

Magic Lounge Architecture

Scenarios and Use Cases

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Magic Lounge is, briefly and abstractly described, a virtual meeting application which will integrate a number of technologies most of which are already known. Magic Lounge will include existing technologies, such as www and video conferencing, and it will integrate the innovations necessary to achieve the envisioned Magic Lounge functionality. Focus is on the needs of broad-population, non-professional communities which are distributed more widely than people living or acting in the same physical building, and which need easy-to-understand interfaces.

This paper provides a preliminary description of Magic Lounge functionalities. Section 1 outlines the physical environment of Magic Lounge. Section 2 investigates part of the needed functionality through a detailed description of two different scenarios. On the basis of the scenarios and the project programme a number of use cases are extracted and described in Section 3. Section 4 concludes the report.

Throughout this paper, ML is being used as an abbreviation for Magic Lounge.

1. Physical environment

Figure 1 outlines how users may be connected to, and present in, Magic Lounge. In principle, there should be no restrictions on the number of Magic Lounge participants (in year 1 a minimum of 3 must be allowed). However, it might turn out that technology availability will impose some limitations.

Magic Lounge may be accessed via computer (Internet), PDA or telephone. Server and clients may run on any computer which can use JDK1.1. Clients will be tested on Suns, PCs, and, if possible, Macs. In addition, connections from PDA and ordinary and mobile telephone will be enabled and tested.

