

# Of maps and guidebooks:

## DESIGNING GEOGRAPHICAL TECHNOLOGIES

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### ABSTRACT

Researchers and designers are increasingly making use of geographic location in designing context-aware computer systems. However, there has been little conceptual work on how geography interacts with technology. In this paper, we use the concepts of “place and space” to explore how technologies are used geographically and how they impact on, and are used in, the physical environment. Fieldwork with tourists using maps and guide books shows how technology brings space and place together in activity. This discussion is used to look at how technologies might better span place and space.

### Keywords

Context-aware computing, geography, place and space, ethnography, user studies.

### INTRODUCTION

The physical environment plays a large role in the design and use of technology. So called “context-aware” systems use ultrasound, GPS or cell-tracking, to work out their position and infer something of their context [21]. These systems offer the possibility of technology which responds better to the environments it is in [12], and also technologies which interact with the physical world in new ways [14]. Through these developments technology is increasingly taking on a geographical aspect, as it both disappears into the environment, and in turn make increasing use of that environment.

Along with this work there is increasing interest in a more conceptual consideration of how we interact with the physical environment, and how we might think about the relationship of the environment to technology [23]. As HCI conceptualised the user, and CSCW collaborative activity, with these new technologies there is a need to consider the physical environment and the role that geography could play in technology use and design. In this paper we discuss these issues using the concepts of “space” and “place” from human geography.

Our aim here is to inform design through developing a conceptual understanding of the geography of technology; something lacking in many discussions of context-awareness. If we are to design new technologies for the city, how is the city experienced and what form

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does it take? In particular how can we design technologies that take better account of the physical location of users, and their movements? The two terms we will use to explore this, “place” and “space”, are not easily identifiable aspects of the physical world. Rather, they have been a battleground over which much conceptual argument has raged. Discussing these terms, and contrasting the ways in which they have been used is an entry point into thinking about how technology is used in particular places, yet reaches across to other places through *networks*. Technologies provide remote links both through digital communication networks (e.g. the internet) and through standardisation, in that computer systems are mass produced with the same programs running in many different locations. In this way technology is ‘doubly networked’. To explore this issue geographically, we use the examples of the map and the guidebook to show how this operates in practice. Although these are not computerised technologies, both the map and the guidebook are key geographical technologies. As with other technologies they are mass-produced, yet used in specific places. Using fieldwork from how tourists use maps and guide books we explore how technologies span place and space. Much of their power comes from their standardised, global nature, yet they are only ever used in specific sites. From these examples we discuss how to develop technologies which address geography more specifically.

### PLACE AND SPACE

The concepts of space and place have been used widely in interactive system design, although mainly with regard to media spaces and virtual reality, rather than context-aware systems. One of the first papers to talk about the importance of place and space with regard to technology was Harrison and Dourish’s influential paper [17].

Harrison and Dourish argued that place and space can be categorised as different aspects of the physical and social world. *Space*, as they put it, is the physical world. The objects, artefacts, air, and so on that make up the world are space – the three dimensional extended world of reality as it is presented to us:

Space is the structure of the world; it is the three-dimensional environment, in which objects and events occur, and in which they have relative position and direction (ibid. p 68)

This definition might seem to be fairly straightforward; indeed, it fits with the dictionary definition of space as “the infinite extension of the three-dimensional field in which all matter exists”. Moving beyond the dictionary definitions, however, Harrison and Dourish differentiate space from place. *Place* is space which has meaning.

Place is therefore a particular geographic location which has meaningful attachments to the people who pass through it. In a particularly effective example, Harrison and Dourish talk about the smoker's corner outside Xerox PARC. While this is a straightforward, if somewhat squalid, physical space, to the smokers who congregate there (and perhaps even gossip about what goes on inside the building) this space is a *place* – a space with value and meanings. In this case, it operates as a 'time out' from the activities inside the building, and a chance to satisfy their anti-Californian addiction. So, places exist on top of spaces – like a tablecloth over a table:

Physically, a place is a space which is *invested with understandings* of behavioural appropriateness, cultural expectations, and so forth. We are *located* in "space", but we *act* in 'place' (ibid. p 69).

