Chapter 10
Situating Cultural Technologies Outdoors: Empathy in the Design of Mobile Interpretation of Rock Art in Rural Britain

Areti Galani, Aron Mazel, Deborah Maxwell and Kate Sharpe

Abstract Mobile applications are presently at the forefront of interpreting outdoor historical and archaeological sites. This chapter discusses the methodological approach adopted in the Rock art mobile project (RAMP) which addresses the challenge of designing and delivering mobile interpretation at three Neolithic and Early Bronze Age rock art areas in Northumberland, UK. RAMP proposes a departure from the more traditional design approaches of delivering scientific content in the form of an archaeological mobile guide. It acknowledges that rock art interpretation requires a 'design space', which facilitates empathy between users and designers, and allows the existing archaeological content, the public's fascination with the 'cryptic' meaning of the rock art sites and the technological, environmental and personal situation of the user to be explored and to inspire technological development.

NoteA previous version of this article was published in: Galani A et al. (2011) Situating cultural technologies outdoors: Designing for mobile interpretation of Rock Art in rural Britain. In Trant J and Bearman D (eds). *Museums and the Web 2011: Proceedings*. Toronto: Archives & Museum Informatics. Published March 31, 2011. Available at: http://www.museumsandtheweb.com/mw2011/papers/situating_cultural_technologies_outdoors_desig The content of the RAMP web application and additional information about this research is available on: http://rockartmob.ncl.ac.uk/

A. Galani (✉) · A. Mazel
International Centre for Cultural and Heritage Studies, Newcastle University, Newcastle upon Tyne NE1 7RU, UK
e-mail: areti.galani@ncl.ac.uk

A. Mazel
e-mail: aron.mazel@ncl.ac.uk

D. Maxwell
Edinburgh College of Art, University of Edinburgh, Edinburgh, UK
e-mail: d.maxwell@ed.ac.uk

K. Sharpe
Department of Archaeology, Durham University, Durham, UK
e-mail: kate.sharpe@durham.ac.uk

E. Ch′ng et al. (eds.), *Visual Heritage in the Digital Age*,
Springer Series on Cultural Computing, DOI: 10.1007/978-1-4471-5535-5_10,

Keywords Experience-centred design · Mobile · Digital interpretation · Design methods · User experience · Outdoors

10.1 Introduction

Rock art—ancient carvings 'pecked' onto natural stone surfaces—forms a hugely significant part of the heritage of the North East of England. The abstract motifs, often referred to as 'cup and ring marks', provide a tangible and iconic link to our prehistoric ancestors which extends beyond the basic activities of everyday survival, to hint at a much richer, creative, and potentially spiritual dimension to their lives. Mostly found in situ, on outcrops and large, earth-fast boulders, rock art also reflects the intimate relationship that Neolithic and Early Bronze Age people had with the natural landscapes they inhabited between 6,000 and 3,500 years ago. Rock art in the North East of England presents a concentration of approximately 1600 panels of various sizes and details (see Figs. 10.1 and 10.2), representing a significant proportion of the known rock art panels recorded in the whole of England. The purpose or meaning of the cups and rings remains shrouded in mystery and continues to challenge archaeologists. The open, dynamic, debate around British rock art (see, for example, Barnett and Sharpe 2010; Beckensall 2010; Mazel et al. 2007) together with its physical availability, primarily above ground, makes rock art an accessible and 'democratic' part of the historic environment.

None of the rock art sites in North East England are proactively managed; no purpose-built visitor facilities are available, and few have any signposting or interpretation boards. Most are situated on private land with open access to the public, under the countryside and Rights of Way Act 2000 (CROW). Under these

Fig. 10.1 Typical motif at Weetwood Moor, Northumberland

Fig. 10.2 View over carved panel at Lordenshaw, Northumberland

circumstances it is difficult to make confident assumptions about visitor numbers; a recent study of heritage visitation patterns in Northumberland indicated that 78 % of surveyed day visitors came from within the region, and 'the Countryside' was found to be the second most visited destination (Smith-Milne 2008). This is supported by a one-day survey undertaken on a Bank Holiday (May 2010) by the author, which found that the majority of the 63 survey participants at Lordenshaw in North Northumberland lived locally (less that 40 miles away) and were regular visitors to the countryside. Public interest in rock art was confirmed in the overwhelming response to the website *Northumberland Rock Art: Web Access to the Beckensall Archive* (http://rockart.ncl.ac.uk) launched by Newcastle University in 2005; during the first 5 days of its launch more than 15,000 unique visitors accessed over 350,000 web pages (Mazel and Ayesteran 2010). An additional indication of enthusiasm for rock art was reflected by the high number of volunteers, more than 150 over four years, in the subsequent *Northumberland and Durham Rock Art Pilot Project*, which updated and extended the Beckensall Archive to include the rock art of county Durham, consolidating all records in the *England's Rock Art* (ERA) website (http://archaeologydataservice.ac.uk/era/) in 2008 (Sharpe et al. 2008).

Significant digitisation work took place in both projects: the ERA website hosts considerable digital assets, which include detailed descriptive records together with 14,600 images and drawings, and 420 3D models for 1,574 carved panels in the North East of England: a rich resource which has yet to be fully exploited for either academic research or heritage interpretation and management purposes.

The Rock art mobile project (RAMP) aimed to bridge these desktop-based digital resources and the physical carvings by bringing the database into negotiation with the Northumberland landscape, and into the visitors' reach, through the application of mobile platforms (see also Mazel et al. 2012). By putting user experience at the heart of the design process, this project not only takes advantage of the 'variability' of digital media (Manovich 2001), which enables the flexible re-use of cultural digital assets on mobile platforms, but also seeks to address the reported tension between handheld guides and narrative (Parry 2008). Therefore,

RAMP explored design methodologies that would have the capacity to situate mobile content in the personal narratives of rock art visitors—the exploration of these narratives forms the main body of this chapter.