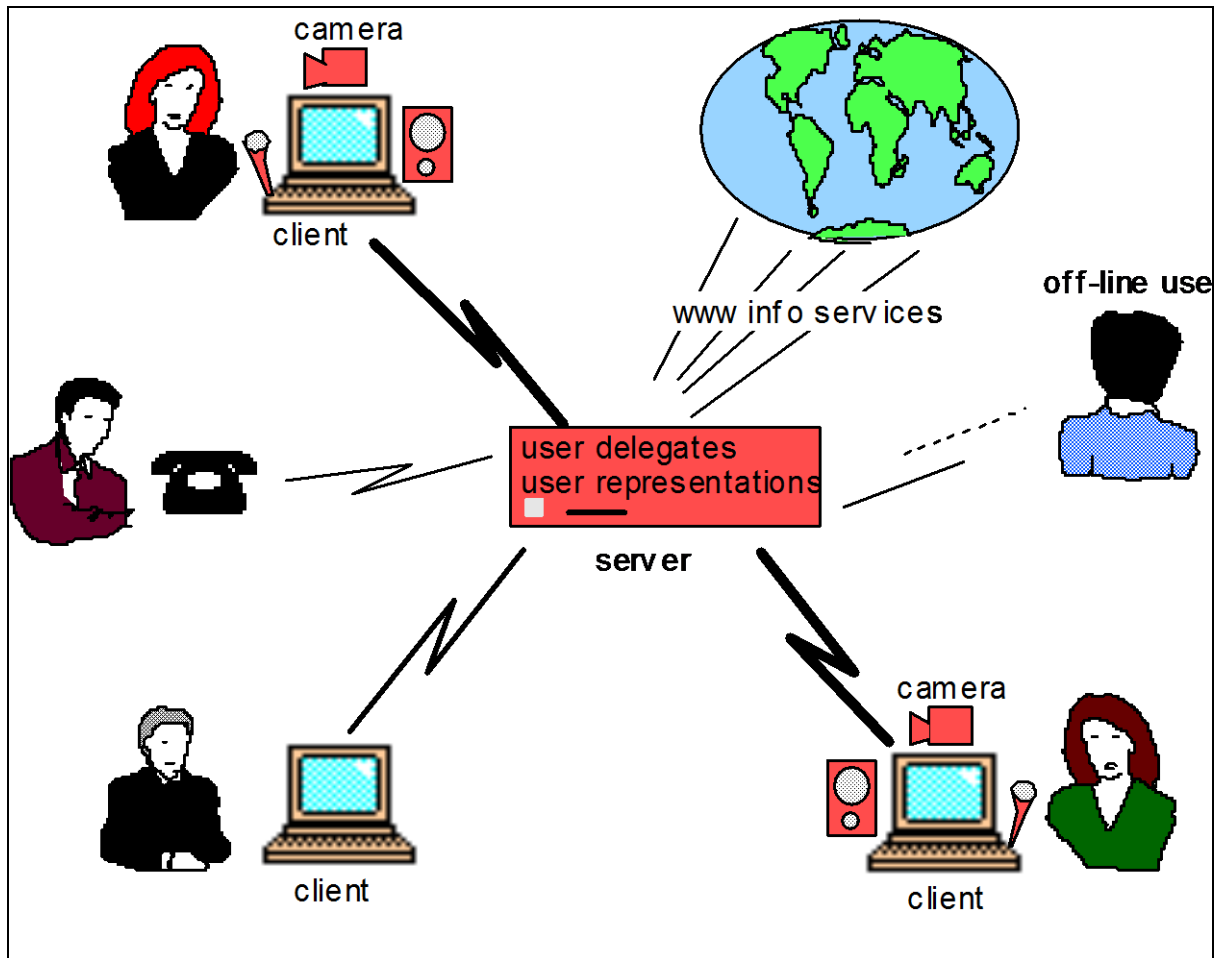


Figure 1. Magic Lounge allows multiparty human-human, human-computer, and human-human-computer communication. Users may be connected to the ML server via workstation, telephone and PDA (not shown) or they may have sent a delegate to the server. Bandwidth may vary and a computer may have more or less equipment (camera, loudspeaker, microphone, etc.). The figure does not show all the functionalities available in ML.

2. Scenarios

In the following, two different scenarios are described in detail in order to show some of the functionality to be considered for inclusion in ML. It should be stressed that while designing the scenarios no attempt was made to keep within the limits of the Project Programme (PP). Rather, focus was on creating real situations of use thereby throwing light on what could be convenient functionalities for the user. The first scenario concerns a meeting on marine history in a club for people interested in this topic. The second scenario is on holiday planning.

Scenario 1: A meeting on marine history

Until recently Peter's situation was as follows. Peter is very interested in marine history. Meetings on this subject are regularly organised by the marine history club. Unfortunately, Peter lives in a remote island and the meetings on marine history are usually organised in another island. It takes him two hours to get to this place. Since it is much to spend four hours on travelling in one evening in order to attend a two hour meeting, he does not go there as often as he would like to.

Now his situation has changed. ML has provided a solution to his problem. There were actually two possibilities for marine meetings in ML. One possibility was that meetings would take place only in ML. The other possibility was that some people meet physically as they are used to, whereas others attend the meeting via ML. This means that the room in which the physical meeting takes place should have, preferably, a well-equipped computer which can connect the participants in that room to ML in a reasonable way, i.e. it should not take much extra effort to have participants attend via ML. The latter possibility seemed to be the only realistic one for the time being since not all members of the marine club wanted purely virtual meetings. More than half of them would only be able to attend via the telephone, which many of them felt was not very attractive. They enjoy meeting people in reality and drinking coffee together. A few of them, however, many of which were in the same situation as Peter, were quite happy about the new possibility of remote meeting participation. Therefore the half-real/half-virtual meeting option was implemented. The marine history club has a computer with camera, microphone and loudspeakers, which enable the club to exploit all the ML facilities, and a fast connection is available from the meeting room. In the following, we explore Peter's present situation in more detail.

Peter has a computer with camera, loudspeakers and microphone which he uses when he wants to attend the meetings on marine history. Moreover, he has an ISDN connection. The next meeting is at 7:30 PM today. A few minutes before the meeting starts, Peter turns on his computer and modem. Since the ML room which he usually visits is the marine room, he has set this room to be the default arrival room, i.e. the room in which one first arrives when logging on to ML. He double clicks on the ML icon on his screen and is now being connected to the ML server. The connection comes up and he is asked to enter his login and password. Peter types in his login and ML password. The marine room is public, so no additional password is required to enter this room. So far, it has not posed any problems that the room is public and the marine history enthusiasts know that they can always decide to make the room private if necessary.

