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Virtual places[1]

Martin Dodge and Rob Kitchin

Introduction

> Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts ... A graphical representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding.
>
> (William Gibson, *Neuromancer*, 1984)

Many everyday activities and social interactions take place in virtual places – places that are dependent on networked computing infrastructure for their existence. For the most part virtual places are created online in cyberspace, usually within Internet technologies, and we concentrate most of our discussion on the geographies of such places. However, important virtual spaces are also increasingly produced in the material world through the embedding of information and communications technologies (ICTs) into the fabric of cities. Examples include traffic management systems, electronic payment through credit/debit cards, point of sales terminals and ATM machines, access control through swipe cards and pins, and surveillance through networks of digital cameras. Here, the virtual and material blend together, one dependent on the other. And as we discuss below, the virtual is always accessed from the material; they are not so easily separated. In other words, there are distinct kinds of virtual places. We start, though, by examining the nature of cyberspace and the online virtual places it supports through its various media.

Cyberspaces consist of information flows and social interactions that are continually beckoned into being *within* the infrastructural ensemble of digital computing hardware, software code and high-speed telecommunications networks. Cyberspace has emerged in the last 150 years from the convergence of two sets of technologies: those for the transmission of information and those for the automation of computation. Since the Second World War the technologies of computing and communication have grown dramatically in capacity and fallen in per unit cost (see Chapter 16). Of particular importance has been the development of the Internet – literally a network of computer networks. The Internet traces its roots to a

US military-funded network called ARPANET launched in 1969 (Salus 1995). This network quickly grew to link together a number of computers across the US, and by the early 1970s via satellite and underwater cable to other Western countries (Kitchin 1998). The first social application was the development of email in 1970, followed quickly by mailing lists. The first bulletin board came online in 1978. Throughout the 1970s a number of non-military networks were established and the PC revolution of the 1980s ensured a steady growth in numbers of users. The launch of the World Wide Web in 1992, and the growth in visual interfaces, led to an exponential increase in Internet users and the development of numerous other Internet technologies and applications (e.g. webcams, multiplayer games), along with rapid commercial exploitation leading to the dot.com boom in the late 1990s (Zook 2005). In 2004 it was estimated that worldwide there were 840 million Internet users contributing to numerous multi-billion dollar industries (including online shopping, gambling, games, distance education, and so on). As Internet usage has grown so has cyberspace itself. Everyday, tens of thousands of new web pages are added so that by the end of 2005 Google indexed over 8 billion pages. It is not unsurprising, then, that Internet technologies and the cyberspaces they support have diffused throughout society and have had a significant transformative agency in the nature of everyday living, including radically altering space–time relations in complex ways through convergence, compression and distanciation (Janelle 1969; Harvey 1989; Giddens 1990).

Cyberspaces are not the technology or infrastructure themselves (although they cannot exist independently of these), but the *experience* of virtual places that these engender. The word 'cyberspace' literally means 'navigable space' and is derived from the Greek world *kyber* (to navigate). As a description of online virtual places it was conceived by William Gibson in his novel *Neuromancer* (1984) as a three-dimensional 'data-scape' inside the global matrix of computer networks where disembodied users interact with 'clusters and constellations of data'. As an everyday human experiential phenomena, online virtual places are much more mundane than William Gibson's science-fiction imaginary, but are nonetheless powerful in mediating social relationships and shaping the material world. For example, they are

> the 'place' where a telephone conversation appears to occur. Not inside your actual phone, the plastic device on your desk. Not inside the other person's phone, in some other city. The place between the phones. The indefinite place out there, where the two of you, two human beings, actually meet and communicate.
>
> (Sterling 1992: 1)

Cyberspace is also the 'place' where your money is (to paraphrase John Perry Barlow, cited in Jordan and Taylor 1998) and is fast becoming the primary archive of memories (emails and text messages, homepages, blogs, digital photographs, and so on).

Online virtual places are not 'real' in terms of common-sense definitions of material 'stuff' that can be touched; they are, in Gibson's phrase, a 'consensual hallucination' created by software code and visual interfaces, and made tangible by access devices (touch screens, keyboards, stereo speakers, joysticks, and so on). However, they are perceived as real places and they can have very real, material consequences (e.g. money being electronically stolen from one's bank account). This is because virtual places are produced as hybrid space that is folded into everyday lived experience and physical environment, rather than being some exotic, dissociated para-space (as frequently depicted cinematically in the 1990s; see Kitchin and Kneale 2001). Uses of ICTs are themselves intrinsically embodied practices and the experiences of virtual places form a complex continuum from purely material ones to wholly

cyber ones, with many social activities now liminally combining the 'virtually real and the actually real' (Madge and O'Connor 2005: 83). For example, when taking part in a multi-player game on the Internet, while the interactions are occurring online as characters take part in shared social activities (fighting, flying, driving and conversing), the virtual characters are made real by the typing fingers of players staring at a computer screen, who might also be drinking Coke and chatting to friends co-present in geographic space. The player is in both the virtual world and the geographic world simultaneously. Later in the chapter, we discuss more fully the idea of material spaces becoming virtualized in particular contexts at specific times.

