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SOCIAL PRESENCE OVERVIEW

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ABSTRACT

This Market Analysis of Presence technologies is aimed at providing a guidance on future market trends and opportunities for Presence science and technology, based on the analysis of the current market and inputs from the Presence Community.

This document has two release issues. The first, May 2008 and the second April 2009. Therefore, the document will be a living document with contributions from the Peach Social Impact, Ethics and Legal Issues WinG members (Working Group 4) and the Peach Team. The community at large should also provide feedback to this Market Analysis for their own benefit.

The present document is the first of two issues, and aims at providing a structured baseline and first analysis of the market for further discussion. The second issue will provide an extension of this analysis and focus more on future trends.

This ANNEX 2 is a short overview of Social Presence, and constitutes an integral part of the Market Analysis of Presence Technologies deliverable.

KEYWORDS

market, trends, opportunities, presence technologies, presence applications, social presence, copresence

ACRONYMS

ACRONYM	Meaning
3D	3-Dimensional
CAVE	Cave Automatic Virtual Environment
HMD	Head Mounted Display
IM	Instant Messaging
SVE	Shared Virtual Environment
VR	Virtual Reality

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1 ANNEX 2: SOCIAL PRESENCE OVERVIEW

1.1 INTRODUCTION

This Annex offers an overview on the Social Presence Science, a discipline studying the 'being there together' implications. Most of the content here comes from the analysis of three main sources: the proceedings of the Presence Annual International Workshop, from year 2000 to 2006[1], some papers resulting from the projects of the Sociable Media Group of the MIT[2], and some papers of the University of Padua[3], Italy.

The main reason for a separate Annex about Social Presence is that this form of the technology, whereby several people have a sense of being in the same environment together, has become by far the most important type of presence technology, in terms of market impact, social impact, and technology development [A1].

1.2 DEFINITIONS

1.2.1 Social Presence

A first collection of definitions of Social Presence are given by K. Nowak, University of Connecticut [A2], who refers to Short, Williams and Christie[4] (1976), credited with giving broad theoretical currency to the concept of Social Presence. They explain Social Presence as '**the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships**'. Furthermore K. Nowak mentions P. Bull[5] (1983), who extended this concept to include the sense that occurs '**when one person feels another person is 'there'**'.

A recent theory of Social Presence has been given by F. Biocca et al. [A3]. They define '**mediated social presence** as the **moment-by-moment awareness of the co-presence of another sentient being** accompanied by a **sense of engagement with the other** (i.e., human, animate, or artificial being). **Social Presence varies from a superficial to deep sense of co-presence, psychological involvement, and behavioural engagement with the other**. As a global, moment-by-moment sense of the other, social presence is an outcome of cognitive simulations (i.e., inferences) of the other's cognitive, emotional, and behavioural dispositions'. This definition is closely related to Telecommunications applications.

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[1] http://www.temple.edu/ispr/frame_conferen.htm

[2] http://smg.media.mit.edu

[3] http://www.psicologia.unipd.it/htlab/index.php

[4] Short, J., Williams, E., & Christie, B. (1976). The social psychology of Telecommunicationss. London.: John Wiley & Sons, Ltd.

[5] Bull, P. (1983). Body movement and interpersonal communication. Chichester, New York: John Wiley & Sons Ltd. Page 162

J. Hauber et al. (University of Canterbury and of Otago, New Zealand) [A4] mention other definitions of Social Presence including the sense of '**being together**'[6], the sense of '**being there with others**'[7], or, according to Lombard and Ditton, the '**perceptual illusion of non-mediation**' [8]. This illusion of non-mediation occurs when a person fails to perceive or acknowledge the existence of a medium in his/her communication environment. Consequently, unmediated face-to-face situations are considered the gold standard in Social Presence.

1.2.2 Copresence

K. Nowak mentions Copresence as another way to refer to Social Presence. The term co-presence originated in the work of Goffman[9] (1963), who explained that **co-presence exists when people sensed that they were able to perceive others and that others were able to actively perceive them** [A2].

Co-presence, as '**the sense of being present with other people**', has been studied in relation to Presence by M. Slater et al. [A5] and defined as an 'orthogonal attribute of presence-in-a-place, […] since, for example, talking on a telephone with someone might give a strong sense of *being with them* but not of *being in the same place* as them'.

1.2.3 Connected Presence

R. Schroeder mentions also the Connected Presence concept that was firstly coined by Licoppe[10]. The Connected Presence concept can be introduced while describing Shared Virtual Environments (SVE). SVEs are **completely immersive networked VR systems - systems in which the user exclusively has a sense of being there with others** – which can be regarded as an end-state. This end-state is **one in which users would live entirely inside immersive virtual worlds**, and this allows to plot all experiences of connected presence as approximations towards this end state.