Peter is now in the marine room. On his screen he has a whiteboard (the magic board) with the room name on top and a window showing the current inhabitants of the marine room. The marine history club is logged in as a single user but otherwise there is nobody in the marine room. The window thus only shows one participant (the marine history club) in addition to Peter. There is only one computer in the physical meeting room so although there are several participants they only appear as one user in ML.

Peter opens the video conferencing facility and connects to the marine history club. A video conferencing window appears on his screen and he can see and hear the people present in the physical meeting room. Peter greets them. He now clicks away the window showing the representations of participants in the ML marine room in order to save space on his screen.

After Peter's arrival, another remote participant joins the meeting. This person, Bill, does not have access to a computer so he uses his phone. Bill usually calls immediately before the meeting starts. He is informed by ML on who is logged in, and the people in the physical meeting room tell him who are actually present.

There are still a couple of minutes left until the meeting starts. Peter spends the time checking the messages which have been posted since the last meeting in the message box for the marine room. The message box can be accessed by anybody because the marine room is public. The message box for a private room can be accessed only by people who have the room password. From the "rooms" menu Peter selects "message box". The only new message is the agenda for

the meeting this evening. Tonight a person who is well-known for his studies in marine history has been invited to give a talk on famous Danish battles at sea in the 17th century. After the talk there is time for discussion.

At 7:30 PM the session starts. Twelve people attend the meeting, including Peter and Bill. The speaker is introduced by the chairman of the marine history club. The chairman speaks into a microphone which is connected to the computer and hence to ML, so that Peter and Bill can hear what is being said.

The invited speaker then takes over the microphone. He has prepared slides which include text as well as pictures and drawings. The slides were prepared using PowerPoint and they have been put onto the computer in the physical meeting room. Via a data projector the slides are shown on a canvas. The slides will not necessarily be readable to Peter via video conferencing but since application sharing is one of the functionalities offered by ML, he can have the slides displayed in a separate window on his own screen even if he does not have PowerPoint in advance. In the physical meeting room they have enabled sharing of the PowerPoint slides window. So now Peter can hear and see the speaker via video conferencing and he can see the slides displayed on his screen. When the speaker proceeds to the next slide, this also happens on Peter's screen. Bill can in such situations hear what is being said but he cannot see the slides.

Participants may interrupt whenever they have comments or questions. Peter has two possibilities when he wants to speak. He may either just speak up or he may, corresponding to raising his hand, indicate that he wants to say something by making a small icon flash or beep on other participants' output units in order to attract their attention. People connected via telephone may ask ML to read aloud the list of people waiting to speak. If Bill wants to indicate that he would like to speak he can do so by using a keyword or by pressing the #-key.

People attending the marine history meeting, including Peter and Bill, will indicate that they want to speak and the chairperson will keep track of who is next. There are quite a number of questions and comments to the speaker during, as well as after, his talk. Peter participates actively in the discussion. At some point he says that he knows that there is an interesting web page on the topic being discussed. He opens the web facility and goes to the relevant page. It is displayed on the physical canvas in the same way as the slides. Later in the meeting, again benefiting from application sharing, Peter also shows some pictures taken in a museum he visited recently and which he has scanned in.

The last point on the agenda is planning of the next meeting. A date and a topic are agreed upon. One of the participants is in charge of contacting the person they would like to give a talk at the next meeting. Then the meeting is over. Before logging out from ML, Peter talks a few minutes to the chairperson who is about to shut down the machine in the meeting room. Then Peter logs out. He is back in his sitting room immediately. How nice that there is not a two hour travel in front of him!

Scenario 2: A planning meeting

Four people (John, James, Robert and Michael) who are old friends but live in different parts of the country usually go on holidays together for an extended weekend once a year. This requires some planning and they usually met to discuss what to do. Some time ago, however, John became aware of ML. He told the others about it and proposed that they could try to meet in ML this year to plan their holidays. The others found this a great idea. Only John, James and Robert have a computer. Two of the computers are equipped with camera,

microphone and loudspeakers while Robert's computer only has loudspeakers. Michael has a PDA. The PDA allows him to either connect to ML as a speaker, via its mobile phone connection, or to connect as a (limited resolution) graphics/text communicator, but not both at the same time.

