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REFEREED PAPER

Cultures of Map Use

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Research into map use has so far largely focused on cognitive approaches and under-played the significance of wider contextual concerns associated with the cultures in which mapping operates. Meanwhile, cartography is being popularised and people are creating and employing their own maps instead of relying upon cartographers. Critical cartography has begun to offer new ways of understanding this cultural and social change, but research into map use has so far not engaged with this critical turn. It is argued that an approach informed by critical cartography is becoming more and more appropriate, stressing the need to rethink map use as a set of everyday activities practiced in real-world contexts and arguing map use is best interpreted using methodologies from the social sciences, employing a mixture of ethnographic and textual methods. Using case studies of community mapping, the mapping of golf courses, map collecting and mapping art, this paper shows how different insights into the nature of map use can flow from rethinking mapping. It is concluded that networks of practice of map use depend upon relations between many different artefacts, technologies, institutions, environments, abilities, affects, and individuals.

Keywords: mapping practices, culture, map use, community mapping, map collecting, golf mapping, art, critical cartography

INTRODUCTION: MOVING ON FROM SCIENCE

The central argument of this paper is that research into map use has so far largely focused on cognitive approaches and underplayed the significance of wider contextual concerns associated with the cultures in which mapping operates. The aim is not to test a simple hypothesis, or separate off part of the complexity of mapping: instead, a broad, contextual and social approach to map use is deliberately adopted. The argument is not that a cultural and contextual approach is any better per se than a cognitive or semiotic approach to map use. Rather that a cultural approach can allow us to answer different questions about mapping and to explore different aspects of the ways in which our society deploys the map. Questions that are increasingly important, given the democratisation of cartography, and that have been too little asked by academic researchers over the last two decades.

In the 1960s and 1970s, cartographic research focused upon communication of information. The emphasis was on how map design might be improved and the approach was underpinned by the belief that optimal maps might be produced to meet carefully specified user needs. Universal answers could be discovered through scientific investigation: users were presumed to exist outside of a social context. This kind of realist belief in progress and in scientific possibilities continued to be significant and was implicit in research sponsored by the International Cartographic Association Map Use Commission in the 1990s. Chaired by James Carter from 1991 until its re-branding as the Commission for Maps and the Internet in 1999, the Commission encouraged a particular approach to map use research.

It is instructive to examine Carter's (1999 and 2005) published attempts to construct an a priori list of the 'many dimensions of map use' underpinning the Commission's work (see Table 1 derived from Carter, 1999 and Carter, 2005). The individual user is categorised as either a consumer or as a producer who also uses, with motivations and abilities such as varying graphicacy. Map literacy requires understanding about availability and being able to know which map to use for what kinds of task. Carter then seeks to establish the use of a map, distinguishing uses from tasks and functions and isolating general reference use as against other more specialist roles. He accepts that the same map may be used in different ways and identifies levels of use (drawing on Muehrcke, Muehrcke and Kimerling, 2001) and their distinction between reading, analysis and interpretation. Function apparently differs from generic use. He identifies cognitive, communicative, decision supporting and social functions (though how these are distinguished from some of his generic classes is unclear). Carter also draws on Olson's (1976) notion of levels of use, and Lobben's (2004) emphasis upon reading tasks in the context of navigation. Carter also codifies the map use

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environment. Printed maps are distinguished from maps in projected environments such as news media or PowerPoint. The personal computer allows different kinds of interaction with maps displayed on a small screen. Networking allows real time update, easy distribution and sharing of Web-served maps. Specific operation environments such as those in navigational contexts are distinguished and the role of the virtual display considered. To Carter's list one might add whether the map is designed to be placed and read in the environment it depicts (e.g. a 'you are here' map).

Carter also argues that map use reflects genre. The classic distinction between topographic, general-purpose maps, and more specific thematic maps is extended through a consideration of how map user communities may determine mapped subjects, scales of display, designs and acceptable levels of accuracy and precision. This leads to the identification of 26 different broad categories.

This kind of enumerative approach to map use is seriously problematic. The enumeration changes over time – there are five dimensions in 1999, and six in 2005 but little explanation is given for the restructuring. The existence of the categories established in both listings is never properly justified. They dramatically oversimplify relations between people and mapping. Speculations are reified. Classes remain poorly related in any causal manner, and exist independent of time, place or context. I am reminded of Denis Wood's stinging critique of the Arthur Robinson's history of thematic mapping (Robinson, 1982; Wood, 1983). Wood rejects any such a priori classification arguing that the interests represented in a map must be understood in the cultural context in which the map is employed, rather than explained by an arbitrary classificatory grid (Wood, 1992). In this view, cultures of map use mattered even in the era when cartographic specialists compiled fixed-formatted mapping: maps then, and now, are best understood as propositions, rather than representations.