SVEs have three dimensions (x, y, z), as shown in **Figure 1:** with the Connected Presence cube [A6], which can be represented as being related to each other. On all three dimensions, the individual's presence in a real physical environment and a face-to-face encounter can be taken as the starting point. On the first dimension (x axis), mediated relations with persons whom are encountered only virtually are on one end ('copresence', or 'being there together'). On the second dimension (y axis), being in physical world is at the starting point

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[6] de Greef, P., & IJsselsteijn, W. (2000) in 'Social Presence in the PhotoShare Tele-Application'. Paper presented at Presence 2000 - 3rd International Workshop on Presence (27-28 March 2000), Delft, The Netherlands

[7] Schroeder, R. (2002). Social interaction in virtual environments: Key issues, common themes, and a framework for research. In R. Schroeder (Ed.), The social life of avatars: Presence and interaction in shared virtual environments. London: Springer

[8] Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. Journal of Computer Communication, 3(2)

[9] Goffman, E. (1963). Behavior in Public Places; Notes on the Social Organization of Gatherings. New York: The Free Press.

[10] Licoppe, C. 'Connected' presence: the emergence of a new repertoire for managing social relationships in a changing communication technoscape. In Environment and Planning D: Society and Space, vol. 22, 135-156. 2004.

while having a sense of 'being there' (alone) in a purely media-generated place is at the other end of this axis. A third dimension (z axis) is constituted by 'completely' mediated relationships. This is the extent to which one's relationships are mediated through environments in which presence and copresence are experienced. This dimension has several subcomponents: the 'affordances' or 'constraints' of the mediation, the extent to which one's relationships with others are exclusively mediated in this way, and third and finally the extent of time spent in these mediated encounters compared with one's face-to-face relationships. Together these constitute 'connected presence' or the extent to which 'being there together' is mediated.
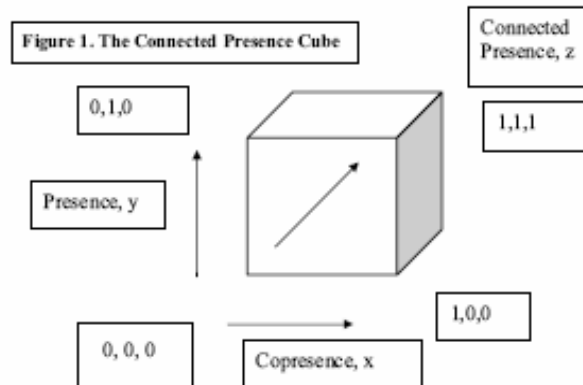
Figure 1: The Connected Presence cube

1.3 META-DISCIPLINARY SCHEME

G. Riva, A. Gaggioli and F. Mantovani (Università Cattolica of Milan) have recently proposed to the PEACH community a scheme to represent the meta-disciplinary blocks for Presence, taking into account Tele-presence and Social Presence (or Copresence), as depicted in **Figure 2**. The main discipline areas mentioned in this scheme are:

- Human-Computer Interaction

- Human-Cognition

- Computer Cognition

- Mediated Communications

This scheme reflects their conceptual framework [A7], [A8], [A9] that is based on different theories emerged recently from research in Cognitive Science (see **Table 1**).

Specifically, these authors suggest that through the concept of "Presence" it is possible to link the enaction of our intentions to the understanding of other people's intentions. The main claims of this framework are four:

1. humans develop intentionality and Self by pre-reflexively evaluating agency in relation to the constraints imposed by the environment (Presence): **they are "present" if they are able to enact in an external world their intentions**

2. this capacity also enables them to go beyond the surface appearance of behaviour to draw inferences about other individuals' intentions (Social Presence): **others are "present" to us if we are able to recognize their intentions**

3. both Presence and Social Presence evolve in time, and their evolution is strictly related to the **three-stage model of the ontogenesis of Self** introduced by Damasio [A10]: Proto-Self, Core Self, Autobiographical Self

4. Presence and Social Presence are not an outcome of our relationship with technology and media but are **general cognitive processes** at the core of our ability to act and communicate.

Table 1: The main theories behind the Presence/Social Presence conceptual framework

Theory	Main Claim	References
Common Coding Theory	The cognitive representations for perceived events (perception) and intended or to-be generated events (action) are formed by a common representational domain: actions are coded in terms of the perceivable effects they should generate	Hommel, B., Müsseler, J., Aschersleben, G., & Prinz, W. (2001). "The theory of event coding (TEC): A framework for perception and action planning". Behavioral and Brain Sciences. 24: 849-937. Prinz, W. (1997). "Perception and action planning". European Journal of Cognitive Psychology. 9: 129-154.
Situated Simulation Theory	To represent the concept we prepare for situated action with one of its instances: rather than representing a concept in detached isolated manner, people construct a multimodal simulation of themselves interacting with an instance of the concept	Barsalou, L. W. (2003). "Situated simulation in the human conceptual system". Language and Cognitive Processes. 18: 513-562. Barsalou, L. W., Simmons, K. W., Barbey, A. K., & Wilson, C. D. (2003). "Grounding conceptual knowledge in modality-specific systems". Trends in Cognitive Science. 7: 84-91.
Covert Imitation Theory	People use a real-time automatic action emulator of other subjects to generate perceptual predictions about their behaviour	Gallese, V. (2005). "Embodied simulation: From neurons to phenomenal experience". *Phenomenology and the Cognitive Sciences*: 23-48. Knoblich, G., & Flach, R. (2003). "Action identity: Evidence from self-recognition, prediction, and coordination". Consciousness and Cognition. 12: 620-632.

