TOWARDS INVESTIGATING THE SOCIAL DIMENSIONS OF USING LOCATIVE MEDIA WITHIN THE URBAN CONTEXT

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Abstract

Locative media are systems of technologically mediated interpersonal communication. This paper investigates the social implications of the use of locative media. It considers various relevant theoretical perspectives and attempts to synthesise aspects of them in order to outline a theoretical framework that may inform the design and implementation of such systems. This framework functions as the theoretical basis on which the LOCUNET project builds on. A short description of the LOCUNET system design and the scenario, which will be implemented for the purpose of evaluating its theoretical approach, are also presented.

1. Introduction

The convergence of new mobile telecommunication networks, geographical positioning systems and interactive graphical interfaces on mobile devices, as they are already being utilised in a series of location-based activities, introduces new forms of interpersonal communication. This paper documents the first phase of a research project, which aims at investigating the emergence of these forms of Information and Communication Technologies (ICTs), supported by the integration of new mobile and locative media technologies and the impact of their use on mediated communication within urban public space. The paper at hand proposes an appropriate framework, which may function as the theoretical basis for designing locative media systems. For this purpose, the proposed framework will take into account the impact that the implementation and use of such systems may have on their users, and ultimately on mediated communication taking place within the urban context as such.

LOCUNET (LOcation-based Communication Urban NETwork) is a research project that mainly focuses on the social implications of using location-based systems in the context of urban everyday life and not only on the technical aspects of designing and implementing such systems. Its main research objective is to study the way that users interact with other users (human-computer-human interaction aspect) and with the location-based system itself (human-computer interaction aspect), while focusing on the physical and social context in which this interaction takes place. To that end, LOCUNET adopts a methodological approach that favours in-depth, qualitative research.

In what follows it will be argued that locative media are to be understood as systems of mediated interpersonal communication. Based on this understanding, the paper proceeds to consider the various perspectives, which the design of locative media should encompass and which together comprise the theoretical approach on which the LOCUNET project is based. Finally, a short description of the system design and the scenario that the project will implement for evaluating its theoretical approach will be presented.

2. Locative media: spatializing the Internet

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 constantly and dynamically updating the output displayed to users, according to their location. 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, which are embedded in the physical environment, contributes towards creating context-aware systems. Locative Media use these technologies for communication purposes, thus making actual physical location a prominent feature of the interaction process, and consequently triggering real time and space social interactions. In order to understand the social ramifications of locative communication media, it is important to investigate the impact that the type of interpersonal communication they support has on the users' everyday experiences within the urban environment.

Computer-mediated communication via the Internet has allowed physical meeting places to "immigrate" to a "virtual" spatial context, as in the case of MUDs or

MOOs. The introduction of mobile location-based communication networks relates again the concept of a "meeting place" to the physical space of an urban environment. It re-introduces the parameter of geographical location in the activity of computer-mediated communication, thus mapping the "virtual" mental space where communication occurs to the physical space, inhabited by the material bodies of communicating participants. In location-based games (e.g. [31]), for example, the location of each player in the physical world is very important. Thus, the virtual spatial context of the game is mapped onto the physical world and the resulting hybrid spatial context becomes the arena of the game. Most importantly, such a communication system affords the possibility of face-to-face interaction and brings back the "compulsion of proximity" [7] into computer-mediated communication.

The significance of utilising actual physical location as a parameter of the communication interface [5] in an ICT system lies in its "naturalness", as humans use location information at all times in everyday life.

In the case of Internet-based communication – whereby the Internet functions as both the medium and the context where symbolic content in communicated – all information remains dissociated more or less from its actual location or the physical *situatedness* of its users.

Locative media on the other hand, afford the possibility of relating a part of this content back to physical locations. In doing so, they hold the promise of a sort of *spatialization* of the Internet [10], whereby a part of its content, and the activities it relates to, are mapped onto physical space.

3. A social framework for the LOCUNET project

The combination of the aforementioned features creates a new mode of communication and interaction, a socio-technological system, which affords communication amongst users, by dynamically allowing them to merge digital information with physical stimuli of the outside environment.

The LOCUNET project aims at developing a theoretical-analytical framework for studying: a) Human-Computer-Interaction (HCI) and b) interpersonal and intergroup communication, taking place in such hybrid environments. Ultimately the project seeks to arrive first at a series of conclusions regarding the interactions and behaviours manifested within such environments and secondly, at a set of design principles/criteria for creating user-sensitive mobile locative media.