Rather than focusing on the whole of Northumberland, RAMP concentrates on three rock art areas which were considered suitable for mobile media interpretation (namely: Lordenshaw, Weetwood Moor[1] and Dod Law) based on the interest value, quality and range of the carvings, general site accessibility and, perhaps most importantly, the ability to withstand any potential increased visitor numbers This was determined using conservation and management data in the ERA database, and through discussions with local heritage managers and stakeholders.

This chapter initially locates RAMP within the technological and natural context of rock art visits. It then presents the rationale for adopting experience-centred design methodologies in the delivery of the project. Although, recent years have seen a significant increase in the use of mobile applications for heritage interpretation, design methodologies for these heritage products continue to rely largely on traditional production workflows that prioritise heritage managers' and interpreters' views of what needs to be communicated and how. Drawing on ideas of empathic and experience-centred design, the chapter discusses a series of participatory workshops which were deployed by the RAMP team to facilitate the formation of a 'design space', which would allow digital heritage designers and participants to co-explore content and media suitable for the mobile interpretation of rock art. Subsequently, the chapter discusses three emerging 'user needs' in this context; namely, the need to locate the rock art in the landscape, the desire for archaeological speculation, and the inclination to reflect on one's sense of place. The chapter concludes with a discussion of the design sensitivities which have emerged from this process and our reflection on the role of empathy in digital heritage design approaches.

10.2 Context: Technological and Natural Landscapes

Archaeological findings, both urban and rural, often inhabit outdoor environments which may not be adequately served by traditional interpretation media for a host of aesthetic, conservation or statutory reasons. It is easy to envisage how such sites and digital mobile media could work together, and indeed early research projects such as ARCHAEOGUIDE (Vlahakis et al. 2002) focused on the delivery of archaeological content in situ via location aware hand-held devices. In these cases, as well as in more recent commercial reiterations of the concept (e.g. the GPS-based multimedia guide in Culloden battlefield (Pfeifer et al. 2009)), the motivation was firmly grounded in both the flexible delivery of sound archaeological information on site and the perceived user need for content personalisation. In the

[1] Since January 2013 access to Weetwood Moor requires the landowners' permission.

majority of these initiatives, digital mobile guides are introduced in managed archaeological or heritage sites, and are delivered through institutionally-owned devices on loan to visitors for the duration of their visit.

The location of rock art panels in open access outdoor sites, due to their occasional and impromptu visitation patterns, require a different approach to the design of mobile digital interpretation; this should take into consideration (i) the current technological landscape, and (ii) the physical environment of rock art, both of which we consider in the following section.

10.2.1 Technological Landscape

Mobile development is a growing trend: the 2009 Oxford Internet Survey (Dutton et al. 2009) indicated that 89 % of British people owned a mobile phone and in May 2010 AdMob (2010) reported that Western Europe experienced a more than six times increase in mobile traffic over the previous two years. This trend of increasing mobile traffic is not only due to mobile or cellular phones but also includes the increasing array of tablet and ebook devices (e.g. Apple's iPad and Samsung's Galaxy Tab). This rapidly moving field brings complexity as well as exciting new possibilities, as mobile platforms encompass a plethora of screen sizes (including variable orientation from portrait to landscape), hardware capabilities (e.g. gyroscope, GPS and accelerometers), input methods, and proprietary operating systems.

In the cultural heritage context cultural institutions are increasingly contemplating the possibility of developing digital mobile interpretation, as indicated by a recent Museums and Mobile Survey (Tallon 2011), with an emphasis on utilising users' own devices, multimedia guides and smart phone applications (see also Doyle and Doyle 2010). However, the most recent Mobile Survey by Tallon (2013) specifically suggests that heritage sites and heritage museums are slower in developing mobile provision. In the meantime, feedback from the current cultural providers of mobile content suggests that on one side, apps is the most promising way for iPhone and Android users to find and use content (Bernstein 2010), versus the potential for wider visitor access through mobile websites (Forbes 2010). However, in general, development trends in the museum and heritage sector are skewed towards iOS-based applications, with the mobile web and Google Android development far less supported, despite Android's rapidly growing install base. Apps range from being simply a pre-packaged, mobile-friendly version of an existing website, to interactive games (e.g. *Tate Trumps* iPhone app), augmented reality (e.g. Museum of London's *Streetmuseum* iPhone app) and guided interactive video tours (e.g. Untravel Media's *Walking Cinema: Murder on Beacon Hill*). Location-aware applications support navigation around outdoors physical locations through a range of solutions such as GPS (Tarasoff et al. 2009), Quick Response (QR) and similar 2D codes (e.g. Manchester Art Gallery's *Decoding Art* project). Geo-tagged photographs (e.g. Beeharee and Steed 2006) are an

exploratory alternative to the above, seeking to tackle GPS limitations, for example under tree cover and 'urban canyons' (i.e. signal obstruction by buildings) as well as increased battery depletion for GPS-enabled mobile phone handsets.

10.2.2 Natural Landscape

By comparison with these examples of indoor and urban mobile applications, rock art in Northumberland is situated in the rural landscape, amidst windswept hills and moorland where electricity supply is not readily available. Frequently located at sites affording extensive vistas (see Fig. 10.2), the carvings generally occur on flattish, exposed sections of bedrock. They are often found closely grouped, perhaps separated by bracken or heather; they are exposed to the elements, partially covered by lichen, moss and general detritus. When looking at rock art, the visitor is also exposed to the elements of nature, such as wind, rain or bright sunlight which reflects on mobile device screens reducing visibility.

Yet in heritage management terms and, as we will argue, in user-experience terms these hostile conditions lend themselves to mobile devices better than static alternatives (e.g. wind up mp3 players). Mobile interpretation can be delivered via both visual and personal audio formats without physically augmenting or intruding upon the landscape as many rock art sites are subject to statutory protection. Additionally, any installation may potentially be subject to livestock and human vandalism due to their use as grazing grounds and their open access location. The above conditions also restrict the installation of alternative energy solutions, such as solar powered kiosks.