In the period since the 1980s, technological change in mapping has increasingly called into question the fixed format and status of optimal designs and encouraged a profusion of mapping, which Morrison (1997) termed a democratisation of cartography. I would argue that this democratisation further limits the scope of scientific approaches to map use, at the very same time as its tools have demonstratively altered the significance of mapping. Desktop mapping and GIS gave the general public tools to make their own maps. GIS allows users to change design specifications and content. Mapping is no longer tied to fixed specifications: users can interact and explore, rather than just employing the image as a final presentation (Rood *et al*, 2001). To deal with this radical technological challenge scientific interest shifted towards representation instead of communication. MacEachren (1995) demonstrated how science might still explain how maps worked, by fusing cognitive with more semiotic approaches.

Table 1. James Carter's 2005 Many Dimensions of Map Use*

1 Users of maps
- individual users as consumers
- producers as users

2 Uses of maps
- reading, analysis, interpretation
- tasks in using maps
- functions of map use

3 Environments in which maps are used
- printed
- projected
- interactive
- networked
- operation
- virtual

4 Nature of the map or maps being used
5 Communities of map users
6 Societal aspects of map use and abuse

*Source http://www.ilstu.edu/~jrcarter/mapuse/

In the decade since Morrison's work, the Web has encouraged a wide dissemination of this capability, and a remarkable sharing of mapping, which exacerbates the problems of approaches like Carter's. The medium becomes much more social and task-oriented, more ubiquitous, ephemeral and mobile. Users and producers are no longer separate. Pervasive technologies offer people possibilities of putting themselves on their own map, destabilising the taken-for-granted representational neutrality of the image; new kinds of maps are being made; more people are making maps; more things are being mapped; and mapping is taking place in more contexts than ever before.

Scientific approaches to the use of maps as representations have subsequently investigated the best ways to design Web-served mapping, through a careful testing of a specified design variables in controlled conditions. The other papers in this theme issue all conform to this neutral view of scientific progress, in which the complexity of real world use might be slowly unpacked through rigorous experimentation. But it can be argued that this style of research is not well-equipped to deal with our changed times. Edsall (2007) for example argues that we increasingly need to examine cultural differences in a dynamic user population, instead of simply designing systems. Understanding maps in terms of cartographic communication, semiosis, or scientific representation relies upon academic distance and underplays everyday practice. By distancing academic research from real world mapping practice, we risk missing the zeitgeist. People are making their own maps, and everyday map use is probably more common now than at any time in human history. Almost all of this map use is unresearched and beyond science.

Yet, despite the democratisation of cartography, most research emphasising cognitive approaches continues to stress 'correct' uses of mapping, drawing implicitly on many of the assumptions made by James Carter. Of course, in practice the map is employed for many different reasons: there is no single 'correct use', instead a multiple and often synchronous set of motivations are at play. Maps may reassure the lost, encourage debate, support arguments, keep the rain off, fire the imagination, help win or lose elections, sell products, win wars, catch criminals: an endless list of uses becomes possible, limited only by the imagination of its author: motivations may well be beyond science, even if most researchers investigating map use remain constrained by realist notions of scientific progress.

Science does not deal well with these complex social systems. It has problems with the unquantifiable and the unique. Experiments oversimplify. Functional explanations are overplayed, the irrational and feelings are marginalised.

Wider social contexts outside of the experiment are not deemed relevant. Processes are hard to model.

There are, however, other ways of approaching mapping, which derive their insights from social–scientific and artistic understanding, and which might be particularly appropriate in the brave new world of collaborative cartography, mash-ups and map art. Different kinds of approaches to cartography emerged in the 1980s that sidestepped science: post-structural thought increasingly rejected the possibility of universal explanations and sought more local and contingent insights that welcomed local difference instead of rejecting it. New approaches to mapping were inspired by influential ideas from Brian Harley and Denis Wood and adopted a much broader and more critical approach (Crampton and Krygier, 2006). Theory and practice became as important as mapping progress (Perkins, 2003). Approaches to mapping have been increasingly informed by approaches as diverse as Barthean semiotics (Wood, 1992); Actor-Network Theory (Perkins, 2006a); Foucauldian power-knowledge (Joyce, 2003); Derridean deconstruction (Harley, 1989); post-colonial theory (Sparke, 1998); hermeneutics (Pickles, 2004); ethno-methodology (Brown and Laurier, 2005); affect (Kwan, 2007); emergence (Dodge and Kitchin, 2007); Deleuzian non-representational theory (Crouch and Matless, 1996) and holistic performance (Del Casino and Hanna, 2006).

