Knowledge Media Institute

Research Proposal

Presence Based Massively Multiplayer Games:

Exploration of a new concept

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1. Introduction

The advances of new technologies and the convergence of different communication media are constantly changing not only our means and modes of communication with other people, but the notion of connectivity itself. Rather that being online or offline, we can be 'connected' in many different ways and without directly interacting with technology itself. 'Presence' awareness, facilitated by Instant Messaging applications, mobile phones, wireless handheld devices, location tracking and so on, makes someone reachable almost at any time.

This research aims to explore the notion of presence on a massive scale. What would be the effect of 'presence awareness' for large numbers of people and what possible group interactions could emerge? There is definitely a particular feeling when being part of a crowd, but how could one get this sense in the online and wireless world? Is there a design that would make palpable the sensation that one was indeed on-line in the company of millions of other people? (Donath, 1996)

This research aims to define and explore the concept of 'massive presence' in the online and wireless world by experimenting with the design of multiplayer games for large numbers of participants; starting from a few tens in order to expand to hundreds or even thousands of people. Expected outcomes would be to find out whether it is possible to have real-time interaction among such large numbers of people in a multi-player game and what could be the challenge or interest for the participants. Another parallel aim is to map the design considerations for real-time multi-user interaction, drawing from the many interesting examples in emergent game genres, as well as non game related areas, like Instant Messaging (IM).

In order to set the stage this study draws upon a variety of areas: Instant Messaging, social psychology, massively multiplayer games, game design, wireless communication, location based games. In the following section titled *Setting the framework for this research,* the importance of each of these areas is identified and the concept of 'presence' based multiplayer gaming is developed. Current research in abstract representations of people in conversation as a means of communicating their presence has been influential and is also presented here.

In section 3, titled *Aims and Objectives* further research aims are put into perspective and the *Suggested Methods and Approaches* paragraph illustrates how the experimentation with a massively multiplayer game will provide the necessary design insight for presence – based play. The *Design Impact* highlights the design decisions that have come out of the investigation so far with the purpose of providing a complete set of design guidelines in the future.

2. Setting the framework for this research

2.1 What is Presence

'Presence' could be described as the sense of *being there in other places* and *being together with other people* (Biocca, Burgoon, Harms, & Stoner, 2001) . We could identify 'presence' in two different, yet complementary ways (Biocca et al., 2001):

- Telepresence, the phenomenal sense of "being there" and mental models of mediated spaces that create an illusion;

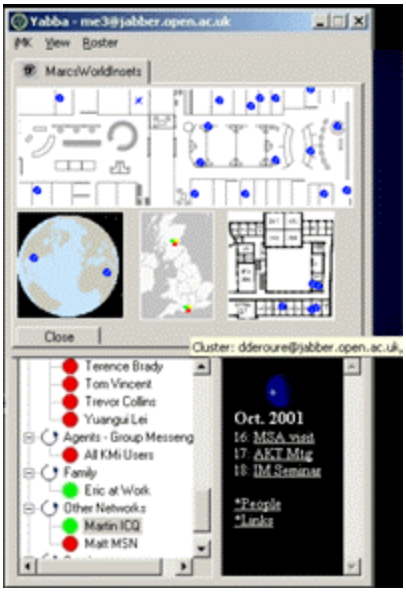
- Social presence, the sense of "being together with another" and mental models of other intelligencies (i.e. people, animals, agents, gods, etc) that help us simulate "other minds".

Different aspects to the sense of social presence can be identified, such as mutual awareness, psychological involvement, behavioural engagement and cognitive states. Presence can be sensed in non visual, but text- based virtual environments such as MUDs, MOOs, IRC chat etc. 'Presence' is described as a feeling of getting lost or wrapped up in the representations of the text-- of being involved, absorbed, engaged, or engrossed in or by them (Lombard, 2000a). Through this process one can experience a "willing suspension of disbelief", as describing the "attitude by which the reader brackets out the knowledge that the fictional world is the product of language, in order to imagine it as an autonomous reality populated by solid objects and embodied individuals" (Ryan, 1999). Alternatively, this process can be seen as a "willing construction of disbelief" (Gerrig, 1993; Gerrig & Pillow, 1998); so as to emphasise the reader's act to assign value to a mental representation, as well as to subsequently reject it, if the representation contrasts their knowledge or beliefs about the represented world. Research in MUDs has shown that the sense of presence is undermined when a virtual world resembles an existing one (e.g. a classroom), while fictional worlds enhance the sense of presence. However, the opposite happens with interpersonal communication; knowing people offline creates a remarkably greater sense of presence in online communication (Jacobson, 2002). In text-based virtual environments interaction with others, rather than spatial representation, appears to be the significant factor in generating a sense of presence- i.e., being with rather than being there (Towell & Towell, 1997).

In the networked world, a sense of 'presence' of colleagues or friends is facilitated by various communication tools. This research focuses on 'pure presence' as the simple sense of 'being connected' or 'in touch' with other people. The most commonly used tools that achieve this are the various Instant Messaging (IM) applications, but there is an increasing trend towards recognising that IM is itself just one (communication-oriented) of many facets of 'presence management'.

One of the fastest growing areas of the internet and wireless communications, instant messaging facilitates one-to-one or one-to-many communications. The most widely known IM applications, like ICQ, MSN Messenger, Yahoo! Messenger, AIM, Odigo and Jabber allow presence information display (typically called 'status'), contact list management and instant message delivery and chat sessions. There is also a significant trend towards integrating IM with the wireless world, and SMS text messages over mobile phones can already be seamlessly integrated into a variety of existing IM products. Currently IM is also implemented on mobile phones through WAP, as well as on Java enabled mobile phones. Instant Messaging is clearly moving into the mobile domain and one of the key functions is connectivity between the internet and mobile world. This inevitably affects usage patterns and can extend the functionality of IM to various directions. Taking for example the current advances in location based technologies, interesting applications are emerging. One example is the FriendFinder service, run by the Swedish Telia (2001). Users can locate their contacts on a map via SMS, the Internet or WAP and communicate with them individually or as a group. In this way people can meet up if they are in vicinity. Other uses of this service, like gaming, are likely to emerge. Interestingly, if someone does not want to be contacted or located, there is an 'invisible' mode as well, which hides the location information, very familiar concept in desktop IM applications (ICQ etc). Another messaging example, though asynchronous and not necessarily directed to particular people, is GeoNotes developed by the HUMLE Lab of the Swedish Institute of Computer Science. GeoNotes is a system on pocket PCs that allows users to annotate physical locations with 'virtual notes'. These can then be accessed by other users in vicinity. Drawing from the concepts of posters, signs, notes and graffiti, the system allows ordinary users to provide, update, remove and comment information in various places. In this way it creates social awareness in physical space that encourages play, expressiveness and personal identity formation (Espinoza, 2001).

A good example that introduces the location aspect in Instant Messaging applications is KMi's Jabber client prototype (Eisenstadt, 2002).



A screenshot from 'Buddyspace': KMi's jabber client with customisable map views, illustrating how one can create their personal space with different views of environments (e.g., office, Lab, country, world).

The customisable map views of 'Buddyspace' allow location based presence awareness of colleagues and friends and enhance a sense of personalisation. Rather that having just different contact lists of names, positioning contacts on maps can create a greater sense of 'connectivity' with people at a distance.

Experts in the telecommunications industry have also attempted to define presence and future application trends. In short, a general notion of presence, while considering the wireless potential, would answer the questions of Who (user), Where (location and device), When (preference and willingness), How, (device capability) and Why (information exchange, leisure, keeping in touch etc) (Chakraborty, 2002).

While the usual understanding of presence in the industry has been that of explicit presence, consisting of geographical location in spatial coordinates and the online/offline status of a device, fundamentally presence reflects changes in a person's context (Emilsson, 2001). The context of our daily life activity is more useful as presence information than location information. Presence information can include a variety of functions, like availability, communication preferences, device capability (Chakraborty, 2002), identity, as well as more abstract concepts, such as a person's intent (e.g. interest) (Emilsson, 2001). Presence is viewed as a constantly evolving dynamic construct with a great potential for future telecommunication applications. Moreover, several industry experts consider presence to be a disruptive technology to the wired and wireless world:

Disruptive technology is a technology that can completely change the way a sustaining technology works. In most cases, a disruptive technology is not noticed and often ignored until it grows exponentially.
(Chakraborty, 2002)

This study aims to provide a composite view on presence, drawing from both academic research and industry perspective. Thus, a synthetic approach on presence information outlines the following fundamental and interrelated functions: *context*, *availability*, *state of mind* and *identity.*

Context

Context can have many different meanings. It can be perceived as the context of activity in which a particular communication takes place (Emilsson, 2001). As one of the fundamental concepts of ubiquitous computing (Weiser, 1996), context can include information concerning the location, user identity, device, proximity of people and devices, and time. In this sense context can be defined as:

Any information that can be used to characterise the situation of entities (i.e., whether a person, place or object) that are considered relevant to the interaction between a user and an application, including the user and the application themselves. Context is typically the location, identity, and state of people, groups, and computational and physical objects (Dey, 2001).

Context however is also "a dynamic construct as viewed over a period of time, episodes of use, social interaction, internal goals and local influences" (Greenberg,

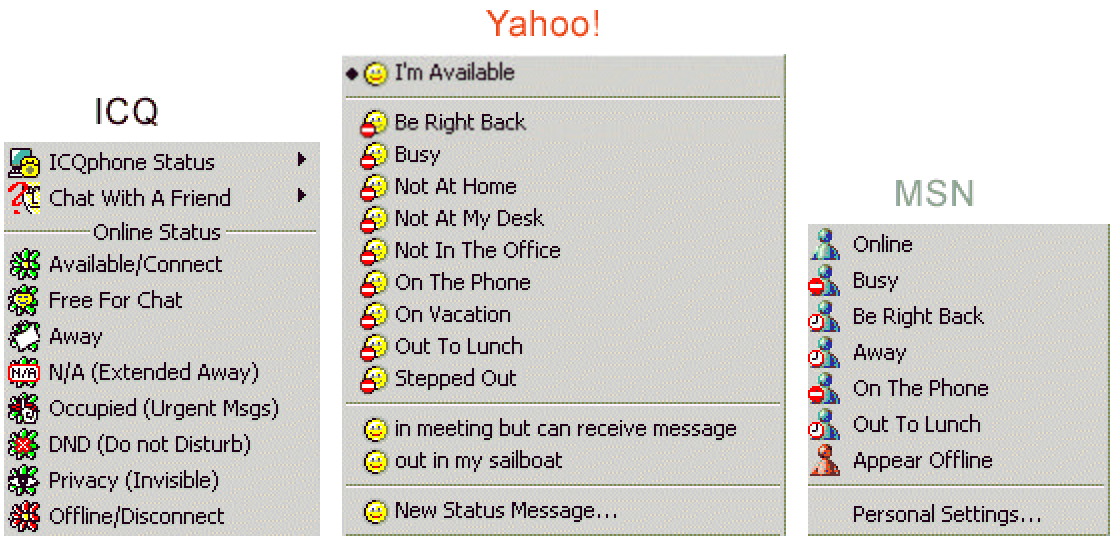
2001). According to Dourish (Dourish, 2001) there are two strands of context – aware computing within HCI research: a) physical based interaction and augmented environments and b) attempts to develop interactive systems around understandings of the social processes surrounding everyday interaction. Dourish argues that the second area, as the broad set of investigations into the relation between social interactions and technology is an important form of context – aware computing that goes beyond the primary technological concerns and helps people to interpret and understand patterns of activity (Dourish, 2001).

