

Spatialising the Internet: new types of hybrid mobile communication environments and their impact on spatial design within the urban context

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This paper aims at investigating the emergence of new forms of communication environments, supported by the integration of new mobile and locative media technologies and the impact that the implementation of these systems may have on mediated communication within the urban context. The paper discusses the technologies supporting such multi-user systems (interactive graphical interfaces for mobile devices and locative media) and investigates the experience of interacting with such systems from a user's perspective. It focuses on such systems accessed via interfaces, which have a spatial character and which are supported by different output devices, ultimately affording a hybrid (synthetic & physical) spatial experience.

Communication is tied to places and places to communication. Consequently, these emerging types of communication may lead revolutionary new ways of social interaction and inhabiting urban space. With the emergence of these ICT systems, the city may again become a social arena and this development certainly calls for reconsidering the way in which we conceptualize and design urban environments.

Keywords: *Locative media; social computing; spatial interfaces; mobile technologies; context-aware systems.*

Introduction

Cities are complex spatial systems, which function as contexts for supporting communication. During the last decades, cities are radically being re-ordered by technological systems and networks. Very recent advances in mobile and wireless communication technologies and a series of location-based activities (games, socializing services, commercial appli-

cations and artworks) have begun to transform the potential for social interaction taking place within the urban public space, as well as our perception of public spaces in general.

This paper aims at investigating the emergence of new forms of communication environments, supported by the integration of new mobile and locative media technologies and the impact that the implementation of these systems may have on

mediated communication within the urban context. The paper focuses on such systems accessed via interfaces, which have a spatial character and which ultimately afford a hybrid (synthetic & physical) spatial experience and a novel form of social interaction. Ultimately, the paper aims at discussing how these technological developments may inform spatial design within the urban context.

Graham (2004, p.67) has suggested a theoretical approach for analyzing the interrelationships between cities and information and communication technologies (ICTs), that this paper finds appropriate for the particular kind of emerging systems it deals with. This approach refers to a series of recombinant perspectives and supports a fully relational view of the links between technology, time, space and social life. New technologies become enrolled into complex, contingent and subtle blendings of human actors and technical artifacts, to form actor-networks, which are socio-technical hybrids. Accordingly, the paper subscribes to the view that through such socio-technical hybrids, social and spatial life become subtly and continuously recombined in complex combinations of new sets of spaces and times, which are always contingent and impossible to generalize.

Spatial interfaces for communication

Communication systems embody and integrate the functions of a communication interface, a series of transmission channels and an organizational infrastructure. Biocca & Delaney (1995) define a communication interface as the interaction of physical media, codes and information with the user's sensori-motor and perceptual systems. As earlier suggested, an important characteristic of the particular interface that this paper refers to is its environmental character; these are multi-user interactive graphical interfaces that display some form of an environmental representation, within which all users of the system are concurrently being represented in real-time and which could comprise two-dimensional and/or three-dimensional visual content. The interface of

other traditional electronic media (radio, TV) could also be considered as having an environmental character, in the sense that these media dominate the space within which they function as well as the mental space of humans who attend to them.

A virtual environment is an intrinsically spatial type of communication interface. Bricken (in Riva & Davide, 2001) also suggests that the essence of virtual reality (VR) is the inclusive relationship between the participant and the virtual environment, where direct experience of the immersive environment constitutes communication. Harvey goes even further, proposing to see VR as a culturally important phenomenon and not just a channel of connecting the world (1995, p.376). An interactive graphical interface¹ however, does not necessarily afford such an immersive experience but still actively engages some of the user's sensori-motor channels, at least up to an extent. In this sense, we could suggest that an interactive graphical interface is an advancement in a continuum of communication interface systems, like the radio and the TV. An important characteristic of such an interface is that it engages the human sensori-motor channels into a vivid communication experience.