A unifying feature of these alternative approaches is a concern with culture, by which I mean something much broader than Edsall's (2007) use of the term. Here, we treat culture as patterns of human activity and symbolic practices, including matters as diverse as social relationships and interactions; material and ideological consumption; systems of belief, norms and values and shared experiences; language; actions; artefacts; and regulatory frameworks and institutions.

In this myriad of different ways of thinking about mapping, attention shifts onto processes, institutions, social groups, power, interactions between different elements in networks, emotions at play in mapping, the nature of mapping tasks and a concern with practice, instead of focusing on one aspect of how an individual processes combinations of visual symbols on a screen, mobile device or paper sheet. In contrast to scientific approaches to map use, these diverse concerns reflect current real world and everyday uses of mapping in society and share a general focus on wider cultural concerns. They recognise that maps are capable of conveying authority, confirming the subjective, or affirming the cultural taste or place associations of the user, but also recognise that like all iconic devices mapping is only ever able to tell a very partial story about the world, a story that depends upon the situated knowledge of the map reader and his or her culture. Maps are more than mere tools. Cognition works in historical contexts and is exercised by people *in* cultures. Even the more rigorously argued cognitive attempts to place map use into a coherently argued framework suffer from severe simplifications of the nature of the cultural process. Indeed, it has recently been acknowledged that 'many of the tasks, strategies and processes have yet to be identified, and possibly more importantly understood' (Lobben, 2004: 270). So the key question becomes what new methods might be deployed to tease out tasks, strategies and processes in map use, but also how these practical methods might relate to some of the more abstract alternatives to scientific work on mapping.

METHODS FOR REAL WORLD MAPPING RESEARCH

There have been many different ways of 'doing' critical and contextual mapping research. No single prescriptive approach or method is 'best'. Instead, the aim for cultural research into real-world and everyday mapping is much more likely to be creating *different* insights, into often ambiguous, poly-vocal, mobile and changing mapping practice (Perkins, forthcoming). Cultural research into Web-served mapping is more likely to employ multiple methods, to tell a partial story of how the representations on a site could be employed in different contexts, instead of offering any universal generalisations about design or functionality. A shared characteristic amongst the many new ways of understanding mapping is that cultural and critical approaches are performed in different ways in different contexts. So case studies offer valid and different ways of interpreting these contexts, and may offer different kinds of explanations to more formal scientific experiment.

Qualitative research may well be more appropriate for this kind of work. There is some evidence of how researchers have used these approaches in cartography, e.g. Suchan and Brewer (2000). But the rich diversity of methods of understanding visual materials brought together in recent work by Rose (2007) has, so far, been rather underplayed in mapping research. Rose documents the different modalities through which meaning might be constituted in the visual, and explores how different methods might be particularly appropriate for sites where the visual is deployed, be they the image itself, the institutions through which its work is done, the sites of its production, or the audiences deploying the mapping. Mapping is moving to new sites, no longer under the control of cartographers. It is time for mapping researchers to draw on Rose's impressive methodological catalogue, to escape the confines of the laboratory and ask broader questions.

Following the actors in different networks, and tracing the inscriptions they leave behind is one particularly appropriate recommendation that emerges from Actor-Network Theory (Law, 1999), and which is beginning to be applied in map use research (see for example Perkins, 2006a and Martin, 2000). A related set of empirical suggestions also emerges from ethno-methodological research, where concern shifts towards observing the social practices of actors in real-world settings, and explores how practices lead to making sense of the world e.g. Brown and Laurier (2005). So a focus for cultural research into map use might shift towards participation and observation of real uses, as well as interviews, focus groups and read aloud protocols. A rich diversity of textual and visual methods needs to be deployed. Observation can and should mean more than just looking. It might encompass other senses; movement through the world; gesture; actions; or play. Research becomes carefully situated in specific times, places,