The environment offers two further challenges: a seasonally changing, relatively featureless landscape which can make finding the carvings difficult, which we discuss later in the chapter, and variable network signal, which has often been reported by local residents as nonexistent. However, a systematic feasibility study of five major UK mobile service providers, carried out at the three RAMP rock art sites, revealed some encouraging results: although network signals vary considerably between the three sites, all have strong availability of network signal in several of the rock art panel areas, especially in higher altitude spots. One site enjoys stable and strong signal with all major network providers, whilst the other two are more variable. Frustratingly, weak signal has been found in the public parking areas of the three sites, admittedly the natural starting point of any activity, which may account for the visitors' perception of 'no signal' mentioned above.

10.3 Methodological Approach

With a significant amount of digitised media in place and a good understanding of the feasibility of mobile applications in the natural context of the rock art panels, this research acknowledged from very early on that significant exploration should

focus on the narratives, interactions and conversations which take place in people's everyday encounters with this environment. The design process, therefore, actively sought to engage with the 'situated' nature (Suchman 1987) of these encounters and to allow for 'empathy' to be developed between designers and users. Wright and McCarthy (2008) explain:

> In an empathic relationship the 'designer' does not relinquish his/her position to 'become the user', a position from which nothing new can be created, rather the designer responds to what they see as the user's world from their own perspective as designer. By holding onto their own perspective each person is able to creatively respond to the other from their own perspective.

This design position, the authors continue, allows the designer to understand and anticipate users' response to novel technological encounters, which they have not previously experienced. Although empathic design has been discussed both in marketing (e.g. Leonard and Rayport 1997) and in product design contexts (e.g. Koskinen et al. 2003) since the late nineties, it has not been used in the design of cultural heritage applications, often due to its resource intensive nature and its speculative outcomes. Its emphasis, however, on opening up design possibilities beyond a specific group of participants was particularly attractive for RAMP researchers, due to the serendipitous nature of the rock art visit.

Drawing on these principles, the project developed three one-day co-experience workshops held in late 2010 with predominantly local participants. The workshops aimed to create a 'design space', which would bring to the fore visitors' experiences and relationships with the rock art environment, and their rapport with interpretive and communication media; they also allowed designers to share expertise and knowledge and float preliminary ideas. This flexible approach enabled the team to expand the traditional boundaries of the system requirements capture process to include not only technical functionalities and content needs, but also to investigate and incorporate more open-ended concepts, such as the role of ambiguity in archaeological information, the pace and tone of delivery in a self directed activity, and the relative importance of the visitor's sense of place in the experience of rock art.

The workshops took place in Wooler (Wlr1) and Rothbury (Rth2, Rth3), the closest villages to the chosen rock art areas. Membership of the workshops was initially informed by a preliminary in situ visitor survey, as mentioned above. This day-long survey had suggested that people who visit rock art sites are likely to come from within the local area and visit in a group (i.e. two or more people) which includes repeat visitors. Several workshop participants were recruited from this initial survey. In addition, participants were found from local contacts in villages close to the project rock art sites, responses to posters in community centres, and from direct correspondence with relevant groups (e.g. a local ramblers group, amateur rock art and archaeology groups, heritage organisations and the local geocaching community). Twenty seven people participated, which included some groups of friends and same family members; ages ranged from a teenager to retirees, with a trend towards older (retirement age) participants.

The workshops deliberately adopted a low-tech, informal approach. Drawing on the design approach of 'cultural probes' (Gaver et al. 1999; Mattelmäki and Battarbee 2002), which helped the research team to focus on the "cultural implications of our designs", they combined conversations, some of which were around maps of the area which explored participants' favourite spots (Fig. 10.3), a site visit, a storytelling session about participants' own mobile phones, a set of prompts written on lollipop sticks, and flash cards. These activities were designed to support first-hand engagement, multisensory (and multimodal) experience and self-reflection—in a bid to shift away from perceived 'truths' or generalisations about visitor needs and behaviours at heritage sites.

The aim of the site visits was not to provide a guided tour experience, which would favour the archaeological narrative of the encounter. Rather, the research team aimed to lead participants to rock art panels and allow them to engage with the landscape and group as they saw fit. The dialogue which emerged between specialists and participants evolved naturally, indicative of the information needs of participants. Knowledge sharing with the specialists was partly in the form of answering questions, enabling group members to probe the extent of known facts and archaeological interpretation, and also served as a moderating sounding board when participants put forward suggestions about the rock art. Participants could also use booklets with sample visual content from the existing database (Fig. 10.4), listen to spoken words (e.g. a poem recital) and music on mp3 players, and make notes on wooden lollipop sticks, which carried prompts such as: "This reminds me of…", "This landscape makes me feel…" and so forth. Brushes and a profiler gauge were also provided to allow participants to physically interact with the rock (Fig. 10.5).

The workshops generated a rich and diverse pool of documentation in the form of notes, photographs, video recordings, participant photographs, and notes on lollipop sticks. This material was then used to generate a set of conceptual thematic maps, similar to affinity diagrams (Beyer and Holtzblatt 1997), using sticky notes (Fig. 10.6) which afforded not only a plasticity in data coding, but also encouraged a collaborative and visual method of working between the project team. This

Fig. 10.3 Group discussion around favourite places (Rothbury, Workshop 3)

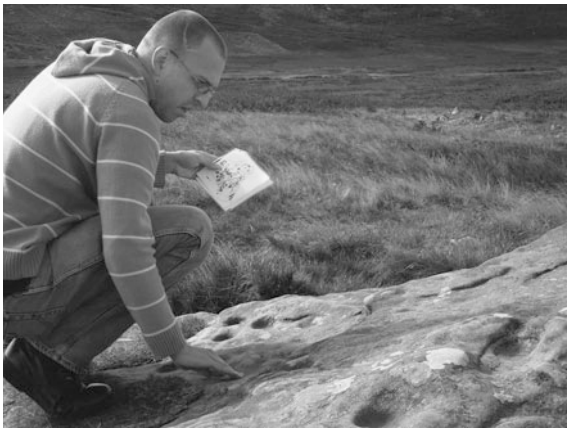

Fig. 10.4 Participant exploring the carving through touch and visual material, Lordenshaw site visit (Rothbury, Workshop 3)

Fig. 10.5 Participants engaging with rock art, Lordenshaw site visit (Rothbury, Workshop 3)

treatment of the collected materials highlighted significant personal and shared realisations of the rock art experience, three of which we discuss in the next section.