It is important to consider context in relation to the type of interpersonal communication that can take place. In a professional environment, context can be defined as activity – specific, for example, a meeting arrangement for a particular group, or a project development process to which users can relate. In this way, an IM application for example, could have groups organised in contact lists according to project, as one person could be working with more than one group at a time.

Considering now a mutely – user entertainment activity, like a multiplayer game, context could have the meaning of a predefined challenge within the game, like collaborating with other players to achieve a goal, making your way out of a maze or avoiding enemies. This would help all participants to relate to the game and coordinate actions. In this case the design of the game should encourage easy and efficient interplayer communication.

Availability

Availability is very closely related to context. Partly availability is about the way we communicate our presence information to other people and partly about the type of communication we can accept (Emilsson, 2001). For example whether we are away and people can leave messages for us to retrieve them later or whether we are online, available for a quick chat to arrange something.



Screenshots of some of the most familiar IM applications. We can see how availability is communicated and that some of the 'statuses' could actually have the same or very similar meaning.

State of mind

Further functions need to be included in order to complement the notion of availability. What we identify as 'state of mind' can be a mood, e.g. for chat, gaming, meeting up or an intention, e.g. going for lunch now. This notion can also be modified for different contexts in order to match more our patterns of everyday life. A wireless IM application could then become a major presence communicator, enabling groups of people communicating their intentions to each other. The state of mind idea appears most interesting for a multiplayer environment. For example, intention, represented by a predefined icon, could illustrate in a game a direction of movement, or a particular action. Mood could have a social meaning, like need for cooperation to perform an action. Part of our research focus is to explore ways to communicate visually and in abstract ways such game related information to other players.

Identity

Various IM clients include personal information display, which ranges from basic information (a username, address, e-mail etc in ICQ for instance) to a more personalised role-playing projection of self (cartoon images you can choose for a user profile in the Odigo Windows client). The creation of a more sophisticated user profile can be very useful as well for information filtering in a multi-user environment. A group can also have an identity, just like an individual (Emilsson, 2001).

A close-up screenshot of the Odigo Instant Messenger: This is the radar view of the Messenger, where one can locate other users. Notice the interesting role playing projection of profile, a rollover image that appears on top of every little figure. (Odigo, 2002)

There is definitely an interesting potential for applying presence information to gaming applications, particularly to a massively multiplayer game, where one needs to communicate simple information efficiently to hundreds or thousands of people. This research draws ideas from the design of Instant Messaging applications to propose a way of experimenting with massively multiplayer games based on presence.

Considering the growth of IM and online or wireless gaming, innovative applications, successfully deploying multi-user communication, are expected to emerge either from game design incorporating IM and presence information or from games integrated to future IM clients. There are already collaborations, like the one between Scan Mobile, an SMS/IM wireless technology company and Odigo, Inc. (Odigo, 2002), aiming to extend the use of Instant Messaging by offering entertainment applications, including multiplayer games.

2.2 Multiplayer Games

The main point to make about multiplayer gaming in general is that we do not have yet any example of a truly massively multiplayer game, where people can interact simultaneously or at least see each other's presence in large numbers, such as groups of hundreds. Even though there might be thousands of players connected to a game at the same time, people will usually interact only with four or five at a time.

Common examples of online multiplayer gaming are multiplayer board, casino and card games (at Yahoo games for example (Yahoo Games, 2002)). In these games any exchange of communication among players is very quick and quite minimal. Usually up to seven or so players can take part in one round, in a group, depending on the game, but the numbers do not rise much higher. These games constitute a reproduction of existing non computer based games, allowing, however, much more limited social interaction and body language communication than the original ones.

Interactive television (ITV) gaming developments on the other hand, reveal a trend towards multiplayer gaming within one household, as players can connect and play together in a similar manner to the multiplayer video game experience. These games are aiming at a different target audience however: casual gamers, who would like to

play a simple and easy to learn game with the rest of the family, rather than hardcore video gamers. Sports, racing games, quizzes and arcade games are some of the usual examples.

When talking about massively multiplayer games, people usually refer to online role playing games (MMRPGs), like Everquest (Everquest, 2001) and Ultima Online (Ultima Online, 2001) or first – person – shooter games like Quake. These games are of particular interest, as there are thousands of people willing to pay a monthly subscription and play them for long hours. The design of current massively multiplayer game examples could provide valuable insight as to how the social interactions are structured and what exactly the players find interesting and challenging about them. This genre is still under definition and designers are looking into ways of building more interesting systems promoting different types of play, constructive and social interaction, without however having yet a clear image on how this could or should be achieved (Kosak, 2002). Another interesting trend in this industry is to allow users to interact with online worlds in new and different ways: there could be the alternative of more casual forms of play – instant messages, e-mail and the like (Kosak, 2002).

In all massively multiplayer games, as mentioned above, players interact in numbers of five or so at a time. The player's view is limited by an artificial horizon in the radar visualisation: this conveniently narrows the immediate scope of events requiring urgent attention, but restricts the 'total immersion' effect that might otherwise be possible to achieve. The map shows more people, but there is no sense of the actual crowd that plays the game at the same time.

Screenshot from Asherons Call, Microsoft's Massively Multiplayer Game (Asheron's Call, 2001). We can see the area map and a radar view with people, represented as dots.

Other examples of massively multiplayer play, like the Nokia Game (Nokia game, 2001), can be asynchronous and more community based. The Nokia game involved players in a real time narrative over a period of three weeks, using all sorts of media, including television, radio and newspapers to provide clues. Players were notified for the next challenge via SMS on their mobile phones, but the game was only played online. While players were in constant contact for information, they always interacted with the game itself alone.

Good observation of all types of available multiplayer games, reveals that there is yet no game in which a player can experience a synchronous massive participation of other people and interact with them in some way. Huge numbers of people are usually considered as a design restriction, not only from a technical perspective (servers crash etc), but from a conceptual as well: how could hundreds of people control their actions? What would be the unifying story or challenge? Would the game be confusing, chaotic or frustrating to follow? In what way could successful social interaction be possible on a massive scale? These are precisely the questions this research aims to address. For this purpose we will experiment with presence based multiplayer games which we identify as essentially different to all massively multiplayer game genres people are familiar with up – to – date (MMRPGs and First – Person – Shooters). This report defines the new concept and points out further research directions.

2.3 Behaviour in crowds

This work has been inspired from very early stages by emergent crowd behaviours like the sports – stadium phenomenon known as the 'Mexican Wave'(Eisenstadt, 2000). Every individual performs a remarkably simple behaviour (stand up, wave arms, sit down) in coordination with the person sitting next and without any particular goal, but just for fun, creating interesting large scale patterns in the stadium. A critical mass of about thirty people is required to get the wave underway; then it subsequently expands through the entire crowd as it acquires a stable, near – linear shape (BBC, 2002). The Mexican Wave phenomenon is more likely to occur when spectators are not already over – excited, such as during flat periods in the game, and it works better in big crowds. For a scientist, the interesting specific feature of this spectacular phenomenon is that it represents perhaps the simplest spontaneous and reproducible behaviour of a huge crowd with a surprisingly high degree of coherence and level of cooperation (Vicsek, Helbing, & Farkas, 2002).

Considering events taking place in public spaces where one can be part of a crowd or a group of people, like concerts and festive celebrations, we can identify a special 'atmosphere' which can positively affect individual behaviour and feelings. On the other hand, in crises or challenging situations, people's actions and competitive behaviour are also influenced by the behaviour of others surrounding them. A striking example of this is the way people in a crowd can panic, e.g. when rushing towards a narrow exit during a fire, thereby blocking it.

A classic experimental study of non – adaptive/self – defeating group behaviour was undertaken by Alexander Mintz (Mintz, 1951). Mintz's study showed that people change their behaviour according to their expectations of the behaviour of others, as well as what actually happens in the process of a challenging situation. Mintz's experiment was valuable because it showed that non-cooperative behaviour in panics is not a result of violent emotional excitement as suggested by social psychologists and early crowd behaviour theories. Instead he explains "the non – adaptive character of such behaviour in terms of people's perception of the situation and their expectation of what is likely to happen" (Mintz, 1951).

The experiment: each participant had to take their paper cone out of the bottle before it would get wet. Only one cone could come out of the bottleneck at a time and there was a reward or punishment structure with very little money.

His experimental study in the form of a game can be indeed applied to a variety of disciplines. Mintz pointed out that: if cooperative behaviour is required and a minority ceases to cooperate, then the whole cooperative pattern breaks in a vicious circle of results, since the needs of the individual conflict with the group strategy.

Some aspects of Mintz's study could prove valuable in the design of a massively multiplayer game – experiment within the suggested research framework, where cooperation would be required to accomplish a task or defeat an enemy. Another interesting issue to investigate is intergroup competition, in order to see how groups of people might behave and organise themselves in order to win other groups. Research has proved that people change their behaviour accordingly if assigned as members of a particular group, even if the group identity is minimal, for example, based on random division. In the context of Social Identity Theory, Henri Tajfel (Tajfel, 1970) performed several minimal group studies, where he discovered that group members acted in ways supportive of their, even minimal, group identity. His experiment fulfilled the following criteria, identified in 1992 by Schiffman and Wicklund:

- No face to face interaction

- Unknown personal identity of every group member

- No particular advantage of belonging to one group or the other

- No advantage or gain for the individual as a result of a particular position/action (Schiffman & Wicklund, 1992).