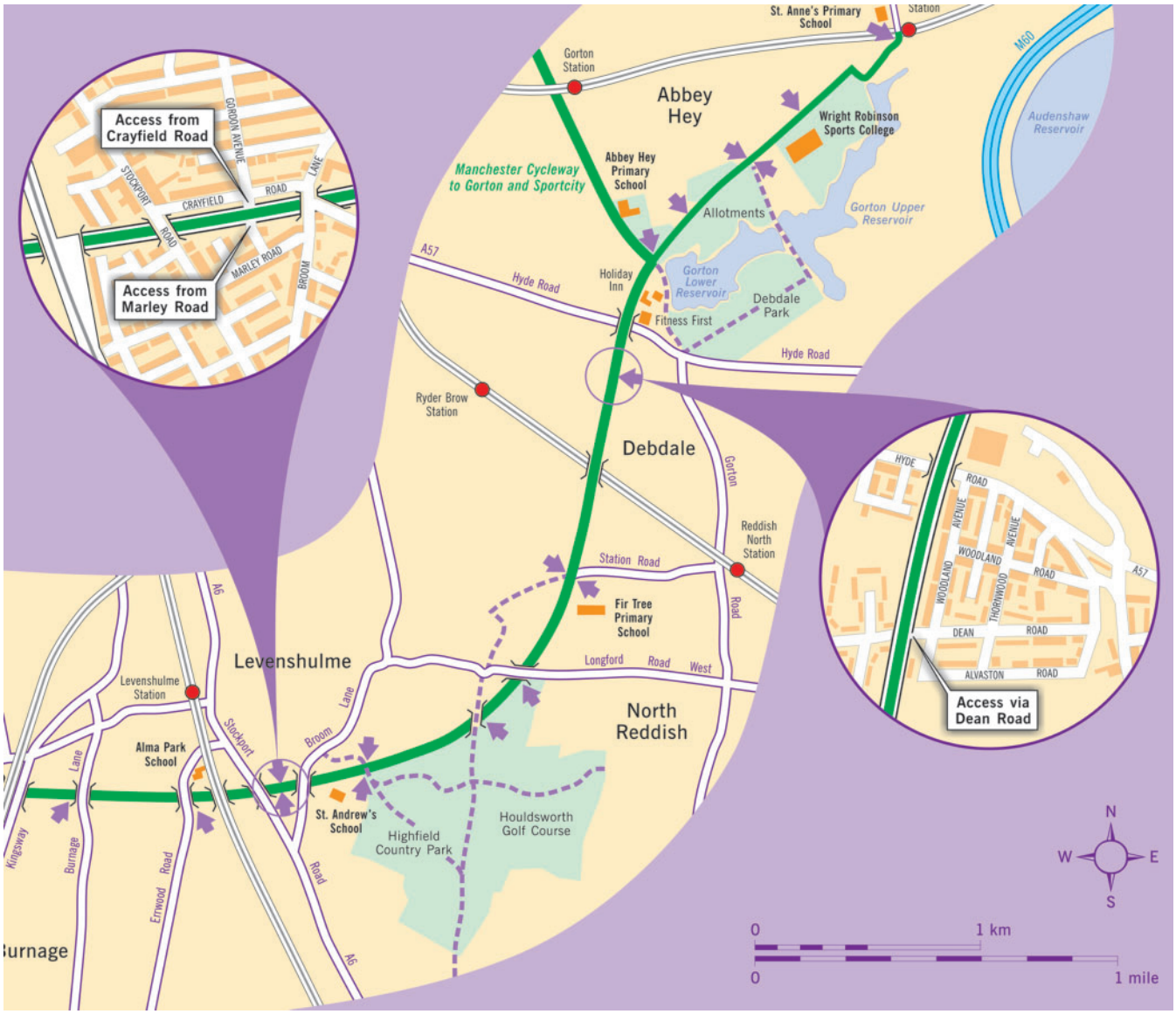

Figure 1. The Fallowfield Loop Cycle Map Manchester

institutions and spaces. Instead of deploying research methods as something somehow apart from the world, a neutral mechanism, we need a proper ethnography, that recognises how messy is our understanding of mapping, and that acknowledges the interested and implicated role of methods in constructing knowledge (Law, 2003). Ethnographic approaches need to be *in* the field, not separate from the field. They need to bring together observations with rigorous recording of different kinds of speech act, ranging from informal conversation, through to formal interviews. An ethnographic approach to map use would see a *final* map as part of an ongoing cultural process. Initial informal discussions between a client and map designer may reveal fundamental influences on subsequent uses of a product that would be hidden from cognitive researchers. In this mapping process, many artefacts play different, changing and contested roles. Ethnographic approaches can allow us to investigate the social relations that strongly affect uses of mapping. For example, the design of Sat-Nav mapping interfaces reflects a commercial opportunity for system vendors and for those controlling digital map databases. It also depends strongly upon the development of locative technologies. On the other hand Sat Nav offers potential for altering driver behaviour: governments can deploy the same technologies to police road charging schemes, or encourage safer, or slower driving. The take up of systems of course also reflects individual driver preference and the social relations of driving. The Sat Nav becomes a consumer durable as well as a functional aid to navigation. By investigating *contexts* of use these processes can be clarified.

CONTEXTUAL CASE STUDIES

Four everyday contexts show the potential of a more cultural approach to map use. They illustrate how different methods may be appropriate in different contexts, focusing on

questions about mapping that are beyond science. In each of these contexts the cultural differences are as significant as any narrowly defined cognitive or information processing activity, in influencing how people deploy mapping.