This experiential continuum of cyberspace and hybrid nature of virtual places is differentiated in two ways: first, the material context and social characteristics of the people using the technologies (see, for example, various empirical analyses presented in Wellman and Haythornthwaite 2002); second, the technologies themselves and how they work to shape the way in which interaction occurs. Focusing on the latter, we can construct a typology of online virtual places.

Typology of online virtual places

Online virtual places composed of infinitely malleable software code can exist in numerous forms including web pages and their hyperlinks, social interactions through text in chat rooms and email mailing lists, three-dimensional virtual reality (VR) environments, large multiplayer games, and huge distributed file corpuses on peer-2-peer networks – all with 'their own sense of place and space, their own geography' (Batty 1997a: 339). These forms of virtual places are always contingent on the time and place of their production. They are also heterogeneous in structure and operation, and are typically fast changing.

To make sense of these virtual places we can categorize them into a simple typology, demarcated by the temporality of social exchange and the configuration and numbers of users (Table 33.1). The time dimension divides online virtual places into two groups: asynchronous (participants can communicate at different times) and synchronous (participants must be present at the same time). In communications in general, letter-writing is the archetypal asynchronous mode of social interaction and face-to-face spoken conversation is the archetypal synchronous mode. The number of users dimension divides online virtual place in relation to how many people are participating through a particular social medium and how they are configured (in terms of senders or receivers of information). Clearly this dimension is a continuum ranging from a minimum of two people, small conversations with a group of friends or family, up to large parties, seminars and concerts, and perhaps even the many millions who participate in large events like the World Cup final or the Olympics via mass media broadcasting. We impose a logical, simplifying break in this continuum, dividing social media into three groups – one-to-one being social media for interactions between two people, one-to-many being media for simultaneous one-way communication with more than one other person, and many-to-many being media that supports several simultaneous conversations and information distribution. Table 33.1 takes these two dimensions to create a typology of six categories which characterize the principal online virtual places used for social interaction.

Email is the archetypal example of an asynchronous and one-to-one form of communication. Messages are sent from one individual to another, with the message being stored in a mailbox for reading at leisure. The users of email never need to be online at the same time to successfully communicate. It is the ideal form of interaction for people in divergent time

Table 33.1. Typology of online virtual places

	Asynchronous	*Synchronous*
One-to-one	Email	Talk/instant messaging (ICQ)
		Private chat rooms
		'Whispering' in MUDs/virtual worlds
		Internet telephony
		Video conferences
One-to-many	Web homepages	'Live' websites
	Ftp archives	Webcams
	Blogs	Podcasts
	Moderated email Newsletters	
Many-to-many	Mailing lists/listservs	Chat rooms/IRC
	Usenet	MUDs
	Bulletin-boards	Graphical virtual worlds
	Peer-2-peer file sharing	Networked games

zones where arranging a convenient time for a 'live' conversation can be difficult. Email remains the most popular reason to use the Internet; for example Oxford Internet Institute's 2005 survey found that 92 per cent of British Internet users check email regularly. One-to-many, asynchronous media include personal homepages and blogs on the web and are the nearest in form to conventional mass media communication of newspapers. Here, information is published by one source and communicated to a group of people, but in an asynchronous form that allows them to access the material at any time. Asynchronous many-to-many media include mailing lists, bulletin boards, Usenet groups and peer-2-peer file sharing, wherein there are multiple authors of information sharing the same place, accessed by many different people.

One-to-one synchronous communications are similar in form to private conversations between two people in the same location, except that they take place online between geographically distant participants. Typically a conversation takes place by typing short sentences which are displayed in real-time on the screen of the other 'speaker'. Examples include instant messaging, the most prevalent commercial example being ICQ, Yahoo Messenger and AIM (AOL instant messaging) and private conversations in 'public' media using a private chat channel or room or the whisper mode in virtual worlds. Many-to-many synchronous communications typically take the form of broadcasts and include 'live' websites that are updated in real-time, such as sports results web pages and broadcasting radio shows or concerts. Finally, synchronous one-to-many media are spaces in which many people can converse and interact in real-time and include chat rooms, multi-user domains (MUDs), virtual worlds and networked games. One must also be aware that digital information and communications are mutable in nature and the virtual spaces set out above can be modified in operation to be used in different ways (e.g. the publishing of information on Web homepages can be made into a one-to-one media by password protection). Information can also be presented in different virtual spaces at the same time (e.g. blog entries being distributed to subscribers over RSS – really simple syndication).

The differing nature of each of these media leads to different forms of social interaction. The degree to which these media have a differentiated sense of spatiality, how they are complementing, reshaping or replacing social interactions in geographic space, and what that means for understanding socio-spatial relations are important questions. Indeed, to what extent can different forms of communication be said to generate new virtual places that have a sense of community similar to existing place-bound communities?

Online virtual places: remaking community, replacing geography?