In this vision, a presence-enabling technology has two different goals.

In **single-user applications**, **the technology has to support the intentions of the user without constraining it** (presence). In this view, the more the technology is "transparent" to the user, the more is the sense of presence experienced interacting with it. This definition considers as possible presence-enabling tools also emerging technologies such as "ubiquitous computing" and "ambient intelligence".

In **communicative applications**, **the technology has to clarify the intentions of the users, through the organization and augmentation of the communicative channels** (social presence). This second goal is the core of the PASION Integrated project funded under the Presence II Initiative in the Future Emerging Technologies within the 6th Framework Programme [A11]: through the real-time capture, interpretation and representation of group metacognitive social psychological, contextual and affective processes, the project aims at both to inform and enrich traditional interaction, and to create new, emergent levels of social interaction.

PRESENCE

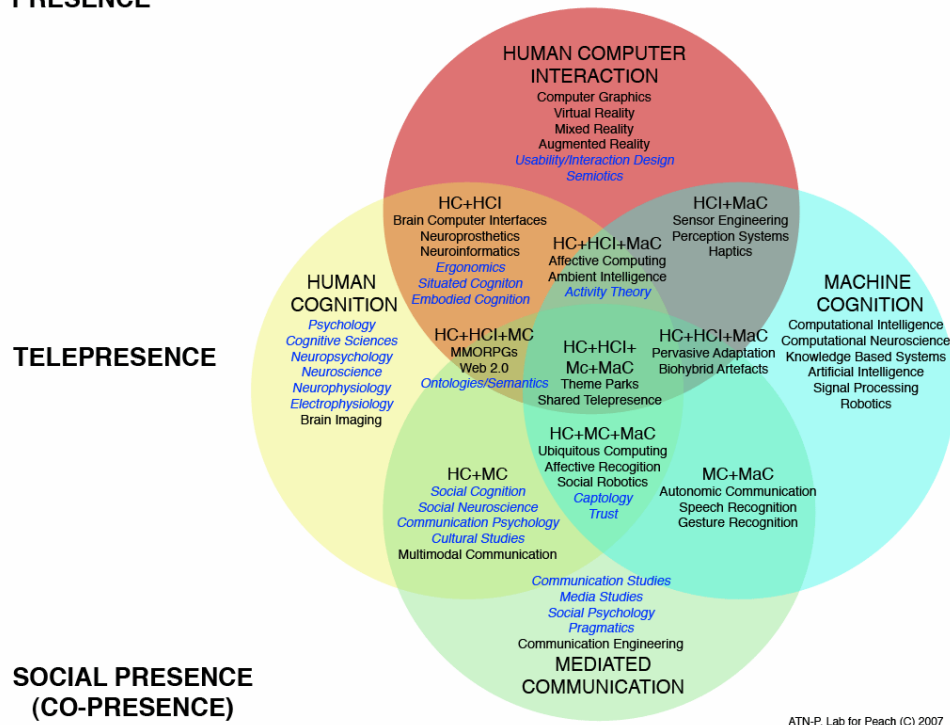**TELEPRESENCE**

**SOCIAL PRESENCE
(CO-PRESENCE)**

Figure 2: Presence meta-disciplinary blocks by G. Riva, A. Gaggioli and F. Mantovani

1.4 MEASURING SOCIAL PRESENCE

The definition of Social Presence is not sufficient to treat it as a measurable entity. Two main approaches can be distinguished in Presence research, resulting in two general categories of measures: **subjective measures** and **objective corroborative measures** [A12]. When using subjective measures, a participant is asked for a conscious judgment of his/her psychological state/response in relation to the mediated environment. The objective approach to presence measurement attempts to measure user responses that are produced automatically and without conscious deliberation, but are still sensibly correlated with measurable properties of the medium and/or the content (IJsselsteijn, 2004). Objective measures can be done through **observation of behaviour** and monitoring of **psycho-physiological variables**. Two methods have been widely used in literature to subjectively measure Social Presence: the **semantic differential** and the **networked minded** measure. As we have seen, there are various concepts and measures for "being there together". Even if this area has not arrived at any firm conclusions because these concepts and measures are more complex than those for "being there" (single users), this is an area of great importance for future markets. But there also limitations to measuring this; the technologies for copresence often do more than what is measurable (keeping people in touch throughout the day, creating virtual networks, and the like).