Billig and Tajfel (Billig & Tajfel, 1973) found that even when group members knew that group membership had been decided randomly (e.g. by tossing a coin) the results were still the same, i.e. supportive of the minimal group (Billig & Tajfel, 1973). These experiments are quite simplistic in relation to real life situations, but nevertheless indicate a tendency to identify ourselves in terms of 'we' when there is already some kind of social categorisation.

Taking a step back to the concept of the 'crowd' there is another theory that has investigated the effects of being part of a crowd, anonymity, issues of identity and personal responsibility in large group situations – the theory of deindividuation. Deindividuation is defined as the loss of self – awareness and evaluation apprehension in situations that encourage anonymity. Several studies have confirmed less

acceptable social behaviour occurring when personal identity is hidden. For example, Zimbardo's 1970's 'electric shock' experiment with female N.Y.U. students giving 'shocks' (false ones), while either wearing a large name tag, or white hoods and capes, revealed that the women with concealed identity pressed 'shock' buttons for twice the amount of time than women who were wearing name tags. Studies in other fields have reported findings consistent with Zimbardo's theory. Watson (Billig & Tajfel, 1973), in an archival study of ethnographic records (Watson, 1973), found a clear correlation between cultures which indulged in highly aggressive practices towards their enemies and those which also regularly changed their appearance before battle in a ritual way (face, body painting or wearing masks) (Brown, 1988). Other findings, from Diener's 'Trick or Treat' experiment (Diener, 1979), for instance, have provided more evidence for the theory of deindividuation. In this experiment, children would take more than one sweet when the experimenter was not present, even though they were prompted to take just one. When the experimenter was present or when there was a mirror just in front of the sweets they tended to be more obedient. However, the focus on the negative effects of deindividuation has proved to be one sided. The circumstances which are alleged to cause deindividuation may give rise to other forms of behaviour apart from aggression (Brown, 1988). In another experiment, Diener (Diener, 1979) showed that a prior experience of activities designed to create a group cohesion (e.g. adoption of a group name, singing and dancing), subsequently led individuals to engage in more unusual and inhibited behaviours (e.g. playing with mud) than those who had an initial experience which made them feel rather self-aware. More convincing on the contradictory possible effects of deindividuation, Johnson and Downing (Johnson & Dowining, 1979) replicated Zimbardo's experiment, but had also women wear nurse's uniforms instead of hood and cape. Those wearing uniforms were less aggressive in 'giving shocks' than those not wearing uniforms. This also brings along some interesting questions on how different fictional identities can affect behaviour in group situations. Diener suggested that factors present in some crowd situations – like anonymity, enhanced arousal, cohesion – lead people to direct their attention outwards and correspondingly less on themselves (Diener, 1980). In this way, people's behaviour becomes less self – regulated. The importance of these findings is that they show that being in a group, even in a primitive one, like the crowd, does not necessary lead to negative or aggressive behaviours as early crowd psychology had suggested. Rather people in deindividuated states, i.e. less self – aware, are more responsive to external, situational cues of how to behave than self – aware persons (Frank & Gilovich, 1988). Taking a further step, Reicher (1984) (Reicher, 1984) has suggested that crowd behaviour involves a change rather than a loss of identity. People might loose some sense of their personal identity, but their social identity sense, as members of a particular group increases. He also emphasised that crowd behaviour is very often an intergroup behaviour (e.g. rioters against policemen).

Recent research into the effects of computer – mediated communication (CMC) has also shown interest in anonymity and deindividuation. The Social Identity Model of Deindividuation Effects (SIDE) by Lea, Spears and others proposes that visual anonymity reduces the communication of interpersonal cues within a group, allowing certain social group information to become more salient. This has the effect of shifting perceptions of self and others from the personal to the group level, thus encouraging behaviour that is normative for the salient group. The self tends to be

perceived and presented more in terms of similarity to a social group (Lea, Spears, & Groot, 2001). In other words, depersonalised perceptions of self and others increase attraction toward group members and this process is stimulated by the dearth of individuating cues in visually anonymous interactions. This suggestion is contrary to early deindividuation theory, which generally, predicts more negative anonymity effects (e.g. aggressive behaviour). Since anonymity can also promote positive and prosocial behaviour, our research aims to explore possibilities of collaborative play and synchronised behavior by introducing abstract group identity characteristics (e.g. same color or shape) in experimental presence – based games.

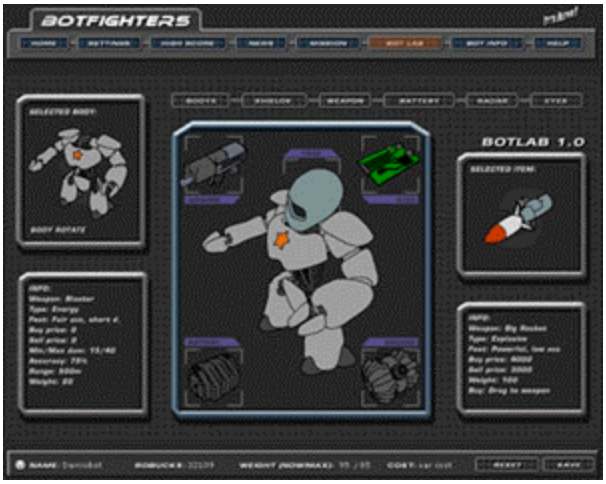
These theories provide food for thought for the design of massively multiplayer games aiming to encourage group interactions. Identity for example is an interesting parameter to experiment with. For instance, if there is a game – related identity, suggested by a user profile that can be viewed by other players, how would that affect the game and what would be the differences in anonymous play of the same game? And how would the sense of a group identity affect play? Will there be any emerging behaviours? The balance between cooperation and competition is also a very important issue to take into account in the game design. Game design has always focused on competition, in order to satisfy people's needs to compete against each other. However, there hasn't been sufficient evidence so far against successful cooperative gameplay; a good example is a simulation where people need to cooperate to achieve particular goals, as in the Sims game (The Sims Online, 2002). A game idea with variable versions as proposed in this document will help us see whether it is possible to have large – scale multiplayer cooperative games and what would be different if, for instance, we attempt to introduce intergroup competition.

2.4 Emerging game genres on wireless platforms and location based games

A closer look at currently emerging game genres will reveal some very interesting observations. The advances of wireless technology have encouraged new types of games, appealing to a larger audience than devoted hard core gamers. Wireless platforms and location based applications are particularly interesting as regards to multiplayer interaction and ideas proposed by this research can be very applicable in this field. In the next paragraphs a presentation of current trends, games and playful applications points out some of the fundamental characteristics, as well as advantages of mobile play.

Wireless devices, like Cybiko (Cybiko Computer, 1999-2002) for teenagers, are clearly very promising as entertainment platforms. Gaming applications based on mobility open up new interesting opportunities, as people have some time to spare for play when waiting for the bus or commuting. Use of commute time partly explains the success of mobile games in Japan (McLorinan, July 2001). The usage patterns vary, but the most common pattern for mobile gaming appears to be frequent – but – brief interactions.

Left: The Cybiko computer for teenagers.



Right: BotFighters: Screenshot from www.itsalive.com *(It'sAlive, 2002). The game combines online with mobile gaming. At an initial stage you build a robot on the site, but the actual game is taking place in the street, by using the mobile phone as radar to locate others and to send them predefined 'attack' messages.*

In 1998, an interdisciplinary EU funded research project, called FLIRT (Raby, 2000) (Flexible Information and Recreation for Mobile Users) explored the potential of playful and social uses of the mobile phone in the city of Helsinki. Most interesting about this project is that some of the ideas presented in the proposed prototypes are now being implemented in different ways in the wireless world. While FLIRT explored the relationship between information flow and the urban environment, one of the most interesting ideas it proposed, 'Pixelkissing' involved indirect person to person interaction through a kind of 'playful' fictional narrative, like a dream – like 'dating service' based on people's everyday commuting routes. Focus was put on awakening imagination, blurring the real with the fictional rather than providing commercial games or mobile dating. Unsurprisingly, real dating services and location based commercial games are already available today.

Examples of this location based gaming trend are 'X – Fire' and 'Botfighters' games by the Swedish company 'It's Alive' (It'sAlive, 2002), in which players can send 'shoot' messages to each other depending on their proximity.

Other companies are focusing on this area as well, e.g. the Swedish BlueFactory (BlueFactroy, 2000-2002) or the UK based Digital Bridges (Digital Bridges, 2001). Mitsubishi/Trium has also developed a prototype for a real – time location based hide – and – seek game, Manhunt (Bruce, 2002). The Danish company Unwired Factory (UnwiredFactory, 2001) has developed a location based treasure hunt game, the TreasureMachine, as well as another game called Zonemaster, where the aim is to conquer 'zones', parts of the city.

The Zonemaster: Screenshot from www.unwiredfactory.com*. The player attacks others by sending SMS or via WAP and whoever manages to win the most territories is the winner.*

The TreasureMachine: Screenshot from www.unwiredfactory.com*. The player searches for treasures by going to a particular location (hints are provided) and sending a message on the spot.*

From a technological point of view location based games can be divided into three categories (Sotamaa, 2002). The older form of 'treasure hunting' games are based on the use of Global Positioning System (GPS) receivers, not even mobile phones, but since these have no communication features, their concept cannot be applied in multiplayer gaming. Secondly, there are experiments carried out in wireless local area networks (WLANs) with proximity sensors. An interesting example of an experimental game fusing location based with online gaming is "Can You See Me Now", using GPS positioning and a wireless network. Players are playing on their computers, but their avatars are being hunted in the streets by real people (Can you see me now, 2002). The third category of location based games is taking advantage of cell identification in GSM networks, like the Botfighters game, mentioned above. While not as accurate as other alternatives, cell identification does not require any new hardware or additional cards. So games can be played by using standard GSM phones and the industry expectations are higher for this category (Sotamaa, 2002).