The relevance of this distinction to the design of technology is brought out when Harrison and Dourish discuss places *without* spaces. Using the example of LambdaMOO, an online chat environment, they explore the possibility of a place without a space. The LambdaMOO has meanings for its users – sometimes quite rich and deep ones. Yet it did not exist physically in space – it took "place" only in the outputs of a computer. This example lets the authors explore the meanings that can be attached by humans (in a place-like way) to things that may not have physical extension. This "placing", they suggest, may be something fundamental to how humans make sense of and make them at home with the use of technology. This discussion of place – as the human aspects of the physical world – has some similarities with Tuan's humanistic discussion of place [31], in so much as it addresses the question of what place means for people.

However, whilst this distinction has much to recommend itself, it has a number of limitations with regard to its theoretical basis, and more importantly for us, in its application in design. Harrison and Dourish's discussion ignores much of the intellectual history of these terms, in particular the philosophical and geographical debates they have been involved in. For example, Plato, Descartes, Leibniz and Kant all discussed the nature of space and place at length. In a design-orientated field as our own this is perhaps easily forgivable; the framework at least has practical application. However, a more serious complaint is that it simplifies the important issues of how technology comes to be used in the course of practical, everyday action. As we argue later in this paper, artefacts that we might classify as concerned with place may actually be better thought of as having to do with space, and *vice versa*.

In Harrison and Dourish's terms, meanings are things which are attached to "spaces", turning them into "places". However, dividing the world up between the objective physical world ("space") and the meanings and viewpoints which we attach to the world ("place") is to us problematic. For example, tables and chairs in a meeting room are certainly 'physical' but they only exist and make sense in a culture which has meetings. At what point can we say we are talking about the physical object free of our culture? We would suggest that searching for where meaning stops and the physical world starts is

futile. In addition, this framework does not take into account *activity* – it seems to describe the meanings which we have about the world as permanent attachments to physical objects, rather than as features of ongoing action. There can be no meanings in a place without some activity. If we want to discover what meanings people have of particular places we have to look at what they do, it is here that the meanings lie (as Dourish himself argues [13]).

There are also problems with how this framework helps us understand technology. Technologies are linked to each other via communication protocols through electronic networks, but they are also networked by standardised software. A software package can be distributed around the world – every place in which software is used, it works in standardised ways. While the uses to which software is put will be different in different places, the software remains predominantly the same. Software is therefore a device of standardisation like any other, such as standards of measurement or weight<sup>1</sup>. In this way technology is a double network – one of communication *and* one of standardisation. Indeed, these often combine, as software is itself distributed over electronic networks. This networking is a crucial aspect of technology and its use.

Harrison and Dourish attempt to address the network nature of computers when they discuss how online environments (such as LambdaMOO) can be thought of as places. This emphasises the meanings that are enlisted in digital environments, using a metaphor with conventional places. But does this metaphorical description of online activity as like a physical place help us? True, users are connected through LambdaMoo, and LambdaMoo can have meanings to people, but calling it a place perhaps just confuses this matter. The users are still in *physical* places even if they communicate over the network. If we look at studies of the use of chat environments, we find that it is the interaction between the physical and online communication which is crucially of importance [9, 10]. This combination is what makes these environments useful.

Looking at something more familiar, we would not call a letter correspondence a "place". We do not 'disappear' into the postal system, nor a computer network. Dwelling is done *here*, with things in our world - not somewhere else. Describing an online environment as a "virtual place", to us confuses matters because it ignores the primacy of the physical world which we dwell in. LambdaMoo is simply an online computer system which uses spatial descriptions to structure the communication which takes place through the system. Users no more 'inhabit' LambdaMoo, than they do the printed pages of books. This is not to say that online environments are not new, interesting, or useful, but we should not fetishise their use of spatial metaphors.

In an extreme case we can see this if we look at studies of mobile workers e.g. [24]. Mobile workers often communicate with each

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<sup>1</sup> Although it must be said that conventional standards are a much neglected topic of research (with [25] being one exception)

other over their mobile phones – in a sense a form of “chat space”. But the space in which they communicate is not a *place*. It is not the “virtual environment” of conversation that is important here, but how those conversations come to be threaded with physical action. Indeed, highly mobile workers emphasise how they need to manage their phone conversations and maximise as much as possible their face to face contacts [5]. In considering mobile workers, perhaps a different way of describing place and space would be more useful, one which attempts to understand how they thread their connections across distances with their own embedded work practices.