Very few commentators now doubt that virtual communities exist. However, to date, virtual communities have been conceived and examined in largely aspatial terms, and tellingly the lack of geography is considered by many social scientists one of the key features in the development and sustenance of online social and economic relations. Indeed, many commentators have argued that cyberspace is essentially spaceless and free of the constraints of place (e.g. Rheingold 1993; Negroponte 1995). It is thus argued that online communities are sustained and grounded by communicative practice, not geographic propinquity. In other words, a sense of community is based upon new ways of communicating and shared interests and affinity, not on sharing the same geographic environment; what is important is what people think, say, believe and are interested in, rather than on where they live. As we have argued previously (Dodge and Kitchin 2001), we believe that this could not be further from the truth. To the contrary, virtual communities are ripe for geographic enquiry because they display remarkably complex socio-spatial relations and because they have been hailed as alternatives to geographic communities.

Online communities as placeless communities

The idea that cyberspace has no spatiality and thus no sense of place has been challenged by a number of commentators. They argue that online interactions are often structured through a complex set of geographic metaphors that are employed precisely because they work to create a 'sense of place' and a tangible spatiality. As we, and others such as Adams (1997) and Graham (1998), have noted, cyberspace is replete with the vocabulary of place – nouns, such as rooms, lobbies, highway, frontier, cafes; and verbs, such as surf, inhabit, build, enter. Cyberspace is 'made real' through the language of place; geographic metaphors supply a familiar spatiality that fosters social interaction. In other words, such interactions are socio-spatial in nature. As Taylor (1997: 190) states, 'to be within a virtual world is to have an intrinsically geographic experience, as virtual worlds are experienced fundamentally as places'. The case example below of AlphaWorld, a three-dimensional, collaborative virtual environment (CVE), illustrates this quite clearly (discussed below).

Online communities as an alternative to geographic communities

For some commentators such as Rheingold (1993) and Mitchell (1995), virtual communities are providing more sustainable alternative communities to those in geographic space which they perceive to be fragmenting and becoming increasingly placeless. The demise of geographic communities has been commented on for a number of years. Analysts have suggested that cultural and economic globalization (the coalescing of cultural signs and symbols, increased geographic mobility, a de-significance of the local, and changing social relations; cf. Castells 1996; Dicken 2003; Klein 2000) is leading to social alienation and a condition of placelessness – that is, 'a weakening of the identity of places to the point where they not only look alike, but feel alike and offer the same bland possibilities for experience' – is occurring (Relph 1976: 90). Online communities thus are perceived to provide an antidote to such conditions, providing an alternative form of community to one underpinned by a sense of place. This view can be contrasted to that of Robins (1995). He severely criticizes the idea that one can simply turn away from the problems of geographic communities and further questions the salience of online relationships, which he sees as fleeting and self-selecting, a view also expressed by Gray:

> We are who we are because of the places in which we grow up, the accents and friends we acquire by chance, the burdens we have not chosen but somehow learn to cope with. *Real* communities are always local – places in which people have to put down some roots and are willing to put up with the burdens of living together. The *fantasy* of virtual communities is that we can enjoy the benefits of community without its burdens, without the daily effort to keep delicate human connections intact. Real communities can bear those burdens because they are embedded in particular places and evoke enduring loyalties. In cyberspace, however, there is nowhere that a sense of place can grow, and no way in which the solidarities that sustain human beings through difficult times can be forged.
>
> (Gray 1995, our emphases)

Wellman and Gulia (1999) argue that it is a mistake to characterize online and geographic communities as being opposed to one another. In many respects they are remarkably similar, consisting of social networks that vary in range and often overlap in many ways (e.g. keeping in contact with friends through email). Indeed, many people's communities, the people that make up their social networks, do not live within the same geographical location. These networks are sustained through various forms of communication beyond face-to-face conversations. What is perhaps different about online communities is that members might never meet. That said, online social networks are not pale imitations of 'real' networks, or substitutions for them; they are just merely another form, a subset of an individual's total network.

Further, one of the common uses of cyberspace is as a forum in which to mobilize and debate a plethora of 'real world' issues such as community development. Many communities are using the Internet to develop cross-community and cross-issue alliances to help fight particular concerns from local (e.g. anti-road protests) to global issues (e.g. opposition to the Iraq war) (cf. Jordan 2002; Pickerill 2003). In addition, e-government initiatives are increasingly allowing residents to communicate directly with state agencies and local political representatives, helping to manage changes in a globalizing world. In other words, rather than replacing geographic communities, the online virtual places in these examples are augmenting them.

AlphaWorld case study

Many of these arguments around community and spacelessness online can be illustrated with respect to collaborative virtual environments (CVEs), often suggested to be the nearest thing to geographic communities available online due to their synchronous, many-to-many nature, their shared three-dimensional graphical environment, and the use of avatars[2] to represent participants. The graphical environment offers more than just an interface, it provides an immersive, spatial context for social activities (e.g. Figure 33.1). This is achieved by differentiating ground and sky, granting the freedom to move in different directions, and providing an awareness of things that are nearby and locations that are distant. It is productive, therefore, to think of CVEs as hybrid virtual places – lacking the materiality of geographic and architectural space, yet having a powerful mimetic quality, containing enough geographical referents and spatial structure to make them experientially tangible (Schroeder 2002). Avatars provide participants with an embodied form, a tangible sense of self within the environment (Figure 33.2). Often the virtual world is seen in first-person perspective

Figure 33.1. A screenshot of the three-dimensional graphic environment of AlphaWorld.