Schroeder suggests that a single-user interactive graphical interface may be defined more accurately as an information technology, rather than a communication technology, since the concept of «information» is mostly used to denote what is transferred to a single individual, rather than what is exchanged between two or more individuals (1996). However, there is an important difference with other information technologies. The interfaces referred to in this paper provide a navigable and manipulable spatial context, within which communication may take place. Following Biocca & Delaney's (1995) earlier mentioned definition, a single-user interactive graphical interface could be considered as a «communication interface». Designing a communication interface implies the design of the way in which interaction occurs amongst physical media, codes and

¹ which is not necessarily three-dimensional

information on the one hand and the user's sensorimotor and perceptual systems on the other hand as well as the appropriate representation of this interaction.

In the case of an interactive graphical "world" as an interface², the experience of telepresence³ afforded to the user, is not as strong as in the case of a VR simulation "world". This is mainly due to the less immersive experience afforded by display devices and also due to the fact that the representational context where interaction occurs may not necessarily be fully three-dimensional. Even in an interactive graphical interface however, we may consider that the user is somehow tele-present in the environmental context of interaction, irrespective of the immersiveness or the display quality of the experience.

Introducing mobility and multi-user access to interactive graphical communication environments

Let us now consider graphical interfaces, which may be accessed by multiple users, concurrently interacting and communicating within this context. These interfaces could, more appropriately than single-user graphical interface platforms, be described as communication media. As Schroeder (1996) suggests, "the concept of a communication technology normally means that two or more people are involved and that the emphasis is given on the messages exchanged between them". Accordingly, the concepts of communication and medium should preferably be used in the framework of multi-user interactive graphics systems. Barnes (2001) argues that a technological medium becomes a communication environment when it is transformed from a tool to a medium of symbolic interaction between people.

² i.e. the environmental experience afforded by the display of a PDA device

³ Steuer (1992) defines VR in terms of human experience: "a real or simulated environment in which the perceiving person experiences tele-presence", where telepresence may be described as "the experience of presence in an environment through a medium of communication"

The term "communication environment" appropriately describes a "communication interface", which has environmental character.

Therefore, the multi-user interactive graphical interfaces discussed here are considered as a communication environments, which function as systems of interpersonal but computer-mediated communication; within the context of these environments, communication amongst remotely located, networked individuals is mediated. Following McQuail's (1997) categorisation of different levels of a communication process, these environments function at two different levels:

- At a *personal level* (human-computer communication), information is transmitted to users in various forms. This information has been created either by the entity that designs, implements and possibly supports and controls the operation of the multi-user environment or is created by the participants themselves and is transmitted within the context of this environment, thus utilizing its functionality for communicating messages.
- At an *interpersonal level* (human-computer-human communication), such a multi-user environment may function as the spatial context, which accommodates synchronous, interpersonal mediated communication amongst participants, represented within this space by some form of graphical representation.

A series of new technological developments regarding wireless communication networks provide the opportunity for presenting interactive multimedia content via 2D & 3D graphics and video on mobile handsets, thus communicating more information and in a more pleasurable and engaging manner than text-based content. These developments afford the possibility of multisensory communication amongst remotely positioned and potentially mobile individuals via a graphical human-computer interface.

One very effective type of multimedia with a proven high ability to hold user attention span is the use of interactive 3D graphics on mobile interfaces. Interactive 3D graphics content adds to the sense of

depth and the environmental character of the representation and also affords more possibilities for presenting information on the limited surface of a mobile device display. Moreover, the ability to interact and determine the course of the representation may significantly enhance the engagement of participants with the evolving action (Beardow, 2002). These facts have contributed to the gradual integration of interactive 3D graphics within the interface of mobile devices. This has enabled mobile users to access on-line 3D games and similar applications, which have the potential for creating huge user on-line communities. In an online game however, 3D content may be distributed to users playing on the road (on a mobile) but could also be accessed by users at home (on a graphics PC). The introduction of 3D graphics in mobile devices implies the introduction of mobility into interacting with 3D interfaces and the potential afforded to both mobile and home users for participating concurrently in multi-user activities within such mediated spaces. One very good example of an artwork affording such a collaborative experience is the revolutionary work of new media performance group *Blast Theory* titled “*Uncle Roy All Around You*”⁴.