Community mapping

The last decade has seen a significant growth in the amount of community mapping – local mapping, produced collaboratively, by local people and often incorporating alternative local knowledge (Perkins, 2007). Democratised mapping offers new possibilities for articulating social, economic, political or aesthetic claims. Data are increasingly available, free at point of use, often subsidised through advertising, and flexible. Software tools allow people to make their own maps. The Web encourages collaborative participation and cost-effective dissemination and can be used as an effective medium to organise opposition, at a time when the social context has shifted with the new orthodoxy of sustainable development encouraging local involvement. Social scientific research suggests, however, that community mapping is much less frequent or emancipatory than might be expected (Perkins, 2007). In the UK at least, there are still substantial barriers hindering participation: mapping is still perceived as a technical exercise, demanding expertise, carried out by others who know best. Ordnance Survey and other official mapping can be prohibitively expensive for community groups. The virtues of mapping have been lauded as a development tool (e.g. Chambers, 2006), but its power for change has often been subverted into a safe participatory technique, rather than a radical alternative. Parker (2006) offers one way of analysing the empowering potential of the medium, in a detailed ethnographic case study of one mapping agency, in which she explores the local processes underpinning making and using a Green Map in Seattle, and highlights the explicit transparency of this kind of mapping. On the other hand, a wider, more institutional focus in the UK suggests that practice depends on contexts beyond the immediate local concerns of participants, articulating contested notions of place, mediated through politics, practices, technology, and aesthetics (Perkins, 2007). Community empowerment is complex. Projects have different goals: cycling mapping is not the same as green mapping (see Figure 1), community artistic maps, or open-source collaborative cartography. Participants in the process will not buy into all these goals either. The same project may carry different meanings for different members, who are likely to engage in different ways with the mapping. Technologies can be deployed in complex ways by local groups, given umbrella support, for example in ground-breaking collaborative open-source projects such as OpenStreetMap, (www.openstreetmap.org, see Figure 2), but successful community mapping depends strongly upon shared communities of interest often extending well beyond a local scale. Perkins (2007) concludes that tensions are always there to be negotiated in these community initiatives. Scientific approaches may create the tools that allow community initiatives to be developed, but understanding the uses that are made of these maps depends upon more than science.

Figure 2. OpenStreetMap depiction of complex multilayered junctions: The M1 Motorway at Staples Corner North London (Source: http://wiki.openstreetmap.org/index.php/Image:Road_junction.png)

The mapping of golf

Recent work on the mapping of golf shows the importance of a contextual and network-oriented approach to mapping. There are now a very wide variety of contexts in which specialist maps are employed around the game of golf and political, cultural, and economic contexts strongly mediate how people read and engage with golf mapping. There is both continuity and change. Perkins (2006a) shows how the scale, inclusion criteria, and design of generic mapping fail to meet organisational, social and individual needs. Instead a network of specialist provision has emerged, in which numerous actors, contexts, products and resources interact (Figure 3). He argues that we need to consider these products in the light of local contextual factors instead of universal user design criteria, and deploys an Actor-Network-based approach to try to explain how golf mapping is used. Perkins (2006a) shows that factors that come into play when mapping is deployed include:

- mobility (whether the map is mobile or fixed);
- the viewing environment (projected, on screen, on paper, or fixed on a tee);
- where reading takes place (in clubhouse, at home, in the hand walking the course etc);
- the timing (before, during or after a round, or other activity linked with the game);
- the social context (read in a group, by an individual, or in a presentation);
- the interactivity of the medium;
- intertexuality and relations to other discourses or media; and
- rhetoric (arguments framing questions mapping might be able to answer (Denil, 2005)).

The mapping of golf has a series of practical uses: to inform, locate, navigate, orient, measure, compare, monitor change or establish relationships. A stable series of questions