10.4 The Rock Art Experience

The documentation of the workshops provided insights in the ways that participants experience rock art visits. The remaining of this chapter focuses on participants' nuanced reflections on landscape use and personal interactions with the landscape and their peers, which have affected our design inspiration. More specifically we discuss:

- Practices around finding rock art ('findability');
- The place of archaeological speculation in engaging with rock art; and
- The participants' connection with the landscape ('sense of place and self').

Fig. 10.6 Conceptual thematic map on sticky notes

We conclude this section by reporting on the participants' types of mobile handsets and usage levels in their rock art visits, countryside activities and everyday life. Although these insights derive from research in rock art sites, they also have broader relevance to how visitors experience a wider variety of cultural and natural environments, such as archaeological sites, industrial landscapes and natural conservation areas.

NB. All participant names have been changed.

10.4.1 'Findability'

As described in the *Natural Landscape* section, the physical locations of rock art mean that they are not necessarily visible from a distance; easy viewing can be very much dependent on oblique sunlight and low vegetation growth. Anita (participant in workshop Wlr1) told us about visiting Weetwood (one of the RAMP sites):

> I'd been up there before and I'd seen some of them, but I saw some today that I hadn't seen before. The one that was in the wood, I'd never seen that one before, I didn't even know it was there—because all it says on the map is 'cup and ring marks'. And the last time I was up there I couldn't find that-the main one, I couldn't find it at all. And we walked backwards and forwards, and backwards and forward until everyone said, 'Come on! We want to get to Wooler before the tea shops shut'. And in the end I gave up. So I

> was particularly interested to go up there today and I've taken it all down on the GPS and got the, er, map references so I can find them again.

Anita (retired) is a keen walker and countryside visitor; she is a volunteer ranger for the Northumberland National Park, so is comfortable in the countryside. Yet her recollection of difficulty in finding rock art rang true for several participants over the three workshops. Her story illustrates several key points, (i) she was unaware of all but the main rock art panel (which is situated on a pathway) despite the existence of several other carved panels in a 250 m radius, (ii) there is a lack of interpretation in situ and in mainstream information channels (i.e. tourist information brochures and on Ordinance urvey (OS) maps), and (iii) she developed a method for dealing with the 'findability' issue by recording panel co-ordinates with her GPS.

Anita's story is typical of other participants, many of whom did not know about less obvious rock art panels in the general area, despite having visited the site and the most well-known carvings previously. On the workshop site visits, several less obvious panels were visited, selected to show a range of rock art motifs and contexts. This range perhaps prompted these responses, and served to enthuse some participants who did not realise that there was so much archaeology on their doorstep. For these participants, the lack or vagueness of the available visitor information both on site and through traditional tourist information channels limited their experience of rock art, especially within the context of a leisurely group visit. Participants' accounts of their troubles in finding the rock art panels gave us insights in the situation of these visits: purposeful, regular, social, and often relying on intuition around the landscape. For instance, only two of our 27 participants spoke of actively using the ERA and Beckensall websites to find and check rock art locations pre-visit.

Anita's method of storing rock art locations for future reference was a relatively new experience for her, having only recently acquired a GPS. Other participants adopted different mechanisms for finding rock art, with one member claiming to enjoy "getting lost", only navigating with OS maps. It took Robyn (retired, Wlr1) three occasions to locate a specific carving, only succeeding after serendipitously meeting Stan Beckensall (doyen of rock art studies in Northumberland and the UK) in a local café and asked for help. It may be initially hard to comprehend the motivation in seeking a simple carving on a rock in the middle of the countryside, especially when it drives someone to search for it on three separate occasions, but it is important to ground this in the setting of the landscape and the user group.

The landscape was cited as its own reward, where regardless of the success of the rock art search, "…one has a nice day out in lovely countryside looking for them and I think that sort of adds to it—they're usually somewhere where there's a lovely viewpoint" (Robyn, Wlr1). The importance of environmental context was reinforced by Dennis (Rth2) who noted that, "If you had the same stones in a museum in Newcastle, well, I would not be bothered at all. It's the landscape, the environment that makes it". Despite the lack of information and interpretation, rock art panels held a fascination for our participants, which was evident

throughout our conversations in the three workshops. This was often expressed through ongoing speculations about the rock art panels themselves, which we discuss in the next section.

10.4.2 Desire for Speculation

The inconclusive explanations about rock art provoked discussion, reflection and speculation. "What does it mean?" was the underlying question at the root of all our workshop discussions and site visits, and was articulated by participants time and time again. A typical conversation among the participants is exemplified by the following dialogue excerpt (Wlr1):

John We haven't really got a clue. I mean there's loads of ideas but…we do not know. Because it's a mystery it's much more alluring, yeah? [General murmurs of agreement]
Stephen It makes it more interactive in some way does not it?
John Well it allows your motivation [Unheard all talking together]
Anita Every time you go you think—well I said today, 'It's a game. It's a game like that one in Africa where you put stones'
Stephen Which makes it more engaging doesn't it?

Anita's comment in the above excerpt highlights the role of speculation in the overall rock art visiting experience, suggesting that on each subsequent visit her view of rock art alters. All of the workshop groups enjoyed speculating on the purpose and possible meaning of the abstract marks. The wooden lollipop or 'memory' sticks (see Fig. 10.7) recorded a host of imagery (e.g. bicycle wheels, labyrinths, maps, a board game, graffiti or doodles, ridge and furrow plough marks, millstones, ripples from throwing a stone in water, and 'planets around the sun') (see also (Morris 1979) for 104 possible rock art meanings).