1.4.1 Observation of behaviour

Held and Durlach suggest **observing involuntary behaviours** as indicators of presence,

such as ducking or blinking when a virtual object approaches one's head[11]. Other possibilities include **'socially conditioned' responses** such as reaching for objects or attempting to shake the hand of a virtual person[12]. Noting the potential instability of subjective ratings found in their earlier work[13] Freeman et al. explored the possibility of employing behavioural responses to measure presence[14]. The rationale behind using this approach is that people will respond in 'behaviourally realistic' ways to a mediated experience to the degree that it accurately simulates an equivalent real-world experience. They report on a study investigating the impact of monoscopic and stereoscopic (3D) displays on subjective presence ratings and postural responses to *vection* (the illusion of observer motion provoked by moving displays). Postural shifts in response to video images of a speeding car were measured using a magnetic position tracker. Though the stereoscopic image resulted in both increased lateral movements and subjective presence ratings, no significant relationship was found between the two. The authors therefore caution against direct substitution of postural responses with self-reporting, though arguing that they may be usefully employed in the evaluation of displays.

1.4.2 Psycho-physiological monitoring

Meehan et al. explored the possibility of using psycho-physiological measures including **skin temperature**, **heart rate**, and **electro-dermal activity** (EDA) to measure presence[15]. Here presence is equated with the success of immersive virtual environments in recreating real world experience; the underlying assumption is that if present, **a person should exhibit similar psycho-physiological responses to an analogous real-world situation**. Their study investigated participants' responses when entering a virtual 'pit' room containing a steep drop-off to the floor below. Findings suggest a steep rise in mean level of heart rate and electro-dermal activity, indicating a marked increase in arousal, as would be expected in an equivalent real-world setting.

1.4.3 Semantic differential measure

As mentioned in §1.2.1, Short et al. proposed a definition of Social Presence, on the top of which a method for measuring Social Presence in laboratory was introduced, based onto the semantic differential technique[16]. Participants are asked to rate **mediated communication systems** on a series of bipolar pairs such as 'impersonal – personal', 'cold – warm', 'insensitive

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[11] R.M. Held and N.I. Durlach. Tele-presence. Presence: Teleoperators and Virtual Environments, 1(1):109–112, 1992

[12] T.B. Sheridan. Musings on tele-presence and virtual presence. Presence: Teleoperators and Virtual Environments, 1:120–125, 1992

[13] J. Freeman, S.E. Avons, D.E. Pearson, and W. IJsselsteijn. Effects of sensory information and prior experience on direct subjective ratings of presence. Presence:Teleoperators and Virtual Environments, 8(1):1–13, February 1999

[14] J. Freeman, S.E. Avons, R. Meddis, D.E. Pearson, and W. IJsselsteijn. Using behavioural realism to estimate presence: A study of the utility of postural responses to motion stimuli. Presence: Teleoperators and Virtual Environments, 9(2):149– 164, 2000

[15] M.J. Meehan, B. Insko, M. Whitton, and F. Brooks. Objective measures of presence in virtual environments. In Presence 2001 4th International Workshop, Philadelphia, USA, 2001

[16] Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). The measurement of meaning (Vol. 1). Urbana: University of Illinois Press.

– sensitive', and 'unsociable – sociable'. Media having a high degree of Social Presence are typically rated as being warm, personal, sensitive, and sociable. This approach has been applied in many studies.

Examples of bi-polar pairs chosen by J. Hauber et al. [A4] to evaluate a 2D or 3D videoconferencing system are shown in **Table 2**.

Table 2: examples of bi-polar pairs by J. Hauber in semantic differential technique [A4]

Bi-polar pairs	
Impersonal	Personal
Cold	Warm
Ugly	Beautiful
Small	Large
Insensitive	Sensitive
Unsociable	Sociable
Colourless	Colourful
Closed	Open
Passive	Active

1.4.4 Networked Minds measure

Another method to measure Social Presence, called **Networked Minds**, was proposed by F. Biocca et al. [A3], in close relation to the definition they gave in §1.2.1, which is based onto three theoretical dimensions:

- **Co-presence**: The degree to which the observer believes he/she is not alone and secluded, their level of peripheral or focal awareness of the other, and their sense of the degree to which the other is peripherally or focally aware of them.

- **Psychological involvement**: The degree to which the observer allocates focal attention to the other, empathically senses or responds to the emotional states of the other, and believes that he/she has insight into the intentions, motivation, and thoughts of the other.

- **Behavioural engagement**: The degree to which the observer believes his/her actions are interdependent, connected to, or responsive to the other and the perceived responsiveness of the other to the observer's actions.