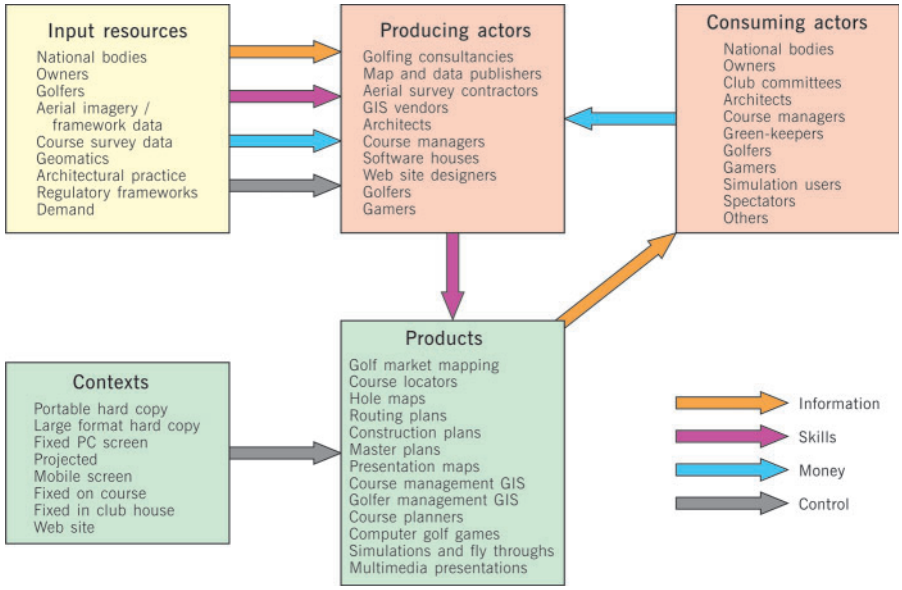

Figure 3. The actors in the golf mapping network

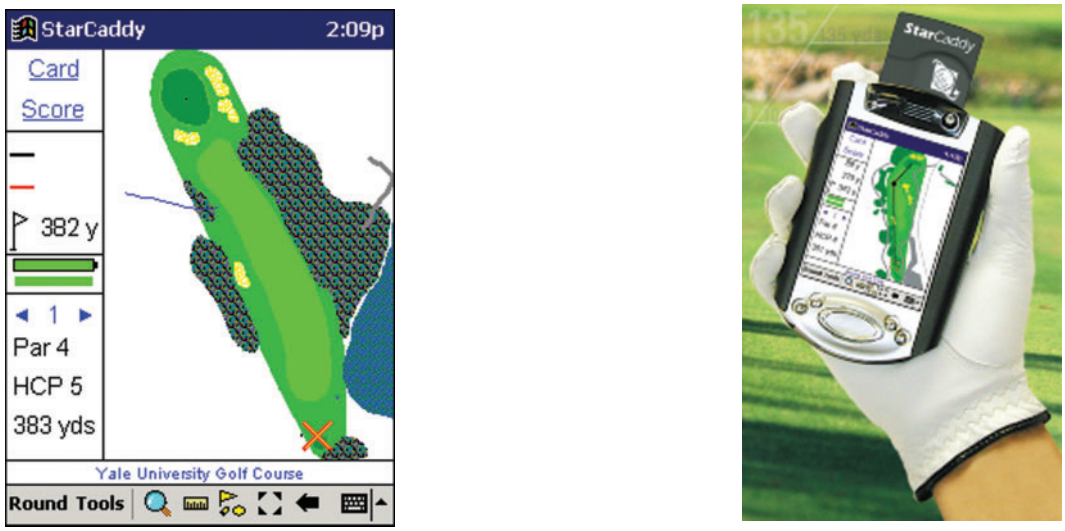

Figure 4. The StarCaddy Golf Distance Management Mapping System: (a) Map display and (b) the context for the display: handheld mobile device (Source: http://www.starcaddy.com/)

emerge in these contexts that are addressed by specialist products: to locate the course; to site the course and assess the market for golf; to plan the routing of the course layout; to map the holes; to manage the course assets; to measure distances on the course; or to market the facility etc. But these questions hide many different reasons for golf mapping: golf maps reassure; encourage debate; fire the imagination; sell a product; or help improve scores. They store information so that the unknown can be controlled. These reasons alter how mapping is deployed. The same maps may be employed for different roles, in different contexts. Architects may be players, golfers may also be owners, map makers may also be map users, course managers and golfers may use a GPS-based mapping system on a PDA for very different reasons (see Figure 4). Cognitive user studies would find it hard to unpack this complexity and would seriously simplify a richly complex context, best understood in a mix of ethnographic and textual approaches.

Map collecting

If the mapping of golf reveals a complex network of functional deployment, then explorations of map collecting display the play of cultural capital. At the very time when the artefact is supposedly becoming supplanted by a fleeting digital image, it is increasingly an object of desire for collectors. Motivations are explored by Perkins (2006b) in a detailed comparative ethnographic study of recent map collecting behaviour in the UK. He distinguishes between antiquarian and everyday practices, showing how collecting identities are constituted around different spaces, social