In particular, this project is based on a theoretical structure that can be depicted as a schema of various concentric circles.

a) The wider circle corresponds to the *macro* level that is the wider context of *contemporary urban culture*, which forms the culturally and socially specific environment within which all communication and media use takes place.

b) The second circle corresponds to an *intermediate* level of *media use* and it incorporates three theoretical strands: *Activity Theory*, *Actor-Network Theory* and *Embodiment Theory*. This paper suggests that these three approaches offer compatible perspectives, which could be somehow synthesized in order to form the background for understanding HCI and technologically mediated communication.

c) The third concentric circle is the *micro* level that focuses more specifically on the nexus of *user-to-user* exchanges, acts and relations. Hereby we "zoom in" on the ingroup and interpersonal processes that define the communication system in hand. In order to achieve this, we draw from the vast literature on group dynamics, intergroup mediated communication and collective action patterns in both technologically mediated as well as face-to-face settings.

These three levels should not to be seen separately but as inextricably linked and mutually defined. Thus, the use of new media and all new forms of communication arise from and are conditioned by the wider 21st century urban culture in which they are embedded. On the other hand, urbanity would be an "empty" word without the actions, artifacts, individualities, experiences and adventures that define its cultural content and meaning. At this point, it is imperative to expound in more detail on each of the three levels, which in combination define the theoretical-analytical background of our project.

3.1 The *Macro Level* of Contemporary Urban Culture

The urban environment may be considered as the locus where the basic processes and forces of modernity are crystallized ([23], [2]). Urban studies, from the early Chicago School thought to the newer Urban Sociology insights, has always depicted the city as a complex and highly ambivalent space, where the contradicting forces of modernity coexist in various and often unpredictable ways. Sociologically and culturally, urbanity bears its own unique characteristics. More than a century ago, Georg Simmel explained that the city is defined by a particular "modern way of life", a particular "modern type of man, the city-dweller", as well as novel forms of social experience. Put briefly, life in the city is characterized by a greater degree of individually experienced freedom, of the kind that characterizes social relations that are mobile, plural, differentiated, adventurous, innovative, but also estranged, alienated, impersonalized. Urbanity above all denotes a post-traditional order of mostly secondary, technologically-mediated, social relations evolving around the possibility of multi-belonging to a variety of associations, groupings and social circles which are constantly multiplying and giving social integration new meanings.

City and spatiality

Central to the discussions about urbanity has always been the question about spatiality. New urban sociology purports that stable places no longer exist and have been replaced by fluid and ever-changing spaces. Castells' "spaces of flows" [8], Urry's "horizontal mobilities and

fluidities" and Augé's "non-places"[1], are all depictions of a common theme: places no longer exist as unified, stable and durable contexts, but rather as fluid and rather impersonal meeting points of highly mobile individuals. Modern city-dwellers are said to be 'modern vagabonds' leading 'nomadic' lives and acting as tourists within their own cities ([29]). Structurally and functionally, the urban centre is no longer to be thought of as a "region" (meaning a bounded identifiable place) but rather as a network of networks (borderless, disjunctive, and highly flexible). This corresponds to a more complex structure and thinkers agree that cities are not to be thought of simply as the territorial containers of individuals, groups and buildings. Instead they are multilevel structures, consisting of various interlacing 'scapes' (mediascapes, ethnoscapes, financescapes, ideoscapes, technoscapes) [1] or otherwise put, constructed around "flows" of capital, technologies, people, images, texts, sounds and symbols [9]. What these and other similar depictions suggest is an alternative spatial rendering of the present, one that is not "fixed" as a typical landscape might be, but which is of various, disjunctive sizes, amorphous, and flowing. The various 'scapes', flows, and networks that make up the modern city are the "building blocks," as Appadurai would suggest, of contemporary imagined worlds. If the imagination is associated with the individual and with agency, "the individual actor is the last locus of this perspectival set of landscapes, for these landscapes are eventually navigated by agents who both experience and constitute larger formations, in part from their own sense of what these landscapes offer" ([1]: 33).