Each dimension can be characterized by some items, which can be grouped in factors, as show in Figure 3:

Co-presence:
- Isolation/Inclusion
- Mutual Awareness

Psychological involvement:
- Mutual Attention
- Empathy
- Mutual Understanding

Behavioural engagement:

- Behavioural Interaction
- Mutual Assistance
- Dependent Action

The items are then proposed in a questionnaire during the experiment. For instance **Isolation/aloneness** is measured by the following two items, one matched pair.

- 'I often felt as if I was all alone'
- 'I think the other individual often felt alone.'
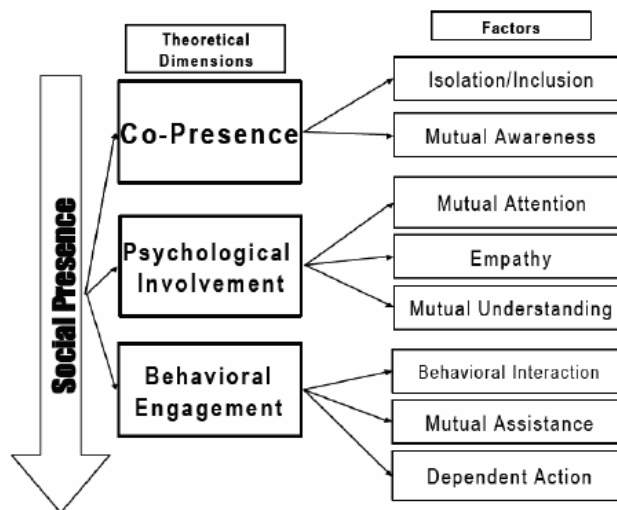
Figure 3: Dimensions of Social Presence and their factors

Based on F. Biocca et al. theory, other similar methods have been derived. For instance G. Bente et al. [A13] proposed a method to measure social presence based on **collaborative net-communications**, which is useful to evaluate the areas of **computer supported cooperative work** (**CSCW**) and **computer supported collaborative learning** (**CSCL**). The method proposed by G. Bente uses four factors in accordance with the Social Presence dimensions conceptualised by Biocca et al. Those factors were named **co-presence**, **comprehension**, **connectedness** and **contingency**. One additional factor emerged which exclusively contained the added items on perceived acquaintance and intimacy of the interaction partners: the component was named **closeness**. The labels of the principal components are listed below, together with the labels suggested by F. Biocca et al. in brackets, and the psychological dimensions they refer to, which are: **spatial**, **social**, **cognitive**, **emotional** and **behavioural** relatedness.

- **Co-presence** - spatial relatedness (perceived shared space). 6 items, example: 'I often felt as if we were in different places rather than together in the same room.'
- **Closeness** - social relatedness (acquaintance/ intimacy). 11 items, example: 'My partner was still a stranger to me.'
- **Comprehension** - cognitive relatedness (perceived attentional engagement). 8 items, example: 'My thoughts were clear to my partner.'
- **Contagion** - emotional relatedness (perceived emotional contagion). 6 items, example: 'I was sometimes influenced by my partner's moods.'
- **Coordination** - behavioural relatedness (perceived behavioural interdependence). 5 items, example: 'My actions were often dependent on my partner's actions.'

1.5 APPLICATIONS

In this chapter applications derived by Social Presence studies or research activities are listed. As a result Social Presence based applications spam mainly in three fields:

- **Mediated Communications**

- **Systems for Collaboration**

- **Robots/ Virtual Humans**

1.6 MEDIATED COMMUNICATIONS

Mediated Communications refers to **communication between people as mediated by technology**, either emailing systems, chat systems, instant messengers, fixed or mobile phones, videoconferencing systems, SVEs (shared virtual environments), etc.

1.6.1 Mobile and wireless Telecommunications

Mobile communications can deliver not only a voice conversation but it can also convey other non-verbal cues and emotions. Some examples are:

1.6.1.1 Mobile Advanced Collaborative Environments

- *Description*: a mobile system capable of generating a frontal view of the face in real-time

- *How this benefits from Social Presence*: this solution is relevant to augmented reality environments for remote communication and collaboration among multiple users, where the goal is **to support all the non-verbal and position cues of side-by-side collaboration** [A15], when a face-to-face communication is not feasible

Figure 4: Mobile face capture system for collaborative environments

1.6.2 High-bandwidth teleconferencing interfaces

Video communication can benefit from realistic 3D environment in convey social cues to the interlocutors. Examples are:

1.6.2.1 3D Videoconferencing:

- *Description*: **three-dimensional metaphors** applied to videoconferencing to simulate traditional face-to-face meetings. For instance:

- *SmartMeeting*[17] provides a highly realistic conference environment involving different virtual rooms with chairs, whiteboards, virtual multi-media projectors, and even an interactive chessboard.
- *AliceStreet*[18] makes use of a similar concept, although with a more minimalist virtual room design. Participants are represented here as rotating video planes sitting around a virtual table and watching each other or a shared presentation screen.
- In '*cAR/PE!*'[19] participants can even freely move within the virtual environment and are able to place and discuss 3D models on top of the virtual table