networks, artefacts and values and contrasts cultures of map collecting with those of other collecting fields (Elsner and Cardinal, 1994). Antiquarian map collectors are interested in different qualities to those that motivate people who collect more prosaic and mass-produced mapping. The values of antiquarian collecting are inherently conservative: authenticity, verified historical rarity, beauty, and the display of taste by a largely aging and wealthy group of collectors, who sometimes value their collections as investments, as well as collectable works of art: the aesthetic and economic merge in these collecting practices. Only the very rich are now able to amass significant numbers of antiquarian maps or atlases. Despite the impacts of globalisation and modernisation, dealers remain an important part of this map trade and social contact between collectors and others who love maps remains important. Collecting in this field requires specialist knowledge and is a well-regulated process. In contrast, the world of the everyday collector is altogether less aspirational. Here maps are cheaper and easier to acquire and the detail of amassing and completing a collection becomes more important. More maps are acquired. The pastime is much less regulated and the trade in maps is less of a business. Collectors value developing their own highly specialist knowledge, rather than relying upon expert opinion. Collecting activities and spaces are more local, and everyday collectors are disproportionately male, with a much wider spread of social backgrounds. The accumulated 'objects of desire' may be cheaper and more prosaic than for an antiquarian collector (see Figure 5), but the everyday collecting practices reveal just as much about the cultural capital involved in the quest for completion. Once again a cognitive or scientific study would be unlikely to advance this kind of understanding of map use. Cultures of collecting are best understood through the lens of social scientific and critical research.

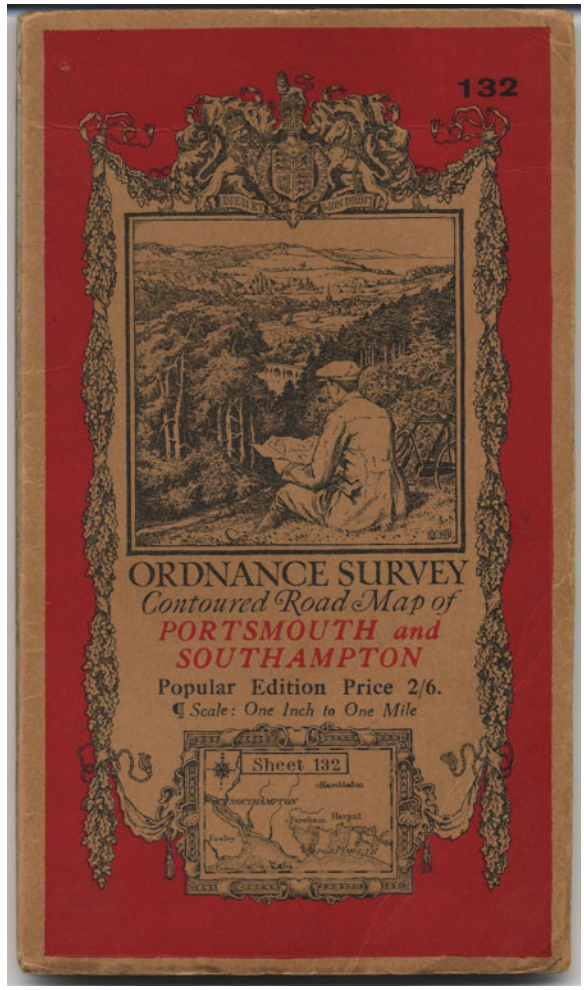

Figure 5. The map as everyday collectable: Ordnance Survey One-Inch Popular Edition Sheet 132

Maps are artistic practice

The study of map collecting behaviour shows that mapping has *affective* qualities – people derive pleasure from engaging with mapping (Kwan, 2007). Maps move people in different ways, and these emotive qualities are of increasing interest to modern artists. In the last decade of the twentieth century, they have increasingly deployed mapping in their work (Schulz, 2001). Maps are once again personal and subjective (Harmon, 2003). Surrealists, pop artists, situationists, land artists, conceptual artists, community artists, digital media artists and live artists have all employed maps, encouraging a performative encounter. The forms of the mapped image and media in which mapping is expressed vary. For example Joyce Kozloff has often worked with ceramic tiles, using the map to bring together the familiar with the alien (Figure 6). Common techniques include: fragmenting known maps and rearranging them in novel ways; juxtaposing far with near; distorting space into a relative or egocentric form; changing orientation; manipulating projection, scale and generalisation to infringe accepted mapping standards; drawing on standard cartographic tropes such as the border, or naming to question social norms; abstracting and over-coding a known form; employing recognisable country shapes in new ways; shifting novel conceptual frames onto familiar icons such as the globe or tube map; and mapping onto different media so as to ask questions about the world or our identities (Perkins, forthcoming).