None of them have attended a meeting in ML before. They have ensured that they are all able to connect to ML and they have read the introduction on what you can do in ML. They have decided to meet in the hall at 7 PM tonight.

At 7:04 PM they are all logged on to ML. John and James have opened a video conferencing window and can see and hear each other. Robert has no microphone and no camera so video conferencing is not possible for him. At most he would be able to see the video output and hear the voices from the video conferencing system but since he has a slow connection he has decided not to do this. However, speech is being converted to text so he can participate in the conversation by reading and writing on the whiteboard. Also Michael cannot use video conferencing. However, he can hear what is being said via his telephone connection (PDA). The textual contents of the whiteboard are being converted to speech and he can follow the audio part of the video conference.

The hall is public so they just have to indicate their login and their ML password to log in. There are also other people in the hall. They therefore use the function which allows to select whom one wants to talk to. Each of them selects the other three. It is more comfortable now - a bit like standing in a corner - although from time to time one can still hear what others say or one may read it on the whiteboard.

In the hall there is a message box for each room. They can, however, only access the message boxes for the public rooms. A password is required for each private room to which a given message box belongs. There is also a board which contains all sorts of messages. There are a lot of different messages on it. These are to some extent grouped. For instance, messages concerning cats, such as cats you can buy, cats which have run away, and food and other stuff for cats, are in the same area. When you navigate in the message board it is like sitting in a spaceship. The messages closest to you grow big enough to become readable whereas those further away are small. A third board in the hall provides a list of all rooms, private as well as public. One can see whether a room is empty or occupied and for each public room one can see who is there. For some rooms there is also an announcement of the next meeting. Other rooms are probably being used for more ad hoc meetings or they are private and the announcement of the next meeting will only be in the message box for the room.

John proposes that they create a "holiday room" and go there to discuss the planning of their holiday. The others agree. John clicks on "create new room". He is then asked for a room name and whether it should be public or private. John types in the name and selects private. The system asks him to choose a password and type it in. The room is now created and this he tells the others who are waiting in the hall. He also tells them that he has sent the password to them by email.

They all go to the holiday room by selecting it among the existing rooms and then typing in their password. Having arrived in the room they can only access each other as represented by name (text) since they haven't made any pictures available. The user representations pop up in a separate window which also contains information on how each user is logged in. John wants to try to put his picture onto the ML server. He is at work and has a fast connection. Moreover, he already has a picture of himself on his machine. So in ML he selects "upload representation". In the dialogue box he indicates the file he wants to upload on the ML server

and clicks OK. He then chooses to see the “full representation” of users logged on to the room in which he is. The default is “text representation” because for people connected via low bandwidth a lot of graphics may easily take a very long time to transfer. Moreover, text representation takes up less space on the screen than, e.g., a picture. On the other hand, text may consume more space than a small icon.

Having chosen the full representation, John can now see his picture as well as his name in text. To tease James he then tells the others that he wants to see James represented as a camel. John has a broad selection of icons on his machine. In ML he selects “create local representation”. The dialogue box which comes up asks him to select one of the users in the holiday room and to select a representation. John selects James and an icon showing a camel and clicks OK. Since John has chosen to see the full representation of people he can now see the same as described above plus a camel attached to James’ name.

James who has an ISDN connection also selects “full representation” of users. After a short while he can see the same as John except that he himself is only represented by name. The camel is only on John’s machine. Robert’s computer is connected via the ordinary telephone line via a modem so he decides to stick to the text representation of users. Michael, with his PDA, has to choose whether he is connected via the telephone part or the graphic part of his PDA. It is not possible to use the audio facility and the display plus keyboard at the same time. So far, Michael has been connected via the telephone part of his PDA. He therefore checks, by using a keyword, who is present in the room. The email containing the password for the room he accessed via voice mail.

Now let’s get started, Michael says. They first discuss possible dates and where each of them would like to go. They end up with two possible dates and a decision to go to London. Usually they have gone to Sweden or Norway but this time the majority of them wants to try something different.