The wireless industry has shown great interest in these emergent forms of mobile entertainment. On July 3 2001, Ericsson, Motorola, Nokia and the Siemens Information and Communication Mobile Group launched the Mobile Games Interoperability forum to define an interoperability specification for mobile games on network-based servers (Ericsson, 2001):

*One of Siemens IC Mobile objectives is to facilitate the experience of multi-player games - anytime, anywhere and across multiple devices and platforms. Mobile gaming is not only about "just playing" but encompasses a rich entertainment experience that includes various application segments such as messaging and location based service*s (Thorsten, Heins – President of Solutions within the Siemens Information and Communication Mobile Group).

Motorola, Ericsson and Nokia have also established the Location Interoperability Forum in September 2000, in order to promote interoperable mobile location service solutions and to control this rapidly developing field. At the same time we notice that established digital games companies are moving into the mobile world. Partnerships are formed between wireless companies, i.e. network operators or device manufacturers and video games giants, including collaborations of Motorola with Sega, Nokia with Eidos, Orange with Rage, and NTT with Nintendo (James, 2001).

At present, the wireless games market is at its infancy; generally simple text-based and graphically limited games over SMS and WAP games are available, with the exception of Japanese mobile games developed for the i – mode platform. Entertainment services on i – mode are considered at present more engaging, graphically interesting and not very expensive. A good example is Samurai Romanesque (Scuka, 2001), a massively multiplayer java based game with reference to actual historical places, where players practice sword fighting and socialize. Interaction takes place between no more than two characters at a time. Samurai Romanesque integrates real – time weather data, provided by the Japan Weather Association, so that game settings change as the real world weather changes; for instance, when it is really raining, a character may move slowly, as the roads in the fictional game world would be muddy.

Another interesting domain includes also hybrid types of games, using a whole variety of media to engage players in what can be called ‘pervasive gaming’, an activity where the game, rather than the players themselves, controls the ‘where’, ‘when’ and ‘how’ of playing. Majestic by Electronic Arts (EA), for example attempts to blur the distinction of game fiction and everyday reality. Majestic however failed in its attempt to attract an audience of casual gamers and did not appeal to hard core gamers, probably exactly because the player had little control on the time and circumstances of the gaming activity (Kushner, March 7,2002). The similar Nokia Game (Nokia game, 2001) on the other hand, is a successful example because of its international and well designed advertisement, played by thousands of people in November 2001.

Summarising the most important issues related to emerging wireless technologies, we identify the following general trends, which are necessary to consider when designing a multiplayer game, as well as other multi – user communication applications:

- *Locality.* People are more likely to use their mobile phone to get an idea of their closest surroundings and then maybe to get an overall view of a place. A good example is the Japanese ‘fishing’ game on i – mode, with which commuters pick up elements from their surroundings on their way to work and then get different scores. So there is a move from specific to general and wireless applications should be

developed with this structure in mind. The focus of the wireless users concentrate on local needs, which in a way contradicts with conventions of Internet information retrieval, where searches start from a general, global view, to more specific content (Sacher & Loudon, 2002).

- *Blurring the physical world with mobile information*. Since the mobile phone is used 'on the move', in constantly changing surroundings, of particular interest is the way people can flexibly interact with their environment and with others. Blurring the boundaries between the urban environment and the small world of the mobile phone display is mostly challenging. Using streets as a game board, not only questions the definition of gaming but also brings new nuances and level to the production of meaning in urban space. If the mobile gaming ideal is to free players from the chains of time and place, location based gaming on the contrary operates through creating new meanings to familiar locations. Then again emotions, memories and perceptions attached to places can affect the game play, for instance in some cities there are certain no – go areas (Sotamaa, 2002).

- *Short, often interrupted interactions – casual play*. It is within the nature of the medium not to allow long interactions. Commuting time can provide an appropriate time for play, but playing can be interrupted at any time. Contrary to all the online massively multiplayer games, players would unlikely perform complicated actions through their mobile phone. This in turn changes the whole relationship to playing itself; a more casual mode of play is expected. Rather than aiming at a devoted video game audience, it seems more reasonable to develop simple to learn entertainment applications that can encourage truly massive participation.

- *Presence awareness- connectivity.* Probably the most important aspect, as identified so far. There is certainly a need to feel 'connected' or 'in touch' with other people, what we identify as a sense of 'presence'. Buddy lists, location information, availability, intentions, all illustrate the importance of user – to – user or user – to – group communication needs. Considering those needs in a gaming context can provide new ideas and perspectives to wireless gaming.

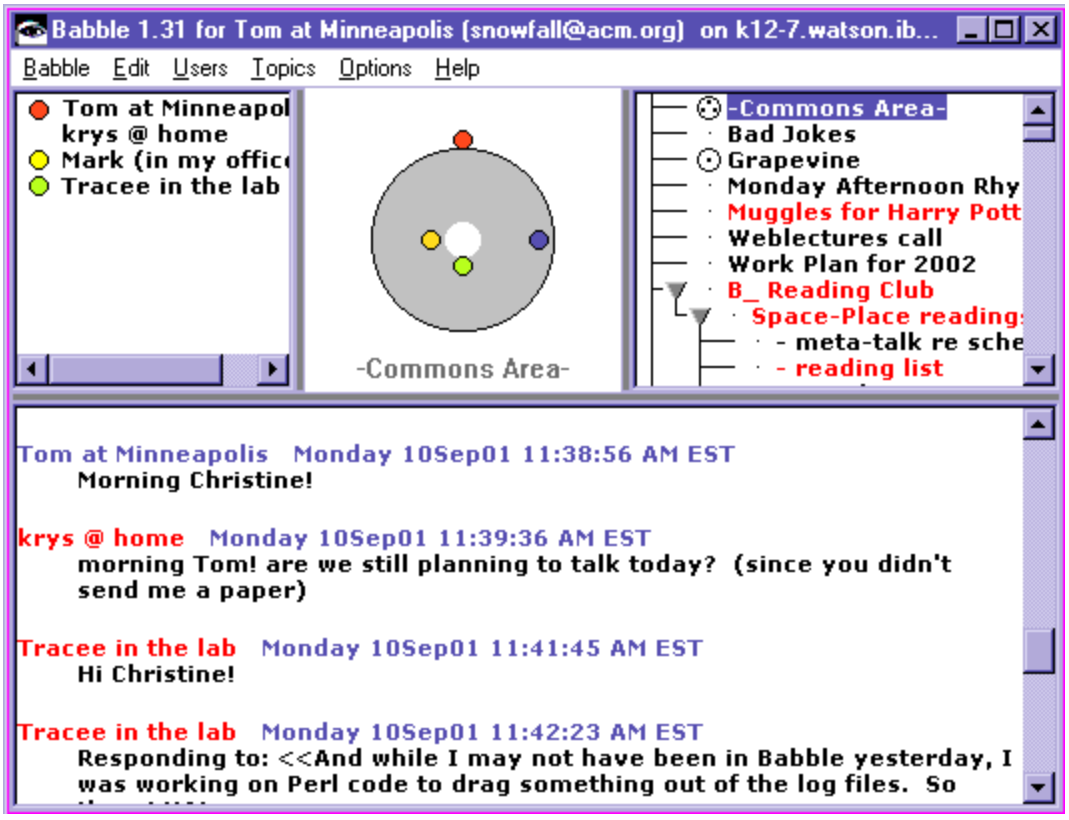
The most compelling element for future wireless entertainment applications is social interaction through play. Here is where the early ideas presented by FLIRT become valuable. The challenge and interest in a game increases when playing against human opponents. If socialisation is the key in gaming, game design should attempt to explore all possibilities to encourage social interactions and structure relationships among players.

2.5 Some interesting research to draw upon

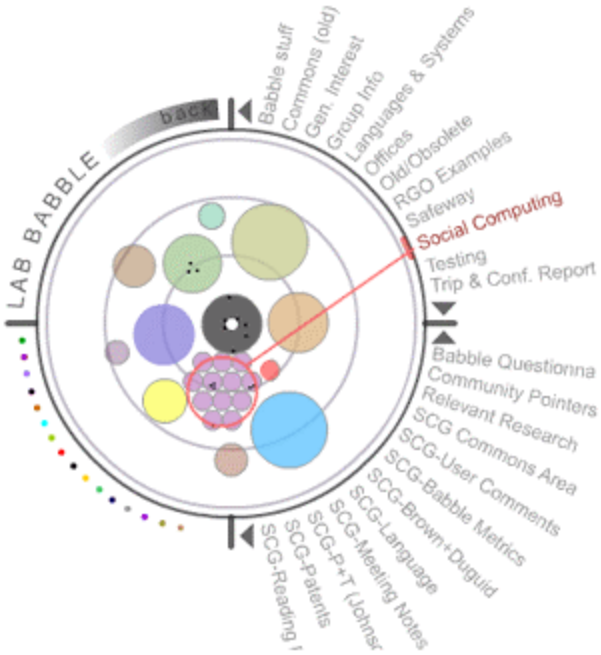
This research draws on some very interesting examples on how to communicate social cues and contextual information in a computer mediated environment in non explicit ways. Thinking of how social interaction could be enhanced through play, the

prototypes described below provide an inspiring research background. Rather than trying to reproduce an illusion of reality or create anthropomorphic avatars, the approach is to explore more abstract ways (as well as scalable for large groups of people) of communicating personal information and social behaviour.

In this context, Tomas Erickson and the Social Computing Group at IBM have tried to design "socially translucent systems", systems that make perceptually – based social cues visible to their users, by supporting mutual awareness and accountability (Erickson, Halverson, Kellog, Laff, & Wolf, 2002). 'Translucence', in contrast to 'transparency' indicates that the aim is not to make all socially salient information visible. It also stands for the notion that, in the physical world, cues are differentially propagated through space (Erickson et al., 2002). The Social Computing Group has developed several prototypes to illustrate the idea, for example the Babble System, a group discussion tool. A minimalist visualisation of people and their activities, what is called a *social proxy* indicates the level of attention. When people are either talking (type) or listening (click & scroll), their dots move to the inner periphery of the circle and then gradually drift back. This can also scale up with several conversation circles, as exemplified in the 'Landscape Proxy', where different categories of discussions are rendered as circles within a larger conversational space and they grow with user activity, indirectly allowing users to 'author' their own virtual space (2002).