Mobility may also be introduced in more engaging environmental experiences afforded by mixed (MR) or augmented reality (AR) simulation systems⁵. For example, a mobile AR game that takes place in the urban context may place the player in a hybrid kind of space simultaneously comprising the electronically mediated spatial context as well as his surrounding physical settings. A system for playing the popular online video game *Quake* in urban space, as opposed to behind a desktop computer, has been developed at the University of South Australia. A wearable computer was mounted into backpack and

⁴ Exhibited at the Futuresonic festival in Manchester in 2004. Information about it and other related Blast Theory projects can be found at their web site: www.blasttheory.com

⁵ A mixed or augmented reality system is a fully interactive system that displays visual output to the user, the source of which is a simultaneous integration of a synthetic 3D computer graphics world and real-time video footage of her surrounding environment

the 3D space of the video game was projected over the real world landscape through a head-mounted display, while the two projected environments were coordinated with the help of GPS technology (Piekarski & Thomas, 2002).

Location-Based Systems: introducing location awareness into mobile communication environments

New types of wireless communication networks enable the detection of user’s position at all times via GPS or related technologies. This information may be utilised by the system for updating the output displayed to users, according to their dynamically changing location at all times. The ability to track the location of users or other potentially mobile entities and the input of information regarding the environmental situation captured by sensors embedded in the physical environment, contributes towards creating context aware systems.

In order to understand the social ramifications of these locative communication media, it is important to investigate the impact that the kind of interpersonal communication they support has on our everyday experience within the urban environment. Souza e Silva (2004) was one of the first to suggest the significance of these interactive communication environments, through which “virtual worlds immigrate from the internet to urban spaces”. While the Internet allowed physical meeting places to “immigrate” to a “virtual” spatial context⁶, the introduction of mobile location-based communication networks relates again the concept of a “meeting place” to the physical space of an urban environment. Thus, social computing, which was previously restricted to the Internet is now brought back into the urban realm. Indeed, the emergence of locative-ness re-introduces the parameter of real location within the mediated communication activity, thus mapping the “virtual” mental space of communication to the

⁶ For example, the mental space where communication in a text-based MUD or MOO occurs

physical space where the real bodies of communicating participants exist.

In location-based games, for example, the location of each player in the physical world is very important⁷. Thus, the virtual spatial context of the game is mapped onto the physical world and this hybrid spatial context becomes the arena of the game. Similarly, urban physical space may be enriched with an essentially social quality; location may become a practical condition of social encounters, offering opportunities for action and interaction. These media may bring back our attention to the social, cultural and intersubjectively constructed aspects that characterise urban space. Most importantly, they afford the possibility for face-to-face interaction and bring back the “compulsion of proximity” (Boden & Molotch, 2004) into computer-mediated communication.

Of particular interest in this discussion, is the manner in which the spatial context, where “*situated*” communication (Suchman, 1987) occurs, is transformed by the introduction of these technologies. Locative media may be called systems of *situated*, context-aware communication. Location-based mediated environments bring human-computer communication and human-computer-human communication back into the context of our physical world, instead of expecting humans to adapt to the needs of a computer environment. If we consider the Internet as a medium and a context, where information and symbolic content is communicated amongst its users, this information and content does not usually relate to its actual location or to the physical location of its users. Locative media on the other hand, afford the possibility of relating a part of this content to physical locations and in a way promise a kind of “spatialisation” of the Internet, where a part of its content, and the activities it relates to, are mapped onto physical space.

