MAGIC LOUNGE

Participatory Specification and Design Ideas from the Danish Isles

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Summary. Virtual co-presence systems (or virtual meeting places) represent a major step beyond the single user - single system paradigm which has dominated the field of interactive human-computer systems for decades. Developers of virtual co-presence systems are faced with large design spaces whose exploration can benefit from user participation in the design process. The paper presents a structured view of the data collected from a group of users living on the Danish isles as part of the participatory design of Magic Lounge. Magic Lounge is a web-based, collaborative virtual environment for ordinary users, with a strong focus on device inter-operability. Users should be able to access Magic Lounge using many different access devices, ranging from workstations equipped with microphone and loudspeaker to mobile telephones.

Keywords: Virtual co-presence systems, participatory design, human-human-computer interaction.
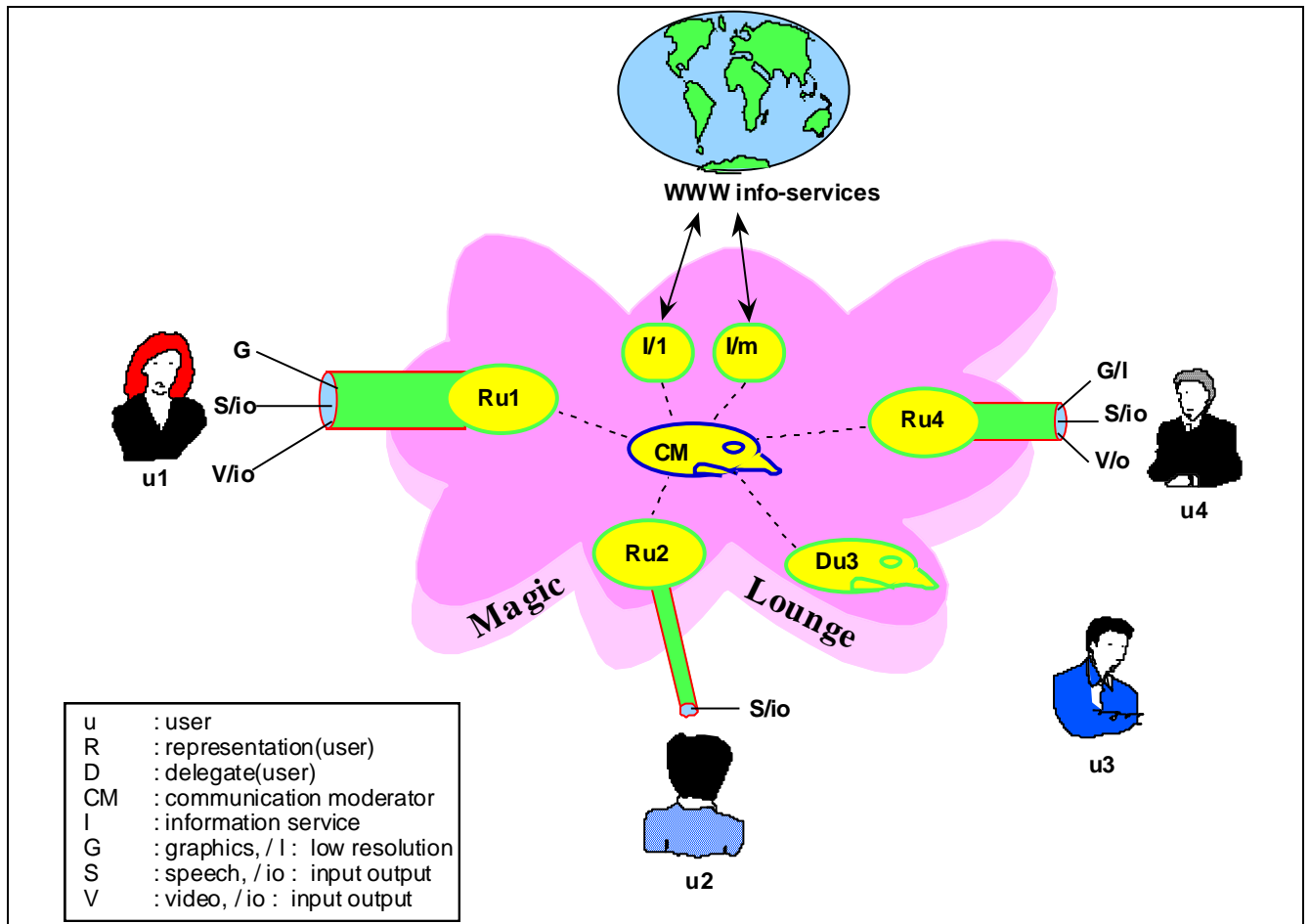
Figure 1. Magic Lounge