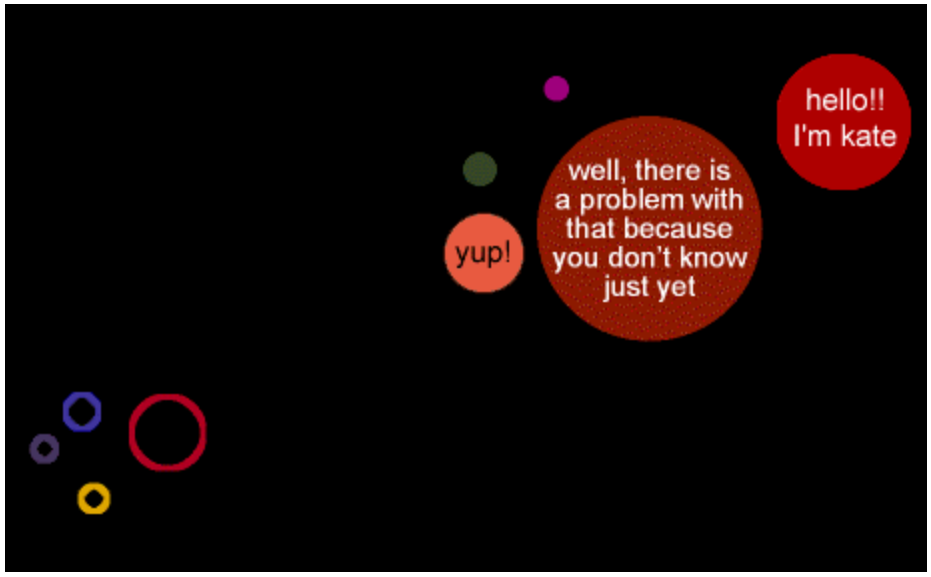
Screenshot from the Babble prototype of the Social Computing Group at IBM

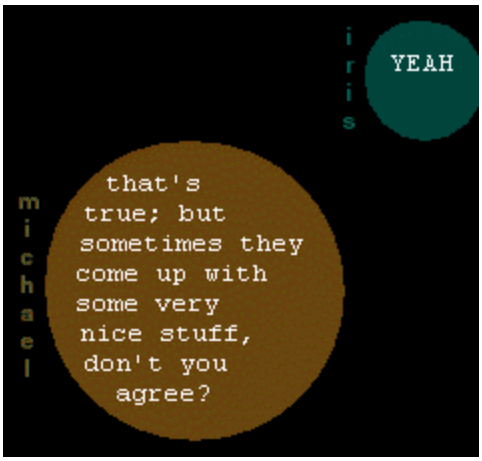


Screenshot from the Landscape Proxy of the Social Computing Group at IBM

Other, particularly interesting research comes from the Sociable Media Group, at the MIT Media Lab, attempting to explore the potential of visual languages which convey social meaning.

In one of the implemented prototypes for visualising conversation, 'Chat Circles', presence and activity are made manifest by changes in colour and form (Viegas & Donath, 1999). Users are represented in space as a coloured dot with a name. Each person has a 'hearing range' that allows them to engage in conversation only with people in vicinity, maintaining however a sense of a broader social environment and its activity. The users outside the 'hearing range' appear as outlined circles rather than fully coloured and their messages are not displayed. Users who have been idle appear as faded dots. The design of 'Chat Circles' indicates not only the number of people, but also their level of presence and participation with a more rhythmic and organic feel of the interface. Circles grow with text and slowly shrink and fade to their original dot size, like in real life conversations, where the focus is on the words said by the person who spoke last and, progressively, those words dissipate in the midst of the evolving conversation (Viegas & Donath, 1999).





Screenshots from the Chat Circles MIT Media Lab prototype – the hearing range.

Another interesting example within the same group is Chatscape, which further develops some of these concepts. Using visual metaphors that can be recognisable from coloured shapes, such as roughness (e.g. a spiky shape) and smoothness (e.g. a round circle) it is possible to communicate different moods and meanings, like chaos and tranquillity respectively (Lee, 2001). Another interesting facility is that other users can modify a person's social identity profile by assigning attributes and in this way change the person's shape appearance, thus creating a 'reputation system'. This brings interesting social behaviour in the conversation. Also if two shapes keep chatting continuously for a certain amount of time, their colours start to blend.

All these ideas and metaphors are very useful within the scope of our research to find ways to communicate presence information visually to large numbers of people and get a sense of the whole environment of a massively multiplayer game.

2.6 Where it all comes together

This study attempts to explore the challenging idea of a game where the very presence of hundreds or even thousands of people could not only be advantageous for the game itself, but actually form the fundamental premise of its play. For this purpose, we suggest the implementation of a massively multiplayer game/experiment, based entirely on real – time presence information that would encourage a varied audience to participate. Motivation, pleasure and social interaction are parameters that we should investigate. If a game can reproduce in some way the 'crowd' atmosphere that people feel in real life events, many interesting observations will come to foreground. Our experiment will also feed ideas into the game design and help us understand how the presence of large numbers of people can affect the playing experience. One of the key design challenges in this experiment is presence information and the different ways it can be communicated. Or in other words, how to design a game where goals and actions depend on changes in every individual's presence information.

For this purpose IM design, game design, social psychology and applications enhancing a sense of presence provide ideas that give form to the concept of presence based massively multiplayer games.

3. Aims and Objectives

Real life examples, like the Mexican Wave phenomenon provide evidence of unexpected collaborative behaviour. Within a gaming context, with several predefined rules and challenges, it would be interesting to see what kind of social interactions would emerge. The fundamental questions this research attempts to answer are: "Is it possible, can we have real time multiplayer interaction on a truly massive scale? At what point does the sheer number of participants inhibit the pleasure of the game experience?" Another fundamental issue concerns cooperative play, which is not particularly encouraged through commercial genres, with a few exceptions. Not only massive, but also synchronised collaborative action is the greater challenge for future massively multiplayer games.

In addition, the study will be looking at visual representations, game dynamics, multi-user real – time communication and game playability. Various design considerations will be brought into discussion to explore possible solutions for different platforms, for online and wireless gaming. Identifying the limitations of a massively multiplayer experience would also prove useful to other, multi – user presence based applications. In particular, the study will investigate the following parameters in a presence based game prototype:

a) *Physical constraints*: movement and collisions in space with large numbers of participants. We will introduce an experiment with 20 – 30 people and gradually increase the number of participants.

b) *Visual Communication/ Interaction*: The number of people the user can see/ be aware of in their display (considering also restrictions applying to the display of handheld devices). The relationship between visual information and physical constraints is very relevant: i.e. to what extent can we have the greater possible number of participants, but still be able to see and understand their presence information.

c) *Psychological constraints*: The sense of pleasure, motivation and engagement: Do participants find such a game fun? Is there a reason for people to communicate and exchange messages? How strong is the social aspect? The Social Identity Theory and H. Taijfer's minimal group experiments (Tajfel, 1970) are also relevant here. If we introduce different identity elements, we could see how players' behaviour would change. The group identity parameter is very important and has been influential from the early stages of this work: encouraging a group identity for intergroup competition can make the game more interesting and promote repeated interaction, rather than a 'one off' play.

4. Suggested Methods and Approaches

A series of game concepts have been developed so far, with many design iterations and suggestions. The initial inspiration for all these ideas can be found in GridMania, a series of Mexican Wave like, cyclical rhythm – based concepts for online games (Eisenstadt, 2000). These created the fundamental idea of changes of 'presence states' creating behaviour patterns performed simultaneously by hundreds or thousands of users. Although fixed location 'state' changes offer great scaleability, they limit the possibilities of social interaction and gameplay. So alternative, movement based ideas encouraging group clustering and information exchange followed. Children's outdoors games brought into discussion the idea of a large scale bumper car game, where people could drive around, communicate, challenge, and play by bumping into each other's virtual cars. The BumperCar concept (see Appendix for a design document and screenshots) summarises all early ideas and is very promising as a testing environment for around a hundred players. Drawing from many areas, including A. Mintz's experiment, Social Identity theory and the design approach of the Sociable Media Group at MIT, this game is currently at a design phase; an early prototype will address the main research questions through evaluation, user testing and interviews:

- *Is it possible*? Abstract representations are very scalable and are more appropriate for communicating large scale presence information, as seen from relevant research by the Sociable Media Group at MIT and the Social Computing Group at IBM. So we believe that such a game is actually possible to some extent which we wish to specify. If the game is unsuccessful or people play it only once there could be several reasons to reflect upon: lack of motivation, not compelling challenges or technical difficulties preventing the game from becoming engaging enough. Group collaboration and communication should then be encouraged in order to make the game more interesting through player interaction. It could also mean that people focus on local interaction and are not interested in using the tools providing an overall view of the environment. In this case the design should reconsider existing challenges as well as allow and encourage player 'teletransportation' from one area of the massive environment to another. Technological limitations (network traffic, server updates) are considerable; for this reason the game will initially be tested with a few players with the intention to expand the player number at a later stage. We will introduce some bots to create a massively multiplayer atmosphere for the purposes of our experiment.

- *Can we have movement and collision on a large scale*? Again the game design will aim to accommodate as many players as possible by providing a scalable overview ('radar view') of the whole environment in which players will be able to locate themselves easily. There will be several starting points to avoid player clustering on a small area. These physical constraints will define screen space requirements. The nature of the game on a mobile phone would be more strategic to allow a completely different and platform appropriate design.

- *Can the user see the 'state' of others*? The prototype is drawing from presence and IM design to involve the largest possible number of players. If participants don't use the radar view, or find it hard to keep up with others' activity, presence information should be made more explicit and easy to see, so that player interaction can move from a local to a larger scale level.

- *Is the game fun to play and motivating*? Psychological constraints need to be addressed by observing the way people play the game, the duration and frequency of interaction, as well as players' evaluation of the game itself. If the game is too hard or too easy to play, then appropriate changes will be made (e.g. introduce more challenges and levels of difficulty or encourage more 'group' formation and team play).

- *Do people communicate and exchange messages*? There is always a trade – off between immersion in play and communication; the game design aims to encourage both. Instant Messages are more applicable for the duration of the game, but a separate chatroom would accommodate participants who prefer to take breaks and socialise with others. If exchanging messages during play is too complicated, some predefined messages will be provided. The game aims to encourage people to interact through collaboration challenges and 'flocking' behaviour, which might actually be possible with a minimal exchange of messages, just by observing presence 'state' changes.