Most importantly, new urban theorists have reinstated space as an expression of the social. Augé describes cities as "symbolized spaces with points of reference, monuments, evocative power, everything that is shared by those who consider themselves inhabitants of this city" (1995: 159). The prevailing concept is that space, while being the sum of moving nodes that intersect in variable ways, is not a purely homogeneous geometrical and material space. It is an "anthropological space" that is to be experienced, symbolized, felt, imagined. Subsequently, a city is more than a conglomerate of buildings and roads, surroundings and territories. It is not only geography, but as the Situationists would claim it is also "psychogeography", conditioned by and conditioning human emotions and social experiences. To take an example, walking the city is an act that ends up creating the very city and "constructing" it as a tangible experience [19].

City and ICTs

In contemporary cities, information and communication technologies (ICTs) have brought about a changed agenda of urban studies. Up until the 1990s, the complex links between cities and technologies had been rather neglected. However, the increasing penetration of urban life by new technological media[2] since the mid-1990s somehow 'forced' theorists to turn their attention to the new linkages between ICTs and the changing nature of urban life ([13]: 3). Virilio [30] sees the new media of communication as acquiring increasingly potent powers in modern metropolises and this poses a variety of ethical, social and political problems and challenges. Castells has heralded the coming of the Information Age, not only in terms of the dominant modes of production and consumption, but also in terms of other life-world aspects and issues such as experience, self, architecture, interaction, time.

The use of new technologies belongs to the nexus of so-called "everyday practices" which are to be seen as an integral part of daily life in contemporary cities. In fact, electronic and territorial spaces not only *co-evolve* meanings which "are produced together, as part of the ongoing restructuring of the capitalist political-economic system" ([13]: 67), but are also "socially constructed in parallel" ([13]: 68). From this "recombinant" perspective (of which Actor Network Theory is probably the most influential variant), modern cities can be seen as "hybrid' social entities which consist of networks, connecting humans and material-technological elements, as "fragmented, divided, and contested multiplicities of heterogeneous infrastructures and actor-networks" ([13]: 69).

Location-based media and the city

The arrival of location-based media refuels both the problematique about space and the problematique about the relation between urban life and ICTs. Mobile and location-based technologies are a novel way to inhabit space and social presence. Mediated social interaction is freed from the limitations imposed by the way we access the Internet via a desktop computer and may expand into the city where people already engage in unmediated social activities of a similar kind. Public space, through its colonization by mediation, assumes a new importance and new dimensions, plus new modes of social interaction, such as gaming with strangers, dating, etc. Technology can now be integrated into the everyday activities in the city. This development has led many theorists to wonder whether the use of these mobile technologies may help the city become social again, and transform it from a "non-place" which people simply pass through to a "social city", in which digital technologies are used for meaningful human interaction. Accordingly, Thackara [27] talks about the 'Post-spectacular' city and Tuters [28] about a 'Locative Commons". Of course any answer to whether the public space, which has so much been

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[1] Most people spend an increasing amount of time in soulless, impersonal places: motorways, airports, in front of cash machines, TVs and computers. Non-places are multiplied in hypermodern, western, urbanized societies. These places have no symbolic dimensions. They are places we pass through but don't really identify with, places where people don't meet. Of course, whether one environment may be considered a place or a non-place depends on subjective evaluations [2].

[2] i.e. Internet, mobile phones, GISs, virtual reality, location-based activities, etc..

bemoaned by urban theorists and sociologists as lost in the last decades[3], can be truly restored by the use of locative media, cannot but remain purely speculative at the moment. Many years of thorough research are definitely needed to even approach an answer. Nevertheless, what can be already stated is that through and within these media, what we call "public space", as the locus of spontaneously enacted social interaction, becomes again a mechanism to support and contextualize communicative action between city-dwellers.

3.2 The *Intermediate Level*: how communication technology is used and put into practice

Firstly, it is important to examine and understand what it means to communicate through such systems in a city. This is a question about "how and why we use the media we use" and in order to answer this question we have chosen to weave together three theoretical strands that have been used in HCI and which to our perception present several elective affinities and similarities. This is the intermediate level of our model.