The next step is to find information about flight fares and departure times, hotels, shopping possibilities, theatres and museums. There may be more they want to investigate later on. They decide to distribute the tasks and continue the meeting in half an hour to see what each of them has found out. Like the three others, Michael has access to the web. If he wants to use it he has to hang up and then connect via the graphics part of his PDA. However, the display is small and he is not very keen on browsing a large number of pages without having a larger screen, so he will just leave the meeting and return in half an hour. John will investigate flight fares and times, and shopping possibilities, James will take care of theatres and museums, while Robert will look for hotels.

Half an hour later, John, James and Robert are ready to resume the meeting. John finished his investigations first and then asked the others if they were also about to be ready to continue the meeting. Michael, however, has not turned up again. Instead of just waiting they decide to call him.

When Michael is back, this time connected via the graphics part of his PDA, John starts the meeting. He has found some timetables, including fares, on the web. He has also found shopping information. Via application sharing, John can make these pages available to James, Robert and Michael.

James has found information on theatres and museums. There is a play in one of the theatres which they would all like to see. However, the theatre does not offer reservation via the web. Instead, the theatre has a spoken language dialogue system which will handle reservations.

Robert has found hotel information including prices, facilities available and pictures of the rooms. He also makes the information available to Michael, John and James via application sharing. One of the pages is very advanced. If you have the right equipment, you can ask questions to it and point at the same time, asking, e.g., “What is the price of this room?” (pointing).

After some discussion they decide to make a list of “things to do”, distribute the tasks, and meet again two days later. Therefore they save the room with all its contents.

Before John logs out he wants to look for the person who told him about ML. He goes to the hall to look at the board on which you can see which rooms exist and which persons are in these (non-private) rooms. One can search the board for a name. John does that without finding his friend. He then decides to search for him in the private rooms. If his friend is there and has accepted to be contacted, John will be able to find him. John selects the search function which allows him to look for a person in all the rooms in ML. John’s friend is in one of the private rooms. The search function does not tell in which room but asks John if he wants it to contact his friend. John answers yes. The friend is logged on via a telephone. A synthesised voice tells him that John wants to talk to him and that he is waiting in the hall. The friend accepts and goes to the hall where he finds John. They talk together for a while. Then the friend goes back to his meeting and John logs out.

2. Use cases

Partly on the basis of the above scenarios and partly on the basis of the project programme, a number of use cases are described in the following.

Logging in

How to enter the Magic Lounge:

Via telephone: Dial the ML number.

Via computer: Click on an ML icon. The user will be asked to provide login and password. The default is that one enters the hall as the first room. However, we should allow users to select another room as the default to which they want to go directly.

When entering ML the system will by itself find out through which devices the user is connected to the ML.

If the room one tries to enter has been deleted or for other reasons does not exist any more, ML will issue an (informative) error message. If you still want to enter a room of that name you have to create it first. The system should ask if you want to create it.

If the selected room is public, you will arrive in it once you have identified yourself as described above. If the selected room is private you have to provide a password before you are allowed access to the room.

Boards

Special hall functionalities:

The hall has a set of predefined and special functionalities which other rooms do not have. For each room there is a *message box* (corresponding to pigeon holes in a reception). The message box for a public room can be used (provides read-and-write

permission) by anybody. To access the message box for a private room a password is required (the same as for the room). The message box may be used for leaving any kind of message or material relevant to other members of the room in question. The message box for a given room can only be accessed from the room itself or from the hall.

The hall also has a *general message board* which is public and which is meant for any kind of message not related to a specific room.

The hall maintains a *list of existing rooms* from which one can see if a certain room is empty or not. For public rooms it should moreover be possible to see precisely how many people are in a room and who they are. For private rooms there may be restrictions.

It may be a good idea to allow hall watching, i.e. to constantly watch from a meeting room who comes into the hall (e.g. by having a small extra window open).

Magic board:

The whiteboard (magic board) is a kind of object board on which the user may put text and graphics. All spoken and written input is displayed as text on the magic board with indication of who contributed what. In addition, users may put, e.g., graphics onto the magic board. This is mainly interesting if it is important that a certain piece of graphics is saved along with the text on the magic board. In many cases it may be more comfortable to show, e.g., slides in a separate window while the speaker's talk will appear as text on the magic board.