- *Can players get a sense of belonging to a group just by having a particular colour*? Drawing from Social Identity theory and Tajfel's minimal group experiments, we are interested to see whether players will treat others with the same colour differently (e.g. avoiding going against them, being more aggressive with different color coded groups). Such behaviours would encourage more experimentation with group identity features and social behaviour.

- *Do we have successful flocking behaviour in the game*? Social psychology theories and anonymity effects on group attraction can be explored through the challenge of forming teams or 'flocks' to achieve particular goals in the game. Drawing from Lea & Spears' ideas related to the SIDE model, we want to find out what could facilitate people within the game to identify themselves with a particular group and how more or less explicit identity clues affect this process. This will help us understand how to motivate people to form groups and what will be the nature of these groups. We believe that collective behaviours actually give meaning to this type of casual, presence based play and moreover create a completely new, socially enriched game genre. A separate version of the game (version 2 in Appendix) will be implemented to explore player flocking behaviour. But whether flocking could work on a large scale or not is an interesting issue in its own right. If we have teams that do not last long or are not enough for the game to become engaging, we should consider the following possibilities: either it is hard to form flocks (for example, players cannot agree on the direction of move), in which case presence information (e.g. direction) and simple controls should solve the problem, or many people prefer to play alone

rather than collaborate with others. In the latter case we would have a design problem (how to enrich the flocking experience), but also the influence of previous gaming experience: players might find it difficult to adopt a game style presupposing some compromise. Then the design will focus on providing a more structured group experience, on empowering the individual and the game world will be based on collaboration. Players will be discouraged to leave their flock. Other problems that might occur, such as players disconnecting from the flock, could be solved by substituting the missing player with a bot if necessary. If flocking behaviour is successful in the game we can prove that cooperation on a large scale is possible. The overview of the whole environment will help players to locate the most successful or the largest flocks.

- *Will people cooperate to get out of a randomly appearing 'escape' exit*? We want to test the idea of A. Mintz's experiment as a cooperation challenge within the game. Since Mintz's experiment included only up to15 participants, we plan to explore his idea of crowd panic that happens when the needs of the individual conflict with the group's cooperation strategy, with as many people as possible. But furthermore, by providing such challenges, we want users to surprise us with any unexpected emergent behaviours. This will not only add an additional interest to the game, but also provide food for thought regarding social behaviour in massively multiplayer games: such games can become a very useful testing environment for social psychology research.

5. The design impact

The essential lesson that we have abstracted from our experiences with Habitat is that a cyberspace is defined more by the interactions among the actors within it than by the technology with which it is implemented. At the core of our vision is the idea that cyberspace is necessarily a many-participant environment. It seems to us that the things that are important to the inhabitants of such an environment are the capabilities available to them, the characteristics of the other people they encounter there, and the ways these various participants can affect one another (Morningstar & Farmer, 1991).

From the very first visual multi – user environments, like Habitat in the 80's, it became clear that social interaction is a key issue for large scale networked spaces. With this in mind we aim to encourage motivation in our presence based game – experiment by enhancing collaboration, playful challenges and communication among the players. We believe that in this way a truly massively multiplayer game is actually possible. Cooperation challenges like the 'escape' exit in accordance to A. Mintz's experiment add interest to the game itself, but also indicate an open ended approach, since we want to see what might happen and what kind of social behaviours can emerge.

It was clear that we were not in control. The more people we involved in something, the less in control we were. We could influence things, we could set up interesting situations, we could provide opportunities for things to happen, but we could never predict or dictate the outcome (Morningstar & Farmer, 1991).

Scalability in a presence based massively multiplayer game can be achieved by using abstract information design for the overview of the environment; for example

different colours and shape outlines will indicate each player's presence information in a radar view which would unfold to full screen. Equally useful is 'teletransportation', i.e. allowing users to move remotely from one area of the whole space to another. Team formation and collaborative action must be simplified with instant messages (predefined if necessary) and easy to use tools for communicating presence information. Colour coding is expected to add to the sense of group identity and 'flocking' should introduce collaborative behaviour in a game. However, each individual must be empowered within the group in order to achieve a sense of participation and enjoy the experience. For this purpose the abilities to vote for significant changes (for example to change the flock's leader), to influence the whole movement and communicate efficiently with the rest of the group are prioritised in the design requirements.

As far as wireless platforms are concerned, presence based play is not only possible, but a great opportunity as illustrated so far. Even though limited displays in handheld devices offer less scalability, the advantages of mobility and location related information can be used in creative and playful ways and need to be explored. While the technology is still limited and far from widely available, wireless communication is a rapidly developing field. Current ideas for online presence based multiplayer games will be designed as screen mock ups for wireless devices with technological limitations in mind in order to get a sense of future possible directions and design guidelines.

6. Conclusion and further perspectives

Many areas have been discussed in order to identify the scope and originality of this research. An in depth approach should provide valuable knowledge as to how we can have multi – user interactions on a massive scale. This fundamental question is interesting and challenging in its own right and hopefully will open the way to further research in the area. Since the literature in the field is quite limited and nobody has ever carried out research in real – time simultaneous player interactions on a massive scale, this study aims to gain knowledge from all the areas mentioned in the present report and apply it to a new context. We hope to achieve interesting findings, some of which will be applicable to other fields of multi – user interaction. Our research is also useful for the design of non game related applications, such as webcasts and online events with large numbers of viewers, community websites, large scale presentations, educational applications for students located at geographically distant areas, such as the Open University courses (Daniel, 1997), and wireless learning and collaboration.

7. References

1. Billig, M. and Tajfel, H. (1973). "Social categorization and similarity in intergroup behaviour." *European Journal of Social Psychology* **3**: 27-52.
2. Biocca, F., Burgoon, J., et al. (2001). *Criteria and scope conditions for a theory and measure of social presence*. Presence, Philadelphia PA, USA.
3. BlastTheory (2002). *Can you see me now*. Blast Theory, MRL, The Equator Interdisciplinary Research Collaboration. http://www.canyouseemenow.co.uk/
4. BlueFactory (2000-2002). *BlueFactory*. http://www.bluefactory.com/web/index.jsp
5. Brown, R. (1988). *Group Processes: Dynamics within and between Groups*. Oxford, Blackwell.
6. Bruce, S. I. *The mobile manhunt*. Guardian, 31 January 2002
7. Chakraborty, R. (2002). *Presence: A Disruptive Technology*.
8. Cybiko, I. (1999-2002). *Cybiko Computer*. http://www.cybiko.com/
9. Daniel, J. S. (1997). *Mega-Universities and Knowledge Media: Technology Strategies for Higher Education*. London, Kogan Page.
10. Dey, A. K. D. e. a. (2001). "A conceptual framework and a toolkit for supporting the rapid prototyping of context-aware applications." *Human-Computer Interaction* **16**(xxx-xxx).
11. Diener, E. (1979). "Deindividuation, self-awareness, and disinhibition." *Journal of Personality and Social Psychology* **37**: 1160-71.
12. Diener, E. (1980). Deindividuation:the absence of self-awareness and self regulation in group members. *The Psychology of Group Influence*. P. Paulus. Hillsdale:NJ, Lawrence Erlbaum.
13. DigitalBridges (2001). *Digital Bridges*. http://www.digitalbridges.com
14. Dourish, P. (2001). "Seeking a Foundation for Context-Aware Computing." *Human-Computer Interaction* **16**: 229-241.
15. E.A. (2001). *Ultima Online*. Electronic Arts Inc. http://www.uo.com/
16. E.A. (2002). *The Sims Online*. Electonic Arts Inc. http://thesimsonline.ea.com/home.html
17. Eisenstadt, M. (2000). *GridMania*. http://kmi.open.ac.uk/people/marc/gridmania/
18. Eisenstadt, M. (2002). *From Buddy Lists to Buddy Space: Scaleable Experiences of InterPersonal Presence*. Proceedings of the Presence and Interworking Mobility Summit (PIM2002), Helsinki, Finland.

19. Emilsson, P. K. (2001). *Presence:Well-done or Medium Rare?* Pulver Spring 2001 PIM, Boston.
20. Erickson, T., Halverson, C., et al. (2002). *Social Translucence: Designing Social Infrastructures that Make Collective Activity Visible*. http://www.pliant.org/personal/Tom_Erickson/
21. Ericsson (2001). *Ericsson, Motorola, Nokia and Siemens launch the Mobile Games Interoperability Forum*. Ericsson. http://www.ericsson.com/press/20010703-2525.html
22. Espinoza, F. e. a. (2001). *GeoNotes: Social and Navigational Aspects of Location- Based Information Systems*. Ubicomp 2001, Atlanta, Georgia.
23. Frank, M. G. and Gilovich, T. (1988). "The dark side of self and social perception: Black uniforms and aggression in professional sports." *Journal of Personality and Social Psychology* **54**: 74-85.
24. Gerrig, R. J. (1993). Experiencing Narrative Worlds: On the Psychological Activities of Reading. New Haven, Yale University Press.
25. Gerrig, R. J. and Pillow, B. H. (1998). Developmental Perspective on the Construction of Disbelief. *Believed-In Imaginings: The Narrative Construction of Reality*. J. d. Rivera and T. R. Sarbin. Washington, DC, American Psychological Association**:** 101-119.
26. Greenberg, S. (2001). "Context as a dynamic construct." *Human-Computer Interaction* **16**(xxx-xxx).
27. IBM, S. C. G. (2002). *Design Explorations*. Social Computing Group IBM. http://www.research.ibm.com/SocialComputing/SCGdesign.html
28. It'sAlive (2002). *Mobile Games*. It's Alive Mobile Games AB. http://www.itsalive.com/
29. Jacobson, D. (2002). "On Theorizing Presence." *The Journal of Virtual Environments* **6**(1).
30. James, J. (2001). Mobile Gaming: An intorduction to the Mobile Gaming Market, Mobile Streams.
31. Johnson, R. D. and Dowining, L. L. (1979). "Deindividuation and valence of cues: effects on prosocial and antisocial behaviour." *Journal of Personality and Social Psychology* **37**: 1532-8.
32. Kosak, D. (2002). *What's This World Coming To?The Future of Massively Multiplayer Games*. www.gamespy.com/gdc2002/mmog