#### Historical interlude

As the above discussion might give away, our interest here is in practices and actions and particularly what we can learn about the geographical aspects of activity. A more open view of place and space might give us a better framework for thinking about action mediated by technology. This moves us in the direction of looking at how the abstract features of space are managed and intertwined with the more place-like aspects in ongoing embodied action in the world.

As Casey points out [6] many different philosophers have seen space and place in very different ways, some which subvert our intuitive understandings. Comparing three gives a flavour of these differences. Aristotle’s view of place is perhaps the easiest to counter against the idea of place as a quintessentially human characteristic of spaces. To Aristotle, the important issue was that objects needed to have places. Objects exist, and have place – so what is the place that they have? Aristotle explained this with his concept of place as an envelope, as a surface around objects. Places are “the inner surface of the innermost unmoved container of a body” (*Physics*, 56). While places contain and surround bodies by furnishing them with an environment, it is not always a stable environment. A boat might move on a river, yet its place is still a defining presence. The place, then, is not the outside of matter but more a changing limit between bodies and the world. And this is a world that is completely full of places; there are no voids - as he puts it: “just as every body is in a place, so in every place there is a body” (*Physics*, 25-26). Aristotle focuses on place almost to the exclusion of space. To Aristotle, place has its unique and non-reducible features which cannot be replaced by measurable space: “what matters most is not the measurement of objects in empty space but the presence of sensible things in their appropriate and fitting places” [6, p71].

If we jump ahead to Locke, a mere two thousand years later, we can see a very different concept of place and space. At this point Newton and Descartes had advanced the primacy of space, in the sense of an infinite geometric expanse into which objects are extended. Locke, however, takes this consideration back in the direction of place. To Locke, place comes from the relationships (in terms of direction and distance) that objects have with each other. He gives the example of a chessboard on a boat at sea to explain this: “the places of the chessmen vis-à-vis each other, as well as the place of the chessboard on the ship, remain the same, so long as the relationship of those parts of the ship that serve as points of reference is not affected by the ships

motion.” (*Essays concerning human understanding*, p169) Place, then, is the configuration (in terms of physical positioning) of objects in space. Moreover, this relationship is not predefined by ‘nature’; it is created by humans for their own practical purposes. This is Locke’s conventionalism – that is, a view of place as based on general agreement. Place is “made by Men, for their common use, that by it they may be able to design the particular Position of Things” (*ibid*, p170). People make places through understanding the configuration of objects.

Lastly, if with ridiculous brevity, we can consider Mearleu-Ponty. For amongst many other points, Mearleu-Ponty comes to emphasise the role the body has in our conception of place. Mearleu-Ponty argues that it is through our lived body we have access to the world. For rather than the origin of space sitting at some point (0,0,0) in the absolute world, it is in our bodies that the only origin can be found. Or more specifically, the origin is no longer a mathematical origin but a constitutive one, for in the experience of movement – kinaesthesia – we experience and explore space:

We must therefore avoid saying that our body is in space, or in time. It inhabits space and time ... I am not in space and time; nor do I conceive space and time; I belong to them, my body combines with them and includes them. (*The origin of the spatiality of nature*, p139-140)

Mearleu-Ponty emphasises the coupled nature of being and space. It is only through living in, and physically exploring space that we can know anything about it. Since that exploring is our existence, space and being are mutually constitutive.

#### PLACE AND SPACE AS TENSION

The purpose of this short review is not merely to confuse the reader, but to show that it is perhaps premature to reduce place and space to Harrison and Dourish’s definitions. By considering some of the alternative discussions of place and space we can arrive at analyses which will highlight more subtle features of geography which are of importance when studying technology.

We are not arguing that one must decide upon a particular philosophical basis for place and space. One alternative would be to talk about place and space as general concepts that highlight features of geography and action. Indeed, this is the direction in which current cultural geography has mainly taken, where place and space are commonly used terms (for example, [30] or [16]). In this work, place and space are seen more as aspects of human activity than geographical things. Specifically, to call something a “place”, brings attention to its located, embodied, personal, human nature. And to call something “space” is to bring attention to its abstract, objective, global, general, inhuman qualities. A tension is therefore then set up between “place” and “space”, the difference between these terms bringing out the conflict between (respectively) the local and the contingent and the abstract and distributed. This tension is constituted in Harrison and Dourish’s distinction, but theirs only examines a small subset of the wider issues raised here. We argue that these wider issues are also of great importance in understanding the distinction

between space and place, and that this broader understanding is of value to systems design.