For the participants, the perceived mystery and enigma of rock art, in combination with the lack of any signs of authoritative interpretation in situ, enabled a degree of intellectual accessibility, where non-specialists can experience a sense of conversing on a comparatively level footing with specialists, qualifying with "we [i.e. *everyone*] do not know [what it means]". During the workshops and reportedly in previous visits, making sense of the rock art panels was practiced through dialogue both on site and in discussions post-visit, opening up a space for speculation and providing an opportunity not only to hear the available archaeological answers but also to discover and hear more questions in a group context. Rock art therefore was at the centre of an evolving set of personal narratives, shaped by ongoing experience and social interactions with peers and specialists—a similar understanding to how people make sense of natural quietness in rural environments was reported in Giaccardi et al. (2006). On a more personal level, a smaller group of participants made sense of rock art through their creative practice. Stephen (Wlr1) writes poetry, and rock art has in the past inspired some of his work,

Fig. 10.7 Discussion around comments on lollipop sticks (Wooler, Workshop 1)

which he brought to the workshop. Similarly, his wife Jean (Wlr1), recounted visiting rock art with her sister-in-law who used the carvings to prompt an artistic reflection post visit; John (Wlr1) and Matthew (Wlr1) take photographs of rock art, which have now been uploaded onto the Flickr account of the project, and both Dennis (Rth2) and James (Rth2) have installed geocaches close to rock art sites.

10.4.3 Sense of Place and Self

An overwhelming aspect of rock art experience, in the context of the workshops and beyond, was the participants' connection with temporal, social and physical aspects of the landscape through the rock art itself. In our team's discussions of the workshops we loosely referred to this aspect of the visit as 'sense of place and self' following Jorgensen and Stedman's (2001) approach where 'sense of place' is considered to be "an attitude towards a spatial setting" comprising of identity (beliefs about the relationship between self and place), attachment (emotional connection to place) and dependence (conative, i.e. directed towards, action).

Participants who attended the RAMP workshops were comfortable in the rural environment, being largely regular visitors to the countryside, in line with Tuan's (1974) claim that "familiarity breeds affection when it does not breed contempt". They talked about the countryside in terms of being able to connect with and be part of nature, giving them a sense of 'being alive and carefree'. Several individually written responses to the lollipop stick prompt, "This landscape makes me feel…" said simply, "Exhilarated".

A sense of tranquillity came out from the responses too, with participants citing a multisensory experience: panoramic views from hills or coast, the sounds of birds and the wind rushing, lying in heather watching sky larks dart across the sky, and drinking coffee from a flask or eating a picnic lunch. This was reflected both in the measured way participants moved through the rock art sites, sometimes sitting down to absorbing the atmosphere, and in discussions afterwards. For instance,

Louise (Rth2) wanted to simply "sit there for 20 min" and Karin to "experience what there was to feel" (Rth3). This correlates with survey findings (Smith-Milne 2008), which suggested that heritage tourists are "motivated by a wider range of factors than the heritage itself", including a "desire to be entertained, an emotional and/or social connection with a particular place, subject, culture, history and so on. Other types of experience include a desire for peace and tranquillity, an interest in learning".

Participants explored the environment through sensory engagement with the landscape and the rock art, touching carvings with their hands (Figs. 10.4 and 10.5), and in a couple of instances, their bare feet. Several participants claimed that by touching the hollows and tracing the grooves they were able to feel more of a connection with the ancient carver. As Michael (Rth3) explained:

> I think often perhaps we are told that things are fragile and 'Don't Touch it' and, you know, '[Don't] look at it', and, 'Not too near it' and, 'Don't walk on it', and by not touching it, we make it lost. Whereas I felt an interesting thing where I was running my hand through some of the cup marks and I thought, hmm, perhaps if this has been done so many times and I remove another thirty little grains from the outside of weathering then I'm also taking part in that process.

Michael's account of his experience suggests a felt connection between the past and present, bringing a direct sense of individual participatory engagement with the carving and the landscape. His contemporary take on the carving and erosion process provided an opportunity to reflect on his personal contribution to the longevity and continuity of rock art which was shared by other participants in the group. It appears then that in this case, Graham et al.'s (2009) suggestion that "the historic environment contributes towards a distinctive sense of place and a sense of continuity which can support a greater sense of people's self-esteem and place attachment", is particularly materialised through the visitors' situated and multisensory experience of rock art.

Before we discuss the design sensitivities associated with the above issues, it is worth pondering on another aspect of the RAMP workshops, the participants' relationship with their mobile technologies.

10.4.4 Participant's Use of Mobile Technologies

The co-experience workshops discussed above were designed to open up dialogue among participants, and between participants and designers. Given the premises of the project, the team sought to understand the relationships participants have with their mobile phones, especially in the context of their visits to rural landscapes. This would allow the research team to develop designs not necessarily for the current technical skills and hardware capabilities of the specific participants and their phones, but in a way that would enable these participants (as well as other future rock art visitors) to feel comfortable in engaging with a technological

intervention in the context of a rock art visit. The conversation around personal mobile technologies brought up a series of details regarding uses and handset capabilities, ranging from those participants who extolled the virtues of Bluetooth to those who had never sent a text message (though both extremes were in the minority). The majority of the participants had older mobile phones, some as 'hand-me-downs', and others as deliberate selections made at purchase. The majority of the participants reported low usage of these devices which correlates with the lower-end capabilities of the handsets, and the corresponding fact that most of the phones were Pay-as-you-go as opposed to contract-based (which generally have a higher specification and bundled internet access). Unsurprisingly, participants were concerned that any kind of mobile tour might deplete their pre-paid phone credit.

More importantly, however, participants were asked to tell the group a story about their mobile phones; in these stories mobiles were cited largely as producing feelings of 'safety' and security when in remote rural settings or when out driving. As a result, participants would always carry their mobile phones in their rock art visits. This admission, however, came hand-in-hand with the perception that mobile signal at rock art sites was non-existent, perhaps borne out by the fact that signal strength is weak at all the 'site entrances', as discussed above.