Users may want to save snapshots of the magic board and then blank everything out. They may also want to search old versions of the magic board or use a filter to only retrieve what a particular user said during a certain session.

Rooms

Creating a new room:

New rooms may be created by ML participants at any time no matter in which room they are. Rooms may be created as being public or private. When creating a private room the creator will be asked to specify a password. The creator is responsible for giving the password to those who are allowed access to the room. If the user wants to establish a new meeting room, he selects "new room" from the "rooms" menu (Figure 2) or asks to create a new room. The new room will have a standard layout. When one creates a new room, e.g. on behalf of a group, the room appears on the rooms list but the person who established it will not automatically be in it. Each participant has to select the room to go into it.

Room names must be unique. If a room with a duplicate name already exists, an (informative) error message will be issued.

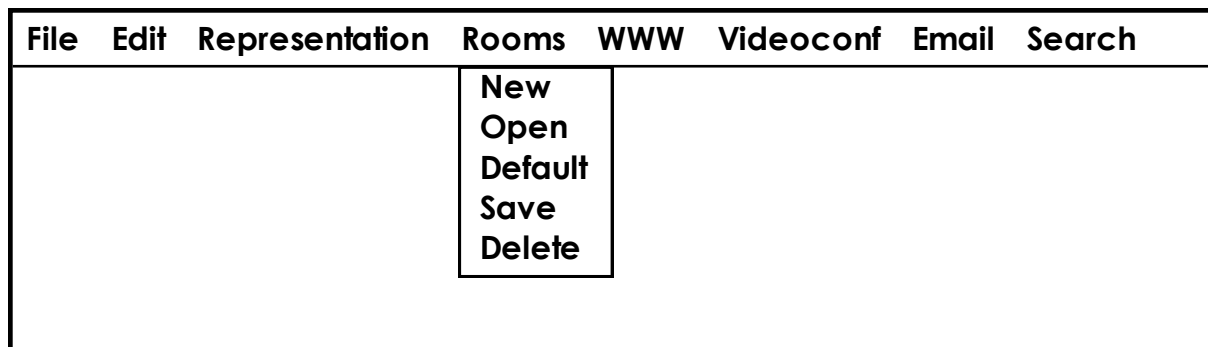


Figure 2. Early draft of the rooms menu.

Entering a room:

In order to enter a room the user must select “open” from the “rooms” menu or ask to go to a certain room. Having chosen “open”, a sub-menu of available rooms will appear and the user will be asked to select one.

Default room:

The default room to go to is the hall. However, the user can select any existing room as default. This is done as described for “entering a room”. The user only has to select “default” instead of “open”.

Saving a room:

It is possible to save a room and its contents. This is done by selecting “save” from the “rooms” menu.

Deleting a room:

Rooms can be deleted by selecting “delete” from the “rooms” menu if the user has the authority to delete the room in question.

Rooms and room administration:

The ML administrator is the overall responsible person for the room administration in ML. Rooms which have not been used for a specified amount of time (e.g. one month) will be closed unless otherwise agreed (cf. above). Rooms may only be deleted or renamed by their creator (owner) or by the ML administrator. Ownership may be changed by the creator or by the ML administrator.

A public room, except for the hall, may be turned into a private one and vice versa.

Any room may be accessed from any other room and a new room can be created from any room.

Basically, all rooms have the same standard layout and facilities. However, it is possible to add extra features as described above for the hall.

The standard functionalities include: a magic board which allows different users to enter text, graphics etc. onto the same board, application sharing of documents and programs, www access through a browser, video conferencing facilities, email, fax, search facilities,

speech recognition, speech generation, text generation (graphics-to-text and speech-to-text), representation of other users in the room.

Communicating with others:

In principle, everybody in a room can by default hear/see everything which is being communicated. However, the actual possibilities depend on the devices through which the user is connected and the facilities used by other participants. It should, moreover, be possible for a user to choose that s/he only wants to talk to one or a few of the people in a certain room. In a meeting it must be possible to indicate that one wants to speak. This is done by activating an “icon” The user can speak to it or click on it. The user can decide how the fact should be represented to him/her that another participant wants to speak. The representation of the user in question may start flashing or a sound attached to this person may appear.