Let us present a brief description of each one and then move on to single out their meeting points, compatibilities and complementarities.

a) The first one is *Activity Theory* (AT), a psychological theory that was first formulated in the Soviet Union, 70 years ago, as a theoretical framework for understanding the relation between consciousness (understood as a set of cognitive processes such as memory or classification) and action. According to it, "we are what we do". And what we do cannot be thought of apart from the social world of which each individual is an organic part. However, this social world is complex and hybrid, consisting of humans and artifacts/tools/technologies. In fact, "activity" is "a form of action geared towards an artifact" [21]. Different activities are differentiated on the basis of the objects they are oriented towards and these objects need not necessarily be material (they can also be a drawing or an idea or a sign-system). Thus, AT sets individuals next to artifacts and objects. Technological "artifacts" communicate human experience.

AT rests on the concept of 'mediation'. All human experience is shaped by artefacts, machines and sign systems that we use. Activity cannot be understood without understanding the role of objects (tools we use in daily life) and the way these objects are integrated in daily social practice. However, people and machines/tools don't have the same status or role. AT gives emphasis to the concepts of motive and consciousness, which are features only possessed by humans. AT is-a more humanistic view of the relations between humans and machines/tools.

In HCI research, AT has been used for defining and elucidating the importance and impact of the "context", the "situation" and the "practices" people are engaged in. One of the uses of information technology is to support communicative acts between participants. These activities are of a communicative and interactional nature; they do not aim to use an object or to transform its use but to make the activity flow, to coordinate motives and actions.

b) The second theory considered here is *Actor-Network Theory* (ANT)[4], a distinctive constructivist approach known for its insistence on the agency of non-humans. An actor (actant) in ANT is anything made to act, whether that is human or non-human. The important fact in this theory is not that humans and nonhumans are treated symmetrically (a given in social semiotics and ecosocial dynamics) but that they are defined relationally as functors in the same total network. The concept of "Actants", for instance, denotes human and non-human actors, and assumes that the actors in a network take the shape they do by virtue of their relations with one another. It also assumes that nothing lies outside the network of relations and suggests that there is no difference in the ability of technology, humans, animals and other non-humans to act. It further notes that as soon as an actor engages with an actor-network it too is caught up in the web of relations, and becomes a part of the "entelechy". This leads to a relational epistemology, which rejects the positivist view of objects or actors as existing in themselves prior to any participation in ecosocial and semiotic networks of interactions.

c) *Embodiment Theory* (ET): As a model for HCI and the basic tenet behind the Social Computing strand, Embodiment Theory [12] understands technology as integrated and situated within a social world. Drawing from the tradition of philosophical phenomenology, embodiment theory provides a model for designing systems of technological interaction by taking into account social action and construction of social meanings that surround technologies.

The keyword for ET is "meaning". We interact with technological systems by constructing social meanings. Users don't just *do*. They construct events, which have meaning. They "appropriate" the world around them, both its physical and its conceptual and technological elements. Therefore ET suggests an epistemology that is "rooted" in everyday world. It emphasizes the context and the social situatedness of media use, in accordance with designers' increasing realization that interaction cannot be examined separately from the contexts within which it takes place. It discusses the concepts of "engagement" and "action", and not distanciated knowledge. It deals with "practice", which is not just what we do, but how we experience this world meaningfully.

3.3 Common threads between Activity Theory, Actor-Network Theory and Embodiment Theory

This paper argues that there are common conceptual and analytical threads that run through these theories and from which a set of basic premises and criteria can be derived to guide us in designing and evaluating a mobile locative system. These are the following:

Media use is a form of social action
Users are not only users of technology, but active agents who act on the basis of personal though culturally-conditioned intentionalities and motives and who are perpetually engaged in meaning-production processes. Users themselves "appropriate" and "construct" the media they use. Therefore, media use must be seen as dependent on their users, on the social environment. Activity theorists claim that "we are what we do". This perspective is based on an emphasis on agency and thus moves away from the behaviorist model of media use and social interaction towards a more constructivist epistemology. More importantly, it takes into account the interrelation between consciousness and action. Cognitive processes, including understandings and perceptions of technological interfaces, are defined and conditioned by actions that take place in particular time and space conditions.

Philosopher Martin Heidegger [16] has asserted that technology is a medium for a purpose as well as a human activity. Technology can be used for various purposes and in various manners, technology can change, but it can never be understood apart from human needs and actions. To reformulate the famous Katz's phrase [17], we must give less attention to what technology does to people and more importance to what people do with technology. Therefore, our effort leads towards a model that does not see technology as a transmitter of messages, but as an object of human attention and social situatedness.