It is not simply that place and space are being used as synonyms for embodied and abstract: place and space are strictly geographical – ‘space’ refers to the abstract processes that organise and arrange the material world. Place refers to the fact that we never escape the everyday physical world we live in: we still walk down the same streets every day, even if the organisation of cities into streets can be described more abstractly as a historical process which has developed over many years. Space refers to the fact that our places are connected together in so many different ways, caught in *spatial* arrangements, such as the laws of property ownership, or computerised networks. The key difference with Harrison and Dourish’s usage is that space is no longer ‘the physical world’ - it is the many abstractions which influence and configure our world. For example, nearly every place we go in the world is owned by an individual or institution, this is a geometric grid of property relations and property markets which have been imposed on the earth [20].

So, we can describe things as having ‘place-like’ or ‘space-like’ characteristics, with a broad wave to the range of discussions about place and space, emphasising their local or abstract characteristics. Talking about place and space like this allows us to think more flexibility through the aspects of our technologies and their uses. To what extent are technologies “spatial”, and to what extent are they “placial”<sup>2</sup>. How can we design technologies to support the local features of our work and lives, and to what extent do they support global, abstract features?

This usage of the terms place and space can be seen in the work of a geographer like Castells. Castells uses the term space to bring out some important abstract processes that are involved in the geographic organisation of the world, and importantly how technology changes that organisation. When Castells describes the “space of flows” [7] as the “new industrial space [...] organised around flows of information that bring together and separate at the same time”, he is not talking about literal geometric space. He is exploring the abstract processes that contribute to the geographical organisation of the physical world. In this case, Castells argues that the world is increasingly organised in the form of flows. These are geographical organisations of work and leisure such that there are flows of material, people, money and information around distributed geographic networks. Or as Castells puts it, flows are “purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors in the economic, political and symbolic structures of society”. The arrangement of these circuits comes to dominate the organisation of activity in individual places. That is, the site of a place on a network and its relationship with other nodes comes to dominate over the importance of the characteristics of that place itself. The network comes to be more important than the individual place - *space* dominates over *place*.

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<sup>2</sup> If we can be forgiven for abusing the root of this word.

One example that Castells uses to explain this is the network of narcotics production, distribution and consumption by drug cartels. The raw plants of narcotics are grown in countries like Peru, sent to refineries and management centres in Columbia, precursor chemicals come from production centres in Switzerland and Germany, using money which has passed through financial centres in Miami, Panama and the Cayman Islands, distributed through centres such as Tijuana, and finally bought and sold throughout the western world. For a “space of flows” like the illegal drugs industry it is the ways in which individual places fit into this space – how they fit together for the job of distributing drugs - that is more important than the characteristics of the places themselves. The *network* dominates over the individual nodes, space dominates over place.

A description like this can be used to analyse other processes that are distributed across the world. While there is much to disagree with in Castells’ analysis (for example, Fuller, 1999) and Castells certainly plays far too little attention to place for our liking, this work has certainly been influential. Castells’ use of the word “space” here highlights the abstract features of work, and the ways in which the flows of money and produce across the world effect individual places. That is, how activities come to be important not just for what they are in a particular place, but how they interface with actions across the globe – how they fit into the space of flows. To describe this in the language of computer-supported co-operative work or human-computer interaction, we would ask: how is ‘co-ordination in the large’ supported? That is, how do the networks and interdependencies between people, technologies and places interact with the situated aspects of action within those places? The space of flows, then, is not an identifiable place, but rather a concept of how work and action increasingly contribute to abstract and standardised flows across the world, from country to country.

#### THE MAP AND THE GUIDE BOOK

Castells’ work points in the direction of thinking about the space of technology – how it connects and links together disparate places. His use of the word “space” in particular allows us to think about the abstractions that technology makes use of. Yet we must not lose sight of the fact that technology is used *in* specific places. Indeed, technology often involves the job of applying abstractions to specific situations – bringing together space and place.

To look at how this is done we have been studying the use of two non-electronic geographic technologies. Our fieldwork has studied tourists visiting the cities of Glasgow and Edinburgh, looking at how they make use of maps<sup>3</sup> and guide books. This ethnography has involved shadowing tourists on their days out in the city, video tapping tourists in public places, participant observation in the Glasgow tourist information centre and interviews with tourists about how they plan their visit.