33. Kushner, D. *So What, Exactly, Do online Gamers want?* New York Times, NY
34. Lee, M. (2001). Chatscape: A Behavior-Enhanced Graphical Chat Built on a Versatile Client-Server Architecture. *Electrical Engineering and Computer Science*, MIT.
35. Lombard, M. (2000a). *Presence Explication*. http://nimbus.ocis.temple.edu/~mlombard/Presence/explicat.htm
36. McLorinan, A. (July 2001). *The Mobile Games People Play*. Ericsson White Papers
37. Microsoft (2001). *Asheron's Call*. Microsoft Corporation. http://zone.msn.com/asheronscall/start.asp
38. Mintz, A. (1951). "Non-adaptive group behaviour." *The Journal of Abnormal and Social Psychology* **46**(2): 150-159.
39. Morningstar, C. and Farmer, F. R. (1994). The lessons of Lucasfilm's Habitat. *Cyberspace: First Space*. M. Benedikt. London, The MIT Press**:** 273-303.
40. Nokia (2001). *Nokia game.* Nokia. www.nokiagame.com
41. Odigo (2002). *Odigo Instant Messaging*. Odigo Inc. http://corp.odigo.com/
42. Raby, F. (2000). *Project#26765:Flirt*. London, RCA.
43. Reicher, S. D. (1984). "Social Influence in the crowd:attitudinal and behavioural effects of deindividuation in conditions of high and low group salience." *British Journal of Social Psychology* **23**: 341-50.
44. Ryan, M.-L. (1999). Cyberspace, Virtuality and the Text. *Cyberspace Textuality: Computer Technology and Literary Theory*. M.-L. Ryan. Bloomington, Indiana University Press**:** 78-107.
45. Sacher, H. and Loudon, G. (2002). "Uncovering the New Wireless Interaction Paradigm." *Interactions*(January + February): 17-23.
46. Schiffman, R. and Wicklund, R. A. (1992). "The minimal group paradigm and its minimal psychology." *Theory & Psychology* **2**: 29-50.
47. Scuka, D. (2001). *A Weather-Affected, Massively Multiplayer, Java-Based i-Mode Game.* Japan Inc Communications Inc. http://www.japaninc.net/mag/comp/2001/07/jul01_filter_game.html
48. Sony (2001). *Everquest*. Sony Online Entertainment. http://everquest.station.sony.com/index.jsp
49. Sotamaa, O. (2002). *All The World's A Botfighter Stage: Notes on Location-based Multi-User Gaming*. Computer Games and Digital Cultures, Tampere,

Finland, Tampere University Press.

50. Tajfel, H. (1970). "Experiments in intergroup prejudice." *Scientific American* **223**: 96-102.

51. Telia (2001). *Find Your Friends with Telia FriendFinder*. Telia.com

52. Towell, J. and Towell, E. (1997). "Presence in text-based networked virtual environments or "MUDS"." *Presence* **6**: 590-595.

53. Unwiredfactory (2001). *UnwiredFactory*. http://www.unwiredfactory.com

54. Viegas, F. and Donath, J. (1999). *Chat Circles.* CHI 99, Pittsburgh PA USA.

55. Watson, R. I. (1973). "Investigation in deindividuation using a cross-cultural survey technique." *Journal of Personality and Social Psychology* **25**: 342-5.

56. Weiser, M. (1996). *Ubiquitous Computing*. http://www.ubiq.com/hypertext/weiser/UbiHome.html

57. Yahoo (2002). *Yahoo Games*. http://games.yahoo.com/

8. APPENDIX

The BumperCar Game: a design document

Main area of the BumperCar game

Description

The BumperCar game is an online massively multiplayer game aiming to encourage simultaneous playful interaction for large numbers of people. The design concept focuses on presence 'state' changes and the way these can coordinate game action. Social interaction is a crucial issue for success. Players can challenge and bump into other cars and gain strength and advantage by forming groups (flocks).

Rules and Variations

Version 1

This is a simple version to test the bumper car game as a feasible playground. Many bumper cars (including bots) belonging to different colour coded groups bump into each other in the playground arena. There is no particular game specific purpose of colour distinction though- colour is assigned randomly by the server- to see whether people will behave differently to others with their colour (drawing from Social Identity theory and Tajfel's minimal group experiments). The players' aim is to avoid being hit by others. If they are successful for certain time their car gets a 'glow' distinction around it. In this way we introduce abstract visual presence information in the game, similarly to the principles suggested by the Sociable Media Group at MIT and the Social Computing Group at IBM. Other players are likely to bump against the 'privileged' one to take off the 'special' glow.

Additional Challenges:

1) A player can also ‘challenge’ other players. This idea is inspired by the actual bumper car game where people may target a particular car (usually their friends) and drive after it just for fun. This behaviour creates a meta-game, an additional playful challenge within the bumper car arena. Our game uses abstract information to convey this meaning. By placing a challenge on another player a line is created between the ‘hunter’ and the ‘runner’ and keeps them linked for limited time, depending on the initial distance between the two cars. The player who initiated the challenge must bump into their target before the link disappears. The rest of the environment and players fade a bit while the ‘challenge’ lasts to give more focus to the target. If the challenge fails, the player’s car fades slightly and they lose some points. If the ‘challenge’ is successful the player gets points, as well as another type of ‘glow’ distinction, which gets lost if someone else challenges them with success.

2) At some point the system notifies all players that time is up and everybody has to get through a narrow exit in order to make it to the next round. The exit appears randomly, like a magic hole. Whoever gets out faster AND with the least collision (this would motivate a bit of cooperation/ negotiation of space) gets a higher score. Too much collision will result in great loses of speed. This idea originates from Alexander Mintz’s 1951 social psychology experiment, which we want to try on a large scale.

Version 2

“Spontaneous flocking behavior” – an advanced version of the BumperCar game aiming to experiment with collaboration practice. All design features aim to encourage group formation and collective behaviours, which are in the forefront of our research focus and are expected to increase interest in the game. A more ‘organic’ look and feel of the game would be more appropriate here. There are only two or three groups of colours. There are exactly the same challenges as in Version 1.

But players can also create teams in a similar way they ‘challenge’ each other! Once the linking line is created they need to approach each other slowly and their cars will stick together like magnets. They can also be in a ‘solo’ mode which means they do not get magnetised – people attempting to team with them will bounce off. Once a team is formed there are several possible behaviours:

As individual *team members* players can have a lot of freedom and the following options of activity:

- A player can invite more members to their team.

- A player can disconnect from the team, but that makes them loose points and immediately vulnerable to any team or individual attack.

- A player can choose not to get more members if the team is big enough by voting.

- Players could have a team only little ‘chat’ window.

- Vote to change the leader (leader is the person who started the team).

- Choose type of navigation by voting:

a) *All drive*, more difficult but the team gets more power (strength element) & points if they do it well. We can also introduce a direction ‘state’, like a little arrow which would indicate everyone’s latest orientation to facilitate flock movement. This design feature will help us see whether collaborative action can be coordinated just through presence information, with minimal player communication and messaging.

b) *The leader drives* and the members just influence the movement a bit with some coordinated action, but not the direction. This driving mode is more accurate and easier, but the team is not as strong and no extra points are earned. This mode is necessary as we expect a large learning curve for flock movement.

- The *leader* can ‘disconnect’ people that misbehave from the team and place challenges to both *individuals* and *groups.* These powerful choices must be taken by one person otherwise teams would become too chaotic and impossible to manage. The leader can also choose an autopilot mode to be able to place challenges or exchange messages with their team and others.

Being in a *group* allows players to enjoy several advantages:

- Players are immune to individual attacks.

- A team can only be challenged by another team.

- In team collision the *larger* & *stronger* one wins, i.e. breaks the links of the other. So there is a trade – off between size and type of movement.

- A player gets more points in a team if they succeed in challenging an individual or a team (even more for team).

Team challenges are different to the individual challenge. Consider this scenario: One team initiates a challenge, but there is no definite ‘hunter’ and ‘runner’ role like with individuals – both teams can collide and the strongest wins! For example, as a team you can try to get more members quickly if you have already been challenged to

increase your chances of winning or switch into an ‘all drive’ mode which gives you much more group power. Or you might as well just run away if the other group is very scary. Team challenges should last much longer, to allow any interesting emerging behaviours take place. In this way, we provide choices and challenges, but it is up to the users to be imaginative and form their own strategies.

Profile Database (extras)

If we decide to keep some data of player performance for community purposes, to give players the chance to distinguish themselves here are the parameters that would determine the ‘best’ player:

Version 1: Points earned every time a player gets a ‘*glow*’ either from collision avoidance or successful challenge (more points from the latter). A player loses points if someone challenges them and then bumps into them successfully. Points earned from *fastest & less collision* in the ‘Exit’ challenge. A player might actually lose points at this phase if they are not careful enough to avoid collision and just try to be the fastest (greedy behaviour). So the trade – off should be clear for everybody in order to see whether we will have successful cooperative behaviours or similar effects to crowd panic (clustering around the exit etc) and to what extent can players learn to cooperate.

Version 2: Same as above but more points are collected when participants succeed in challenges against individuals or other teams as a team. Team members gain some points from managing to navigate as a team in the ‘all drive’ mode. Players lose points when they give up their team, they get kicked out or when their team gets broken apart by a stronger team. In this way we want to encourage people to form sustainable teams and observe how players use this feature.

In the end all this could be summarised in some performance feedback like:

- Driving skills.

- Leadership skills.

- Team player skills (counting also how many teams a player has been in and for how long).

That would give an extra ‘social’ dimension to play.

A user scenario:

First screen: Login form and a link to a brief description of the game and guidance notes. You can choose to be an observer (chat & lounge mode) to see others playing and get an idea of the game or get into the game immediately. The reason for the two modes is that it is too difficult to chat and play at the same time and there will be people who would prefer to do either or take breaks or use the chat communication feature to form alliances with other players. The 'observer' mode will also work well as a pure presence communicator; a user can login just to see who else is there and watch the collisions. Second Screen: Depending on the initial choice you enter one of the two areas: a) Main area (player mode). You get into one of the four or so parking areas of the whole environment and you can start driving. b) Or, in observer mode, you get assigned a car that is outside the play area, you can chat with players, explore the interface and at any point you can decide to 'PLAY'. There is some server feedback (your info, color etc.) and a link to guidance notes.