Technological media are integrated and embedded in the social world
These theories see technological media as crucial mediators of social life (AT), as embodied in the social world (ET), even as agents and social actants equal to human actors (ANT). Technological artifacts are not simply tools used instrumentally to carry out various tasks; they are media communicating human experience. The social world consists of humans and artifacts/tools/technologies, it is a hybrid technosocial world. According to the basic axiom of ANT, the social world consists of "heterogeneous associations of humans and nonhumans". All human experience is shaped by artifacts, machines and sign systems that we use. In this framework, any system of technologically mediated communication (and certainly multi-user locative media are such systems) is assumed to be a "type of mediatized (or technologically-mediated) experience". Therefore, all these theories set individuals next to artifacts and objects and emphasize their mutual relationship. None of the human actions can be understood without understanding the role of objects we use in daily life and the way these objects are integrated in daily social practice. However, it must be noted that tools and machines don't have exactly the same status or role in all these theories. Their slight differences notwithstanding, all these approaches are moving away from a purely "technological" approach by suggesting a renewed emphasis on the communicative and psychosocial dimensions of media use. It is after all an axiom hardly ever questioned that a technological medium becomes a communication environment when it is transformed by a simple tool into a medium of symbolic communication between individuals [4].

Media use involves meaning-making processes
The way we are engaged with technologies involves not only material but also semiotic and social dimensions. The way we are involved with technologies is through "practices" and practice in not mere action. Using technology is a "practice" or a "series of practices", a process through which we experience the world and participate in it with meaning. Practice has to do with meaning and the concept of practice unites action with meaning. Actions produce meaning, meanings produce actions. Therefore a technological system can be material but is incorporated in a system of practices through which it acquires symbolic, individual, emotional value.

Although the concept of "meaning" is more central in Embodiment Theory, all the three theories define a "material-semiotic" method. This means that they map relations that are simultaneously material (between things) and 'semiotic' (between concepts). They then try to explain how material-semiotic networks come together to act as a whole, how different elements relate together into a network so that they form an apparently coherent whole. This corresponds to what can be called a 'relational" epistemology ([13]: 69), which rejects the positivist view of objects or actors as existing in themselves prior to any participation in ecosocial and semiotic networks of interactions (including the interactions by which they are observed, named, etc.). ANT for example is according to Graham a "highly contingent, relational perspective on the linkage between technology and social worlds" ([13]: 69). "It is fully 'relational' in that 'it is concerned with how all sorts of bits and pieces, bodies, machines, and buildings, as well as texts, are associated together in attempts to build order" (Bingham in [13]: 69). It assumes that agency is a purely relational process, contingent about space and time and that technologies can only have contingent and diverse effects through the ways in which they become linked into specific social and cultural contexts by linked human and technological agency ([13]: 69).

All media use is contextual and socially situated
Being an integral part of everyday life practices, technologies and media, as all forms of social action, are already and always context-specific, user-specific and socially-situated. AT, ANT and ET all take seriously into account the context within which actions take place and media are appropriated.

Another conceptual model, which has also been extensively used in HCI, is *Situated Action Theory* (SAT), a sociocognitive approach ([26], [11]) known as "cognition in action" [14]. The notion of situatedness denotes that: human being is a situated agent and that human cognition is emergent from the interaction of the human with the environment, i.e., the current situation the human is involved in. More generally spoken, the system-environment coupling is a prerequisite of cognition and cannot be abstracted away. In this sense, SAT is useful in that it sees action not as the execution of a readymade plan but as adaptation to a specific context and situation [26].

As Suchman notes "instead of separating action from the conditions under which it takes place…SAT aims to study how people use these conditions to develop a meaningful course of action" ([26]: 167).

Social situatedness denotes not only the human-system-environment interrelation but another dimension: the specificity (reality) of users and uses. Moving away from abstract media use models, the aforementioned approaches turn towards the always specific and real users and uses of technology. Abstract communication separates the message from the physical environment, whereas situated communication links them inextricably. In situated mediated communication what we must keep in focus is that we don't simply have to do with system users but with social actors interacting in a complex world, social actors who participate in electronic environments for various reasons.