Figure 33.2. Avatars interacting in AlphaWorld at 'Ground Zero'.

through the eyes of the avatar, which can be made to move, manipulate objects, talk to others (via text presented in speech bubbles) and make simple gestures (wave, dance, shake a fist in anger). They also set the scale of the world in context, particularly in terms of the size and layout of buildings. The fact that avatars can modify the virtual world to varying degrees helps engender a sense of community: lifeless online media are rendered into *places* that have meaning to regular users, who in turn develop a sense of belonging.

The CVE we examine here, AlphaWorld, is one of a number of commercially developed systems that are publicly available. It is the flagship virtual world produced by ActiveWorlds. The system can be tried for free but requires downloading a special 3D browser (more details are available at http://www.activeworlds.com). AlphaWorld measures 429,000 square kilometres (about the size of California). Since 1995 over 158 million objects have been placed on to this landscape by over a million different users, as of June 2004 (Roelofs and van der Meulen 2004). Like other social CVEs – such as Second Life (http://secondlife.com/) – AlphaWorld is expressly designed as a space in which people can meet, interact and build new forms of community. These CVEs differ in relation to the interface and the rules explicitly built into the system. Other CVEs have been designed for pedagogic use as virtual learning environments or as training simulators for the military (Taylor 1997).

From the perspective of social geography, the analysis of CVEs is worthwhile because it can shed light on how social interaction and the spatial environment combine to create a virtual place. This can considered in four different ways: (1) the built environment and the social meaning inscribed into homes; (2) the changing notion of distance and accessibility in an environment with virtualized location and instantaneous travel; (3) the emergent morphology of virtual urban development; and (4) persistence of place and the manifestation of community memory. The virtual nature of AlphaWorld actively shapes the socio-spatial practices that occur there by shaping how people interact (through typing at a keyboard at a remote location), masking identity (using avatars), regulating how people make things (using a virtual toolkit) and get around the world (using teleporting), and so on. That said, social and spatial behaviour is infused with the social norms, rules and meanings of the 'real' world that people take online with them.

Built environment and making homes:

AlphaWorld enables inhabitants to claim their own plot of land and design and build homes, thereby constructing their own places for social interaction. This 'homesteading' facility was a conscious part of the design and has been enthusiastically grasped by many thousands of people since AlphaWorld opened. Building in AlphaWorld is much like using a Lego construction set with predefined objects (such as road sections, wall panels, doors, windows, flowers and furniture) and the citizens have built a huge, sprawling city in the centre of the world (Figure 33.3), along with many smaller settlements and isolated homesteads.

Building in AlphaWorld is time-consuming and represents a real investment in the virtual world. It also provides a powerful new mode of personal self-expression with many thousands of people becoming virtual architects. Virtual homesteads, like web homepages, are tangible expressions of presence and a fixed point of reference. 'Building a home provides an opportunity to showcase one's craftsmanship, and create a feeling of ownership as the home is a territorial marker for a virtual habitat' (Jeffrey and Mark 1998: 26). The ability to own land and to build is also one of the major sources of social conflict in AlphaWorld. For example, virtual vandalism is possible by deliberately placing annoying/offensive objects (like flames, bogus teleports and even large billboards with pornographic pictures on them) as close as possible to other people's homesteads. Furthermore, the homestead, whilst owned by one individual, does not really operate as private space as other users can go anywhere, including entering buildings without the owner's permission.

From informal observation of the homes and other structures which users have built it is clear that they are firmly rooted in users' quotidian experience of real-world places. Many designs use vernacular architectural forms (e.g. the mock Tudor mansion shown in Figure 33.1)