Stores

History:

ML will maintain a communication history including a series of snapshots of the magic board. It will be possible to search the history or apply a filter to only access parts of it, such as what did user X say during session Y, and it should be possible to ask for a summary of the room history. This will be useful for, e.g., newcomers. The history will not contain everything said, shown or accessed from the ML. It would require huge amounts of space to store all that. But it should contain the most important information.

Information stores:

Users must be allowed to store the information they consider of particular importance in an archive or directory from which it is easy to retrieve it.

Representations

Representation of users:

Users may create any kind of representation of themselves (“new” in Figure 3) and upload it on the ML server (“upload”). ML shows as default representation only a text with the participant’s name. Other possibilities are to include graphics, have an acoustic representation, or include all representations made available by a given user (“full”), cf. Figure 3. Text may be the only representation if a picture is not available. If there are more than X participants, the picture may be left out anyway in order to save screen space. The user may choose other representations than those uploaded by other users, such as an icons instead of a picture (select “create local” to do that), or decide not to have open the field/window showing representations.

File	Edit	Representation	Rooms	WWW	Videoconf	Email	Search
		New Upload Create local Text Text+static graphics Sound Full					

Figure 3. Early draft of user representations.

Delegate users:

If a user is not able to attend a meeting in real time, it should be possible for this user to send his/her delegate. A delegate can be uploaded in the same way as any other representation of the user. However, attached to it are one or more messages plus a specification of which room it should go to and when.

Representation of the system (ML delegate):

The system will participate in ML activities as an active information provider and will therefore be present in a way corresponding to that of other participants. The system thus needs to be represented just as the other participants are. We probably need a sound representation as well as a graphic/textual representation for this purpose.

Programs and corresponding facilities included in ML

Each ML room will be equipped with a number of facilities. Among others, these include video conferencing, a www browser, email, fax, and general application sharing.

Search:

A user may want to look for somebody who may be in one of the ML meeting rooms. The board in the hall which contains a list of all rooms, may help. However, if the person is in a private room, his/her name will not necessarily appear from the board. Each participant should be able to decide whether or not to be visible to other ML participants if s/he is in a private room. If a participant has accepted that other people may contact him during a meeting it must be possible to contact him without necessarily knowing which room he is in. The result of a search for a person indicates where he is if he is in a public room and it should tell if he does not want to be interrupted. If he is in a private room and does not want to be interrupted, he will not be found. If he has accepted to be disturbed, then a search should tell that he is in ML (without telling in which room) and allow the user to send him a message or otherwise get in contact with him.

It should, moreover, be possible to search any board in ML as well as the history of each room.

Logging out

Logging out from the meeting room:

Use quit to leave ML or hang up if you have accessed ML via the telephone. The user may also leave ML by going to another information space.

4. Concluding remarks

The above scenarios and use cases unfold, at a fairly abstract level, most of the ML functionalities. Functionalities described above but not included in the project programme will be implemented only if time allows. See also [Bernsen and Dybkjær 1998] for a comparison between the users' ML and ML as described in the project programme.

The above exercise generated quite a number of questions which will have to be answered as work proceeds. Examples of such question are the following:

- Can different rooms have different extensions so that you can go there directly? Is it safe to provide login and ML password via the telephone?
- Can you make a telephone call from ML to the person you seek? This ought to be doable from ML - establishing a phone connection.
- How does Magic Lounge handle simultaneous input from several people? Can it process it?
- Can the same user be logged in from two devices at the same time in the same room session, such as from a non-microphone-computer and a mobile phone?
- Can several people be logged into Magic Lounge from the same unit (PC, PDA, telephone) at the same time? Can the same person open two clients on the same computer and thus attend two meetings in two different rooms at the same time?
- Can several microphones be connected to ML from the same physical room?
- All users, whether connected through phone, mobile phone, video conferencing or computer microphone, should use the same sound track. How to implement that?
- Are there any technological restrictions on the number of co-present users in Magic Lounge? If any, to which facilities (see below) do the restrictions apply?

The next step will be to outline an architecture for ML which will enable the described functionalities. This is done in the report entitled [Dybkjær and Bernsen 1998].

References

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