⁷ When the player approaches a location his mobile phone notifies him of his whereabouts, while at the same time, this location is mapped onto the game’s visual representation for all players to view

Locative media and mediated communication within the urban context

Castels (in Graham, 2004) suggests that space expresses society; it is actually a fundamental dimension of society, inseparable from the overall process of social organization and social change. Thus the new urban world rises from within the process of formation of a new society, the network society. This paper, however, does not view the aforementioned novel telecommunications technologies as *directly* causing urban change because of their intrinsic characteristics as space-transcending and unifying communication channels. As suggested in the introduction, the paper subscribes to a theoretical perspective, according to which urban places and technological systems are socially constructed in parallel (Graham, 2004, p.68). This view is anchored around the actor-network theory (Latour, 2005) and Haraway’s “human-technological” *cyborg* concept. The actor-network theory suggests that particular social situations and human actors enroll pieces of technology, machines, built structures, documents, texts etc., all of them associated together into actor-networks. This theoretical model is fully relational, therefore absolute spaces and times are meaningless. According to this approach, electronic domains and cyber-cities can be considered as fragmented, divided and contested multiplicities of heterogeneous infrastructures and actor-networks.

It is also clarified that the proliferation of electronic spaces and networks is not understood as having only positive effects for urban life. We are all daily witnesses of numerous events, revealing how communication via mobile telephony may isolate individuals from the social context within which they act. While taking into account the fact that the dissemination of these technologies and communication practices may undermine urban life, this paper attempts to investigate possible reasons to support the view that it may also contribute to regenerating public space and social life within it. It is useful to ask here, therefore: why is public space in need of regen-

eration?

Auge (1992) appropriately describes the character of urban space in *post-industrial highly urbanized societies* as a “non-space”, which we perceive but only in a partially and incoherent manner. The term “space” is more abstract in itself than the term “place”, the usage of which at least refers to an event (which has taken place), a myth (said to have taken place) or a history (high places). Cities today are full of spaces, in which the individual feels himself to be a spectator without paying much attention to the spectacle (Auge, 1992). In these spaces, *city-dwellers usually navigate without bothering to attempt interaction with others or to relate to the environmental setting; they are mere passers-by and they rarely find any meaning in these spaces other than merely moving from one point to the other, at a topological or geographical level.*

The “non-spaces” we experience in our everyday urban context are certainly not experienced as “places”. The definition of a *place* implies a *space* enriched with meaning, within the context of which human interactions and relations “take place”. For Relph (1976, p.114) the foundation of the “place” concept is ‘existential insideness’ - the degree to which people feel a part of a place - as opposed to ‘existential outsideness’ - which involves feelings of strangeness and separation from a place. A space is subjectively defined and remembered as a place and is thus tightly related to individual actions and intentions. Relph (1976, p.42-43) suggests that “*places are the contexts or backgrounds of intentionally defined objects or groups of objects or events, or they can be objects of intention in their own right... Those places are defined largely in terms of the objects and their meanings. As objects in their own right, places are essentially focuses of attention, usually having a fixed location and possessing features which persist in an identifiable form... They can be at almost any scale depending on the manner in which our intentions are directed and focused.*” But why do we need places to “dwell” in? According to Relph (1976, p.1) we need to design our environments and to develop frameworks, as

systems of meaningful places, which give form and structure to our experiences in the real world.

Castells (1996, pp. 441-2) presents a social conception of space as the material support of time-sharing social practices. He argues that our society is constructed around “flows”: flows of capital, flows of information, flows of technology, flows of people who commute, flows of images, sounds, symbols, etc., as expressions of processes dominating our economic, political and symbolic life. He then introduces the concept of the “*space of flows*” as the “material organization of time-sharing social practices that work through flows”, supported by information and communication technologies and networks.