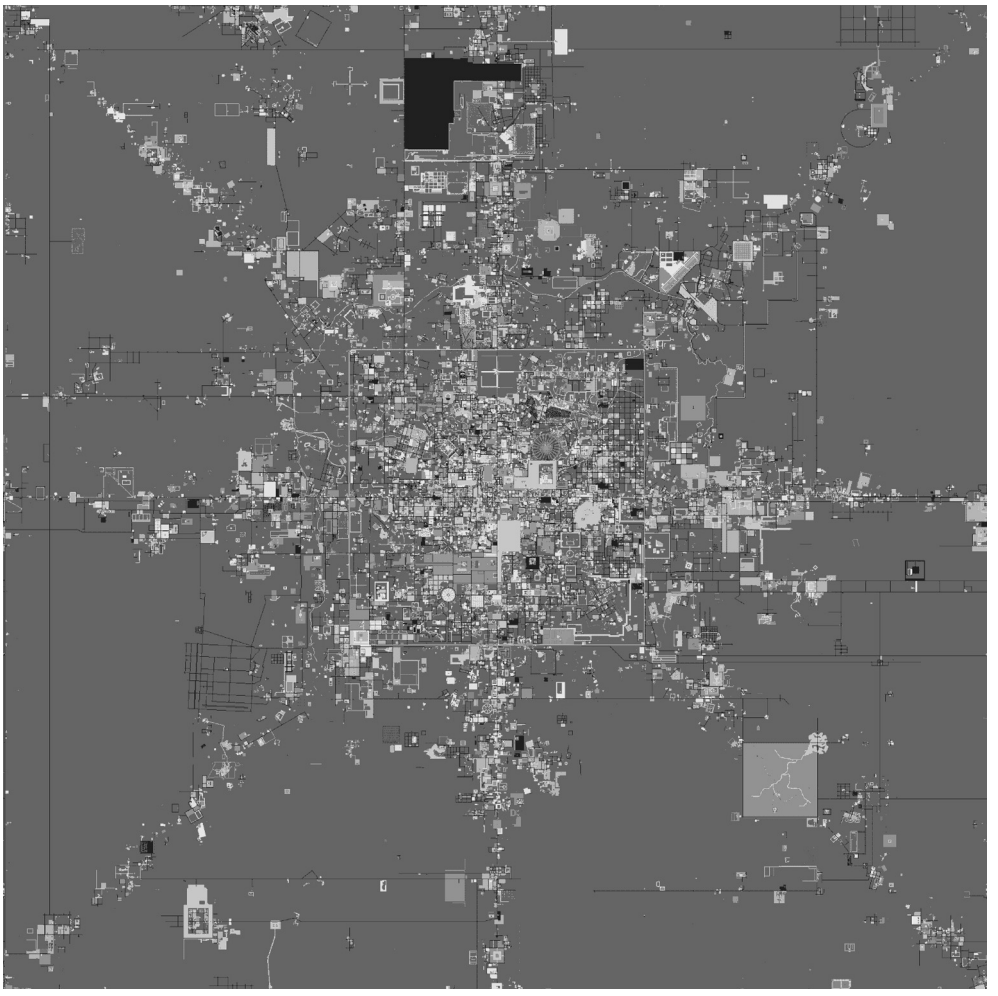

Figure 33.3. A satellite image of the building at the centre of AlphaWorld in December 1996
Source: Roland Vilett, http://www.activeworlds.com/community/maps.asp

and grid street layouts despite the ability to stretch and warp conventional architectural notions of the material world. Indeed, it is perfectly possible to build abstract structures floating in mid-air and other architectural designs that would be impossible with real-world building materials and gravity. And yet the ideal of a spacious Californian-style home with sun decks and a pool is common in AlphaWorld, due in part to the North American background of many users and the aspirations of many others based on Americanized media representations of 'dream' homes. Importantly, there is also a strong tendency to scale the buildings to the height of the 'human' avatar, just like the environment of the real world.

Location and movement

AlphaWorld's 'geography' consists of a rectangular plain with a pre-defined Cartesian co-ordinate system delineating location around an origin point in the centre of the world

(designated 0,0). This centre point is known as Ground Zero (GZ) to regular users and is the focal point for the world because it is the default entry point for avatars arriving in AlphaWorld. (Figure 33.3 shows the town that has grown up around GZ.) Consequently, the area around Ground Zero tends to be the most densely populated. When people give addresses in AlphaWorld they use co-ordinates such as 67N, 42W which translates to 670 metres north and 420 metres west of GZ. Regular users know the co-ordinates of their homesteads in these terms and use them as the primary address location scheme.

Social stratification is played out in spatial terms, with 'newbies' tending to cluster at GZ while regular users are more wide-ranging, exploring more of the territory and holding meetings and events at specific locations (Schroeder 1997). This is due to their greater familiarity with the system and what is available in the world – they know the good places to go. Also, regulars have often built homesteads that they can invite people to visit, a facility denied to casual users (known as 'tourists').

The movement of avatars in AlphaWorld is enhanced compared to embodied human movement. Avatars can dispense with the real-world convention of doors and simply walk through walls by holding down the shift key. Second, avatars can as easily fly in the air as stick to *terra firma*. So while AlphaWorld encourages the construction of a built environment with solid walls using the metaphors of the material world, it also provides superhuman powers to shatter the illusion and allow avatars to effortlessly glide through and above structures.

The nature of time–space is also warped in virtual worlds such as AlphaWorld by the power to teleport avatars to a specified location. Teleportation side-steps geographical accessibility based on the friction of distance because any location in the expanse of AlphaWorld can be reached instantaneously from any other point, at no cost in time or money. Consequently, every point in AlphaWorld is equally accessible – this is truly the 'death of distance' (Cairncross 1997). The ability to teleport is a powerful feature; however, it was not available at the beginning of AlphaWorld's history. It has been progressively introduced for fear of its effects on the world. Teleportation does cause problems. In terms of navigation, when users become dependent on it they tend to lose their understanding of the geographic context of features and the spatial relations between them. When combined with the limitations on avatar vision (by default only 40 metres), it is hard to build up a mental map of local AlphaWorld neighbourhoods, which in turn means it is difficult to find buildings and features of interest unless their x and y co-ordinates are known. Teleportation also has a negative impact on the social life of the virtual place as it reduces the opportunities for chance encounters and discoveries. AlphaWorld citizens can teleport directly to their homesteads without encountering other people. In a similar manner to car travel in cities, teleportation has the tendency to diminish spontaneous social interaction.