Multiuser technologies, in particular, are by definition communication technologies ([22]: 146), since they deal with a situation whereby a smaller or larger group of people transform the available tools into meaningful social practices. Stasser [25] has also defined interpersonal communication as a process by which a group of social actors in a given situation negotiates the meaning of the various situations, which arise between them. Mantovani [20] suggests "individuals should not be viewed simply as users of certain systems but as social actors and that the "context", is a "common symbolic order through which action acquires meaning and produces meaning". We expect people to behave differently in different places and in different situations. Interaction with others is always context-specific and situated [26]; it is shaped by the physical environment, but most importantly by the richer and rather more unstructured background of social experiences and circumstances ([32]: 2).

3.4 The Micro Level of interpersonal and group interaction

Having examined the wider and intermediate levels of interrelations between urban space and technology, the paper now considers a central issue of the LOCUNET research project, that is how communication is enacted through and within multiuser location-based media used between urban city dwellers. It is suggested that a multiuser locative media system should be evaluated as a medium of interpersonal communication in the same way that other media have, such as the telephone, e-mail, online groups, virtual communities (Palmer in [6]: 291).

For the purpose of investigating communication amongst users of such a platform in the urban context, a series of research questions arise:

1) What are the features and forms of the basic processes of interpersonal communication, which are the codes and mechanisms of interpersonal communication in such an environment?

2) How does the pendulum move from the presentation of personal identity to the perception of the identities of others? Impression management, self-presentation techniques, performativity, and public identity construction

when using locative media, are significant issues that should be investigated.

3) How is alignment achieved? "Where" is the common space among participants? How do users appropriate the communication media they have at their disposal to produce a common definition of the situation?

4) Do concepts of togetherness, group identity or community emerge in this communication environment and through this activity? Do we observe the exchange of socioemotional content and cooperative interactional practices?

In accordance with the methodological requirements of the study of interpersonal and group communication, the LOCUNET research project will attempt to examine these questions by employing a series of user-sensitive qualitative methodologies, including:

- Sustained structured observation for the codification of participant behaviours in the course of interaction. These will be qualitatively and quantitatively analysed.
- Interaction Process Analysis ([3]) which allows the categorization of observed behaviours on the basis of their content and purpose (eg. Socioemotional, task-oriented, friendly, hostile, etc).
- Questionnaires and interviews

4 Designing the LOCUNET system

With regards to the aforementioned classification of the theories involved in constructing a comprehensive theoretical framework for social oriented research on the uses of locative media, an actual system will be developed for the purpose of evaluating aspects of this theoretical framework. This system will aim at enhancing social and group interaction. In this section, the LOCUNET system's requirements and architecture are briefly presented for the purpose of providing a more descriptive illustration of how the theoretical framework, previously discussed, will be evaluated. Finally, the particular scenario that will be developed for the needs of the evaluation is also briefly discussed.

4.1 LOCUNET system requirements and architecture

In terms of methodology, our research focuses at a *micro level* point of view, which relates mostly to the inner circle approaches of group formation and dynamics. Therefore, the architecture of the system is oriented towards satisfying the criteria set by the theoretical framework at group level, seeking out to investigate this level of social interaction, which occurs as a result of using a multiuser location-based communication system.

In any case, there are a number of requirements and prerequisites that have to be met at the technical level, assuring that multiple user interactions will occur. Taking into account specific requirements derived from the goals that the evaluation of the theoretical framework will strive to achieve, table (1) shows the main characteristics that have to be implemented into the system's architecture.

LOCUNET requirements	
Characteristics	**Description**
Multi-user support	Support for simultaneous interaction between many users
Synchronous Communication	Support for synchronous communication between users
Upgrade support	System support for future upgrades and expansions
Open architecture	The platform should be interoperable in order to support multiple applications
Adaptivity	Adapting certain aspects of the system according to users' preferences or/and characteristics.
Creation and exchange of multimedia content	Mobile and desktop interfaces should support the activity of creating and exchanging multimedia content (via microphone, camera, keyboard, stylus etc)
Location awareness	Location detection with 1-2m precision in real time, linkage of information with location (geotagging)

Table 1: System's requirements

Further considerations on architecture include the segmentation of the system in four components:
1) *Client*: runs on mobile appliances.
2) *Server*: the main server that manages and provides content to users.
3) *Application/Content Creator*: An environment, which supports the creation of new scenarios of locative media applications, via a user-friendly GUI, for the purpose of organising new experiments.
4) *Data Structure/ Model –XML based*: All users and objects are represented in the system as Data Structures that have (or not) certain properties: *Location*, *Mobility* (whether the object is capable of moving), *Visibility radius*, *Portability* (whether the object can be picked up and carried by users), *Replicability* (whether and how many times can a user replicate an object), *Group availability* (whether it is available to all participating groups or not).