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<sup>3</sup> Wayfinding with maps has been a popular topic in psychology (for example, [15]) with regard to spatial reasoning, although naturalistic map use has been somewhat neglected.

## Maps

An important artefact for tourists is the map – indeed, it might be thought of as the quintessential “spatial” technology. It supports the objective view from above – an abstract view of an area (or even the whole world), which allows us to gaze upon the world as if ‘from above’. This surely is very spatial in the sense that it is both abstract and geographical. Maps offer us a standardised description of physical geography – we can look at maps from almost anywhere in the world and make comparisons.

Yet maps also have very strong placial characteristics. Perhaps most importantly, they are made by people, for other people – they display (although they often hide) the view of a particular person. So, as Wood points out [33], maps often contain old abandoned mines. This might seem an unusual thing to have on a map; yet the early maps were funded by mining companies. Another example is the map of Bristol, which covers Hewlett-Packard’s research lab there. Whereas the university next-door is titled “The University of the West of England”, the research lab is simply described as a “factory”. Ironically, the university recently changed name, whereas the company name has remained the same for over 70 years. This reveals some of the preconceptions of the mapmakers in what they regard as suitable for a map; perhaps displaying some of their suspicions of *mere commerce*.

These sorts of representations do have a major impact on what people do in places. For example, in one interview with the manager of a newly opened Glasgow youth hostel, the manager talked about the hostel being literally “off the map” for visitors to Glasgow, because they were not on any of the tourist maps, or in any of the guide books. To counter this, they had advertised heavily in the tourist information centre and on the Internet to try to make themselves be noticed by visitors to Glasgow. One of their major concerns was to get themselves into the new editions of the tourist maps and guide books. Here, what was on the map impacted what people thought was in Glasgow, and where they stayed – the space of the map impacted on the place that is Glasgow.

But perhaps the most ‘placial’ aspect about maps is that they are read in specific places. As Smith describes it:

I think of Ann, my son’s partner, and I driving to dinner with friends. It was dark. We had never been to their house before, and it is in an area of Vancouver with which we aren’t familiar. I am driving; Ann is navigating. She goes back and forth between the map and the not-always-well-lit streets and street names. [...] Finding our way involves going back and forth between the text of the map and the actual streets and “connecting” its conventionalized signs with the street signs, the actual configuration of streets, and so on, that we’re travelling [26, p192]

Reading a map in a specific place is a complex balancing and linking, between the abstract and the embodied, between the relations of streets and places with the abstract spatial relations of the map. This is one aspect of map reading, *mapping* between the map and the physical world. Maps are drawn and read, then, in places, although

they encapsulate much of the power of the spatial in their figuration and production.

Looking at our data from tourists using maps, one straightforward finding was that maps could be a source of considerable confusion to city visitors. Indeed, when staff in the tourist information office gave directions they would combine two different ways of giving directions. One set of directions were given in terms of a line on a map – a portable and abstract version which could be used by a tourist from any point on that map to find their destination. However, maps are hard to use, particularly if you do not ‘know’ a city. So staff would combine the map with actually ‘showing’ in physical space where the destination was and how to get there: “it’s behind us on Argyle street” (figure one).



Figure one

During the fieldwork when giving directions at the tourist information centre (TIC) I found that when using the map I would often get a blank face, but when describing where things were physically in relation to where the tourist was, I would get recognition. It is tempting to describe this in terms of visitors building a ‘mental map’ of the city; and there may be a grain of truth here. But a more accurate description is in the terms of giving a set of instructions for someone to follow using environmental and navigational queues. Walk *here*, walk *there*. Less portable than a map, but easier to follow.

In addition, there is a lot more involved in learning about a city than just understanding its physical configuration and indeed often this is not possible to separate from other sorts of city information. Questions would be asked in the TIC about “what sort of area is good for going out”, or “what sort of area has craft shops”. Maps are not very good at explaining the ‘feel’, or experience of an area, and this was where the local knowledge of the tourist information staff could help visitors to see what the places on the map were *actually like*.