Participants were also divided between those who actively engaged in imagining the positive transformative effects of a mobile application for the rock art experience, and those who warned the RAMP team about the disruptive effect of technology in the tranquillity of the landscape. Furthermore, participants with smart phones were observed taking photographs throughout the visits and in two instances to combine low capability mobile phones with high-end iPad devices (Fig. 10.8)—the majority of the group used their electronic cameras to capture the visit. They also accepted and made calls throughout the day. The overall experience, hence, was regularly recorded, mediated and in some instances disrupted by the use of an array of technologies.

Fig. 10.8 Participant using own iPad during Lordenshaw site visit (Rothbury, Workshop 2)

10.5 Design Considerations

The co-experience workshops indentified new perspectives for the mobile interpretation of rock art that are not often included in heritage interpretation manuals, namely the visitors' need to speculate around the making and the meaning of these sites and their desire to connect with the landscape during their visits. The workshops also provided the research team with more defined questions to ask around already known interpretation needs, such as the visitors' need to be able to locate the site/artifact in the landscape before they engage meaningfully with its message. These findings have inspired digital mobile interpretation sensitivities which are further discussed in Mazel et al. (2012) and are summarized below:

10.5.1 Hybrid Media Ecologies

When it comes to technological decisions, the co-experience workshops suggested that rock art visitors make use of a variety of media in their personal sense making of rock art, including iPads, cameras, maps, books, websites and the physical infrastructure. Understanding how these "hybrid [media] ecologies" work in the context of the heritage visit in rural environments will help us to support the nature of cooperation and interaction in these environments, which merge physical and digital encounters (Crabtree and Rodden 2008). For example, RAMP was faced with a fundamental dilemma of whether to work to the lower-end phone specification, perhaps by the use of SMS (e.g. Botturi et al. 2009) or recorded voice messages, or to push the user boundaries and adopt a higher level specification, perhaps through the use of an app, despite the fact that most of our participants would be unable to access it in the first instance. Furthermore, there is always the temptation to simply translate the existing database directly into a mobile format, which, however, would contradict our participants' need for situated interpretation, appropriate to repeat, purposeful and intuition-based encounters with rock art in a social group or alone.

The final implementation of the mobile interpretation explored a multi-pronged approach to digital cultural communication by (i) developing a mobile web application, reusing key resources from the existing database (e.g. optimised imagery) and creating additional material as required, to allow Internet enabled mobile devices to access content in situ, (ii) by adopting the emergent Bring your own device (BYOD) paradigm through the development of multiple versions of the web application for low-, mid- and high-end devices, (iii) by making components of the interpretation available for visitors to download on alternative personal devices (e.g. mp3 players) or print pre-visit, and (iv) by incorporating QR codes in the landscape for quick and efficient access by smart phone and tablet users. This approach aimed to provide maximum access to the mobile interpretation content at various stages of the visitors engagement before, during or after the visit.

10.5.2 Granular Navigation

Arguably, one of the fundamental rules of any heritage interpretation, analogue and digital, is for people to be able to physically find it and access it. As discussed previously, the perceived intellectual accessibility of rock art and the relationship with its natural context is one of its appeals. The somewhat hidden nature of its location could well have been another manifestation of this, a puzzle or riddle to solve, another facet of its enigmatic nature. However, the discussions in the workshops clearly demonstrated that this was not the case, as people expressed frustration in not being able to locate the panels in past visits. They further revealed the participants' enjoyment in using their intuition and resourcefulness in navigating the landscape.

The co-experience workshops highlighted three aspects of the participants' way finding practices when visiting landscapes with rock art sites. These broadly include navigating around the landscape, locating potential rock art panels and confirming that the panels they are looking at contain rock art carvings rather than other naturally occurring shapes. The workshops also revealed preferred navigation techniques: (i) the use of static GPS coordinates, the method of choice for rock art enthusiasts and geocachers, (ii) the use of mainly Ordinance survey (OS) paper maps preferred by regular walkers in the countryside, and (iii) intuitive navigation around the landscape using natural features and own recollections of previous visits.

The final implementation of the mobile interpretation combines these elements by providing a schematic map of the site with annotated photographs of views and actual panels (a solution also discussed by Wenig and Malaka 2010). The navigation functions in both environments, the users' mobiles through the application, and the physical site through considerate and managed physical interventions in the landscape in the existing public path signage. Durable inconspicuous plaques with the map of the site and QR codes have been installed on existing way findings markers to provide anchors for landmark-based navigational descriptions. Static GPS coordinates are also provided in the web application but no content is triggered by the users' GPS location given the challenges of this technology for heritage applications (e.g. Pfeifer et al. 2009), the mobile technologies used by the visitors to these sites and the serendipitous nature of the rock art visit.

10.5.3 Interpretive Openness Through Dialogue

In their exploration of ambiguity as a design opportunity, Gaver et al. (2003) commenced their discussion by accepting that, "ambiguity can be frustrating, to be sure. But it can also be intriguing, mysterious and delightful". This certainly rings true in the case of rock art experience as already discussed. On the other hand, it was obvious to the RAMP team that the specialists' point of view is that although

there are a lot of things we do not know about rock art, and therefore speculation around these issues is welcome, there are certain things that we *do* know, which should form the basis of any meaning making exploration.

The co-experience workshops particularly highlighted that participants seamlessly interwove and evolved their own archaeological narratives about rock art through (i) their engagement with the natural landscape, (ii) their sensory explorations, and (iii) the more evidence-based conversations with rock art specialists in the group and more 'knowledgeable' peers.