Figure 5: cAR/PE! screen shots (www.igroup.org/projects/carpe) and Blue-C 3D Portal for immersive videocommunication (http://blue-c.ethz.ch)

- *How this benefits from Social Presence*: the common goal of all of these approaches is to **improve the usability of remote collaboration systems** by **decreasing the artificial character of a remote encounter**. This goal seems to be of particular importance for the acceptance of these systems, as F. Biocca et al. point out: *'The assessment of satisfaction with entertainment systems and with productive performance in teleconferencing and collaborative virtual environments is based largely on the quality of the social presence they afford'*. [A4]

1.6.3 Computer Mediated Communications

Computer Mediated Communications is based on several methods involving the use of a computer in communications using the Internet; this topic is thoroughly analysed by non-profit Pew Internet & American Life Project, which explores the impact of the Internet on families, communities, work and home, daily life, education, health care, and civic and political life, that predicts a vast blurring of virtual/real reality [A16].

1.6.3.1 Instant Messaging

- *Description*: an Instant Messaging (IM) application allows to exchange real-time text messages through the Internet and to manage a buddy list, knowing when your buddies are online and their state of availability

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[17] SmartMeeting (2005). Online product description. http://www.smartmeeting.com Last accessed 31 May 2005.

[18] AliceStreet (2005). Online product description. http://www.alicestreet.com/. Last accessed 31 May 2005.

[19] Regenbrecht, H., Lum, T., Kohler, P., Ott, C., Wagner, M. T., Wilke, W., et al. (2004). Using Augmented Virtuality for Remote Collaboration. Presence, 13(3), 338-354.

- *How this benefits from Social Presence*: Social Presence has been recognized to play an important role in IM: even with its low bandwidth, text only format, **IM evokes a sense of social presence** — i.e., of 'being together' or 'emotional connectedness'; IM gratified the following needs successfully: social utility, interpersonal utility, convenience, entertainment relaxation, and information [A17]

1.6.3.2 *Virtual Presence for the Web*

- *Description*: avatar co-browsing on web pages - a program which runs in the background, and as soon as you go to a web site, it shows your avatar on the page and the avatars of other users, who are at the same Web page at the same time[20]

- *How this benefits from Social Presence*: it enables to **browse on web pages virtually with others** (like being in the same room visiting a place and being aware of other people presence and free to communicate with them) [A18]
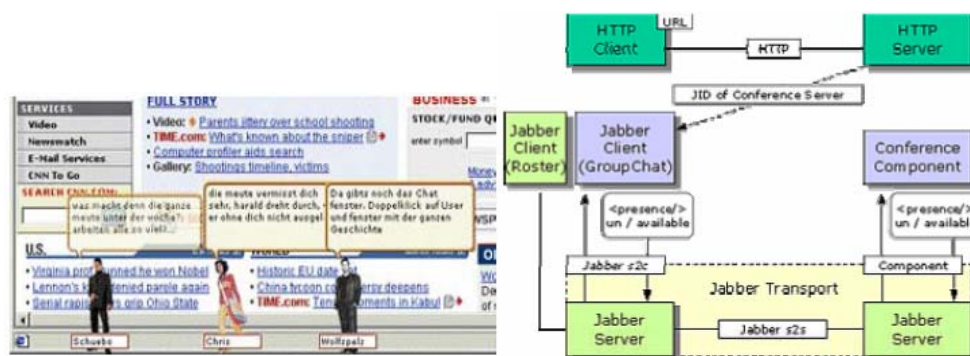
Figure 6: avatars on web pages and a possible infrastructure to achieve the solution [A18]

1.6.3.3 *Multimodal chat environment*

- *Description*: a multimodal voice-chat environment which emphasizes spatial grounding, and visually expresses presence and reciprocal distance

- *How this benefits from Social Presence*: supporting **natural group interaction behaviours** [A19], helping users map the voices they hear to the circles representing the respective participants, and expressing their mood and emotions graphically on the circles

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[20] from the technical point of view this could be implemented by a Jabber group chat client with a graphical user interface, which automatically enters and leaves Jabber chat rooms while the user is browsing the Web
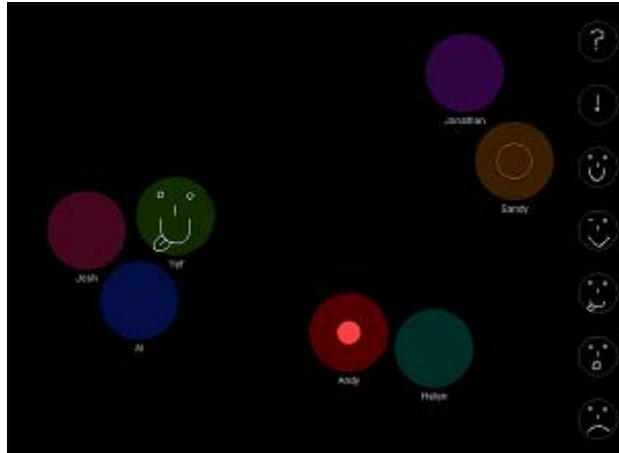
Figure 7: Talking in circles [A19]