While the 'tyranny of distance' may be rendered obsolete by teleportation, location remains important. When people are choosing a location to visit or, more importantly, a place to build their homestead, they want a *good* location. In the context of AlphaWorld a good location is determined by two main factors: first, being as close as possible to Ground Zero, the centre of the world; and second, having a location with memorable co-ordinates – for example, the Pink Village is located at 2222S and 2222E. These parameters have interesting impacts on the evolving urban morphology.

Urban morphology

AlphaWorld has undergone concerted urban development since it came online in 1995. The initial *terra nullius* state has been transformed by the placing of millions of objects into the

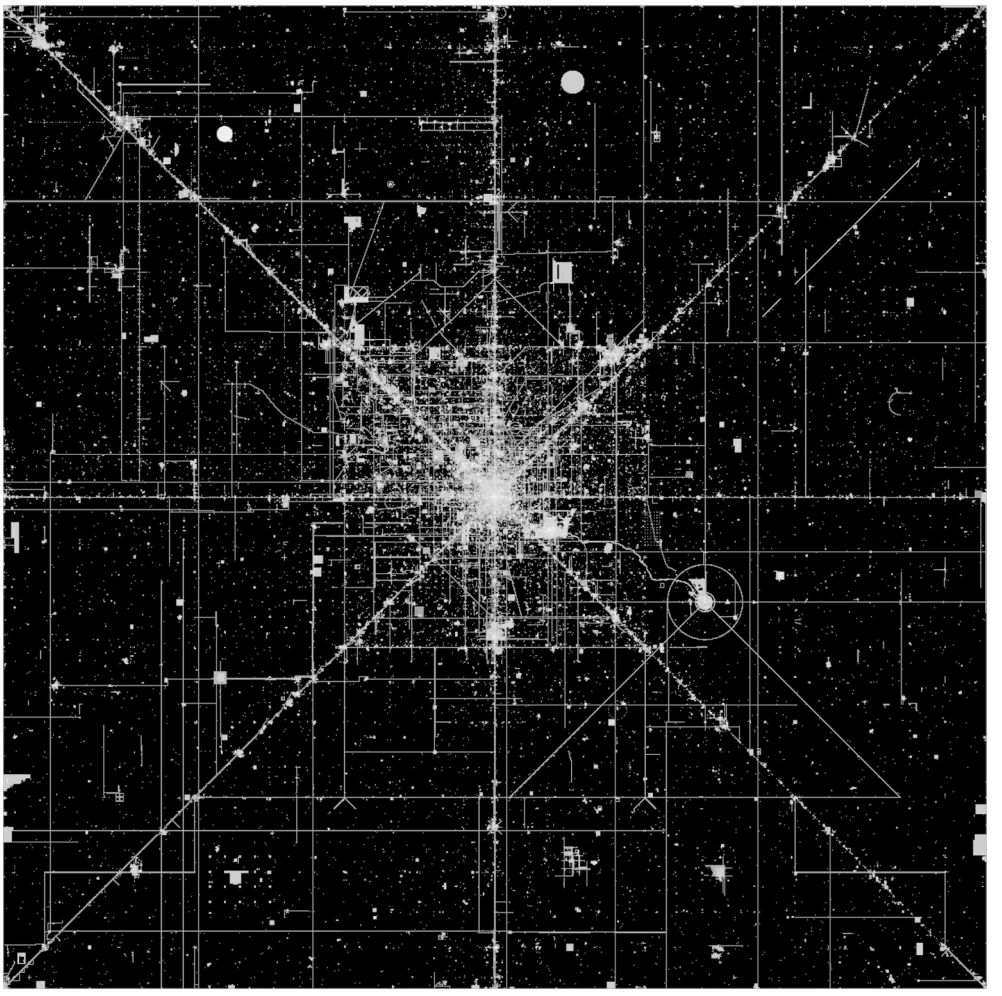

Figure 33.4. A density map of the whole of Alpha World, with light intensity relating the amount of building. Map computed in June 2004

Source: AlphaWorld mapping project, Greg Roelofs and Pieter van der Meulen, http://mapper.activeworlds.com/

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landscape. Yet it is evident that a large amount of AlphaWorld's expansive plain, beyond the central core at GZ, remains undeveloped with only a small percentage of the land containing any buildings (Figure 33.4).

It is clear that the most developed part of AlphaWorld is the densely built city around GZ, which sprawls out in all directions for about 35 kilometres. Ribbons of urban growth project out from this city along the principal compass axes to form a distinctive star shape. Towns and other small settlements lie along these axes, looking like bright beads strung along a necklace. The spatial structure of urban development is largely the result of the power of the co-ordinate system as a form of addressing in AlphaWorld. Once a pioneer has started building, other citizens will build alongside either by invitation or just to be close to other potentially interesting people.

At the local scale, the urban morphology of the city around GZ (shown in Figure 33.3, from 1996) is chaotic and disorganized because it has accreted over time from the efforts of lots of individuals with little or no co-ordination. In AlphaWorld there are no building controls or planning zones. One could argue that AlphaWorld's towns are similar to the informal squatter settlements described in Chapter 31, that characterize many rapidly urbanizing cities in the third world. These settlements are unplanned and built by the residents themselves from whatever materials they have to hand.