The client component consists of the following: *interface, scenario application, local database, location-awareness module*. The server component is actually composed of two distinct servers, the *game server* (that sends and receives data to and from client devices) and the *author server*, which also contains the "content creator" application. The Data Model refers to all scenario objects, and also applies to the user profile.

4.2 Application scenario

Within the context of the system, users are separated in two distinct groups: mobile users that move in the urban environment (Group A), and desktop users that remotely "navigate" through the city (Group B). Each group member is visible to all others. Mobile users' representation of the urban environment is achieved through a two dimensional map, whilst desktop users may have the choice of navigating through a 3-D version of the map, that also includes their avatars in a more detailed fashion.

The following scenario is one viable and suggested realization of this briefly described system architecture and its components:

Both mobile (Group A) and desktop users (Group B) have been informed that the purpose of the activity (quest) for each group is the acquisition of five items within one hour. Each group has to transport these items to a different location, and in parallel to impede opponent group members from doing the same. The quest items are visible on both mobile and desktop interfaces only when users are in 2m proximity from each item.

Users can pick up items by walking through them, and hold them in their inventory for a short period of time (e.g. 5 min). When users hold items, their representation on the map is accompanied by an indication that makes the item (and its carrier) visible to all participants. Users can give the item to their team mates, but if they do not do so, and they fail to reach the destination location in time, they drop the item. Thereafter, only another user (team mate or opponent) can pick the item up again. However, when the item is dropped it becomes again invisible in a greater that 2m radius.

With regards to mobile users, teammates are represented by blue dots (Group A), while opponents (Group B) by red dots. Each user's "visual field" extends to 500m radius from his/her current position. The quest items are yellow squares (only visible in 2m radius), while dispersed multimedia content is shown as green rhombuses. This multimedia content is created by both system administrators and participating users, and contains useful or deceiving information, related to the purpose of the quest.

One of the most essential elements of the system is the communication between users, which is both synchronous (messaging) and asynchronous (multimedia content). In any case, the team that has reached its goal first or possesses most items after 1 hour passes by wins.

From the desktop user's point of view, the rationale of the interface is quite the same; still, a 3-D map is far more easily implemented, while text based communication is achieved more efficiently. For that reason, additional constraints will be imposed in the case of desktop users.

Besides qualitative methods for examining group dynamics and interactions, such as observation and interviews, we intend to keep a log of users' actions and communications, whether the latter occur at group or personal level. Messages that users exchange and the content they create is a valuable source for clarifying the levels of attention, interest and participation they exhibit, and the replication or not of pre-existing social hierarchical structures.

5. Concluding remarks

This paper has attempted to consider the various perspectives, which the design of locative media should encompass and to propose some aspects of an appropriate framework, which may function as the theoretical context

for designing locative media systems. This framework provides the theoretical basis on which the LOCUNET project will evolve. According to what has been discussed in this paper, two preliminary conclusions concerning the conceptual and analytical structure of this project can be formulated:

- In order to understand technologically mediated systems of communication, we should analyze individual and group-specific uses of these systems and therefore analyze how participating individuals act within and through these systems in particular space and time conditions. Accordingly, it is considered important to move the analytical focus of this project towards the social setting in which the experience of communication takes place.

- Technologically mediated systems of communication should be seen as dynamic. New processes and activities are bound to emerge during all interaction, and the outcome of these processes will in its turn impact on the initial relation between subject (user) and object (technology, medium). Media use is only partly determined by the medium itself. Media use is always contingent on the particular context, situation, individualities, uses and space-time correlates, which define it.

Therefore, the design solutions that LOCUNET will strive to come up with will incorporate not only concerns about technological advances but simultaneously and maybe most importantly concerns about supporting the actual needs of humans and groups. Thus, the central issue of the LOCUNET research project is identified as the study of the way that communication is enacted through and within multiuser location-based media, used among 21st century urban dwellers.

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