1.7 SYSTEMS FOR COLLABORATION

Computer-based solutions to **enhance the collaboration** between people. The goal is supporting a working task, a learning activity, an entertainment activity, a knowledge based task. Examples are:

1.7.1 Collaborative work environments

1.7.1.1 *Virtual Teams Support*

- *Description*: all processes that construct and maintain the sense of social presence in virtual teams

- *How this benefits from Social Presence*: geographically distributed work teams, or virtual teams have better performance if a sense of social presence is constructed; three processes are instrumental in constructing and **maintaining the sense of social presence: identification, structural interdependence, and leadership** [A20]

1.7.1.2 *Computer Supported Cooperative Work/ Learning*

- *Description*: this refers to the areas of computer supported cooperative work (CSCW) and computer supported collaborative learning (CSCL)

- *How this benefits from Social Presenc*e: significant improvement of collaborative learning and problem solving by including **non-verbal channels** into the net-based communication process [A13]; non-verbal behaviour is detectable by means of cyber-gloves, motion trackers and eye-tracking system and can be mapped to control avatars, in a Virtual Video Conference context

1.7.2 3D social virtual environments

1.7.2.1 *Shared Virtual Environments*

- Description: SVEs can be pictured as completely immersive networked VR systems - systems in which the user exclusively has a sense of being there with others - as an end-state; this end-state, to be seen as asymptotic, is one in which **users would live entirely inside immersive virtual worlds** (usually implies the use of CAVEs, HMDs or other ways to re-create the illusion of "being there")

- *How this benefits from Social Presence*: a SVE is in fact an environment to experiment Social Presence [A6]

Figure 8: Meeting a Virtual Human in a Shared Virtual Environment [A4]

1.7.2.2 Internet-based desktop SVEs

- *Description*: an approximation of SVE where the visual interface is the PC screen, such as Activeworlds (AW), Second Life and others

- *How this benefits from Social Presence*: (tele-)presence in desktop systems may not generally be experienced as powerfully as in an immersive system, but it is not easy to say the same for co-presence [A21]. The **psychological and personal involvement while projecting him/herself into a desktop SVE** can be so strong that co-presence results in a very vivid way


Figure 9: ActiveWorlds

## 1.7.3 Knowledge management

1.7.3.1 Social Network Analysis

- *Description*: a tool the can **analyse the structure of an individual's social network** capable to visualize the landscape for self-awareness through email behaviours analysis, or other communication media (SMS, phone calls, etc.)
- *How this benefits from Social Presence*: supporting mediated interaction behaviours for individuals [A22], through **communicating explicitly indices elaborated with Social Network Analysis** (extracting some structural information from the set of communication events occurred) by providing directly to users visually (by using different representations according to the context) or verbally (by sending messages to the users) [A23]
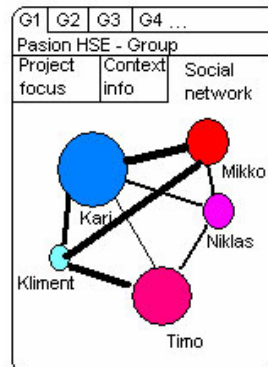
Figure 10: Sketch of a Social Network Analysis from IST FP6 PASION project

1.7.3.2 Virtual Meetings Support

- *Description*: in a SVE (or desktop SVE) this is a tool that is capable of **showing the ideas flow and tracking it**, and positions avatars of the people participating to the meeting with significance to where people place the avatars that represent
- *How this benefits from Social Presence*: supporting mediated interaction behaviours for groups [A24], through making explicit the social ideas creation and decision mechanisms and leveraging on "**collective intelligence**" and "**collaborative intelligence**"
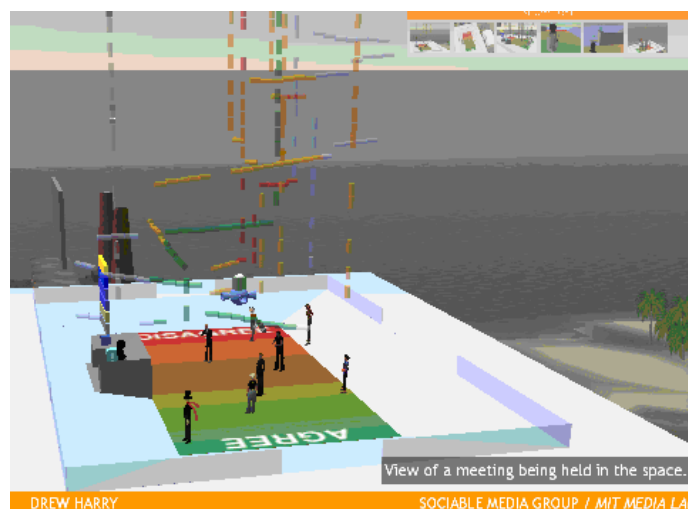
Figure 11: Showing and tracking the ideas flow in a virtual meeting in SecondlLife