## Guidebooks

A second example of the differences between “place” and “space” can be seen in a second technology of navigation – the guidebook. With the guidebook we have something that might be seen as more essentially placial. It does, after all, tell us in detail about specific

places (in Harrison and Dourish's usage) with its meanings attached to places, and the activities that take place within them. However, if we look at the use of guidebooks we again find users mapping between space and place. Guide books abstract away from the characteristics of specific places and generalise across thousands of places. In a popular guide book such as "the rough guide to Cuba" (for example) we might learn that in Cuba:

[Telephone] numbers generally contain either four, five or six digits, but in areas of particularly small populations there are two- and even single-digit numbers. Frustratingly there is often a whole series of different numbers for the same place and nothing to determine which one is most likely to get you connected. Thus you may see a number written as '48-77-11 al 18', which means when dialling the final two digits you may have to try all the number between and including 11 and 18 before you get through. To top it all, numbers change at an astonishingly quick rate, especially now that the transition is finally being made to a new, digital system [22, p40]

In this way the Cuban telephone system is at once compared to the systems we all know at first hand – standardised, fixed numbers that do not change. The space of telephone numbers is standardised – except in Cuba with its charming yet frustrating peculiarities. In this way we have both a comparison and standardisation. If we sit with the complete set of "rough guides" in front of us we have an even more compelling standardisation of the world than a world map. For the human systems in these countries – or what is of interest to a tourist – are described in a standardised way. How to get there, how to get around, good restaurants, etc. The space of the guide book, and by extension, that of the tourist, is of the consumption of places [32]. As we go around the world with a guidebook, we view each different place in comparison to the other sites we have already seen. The guidebook in this way has a spatial quality – it opens up the particular for comparison with the general, by utilising both standardisation and abstraction. More specifically, as with the map, the guide book is useful not merely as a form of travel journalism but as a guide in a specific place, as a way of helping action in that place. The guidebook is something that is used for planning and visiting particular places. In use, the guidebook brings together space and place – the standardised and the specific. The guidebook offers a standardised template for describing places, something that assists both its production and use. We know that there will be a section on accommodation, a section on restaurants and so on.

Again we can look at some of the uses to which guidebooks were put by tourists. One guide<sup>4</sup> to Glasgow that was used by visitors was "the essential guide", a guide produced by the tourist information centre, and given free to visitors. Usually this guide would be handed out to tourists along with an accommodation guide. However, this guide was often just the start of an interaction with tourist information staff. In practice, users of the guide faced a problem: how to put the guidebook to use. For example, when seeking accommodation, visitors would not know what places were like, where they were, and what price to expect to pay for what sort of quality. Because of this,

<sup>4</sup> There is no "rough guide to Glasgow", so in that sense Glasgow is 'off the map'.

conversations over accommodation would often take place with the guides laid across the serving desk with staff helping visitors through the guides to show where different sorts of accommodation in the city were (figure two).

Staff at the TIC knew most of the accommodation in the city fairly well, and could make decisions which visitors might not be able to make themselves. For example, a hostel called "the Euro hostel" might not seem to be a very suitable form of accommodation for an elderly woman. However, in Glasgow this hostel did have a few single rooms and attracted a wider range of ages than one might expect. So for an elderly woman on a particularly tight budget the staff could suggest the Euro hostel as a place to stay. Another factor that impacted on accommodation was the cost of taxis in Glasgow. To be able to say that a particular distance was a "four pound taxi ride" you would need to know not only about the route taken, but about taxi prices and traffic flows at different times of day. Prices of taxis (and their availability) impacted what was practical accommodation, and for whom.



Figure two

In using both these technologies – maps and guides – visitors had to bring together the space-like and place-like characteristics of technology. While maps and guides of Glasgow offered standardised and abstract views of the city, it was only in combination with local details that they could make these work to help them plan and enjoy their visit. Thinking about the spatial and placial characteristics of these technologies, and how they came to be used by visitors to the city helps us explore something of how these technologies were used.

Although these two examples are not specifically of computerised technologies, they illustrate what we think is one of the key features of technology: both the map and the guidebook are ways of bringing together *space* and *place*. That is, they support the bringing together of formalised, generic, impersonal information with activity in a specific place.