Manifest community memory

Specific events and social acts are performed in particular places and at set times in AlphaWorld. CVEs such as AlphaWorld have socio-spatial persistence, unlike other online spaces, which is manifest as a communal memory. AlphaWorld exhibits the best and worst of human culture in this regard. Social activities mirror 'real' materially based culture and include virtual weddings, religious ceremonies (Schroeder 1997), political meetings and poetry readings, educational classes in building, contests for the best homestead, guided tours and games (such as hide-and-seek). The first AlphaWorld wedding took place in May 1996:

> Citizens floated their avatars down the aisle, crowded the altar to witness the words 'I do' from both the bride and groom, and then floated in around the couple to wish them well ... When the bride tried to toss her bouquet, she discovered that it was permanently glued to her avatar. Immediately after the wedding, the groom drove 3,100 miles from San Antonio, Texas to Tacoma Washington to kiss his bride.
>
> (Damer 1997: 134)

The activities are accompanied by social memory in the form of communally recorded histories. For example, there is an AlphaWorld Historical Society, with an actual museum, in the world (see http://www.awcommunity.org/awhs/ for details). There have also been several attempts to form specific communities in AlphaWorld by formally planning and building an actual township. The most well-documented of these has been the Sherwood Forest community project run by the Contact Consortium (Damer 1997).

Social institutions have also been forged to deal with problems in AlphaWorld. For example, the AlphaWorld volunteer police, called Peacekeepers, have taken on a proactive role to intervene in cases of verbal abuse and to investigate avatar stalking and incidents of vandalism, and they have the powers of ejection and banning users from the world (see http://www.peacekeeper.net/ for details). They are organized with a duty roster to provide continuous police cover. Some users have expressed serious concerns over how the peacekeeper role is executed, with accusations of heavy-handed policing and summary expulsions, and an inadequate appeals systems. The evidence of formalized social activities and regulation nonetheless illustrates the vitality of socio-spatial relations.

The material world as virtual place

So far the discussion has focused on characterizing online virtual places. In this final section we want to turn things on their head and consider the extent to which the material world is becoming virtualized: that is, to consider how everyday geographic spaces are becoming virtual places due to the embedding of distributed, networked computing infrastructure into

Figure 33.5. Plane ticket.

their physical fabric and diffusing of software mediation throughout their social reproduction. In some cases, we argue, this embedding and mediation has become so pervasive that if the networked computing infrastructure fails then the geographic space cannot function as intended. An archetypal example in this case is the airport. It is no exaggeration to say that nearly all essential operations within an airport are dependent on software, with several consisting of dedicated intranets that sift and profile passengers – ticket purchasing, checking in, baggage handling, security checks, immigration and passport control, and air traffic control (Dodge and Kitchin 2004). The development and implementation of these systems are driven by issues of security and safety, fears over fraud and illegal immigration, and the desire to increase productivity and efficiency. A prime example of the former is the US system known as Secure Flight which uses routine transaction information (e.g. how a ticket was paid for) to identify 'suspicious' passengers. Even planes are dependent on software for their operation, with a Boeing 747–400 reliant on some 400,000 lines of code to power its numerous cockpit avionics systems, while a Boeing 777 aircraft has some 79 different computer systems, requiring in excess of 4 million lines of code (Pehrson 1996). A mundane view into the software-mediated extent of air travel is given when one examines a typical flight ticket (Figure 33.5), which contains a myriad of code numbers that tie the passenger into databases (Dodge and Kitchin 2005b). Of course, the ticket itself as a material object carried by passengers is itself virtualizing through the move to e-tickets. The airport, we would argue, is a virtualized place – it depends on cyberspace in order to function as an airport. Many other spaces are similar, although with varying degrees of virtualization dependent on software: for example, city spaces, workspaces and 'money-spaces' (Dodge and Kitchin 2005a).

City spaces

The built environment is increasingly overlain and augmented by virtual systems and software in complex ways, resulting in what Graham (2004) defines as cybercities (see also Batty 1997b; Mitchell 1995). New buildings come supplied with 'intelligent' management systems that monitor environmental conditions, sense occupation level and then control lighting, heating and other utilities appropriately to produce spaces that have a more sustainable

'footprint'. Buildings are also made safer through software, for example controlling a sensor network of smoke detectors and sophisticated alarm systems, emergency lighting and automatic door closures. Even seemingly mundane mechanical items such as elevators and public toilets are now literally brought to life through software. Bodies are moved up and down by the same physics but the control algorithms are now held virtually, such that 'smart' lifts 'learned to skip floors when they are already full, to avoid bunching up, and to recognise human behaviour patterns. They can anticipate the hordes who gather on certain floors and start pounding the DOWN button at 4.55 p.m. each Friday' (Gleick 1999, quoted in Thrift and French 2002: 314). In many toilets the mechanics of flushing, turning on taps, dispensing soap and activating dryers is going 'hand-free' to maximize hygiene. Here, sensors and software become crucial to mediate bodily encounters with the environment.