1.7.3.3 Knowledge marketplace

- *Description*: a system that **visualizes connections between people & ideas**; the site constantly measures the interactions between people and their interests in order to provide a more accurate picture of what relationships and information are important
- *How this benefits from Social Presence*: supporting mediated interaction behaviours for groups [A25], and providing **a marketplace of knowledge**

1.8 ROBOTS/ VIRTUAL HUMANS

Creating a **real or virtual machine capable of social interaction with people**, and all related technologies (speech interfaces, artificial social intelligence etc.). Examples are:

1.8.1 Agents / Help interfaces

1.8.1.1 *Speech interfaces or Machine-generated voice*

- *Description*: **computer-synthesized voice** that manifests a personality

- *How this benefits from Social Presence*: Users are shown to feel stronger social presence when they hear a computer-synthesized voice that manifests a personality that: a) is similar to the user as compared to dissimilar to the user's, b) is consistent with the text's personality, and c) is extroverted as compared to introverted; for instance it can be applied to e-Commerce [A27] tools or Call-centres

#### 1.8.1.2 *Artificial Social Intelligence*

- *Description*: basic knowledge used to implement and evaluate non-verbal encoding and decoding abilities and dialog management systems in so called **anthropomorphic interface agents**

- *How this benefits from Social Presence*: enabling robots and agents to interact with each other and with humans [A28]

1.8.1.3 *Digital assistants/ Virtual Humans*

- *Description*: **digital assistants, usually in the form of virtual humans**, based on artificial social intelligence and capable of social interaction, which can be used to support sales, pre-sales, and post-sales phases, or other mediated activities, that can be used in SVE or desktop SVE

- *How this benefits from Social Presence*: interacting with human being on similar behavioural level aiming to support and perform a task, thus being accepted as assistants in several contexts

1.8.1.4 *Avatars*

- *Description*: **virtual representation of humans**, typically in (desktop) SVE, which mediates human interaction in virtual words and augment it (i.e. avatars in SecondLife)

- *How this benefits from Social Presence*: the existence of a virtual image increases co-presence [A13], anthropomorphic images of avatars affects **users' emotion perceptions** of interactants and medium when they are engaged in a conversation on a mobile telephone [A14]. Incorporating **mediated faces** has been also discussed by J. Donath[21] of the MIT Social Media Group
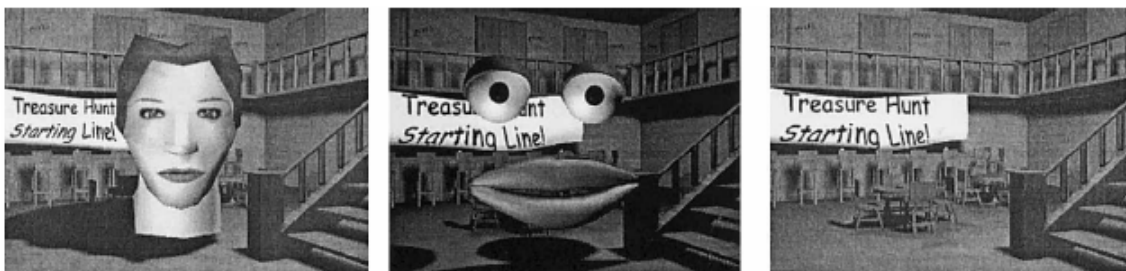
Figure 12: Images: (a) high anthropomorphic, (b) low-anthropomorphic, (c) no image [A14]

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1.8.2 Robots

1.8.2.1 Robots as Companions

- *Description*: robots whose primary goal is **social interaction** with humans, that can be used in real life

- *How this benefits from Social Presence*: interacting with human being on similar behavioural level [A29], thus being accepted as daily life companions

Figure 13: A robot companion imitating realistically the cat behaviour, produced in 2007 by Sega Toys Japan, and an image of a robot from the IST FP6 COGNIRON project.

1.9 CONCLUSIONS

As (especially younger) people become natives in the online realm, the technologies for presence and especially copresence will increasingly become crucial for our lives, not just for gaming and socializing, but for collaborating online such as doing homework together, doing research together, visualizing our online shopping together, mapping directions to tourist destinations together, watching the news together, exchanging information about or location and availability, and many more. Presence (and again, especially copresence) technologies will play an integral role in these developments (even if other technologies are also involved).

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