Therefore, the final implementation of the mobile interpretation sought to explore designs that would combine Gaver et al.'s (ibid) suggestions for "enhancing ambiguity of information" with techniques used in archaeological research. It realises this by (i) providing an evidence-based set of material and insights which leave space for the visitor to make their own informed judgements on aspects of rock art, (ii) mirroring conversational dialogue in both audio and text interpretation to introduce informality and openness and to avoid one authoritative voice, and (iii) inviting users to respond to speculative questions about the meaning of rock art to be shared with other users on-site and online via the applications' desktop version. The dialogic approach to interpretation is expected to overcome limitations of meaning derived from the inherently positivist medium of terse mobile interpretation by opening up the space for conversations, whilst putting forward a sound archaeological discourse.

10.5.4 'Felt' Experience of Place

One of the challenges for RAMP was to contradict Malpas's (2008) proposition that digital media, by removing "spatial and temporal distance *and* difference", and by "the way they release things, including ourselves, from place may also bring with it a loss of any proper 'sense' of place, and so of any proper sense of identity." Connecting with the natural, historic, and social aspects of the landscape through one's senses and previous understandings appears to be an essential part of the rock art experience.

The co-experience workshops highlighted the nuanced character of rock art visiting experience which often interlaces rock art engagement with moments of relaxation, attention to the natural and built elements of the landscape and personal reflection; due to the tactile nature of the rock art panels and their embeddedness in a living and changing landscape the rock art visit is also inadvertently multisensory and tempts people to physically interact with the panels.

The final implementation of the mobile application prioritised (i) the creation of flexible, modular content, which favours the user's personal pace by avoiding interdependencies between content associated with traditional linear guided tours of heritage sites, and (ii) the inclusion of content for other aspects of the landscape, such as views, plantations and remains from other archaeological periods (e.g. hillforts). This latter approach also signifies a move towards a more holistic style

of interpretation of rock art, and of archaeology more generally, informed by an empathic understanding of the visitors' viewpoint. Although the mobile interpretation provides considered encouragement for users to use all senses during the visit, it also advises against touching or walking on the rock art panels. Arguably, this latter point highlights a real-life tension between the tactile aspects of the rock art experience and the concerns of heritage conservation, which are particularly prevalent in rural open access sites.

10.6 Conclusion

This chapter has outlined the contextual background to the RAMP. It has particularly highlighted the technical and environmental context of the project and the rationale behind the chosen empathic and experience-centred design methodologies. One might then question how the empathic design approach compares to more traditional system design processes used in digital heritage. RAMP aimed to situate digital mobile interpretation within the personal, technological and natural context of rock art visits; it also sought to introduce an interpretation delivery mechanism which is 'novel' for both the sites and the traditional user base. Through the adopted experience-centred methodology, the design team achieved an 'empathetic' relationship with both the landscape and its users. The workshops generated rich visual and textual accounts of participants' specific content and modal preferences, as well as the range of participant mobile usage patterns and experience. They also, crucially, exposed a series of observations and comments revealing how visitors experience and engage with rock art and the wider countryside. As the premise of this chapter is that experience-centred design methodologies can lead to nuanced, thoughtful reflections for conceptual design, it is important to consider what these reflections can tell us in terms of design sensitivities. Whilst conscious of Dourish's (2006) concern for notional, wide-sweeping design implications based on fleeting observations, several clear points emerged which RAMP used as inspiration springboards in the design and implementation of the mobile interpretation.

Wright and McCarthy (2008) warn us that experience-centred approaches might run the danger that "empathy will be regarded as something vague, mysterious, unwarrantable, undocumentable and unusable". RAMP aimed to address this issue by putting in place an iterative design process, establishing a longer term relationship with participants, and evaluating design prototypes through further participatory design exercises (Mazel et al. 2012). In all these steps, a keen awareness of the design sensitivities has driven each decision. While the evaluation of the mobile interpretation with visitors is currently underway, and will be reported in a forthcoming publication, the empathic design approach explored in this project has already achieved to challenge designers, heritage professionals and participants

involved in the co-exerience workshops to consider mobile interpretation not only as a vehicle for heritage information in situ, but also as an opportunity for active engagement with one's companions, the archaeology and its surroundings.

Acknowledgments RAMP was supported by the Arts and Humanities Research Council (AHRC), UK, AH/H037608/1. We would like to thank all participants who attended our workshops, and the local services in Wooler and Rothbury for their hospitality. Figure 10.2 is included courtesy of England's Rock Art.

References

AdMob (2010) *AdMob Mobile Metrics Report 2010*. Retrieved February 6, 2011, from http://www.slideshare.net/admobmobile/ad-mob-mobilemetricsapr10.

Barnett, T., & Sharpe, K. (Eds.). (2010). *Carving a future for British rock art: New directions for research, management and presentation*. Oxford: Oxbow Books.

Beckensall, S. (2010). *Prehistoric rock art in Britain*. Stroud: Amberley Publishing.

Beeharee, A. K., & Steed, A. (2006). *A natural wayfinding: Exploiting photos in pedestrian navigation systems: Proceedings of the 8th conference on human-computer interaction with mobile devices and services (MobileHCI '06),* (p. 81). Espoo: ACM.

Bernstein, S. (2010). Brooklyn museum mobile web on iPhone and Droid, July 27, 2010. Retrieved February 6, 2011. from http://www.brooklynmuseum.org/community/blogosphere/2010/07/27/brooklyn-museum-mobile-web-on-iphone-and-droid/.

Beyer, H., & Holtzblatt, K. (1997). *Contextual design: Defining customer-centered systems*. San Francisco: Morgan Kaufman.

Botturi, L., Inversini, A., & Di Maria, A. (2009). The city treasure. mobile games for learning cultural heritage. In: J. Trant & T. Bearman (Eds.), *Museums and the Web 2009: Proceedings, Indianapolis, 2009*. Archives & Museum Informatics, Toronto. Retrieved February 6, 2011. from http://www.archimuse.com/mw2009/papers/botturi/botturi.html.

Crabtree, A., & Rodden, T. (2008). Hybrid ecologies: Understanding cooperative interaction in emerging physical-digital environments. *Personal Ubiquitous Computing, 12*(7), 481–493.

