynamic "contextual factors and situated conditions arising from their deployment" (Luger & Rodden, 2020, p.150). It was evident that the mobile digital technology and its use could not be fully anticipated prior to the field research; indeed, as Rogers and Marshall (2017) noted, this is also "one of the main reasons for conducting in the wild studies in the first place!" (p. 77). The agency of the research team to address emergent issues and provide consistent online and phone support to the participants before, during, and after the TGO was considered. As noted by Probst (2016), employing a "researcher as participant" design can improve the research team's understanding of the participants' experience of the study, although one must be very careful to separate the two roles as appropriate, which may not always have been entirely achievable. The study aims to be transparent where data from the author–participant was used and it, where possible, provided the same study experience for all participants. Some of the participants' experiences of the TGO might have been compromised by adding new technologies and daily data collection procedures into what is already a challenging situation.

This may raise potential ethical issues, however at least some of the participants were explicitly very pleased to have had the opportunity to

use new technologies. In Hyatt et al. (2021), the issues around battery preservation on the trail were touched on because it is something not yet addressed in the backpacking literature. This was already a challenge for the participants, and something that was on their minds quite a lot (Fig. 5). The methodology contributed to this, as participants needed to use battery power on recording vlogs, charging their MiFit watches, and so forth.

Although research tasks were cut to an estimated average of 4 minutes a day, it was felt that the participants had a lot to do. On some occasions, participants forgot to perform the tasks as they were not a natural part of their usual backpacking day.

The element of timeliness with some vlog data was lost (some participants did them days later); such was the actuality of field research in context. Imposing specific tasks on the participants also contrasts somewhat with the ideals of a RITW study; however, this was necessary to ensure the collection of data to analyse. It could be argued that it would have been a much greater imposition (given the issues around battery life and privacy, among others) to have required participants to, for example, video record their entire TGO experience. A further lesson learned is that it would have been helpful to have an onsite team to provide support and troubleshooting en route, although this may arguably have an effect on the ecological validity of the findings as it would be difficult to not influence participants whilst providing in-situ assistance.

The participant profile could have been more diverse and perhaps reflected wider opinion; for example, there was only one female among eight TGO participants. The recruitment process started several months prior to the event, and participants were selected based on their intention to participate in the TGO and their indicated use of technology when backpacking. Efforts to have a more balanced participant profile were unsuccessful.

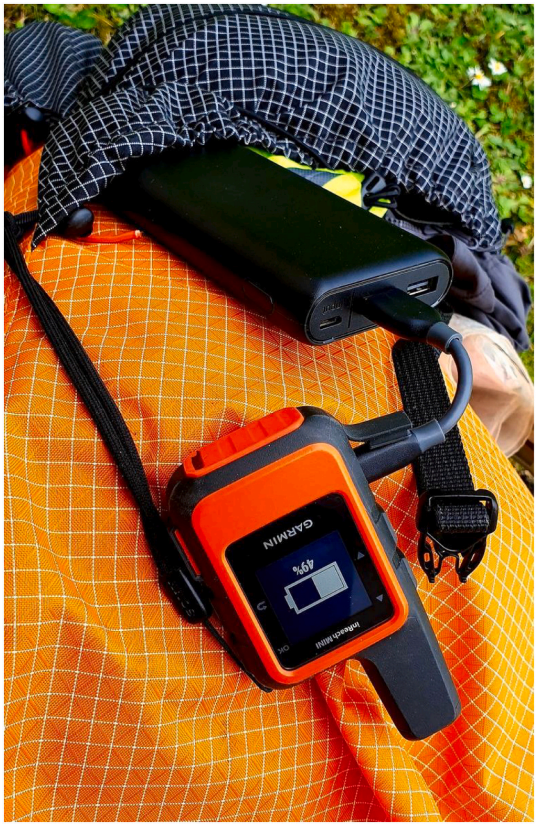


Fig. 5. The Garmin inReach of P08 attached to a battery pack for recharging near Fort Augustus, Scotland.

5.2.3. Researcher's positionality

There were strengths and weaknesses associated with the positionality (Rowe, 2014) of the backpacking member of the research team (P08). P08 reflexively acknowledged his views, values, and beliefs about the research topics and design, as well as his backpacking behavior and interactions with other participants while conducting the research, as detailed in his interviews and notes. In line with Savin-Baden and Howell Major (2013), P08 located himself in the thru-hiking research, acknowledging personal positions that have the potential to influence the research, with his forty years of hiking experience and personal opinions. He also positioned himself with regard to the other research participants, making himself overtly known to them, and acknowledging that he is part of a number of hiking communities in which some of the other participants were also involved. Thirdly, he positioned himself in the research context and process by designing the research project in light of his hiking experience and knowledge of situations in the field.

The insider-outsider dialectic is also generally relevant in qualitative research and particularly in ethnographic studies (Hammersley & Atkinson, 1995). The co-author was an insider to the hiking culture being studied and, at the same time, he was also an outsider to the TGO Challenge, which was not the type of event in which he normally participated. In line with the main arguments summarized by Gary and Darwin Holmes (2020), thanks to his being an insider P08 had easier access to the long-distance backpacking culture being studied. Furthermore, his pre-existing knowledge and exposure within the backpacking community allowed him to interact in a meaningful, empathetic, and insightful way with other participants, and receive candid answers as evidenced in the interviews, all of which were conducted by P08, and which led to rich and authentic research insights. Depending on specific circumstances and viewpoints, it is evident that these advantages may be also viewed as disadvantages. However, by reflexively acknowledging P08's positionality the study strived to strengthen the accuracy and transparency of the research process (May and Perry, 2017).

6. Conclusion

Researchers in LIS and HCI may consider this mixed-methods approach when conducting information behavior and multi-user experience studies of a specific social group in-the-wild. Previous studies on the adoption and use of consumer electronics by backpackers have largely been theoretical in nature, mono-method, or based on auto-ethnographic accounts of a single researcher. The exploratory methods discussed in this work are complementary, enhancing their respective benefits while reducing limitations, integrating off-site and on-site experiences, and providing a holistic view of information practices around community use of mobile digital technology in backpacking.

A research design that encompasses off-site quantitative data collection instruments may identify potential participants while providing information on their perceptions of technology. A mix of on-site, in-context qualitative and experimental data collection instruments (interviews, vlogs, smartwatch data, browser histories, GPS tracks, and satellite messages), may support the understanding of the participants' experience in a specific in-the-wild situation. A multi-method approach of this nature can facilitate the collection of distinct and rich accounts of participants' experiences, aid in triangulating findings, and ensure a degree of redundancy to mitigate data collection issues. Furthermore, the in-situ observation of digital technology use may contribute to future user-centered design decisions.

Implementing and delivering this research design required interdisciplinary skills, meticulous preparation, in-field pilot testing, flexibility, an open mind, a good rapport with research participants, and a degree of luck in the field. It is also evident that researchers must address a number of tensions when applying such an approach (for example between ecological validity and practicalities of reliable data collection). Future scientists and hikers may contribute to a deeper understanding of

real-time mobile digital technology use by long-distance backpackers in a variety of in-the-wild contexts, and the implications for leisure, health, and safety.

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