Another facet of diffusion of software systems throughout buildings operations is to make access control more sophisticated, for example through automatic doors and turnstile barriers, while keys for entry to secure sections are authenticated by swipe cards or transponders. Importantly, the move to software-mediated access enables the potential logging of individual movement patterns. Similarly, many road networks are continuously monitored and managed in real time via dedicated intranets that link up cameras around the city with a management programme which calculates the optimal phasing of traffic lights. Other systems monitor access to certain parts of the network, such as bus lanes, toll roads and congestion charge zones, automatically logging which vehicles are using them and administering payments or fines as required. Much of these information is collated together and presented on multiple displays for human operators to interpret and manage in dedicated traffic control centres (Figure 33.6). Other transport systems such as rail are also becoming virtualized, with safety systems that automatically monitor all train movements and work to second-guess decisions made by operators, intervening to override drivers if necessary. In addition, smart ticketing systems are being introduced, along with enhanced safety features.

As these complex process of virtualizing material spaces proceed, the result, according to Amin and Thrift (2002: 125) is that '[t]he modern city exists as a haze of software instructions. Nearly every urban practice is becoming mediated by code.' However, much of the haze is unseen and subject to little external scrutiny. Software itself is largely invisible and the assemblage of networked computing infrastructure is small in scale and has few noxious externalities in operation (particularly in relation to earlier communications technologies).

Workplaces

We would argue that there are few workplaces in the western world that are not infused with software, a great many of which are distributed in nature. Indeed, distributed communication and information systems are now the structural glue that binds distanciated corporate activities together. They enable companies to maintain complex systems of customer orders, production and logistics. Moreover, they have enabled companies to change how and where they operate by transforming how work is undertaken (Graham and Marvin 1996). To take one example, that of grocery retail: supermarkets are very much virtualized places with many seemingly 'low-skill' working practices being mediated thoroughly by software. Stores now monitor their stock levels using PDAs, automatically ordering new supplies; the checkout system monitors employee performance; computer systems monitor work hours, calculate pay, process payments and organize logistics. Other service industries similar rely on such systems to organize and run their businesses. Workplaces, then, are increasingly virtual places.

Figure 33.6. Los Angeles Department of Transportation's automated traffic surveillance and control centre

Source: Center for Land Use Interpretation (2004).

Money-spaces

A final example is the increasing virtualization of money, most of which now only exists in virtual form as credit (see also Chapter 54). In Britain there were 8.1 billion payment transactions made with debit and credit cards in 2004, amounting to some £443 billion spent (APACS 2005). A person withdrawing money from an ATM maybe stood in material space withdrawing material cash, but the withdrawal can only take place due to the ATM's virtual connection to the bank's intranet that verifies account details and authorizes payment. At the checkout, a networked pay system allows the use of virtual money via credit/debit cards to pay for goods, and another system administers the loyalty card scheme, automatically updating records held on a central database. The widespread use of online virtual places (Internet banks) instead of material banking spaces for many transactions is a tangible manifestation of software in everyday practices. Yet it is not without risks: for example, it gives rise to some novel forms of virtual criminality, including so-called phishing (the attempt to lure people to divulge valuable information such as passwords to access bank accounts by constructing fake web pages). The virtualization of money also has significant wider social risks, for example in terms of individual privacy over purchases. The swiping of a payment card by necessity undermines the anonymity of the transaction and leaves a data trail that is of interest to both commercial firms and state bodies to profile individual behaviour – the maxim being that you are what you buy. Given that the geographic locations of ATMs and

points-of-sales terminals reveal the place of the person making the transaction, these profiles also map important aspects of time–space paths.

Conclusions

In this chapter we have argued for a broad conception of the notion of a virtual place – as a place that is dependent on networked infrastructure for its existence. Such places can exist online through the various media of cyberspace, or in the material world as it becomes increasingly virtualized. In both cases, virtual places are a hybrid mix of virtual and material – online spaces are accessed from the material world and embodied with its customs and conventions; material spaces are virtualized through the embedding of virtual architecture into its fabric. In both cases, the nature of place is altered in interesting ways through the modes of interaction (e.g. temporality, degree of anonymity, ease of use), but as our examples and discussion have highlighted they retain many of the characteristics of non-virtual places. For example, AlphaWorld is a complex society that has built and inhabits a complex space. Its diverse socio-spatial relations work to turn the virtual environment into a place, engendering its inhabitants with a rich sense of place and community. In this sense, AlphaWorld is just as tangible and real as the neighbourhoods of the pre-virtual era. Similarly, the airport still looks and operates in much the same way as it did 50 years ago, but now with many of operations are virtualized. And while some would call an airport a non-place (Augé 1995), the large community who work there every day and its defined role clearly make it a place – and also a virtual place. Much more work needs to be done to think through the complex nature and implications of these interactions between the virtual and the real.

Notes

1 This chapter draws on our previous work, particularly Dodge and Kitchin (2001, 2005a), Kitchin and Dodge (2002) and Dodge (2002).
2 The word 'avatar' comes from Sanskrit and is commonly translated as 'God's appearance on Earth'; it was first used in the context of CVEs in the pioneering Habitat system developed in the late 1980s (Morningstar and Farmer 1991).

Further reading

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