Dourish, P. (2006). Implications for design: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'06), Montréal, 2006* (p. 541). New York: ACM.

Doyle, J., & Doyle, M. W. (2010). Mixing social glue with brick and mortar: Experiments using the mobile web to connect people, objects, and museums. In J. Trant, & D. Bearman (Eds.), *Museums and the Web 2010: Proceedings, Denver, 2010*. Toronto: Archives & Museum Informatics. Retrieved February 6, 2011. from http://www.archimuse.com/mw2010/papers/doyle/doyle.html.

Dutton, W. H., Helsper, E. J., & Gerber, M. M. (2009). *The Internet in Britain 2009*. Oxford: Oxford Internet Institute.

Forbes, T. (2010). Web apps vs iPhone apps for museum content, February 28, 2010. Retrieved February 6, 2011. from http://blog.tedforbes.com/web-apps-vs-iphone-apps-for-museum-content/.

Gaver, W., Dunne, T., & Pacenti, E. (1999). Cultural probes. *Interactions, 6*(1), 21–29.

Gaver, W., Beaver, J., & Benford, S. (2003). *Ambiguity as a resource for design. Proceedings of the SIGCHI conference on human factors in computing systems (CHI '03), Ft. Lauderdale* (p. 233). Florida, New York: ACM.

Giaccardi, E., Eden, H., & Fischer, G. (2006). The silence of the lands: Promoting the virtual museum as a place of cultural negotiation: *Proceedings of the New Heritage Forum*. Hong Kong, March 13–15, 2006.

Graham, H., Mason, R., & Newman, A. (2009). *Literature review: Historic environment, sense of place, and social capital, Commissioned for English Heritage. International Centre for Cultural and Heritage Studies (ICCHS)* Newcastle upon Tyne: Newcastle University.

Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal Environmental Psychology, 21*, 233–248.

Koskinen, I., Battarbee, K., & Mattelmäki, T. (2003). *Empathic design, user experience in product design*. Helsinki: IT Press.

Leonard, D., & Rayport, J. F. (1997). Spark innovation through empathic design. *Harvard Business Review, 75*, 102–115.

Malpas, J. (2008). Cultural heritage in the age of new media. In Y. Kalay, T. Kvan, & J. Affleck (Eds.), *New heritage: New media and cultural heritage* (pp. 13–26). London: Routledge.

Manovich, L. (2001). *The language of new media*. Cambridge: MIT Press.

Mattelmäki, T., & Battarbee, K. (2002). Empathy probes: *Proceedings of Participatory Design Conference (PDC 2002) (*pp. 266–271). Malmo, Sweden: CPSR.

Mazel, A. D., & Ayestaran, H. (2010). Visiting Northumberland rock art virtually: The Beckensall archive analysed. In T. Barnett & K. Sharpe (Eds.), *Carving a future for British rock art* (pp. p140–p150). Oxford: Oxbow Books.

Mazel, A., Galani, A., Maxwell, D., & Sharpe, K. (2012). 'I want to be provoked': Public involvement in the development of the Northumberland rock art on mobile phones project. *World Archaeology, 44*(4), 592–611.

Mazel, A., Nash, G., & Chippendale, C. (Eds.). (2007). *Art as metaphor: The prehistoric rock-art of Britain*. Oxford: Archaeopress.

Morris, R. W. B. (1979). *The prehistoric art of galloway and the Isle of man*. Poole: Blandford Press.

Parry, R. (2008). Afterword: The future in our hands? Putting potential into practice. In L. Tallon & K. Walker (Eds.), *Digital technologies and the museum experience: Handheld guides and other media* (pp. 179–193). Berkeley: AltaMira Press.

Pfeifer, T., Savage, P., & Robinson, B. (2009). Managing the Culloden battlefield invisible mobile guidance experience: *Proceedings of the 6th international workshop on Managing ubiquitous communications and services (MUCS '09), Barcelona, 2009* (p. 51). New York: ACM.

Sharpe, K., Barnett, T., & Rushton, S. (2008). The prehistoric rock art of England: Recording, managing and enjoying our carved heritage. English Heritage, Northumberland County Council and Durham County Council.

Smith-Milne, D. (2008). *Maximising the contribution of heritage to the North East regional economic strategy and North East tourism strategy tribal group*. Newcastle upon Tyne: One NorthEast.

Suchman, L. (1987). *Plans and situated actions: The problem of human-machine communication*. New York: Cambridge University Press.

Tallon, L. (2011). The museum and mobile online survey 2011. Retrieved August 1, 2013, from http://www.museums-mobile.org/survey/.

Tallon, L. (2013). Mobile strategy in 2013: An analysis of the annual museums and mobile survey 2013. Retrieved August 1, 2013, from http://www.museums-mobile.org/survey/.

Tarasoff, T., Hutcheson, M., & Rhin C (2009) GPS-triggered location-based technologies at Parks Canada: The Explora Project. In J. Trant, & D. Bearman (Eds.) Museums and the web 2009: Proceedings, Indianapolis, 2009. Toronto: Archives & Museum Informatics. Retrieved February 6, 2011, from http://www.archimuse.com/mw2009/papers/tarasoff/tarasoff.html.

Tuan, Y. (1974). *Topophilia: A study of environmental perception, attitudes, and values*. New Jersey: Prentice-Hall Inc.

Vlahakis, V., Ioannidis, M., & Karigiannis, J et al. (2002). Archeoguide: an augmented reality guide for archaeological sites. *Computer Graphics and Applications 22*(5), 52–60.

Wenig, D., & Malaka, R. (2010). Interaction with combinations of maps and images for pedestrian navigation and virtual exploration: *Proceedings of the 12th international conference on human computer interaction with mobile devices and services (MobileHCI '10), Lisbon* (p. 377). New York: ACM.

Wright, P., & McCarthy, J. (2008). Empathy and experience in HCI: *Proceedings of the twenty-sixth annual SIGCHI conference on human factors in computing systems (CHI '08)*, *Florence* (p. 637). New York: ACM.