#### THINKING GEOGRAPHICALLY ABOUT TECHNOLOGY

In talking about place and space in this way we are hoping to explore how technologies can be used to bridge the abstract and the specific –

the space-like and the place-like. Specifically, this bridging has a geographical characteristic in how it allows action to be transmitted across distance. So a map may be designed in an office in Paris, yet come to be used in Cuba. This *distance* is an important part of understanding the geographies of technology. That is, the ways in which technology supports actions that are distributed across large distances – what Latour calls “action at a distance”:

Once files start being gathered everywhere to insure some two-way circulation of immutable mobiles, they can be continued until a few men consider millions as if they were in the palms of their hands. [19, p28]

Discussions of the geographical distribution of technology can be traced back at least as far as Marx’s with his notion of “frozen labour” – how labour came to be embodied in objects which can be transported around the world. Technology plays an important role here in supporting this displacement of activity across space. Moreover, a range of recent studies have focused on the *places* in which formalisations are used and brings out the actual negotiation involved in the “defrosting” of labour (e.g. [3]). Cash tills made in Korea may be distributed around the world and enable standardised transactions of buying and selling; but there is also complex work involved to make this possible. So, a computerised system might attempt to formalise work, and may succeed to an extent, but there will still need to be local work done to make the formalisation work at the site of its use [4]. Standardisations (such as computer software) can travel across the world, but defrosting them in different places is often a major task. Here we come to the hub of our argument – making technology useful at the point of action. This is more than an issue of usability, it is an inherently *geographical* issue, to do with local, embedded action in a real world setting, and the performance of the actor doing work to make an abstraction useful in that context.

This is a start to thinking about the geography of technology in a grounded way – an attempt to look at how technologies support the transposition of work across large distances to influence other work in many other sites. That is, how *spaces* of work comes to dominate over places. Indeed, as has recently been emphasised by Schmidt, 1997, we must resist the temptation (which has been present in some work) to over emphasise place over space – the local over the generic. Nevertheless, spatial organisation does have very important characteristics, and does influence and *control* activity at a distance in many different subtle ways. It is possible that these transportations will not be amenable to the standard single-site ethnography. We are presented then with the problems of multiple site ethnographies (as described by [11]), and of describing the processes of transposition of labour and work. However, a focus on the local, and in particular through the use of empirical data, will be an essential part of understanding what actually goes on in these sites. Yet this is still an attempt to move beyond the limits of studying an individual situation, to speculating about the determination of action over wider areas and time. In particular, thinking about standardisation offers us insights into how we might talk about the tensions between local customisation and global standards. Of course, there is conflict here with the traditional focus of technological ethnography, but an

increased sensitivity to networks in ethnography (e.g. [27-29]) is one starting point to exploring the linking of the local with the global.

#### DESIGNING FOR PLACE AND SPACE

From this conceptual discussion, we can draw a number of implications for the design of geographical technologies. There are already a number of systems which currently support the display of maps on handheld computers, such as Microsoft’s “Pocket Streets” (<http://www.microsoft.com/pocketstreets/>). While these systems have focused on the presentation of maps, the above discussion suggests that a key aspect missing from these systems is how they can support users’ behaviour. This includes both orienteering from co-ordinates in space to a particular place, or visualising how to move from a physical place to a location on an abstract spatial representation. The key to this lies in helping users to understand abstract details about the current situation and ‘defrosting’ those details to make them useful. This suggests that, rather than just offering flat maps, these systems should support a sense of embodied location. A simple example of this would be to show the users a 3d view of their location, or possibly a more complex, technological solution using ‘augmented reality’ visualisations of the space, overlaying information onto objects. A middle way here has also been used (Hewlett Packard’s CoolTown initiative, [18]), where all objects in the world have a URL and are able to identify themselves, to provide information about their function and interdependencies with other objects.

Moving beyond straightforward wayfinding, these map-based systems should also more explicitly support the linking of the ‘placial’ features of sites with spatial information. Through providing local information, such as pictures and sounds, designers could look at communicating the specific aspects of places that make them interesting and distinct, rather than simply presenting them as a set of co-ordinates and streets through a standardised spatial view. This is not to say that standardised views are not of use; although it is important to understand how different views are useful at different times. This is clearly evident from the wide range of maps available (e.g. road atlases, walking maps, tourist trail maps), but this is not so evident in technology – software spatial representations are usually direct copies of one form of physical spatial representation. Yet there is no reason as to why this needs to be done in this way – mobile electronic representations need not just be ‘handy’ representations of space (albeit, some with a ‘current location’ marker), but could allow a variety of additional re-representational capabilities, tuning the spatial representation to the users’ needs *at that moment*. As research on the presentation of transport maps has shown [1], topological and other forms of presenting information are often more effective than linear projections. In developing these representations we also need to think about standards for the integration of space and place. So, for example, we have standard representations for what maps do and how to operate on them, and how guidebooks are structured (albeit to a lesser extent, as anyone using different publishers’ guidebooks will soon find).