(Version 1): 'Play mode': You start driving and avoiding bots that try to bump into you, when suddenly you get 'challenged'! You manage to avoid that car efficiently. You get a 'green glow' around your car which indicates how good you are at avoiding others. Then you get more 'challenges', which result in being bumped at some point and so you lose your fame. You can see the whole environment in your radar view and get a sense of all the colours and challenges that are there, so you decide to go towards the most busy part. You decide to challenge back (note: there has to be a minimum distance between the cars for the challenge to take place, so for example you cannot immediately challenge back the car which last challenged & bumped into you).

After a while you get a system notice that time is up and you have to run to the 'exit' avoiding crashes:

You rush, but you don't really care about collision, as long as you can push those cars out of the way to the exit (selfish – non cooperative behavior)! But crashes make you weak, so you lose some speed at this point and others are pushing you as well…you hardly make it to the exit before time runs out, so now you can play version 2.

(Version 2): You enter the parking area and start driving around. You get a curvy green line from another car and a message saying: "132 – Alex invites you to form a team! Drive slowly to link!" You start driving along the line slowly and you link with that car. Then you send a similar line to another car and it slowly starts moving towards you and links. At this time Alex (who started the team) drives you along, but you can still influence everybody's move. You see that the third car has an arrow indication to 'left' and you decide to bounce 'left' a bit, that affects your move. When the team gets confident you want to try the 'all drive mode' so you initiate a vote. The team accepts your vote and you start practising driving altogether by noticing each others 'arrow' states. Another car wants to join you. You move slowly towards it. Maybe you should stay as four though. Too many would be hard. So the third car

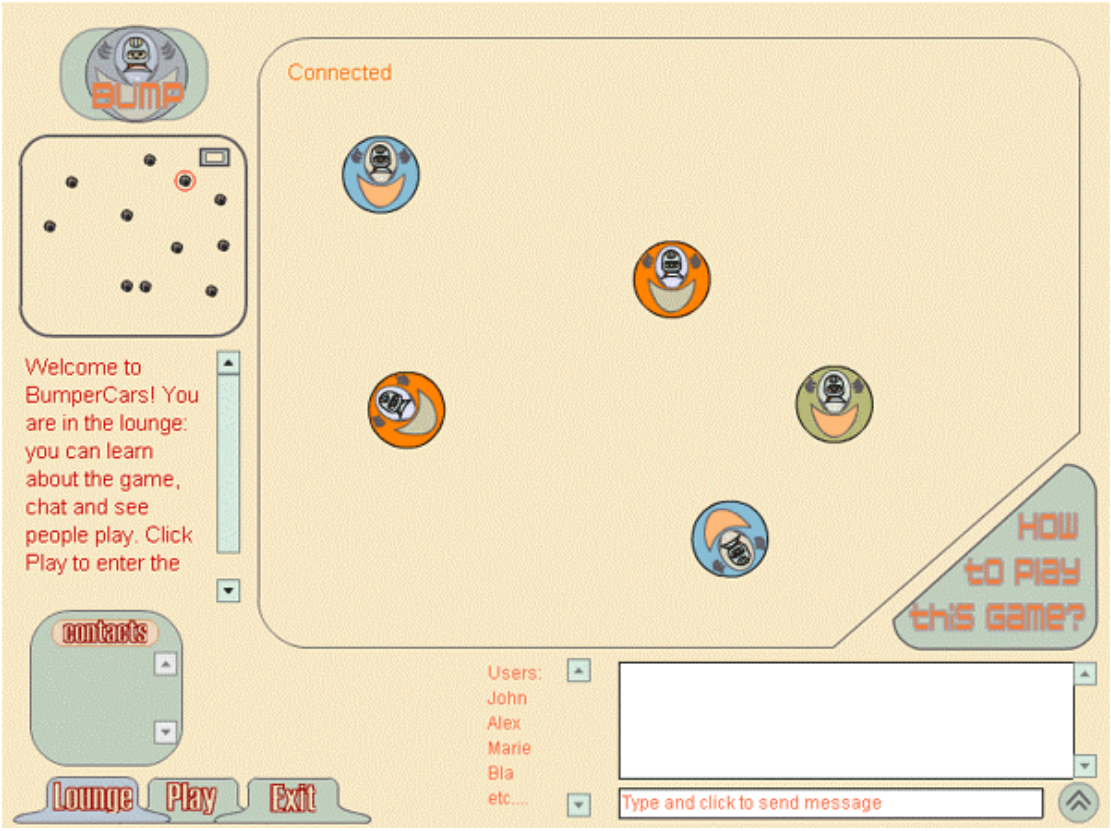
initiates a close team vote and the others accept it. Then Alex (the leader) sends you a quick message to attack another team and initiates a challenge. You follow, you bounce and the other team gets broken apart, even though it was also a group of four – your driving was stronger.

Technology

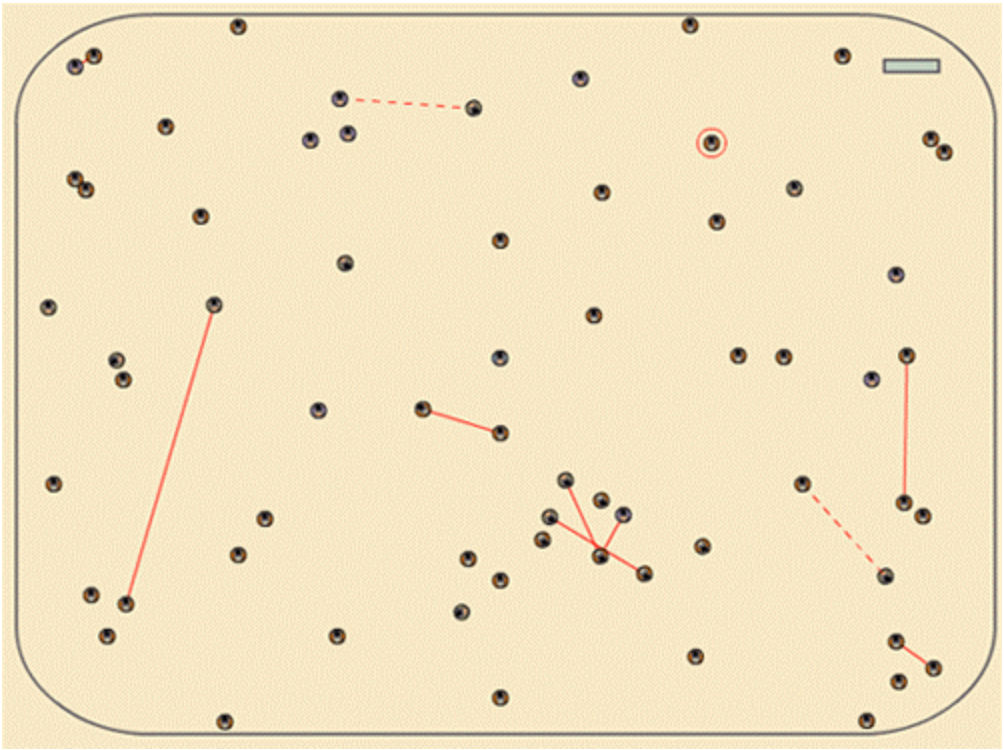
A first prototype of the BumperCar game will be implemented in Flash MX. A more complete version is planned as part of KMi's Buddyspace client, which will be implemented in Java.

Some Screenshots (Version 1)

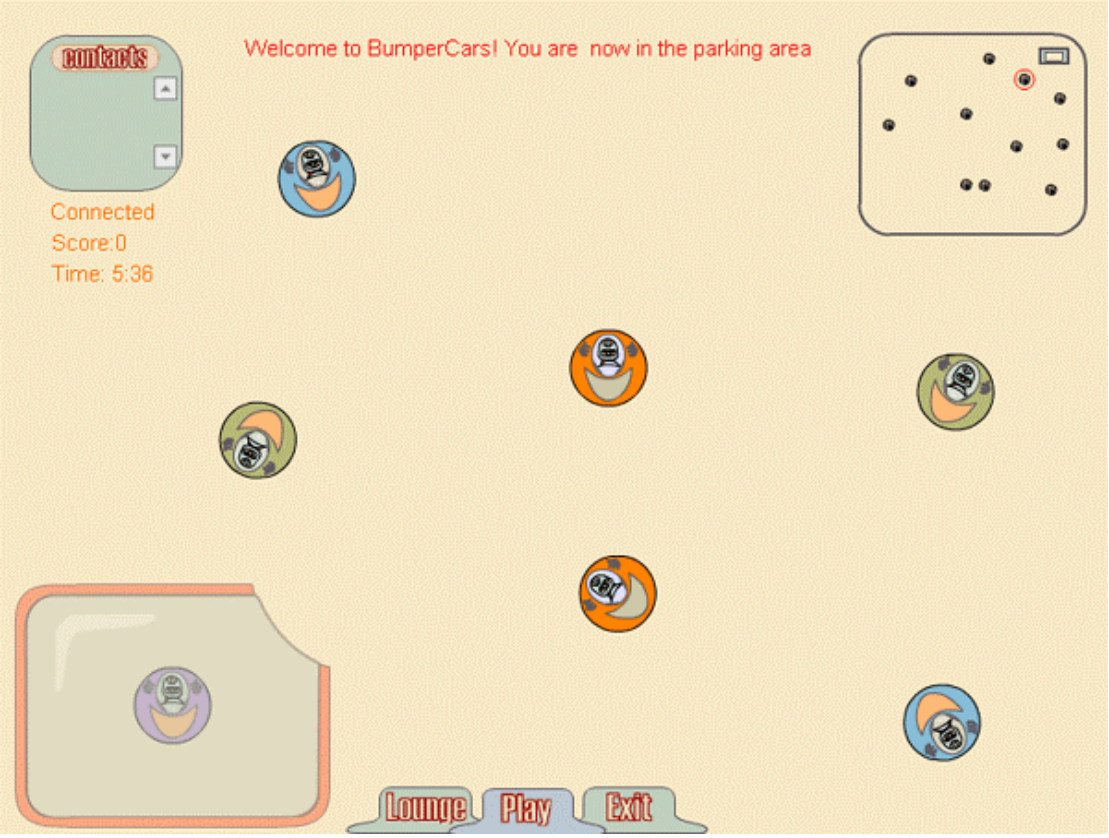
A login screen, with game info and two options to choose from: observer or player, participants can switch between the two later.



The ‘viewer’ mode: Multi – user chat, contact list and radar view.



The full screen view of the radar facility. Challenges are represented with a red line.



The main area (‘PLAY’) area of the BumperCar game.