Even though the space of flows appears to be the dominant spatial form in our network society, these spaces, and people acting in them, still live within the *space of places* of their physical surroundings too. Castells (in Graham, 2004, p.85) identifies a growing tension and articulation between the space of flows and the space of places. While the space of places organizes experience around the confines of locality, the space of flows links up electronically separate locations in an interactive network, that connects activities and people in distinct geographical contexts. Cities do not disappear in the virtual networks of ICTs but are transformed by the interface between electronic communication and physical interaction, through this combination of networks and places. Our cities are made up, at the same time, of flows and places and of their relationships. The places of the space of flows are the corridors and halls, usually experienced as “non-spaces” that connect places around the world. The city-dweller of the 21st century is usually mobile and on-line, moving physically between places, while keeping the network connection at all times. What is quite significant to stress here, therefore, is that “we move physically while staying put in our electronic connection. We carry flows and move across places” (Castells, in Graham, 2004, p. 88).

In an attempt to focus on the user perspective and to view the sense of presence experienced by

a human in the context of electronically enhanced mediated environments of our cities today, it can be suggested that this sense of presence may fluctuate amongst three different states (Biocca and Kim, 1997):

1. Presence in the physical world: the most natural and non-mediated state of "being here", where man attributes the source of his experience to the stimuli emanating from his physical surroundings.
2. Presence in an electronically mediated "virtual" environment: this could be any synthetic experience with environmental qualities, which is generated by making use of one or more electronic communication media.
3. Presence in an imaginary environment, which is dominated by internally generated mental images.

In fact, a human may experience all three of these states at the same time but usually one of them prevails.

This conception could be related to Hayles' (1999) attempt to explain the spatial experience involved in mobile communication. She suggests that we could conceive of contexts of communication as being unfolded, so that "there is no longer a homogeneous context for a given spatial area, but rather pockets of different contexts in it". Souza (2003) further explains this approach: there may be a context that is created by the spatial proximity of people and inside it there is another context that is created by the cell phone communicational activity, involving a remotely located interlocutor too. Each new folded context reconfigures reality and social relationships that take place within one specific area. Each mobile device carries a whole potential of new contexts, ready to fold reality again.

In an attempt to describe the collaborative spatial experience afforded to all participating users of the multi-user locative media discussed in this paper, it may be suggested that the folded context corresponding to the concurrent flow of content amongst all of them, has indeed more of a representational

and spatial character, due to the spatial graphical interface of the system. This may result in a kind of hybrid spatial experience, involving the potential co-existence of participants, not only in the space of flows they carry with them but also in the space of places, where they may experience proximity.

In the context of global cities at the beginning of the 21st century, Castells (in Graham, 2004, p.87) argues that public places, as sites of spontaneous social interaction, may again become the communicative devices of our society. Could then mobile and location-based communication technologies afford highly mobile and individualistic 21st century city-dwellers the ability to connect to each other, to rediscover the joy of spontaneous social interaction, to become more active and to recreate communities and bonds of socialisation? Could these media contribute towards transforming devoid of meaning, "non-places" of contemporary urban space into a socially meaningful network of places for interaction? *Tuters (2004) suggests that locative media may transform the urban space of disconnected flows into a huge "peripatetic computer" of interpersonal contact that is a space full of potentially social places. This may lead to an electronically enhanced public space that can be enjoyed, as it regains life by aiding city-dwellers who are virtually strangers to meet in public places and engage together in various activities.*

The introduction of mobility into interacting with spatial interfaces and the possibility to access a virtual environment, afforded concurrently to mobile and home users, creates very interesting prospects for collaborative mediated experiences. With the aid of location-based systems, space is being hybridised as the mediated spatial experience is mapped onto the physical urban environment, allowing for new kinds of collaborative activities and social interaction. Mobile and locative technologies are seen as supporting novel and revolutionary new ways of inhabiting urban space. Communication is tied to places and places to communication (Charitos et al., 2005). The emergence of locative and mobile communication systems and their potential impact on social inter-

action in the urban context, suggests that we are in need of new conceptual models, regarding the design of such hybrid, dynamically evolving environmental experiences. Locative media may contribute in turning the city into a social arena again and this possibility certainly calls for reconsidering how we conceptualise and design urban environments.

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