The richest source of placial information, however, will likely come from people in that environment. There is potential to integrate this

through both content, which is authored about locations and interactive communication with those who provide services in particular places. It is usually institutions that produce content about places (such as tourism organisations), although individuals are increasingly producing and distributing content on the web that reviews and discusses particular locations. The famous 'Zagat restaurant guides' are an intriguing example here of how individuals can be involved in reviewing and surveying places. As has been noted [8] we can use the movement of others through space as a resource to guide us in our own encounters within that space ('ant trails') – imagine a tourist asking a system "where do people like me visit here?". This can, of course be extended far beyond the tourist, for example to the travelling sales executive – they could use such a map system as an access point into their organisation's data: "Do we have any other clients in this area that I could visit here at the same time?" As an additional resource, users could enrich these electronic representations with comments, for example, in the case of maps, as recommendations about an area, and in the case of guidebooks, as 'electronic graffiti'. There is of course a danger here in creating dominant areas as some popular locations suck in more and more interest, whilst others wither (a tourist *space of flows*, as Castells might put it). Such is the nature of geographical representations – maps have always been instruments of power. On the other hand, this kind of information can be seen in a more positive light, for example, in the tourist example, these kinds of representations allow people to go 'off the map' as well as onto it, perhaps to see untouristed areas, or to get cheaper accommodation.

With messaging, be it through the telephone, email or messaging, there is also the potential for introducing interactive assistance about places, so that a user could communicate with those who provide services in locations such as transport organisations, tourist information providers, or hoteliers. This is already done to an extent currently through providing the telephone number of organisations in guidebooks. Multi-media messaging could augment these interactions, with information sent when requested.

A comparison can be made between the systems we describe here and the more traditional use of geographical information in geographical information systems (GIS). These are systems that support the capture, storage, manipulation, analysis, and visualisation of geographical information. However, GIS's almost entirely deal with abstraction, since their physical and representational form does not usually allow it to be used in the environment to which it refers (such as requiring a large screen and uninterrupted contemplation). The technologies we describe here are therefore a step towards a *personal* GIS, a system that integrates space more specifically with place, relating geographical abstractions to the places that they represent.

Moving away from geographical technologies themselves, there are issues that arise from this discussion regarding how technologies network together. In particular there is the general tension in the use of technology between local contingencies and the power of abstractions which are produced to be used across different settings

and locations [2]. As can be seen from the uses of maps and guidebooks, interpreters have a crucial role in assisting individuals to use abstractions. Computerised abstractions then should not be seen as something that are introduced into places unproblematically, but rather as things that are *interpreted* to support activity in those places. How this interpretation is arranged with different technologies is the subject of our future work.

## CONCLUSION

We have attempted here to give something of the flavour of the differences between place and space, and to start an exploration of the geography of technology: how technologies influence our conceptions of place and space. This is of great importance in the design of context aware computing, and goes beyond its more obvious philosophical implications. Alongside the theoretical discussions, our two simple examples of ordinary geographical artefacts illustrate important issues that demonstrate how limited current technological discussions about space can have an impact on the design of computer systems. By describing this the use of a technology in terms of its geography (in terms of place and space), the importance of location and activity are underlined.

Both the guidebook and the map can be seen to have "placial" and "spatial" characteristics. This descriptive frame, we would argue, brings out interesting characteristics about these artefacts, and perhaps most importantly, how they are used. More specifically, we propose that the ways in which the mediation between space and place is "pulled off" by users as these technologies are put to use is an important issue in understanding the nature of the work that people do to make sense of geographical information. These artefacts bridge different geographic places through their design and use. That is, the guidebook and the map present the user with spatial information that needs to be put together with local placial information to guide activity. This "embedding" of representations within an activity is an important aspect of the performance of that activity. In doing so, users take a formalisation and make use of it in a course of action. Showing how this 'mapping' occurs is crucial in designing appropriate technologies to support geographical information use. If we can answer questions about what users need from formalised spatial abstractions, and how those abstractions can be applied usefully in a local setting, we can support the user with additional resources to better undertake this task.

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