Many of these artistic encounters with mapping explicitly focus on the performative potential of the medium, inspired by Situationist encounters with the modernist city in the 1950s and the 1960s, when art moved from the galleries to the streets of Paris, and artists encouraged people to take part in *dérives*, walking across urban space, to subvert the controlled modernist dream of the city. Situationist maps were published as collages, fragmented, multi-mediated alternatives to the all-knowing map on which they were based. This performative cartography has continued to inspire urban opposition ever since. Live artists also enact mapping, for example by layering and re-enacting one set of alien events against a familiar mapped place. Others devise mapping puzzles to encourage urban exploration, casting the user as a player in an evolving work. Locative art is emerging as particularly performative. Digital and satellite mapping technologies supporting networked, portable, location-aware computing devices allow user-led mapping, social networking and artistic interventions, to be enacted on the canvas of the real world (Wood and Krygier, 2006).

Figure 6. Mapping art: Joyce Kozloff 'Around the world on the 44th parallel: Sarajevo' (Source: http://www.lib.mankato.msus.edu/News/Kozloff.html)

People can track themselves, across a landscape. In skywriting, for example, the old certainties of land art are subverted: participants walk the shape of letters, or the outlines of animals, and, instead of the landscape itself being shaped as art, unseen messages are overlain onto mapping. Others deploy technologies to chart changing feelings in space: Christian Nold (<http://biomapping.net/>, see Figure 7) for example, has devised bio-mapping technologies, merging GPS and bio-sensors, to produce collaborative emotion mapping, and released this information in very diverse contexts, as exhibitions, in enabling workshops for activists, as hard copy publications, and as Web-served Google Earth mashups. Art shows how maps too evoke powerful feeling beyond science, but also that science itself might be deployed in artistic and emotive ways.

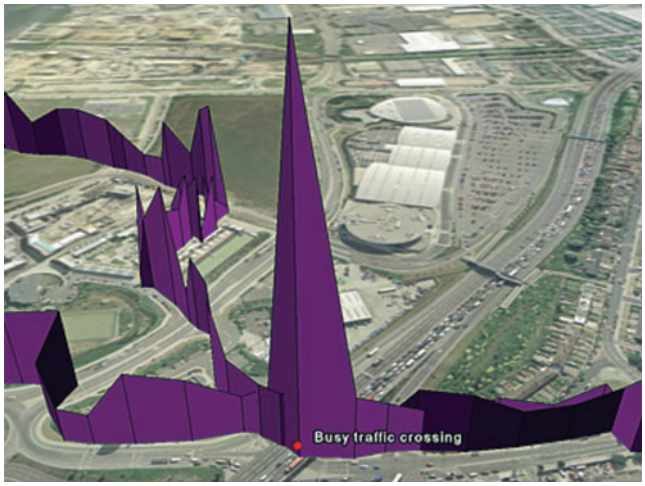

Figure 7. New visualisation from Greenwich Emotion Map overlain on Google Earth (Source: http://biomapping.net/new.htm)

CONCLUSIONS

Networks of practice of map use depend upon relations between many different artefacts, technologies, institutions, environments, abilities, affects, and individuals. in this paper we have argued that we need different ways of approaching mapping and its use, that reflect this complexity and which are beyond the narrow hypothesis-testing of most contemporary mapping user studies. Paradoxically, it is the democratisation of cartography, taking place as a result of scientific progress and technological change, which is fuelling these calls for plural ways of understanding map use. When local contexts of map use are explored the potential of alternative approaches beyond science becomes clear.

Case studies of community mapping reveal that its successes or failures depend upon much more than cognition of user interfaces. The local community context and institutional framework have significant impacts on how mapping is created, and deployed: local mapping and use has to be understood in the light of these wider influences. Other case studies show how the same maps may be employed in very different ways in different contexts: on and off the golf course representations of the golfing landscape mean different things according to the cultural context in which they are deployed: these may well be unpredictable. The player, course owner, manager, and architect have very different mapping demands, but owners may also be players and studying mapping as representation underplays the social complexity in which meaning is constructed.

A broader appreciation of cultural context also allows research to focus on wider uses of mapping. Map collecting might be regarded as being outside the remit of narrowly defined enumerations of map use informed by cognitive and scientific studies. Collecting is, however, arguably more popular than ever and mapping is deployed in collecting practices because it is *mapping*: pleasure in the artefact is no less important than more functional uses. The artistic impulse might also be excluded from narrowly defined scientific user studies. Once again, however, the mapping

process is being deployed, the map is being used for a human purpose and modern art appears fascinated by the map. Critical, aesthetic and social uses of mapping in artistic endeavour reveal the subjective and personal emotive qualities and powers of using the map that are beyond science.

A scientific approach to mapping is certainly important, but it is only one of many ways of increasing our understanding of how and why maps are used. In addition to focusing on individual relations to a map, we should encourage investigation of the wider cultures of map use as a central concern for mainstream cartographic research and deploy the tools of social science and the humanities to help us in this endeavour.

BIOGRAPHICAL NOTES

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