1. Magic Lounge and its Users

The purpose of the Magic Lounge project which is done under Contract No. 25458 with the European Commission's Esprit Long-Term Research Programme, is to build a series of increasingly sophisticated prototypes of web-based, device inter-operable, collaborative virtual environments for ordinary users (see the project description at http://www.dfki.de/imedia/mlounge/). The Magic Lounge project began on 1 July 1997 and runs for three years. The Magic Lounge software platform builds on a collaborative platform developed in Java by the Natural Interactive Systems (NIS) Group at the Maersk Institute. Based on that platform, the NIS group is responsible for the development, during Year 1 of the project, of the first Magic Lounge prototype to be demonstrated in the summer of 1998. Figure 1 presents a generic view of Magic Lounge, showing a number of users who are connected to the Lounge through different access devices using partly different input/output modalities for representing and exchanging Magic Lounge information. The users are virtually present in the Lounge through some form(s) of representation, including a user who is not presently able to participate in the meeting but has chosen to send a proxy agent. Magic Lounge moderates the virtual encounter and enables the participants to jointly seek information for common use through the network.
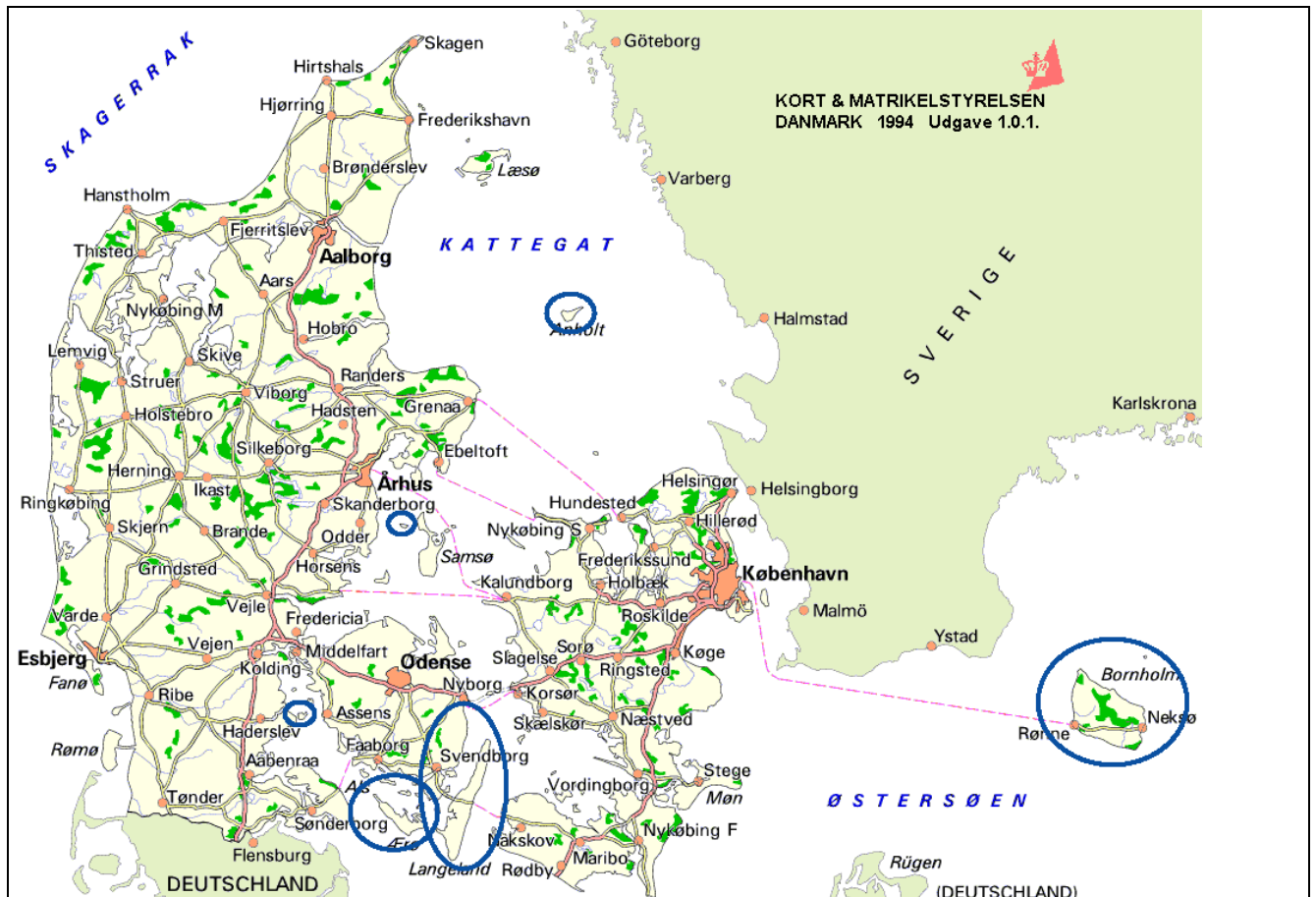
Figure 2. Map of Denmark showing the six islands encircled in blue in which the participatory design group members live. Two live in Anholt and two in Ærø.

As part of the design, specification and development of the Year 1 Magic Lounge prototype, NIS is carrying out a participatory design process with a user population inhabiting various Danish isles. The purpose is to gather from representatives of the intended Magic Lounge user population needs, design ideas and evaluation criteria for the development of Magic Lounge. The Danish isles user population is deemed representative of the intended users of Magic Lounge in the following respects: (a) the users are widely distributed geographically (Figure 2); (b) they are "ordinary users" in the sense that they have very different professional backgrounds; and (c) they are expected to use Magic Lounge for their ordinary activities, i.e. activities which can be assumed to represent the shared activities of users with widely different skills and professional backgrounds. It has not been investigated to which extent this user group of eight people (see below) are otherwise representative of the population of the Danish isles in general. In one respect, they are definitely *not* representative because they are all males between 34 and 57 years old and they are computer and networking enthusiasts, equipped with state-of-the-art private-home equipment (Figures 3-6) which allows them to participate in the project without having to go through extensive training following purchase of basic equipment.

Group member	Age	Occupation
EBS	41	EDP-responsible in a bank (Rise Spare- og Lånekasse)
FEH	34	Nurse (male)
GT	-	-
HCH	50	Project leader

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KK	43	Garbage collector	
KS	57	Small business in communication/PR. Teacher in mathematics, informatics and personal development	
LNA	41	Programmer and webmaster	
SV	50	Journalist	

Figure 3. Age and occupation of the participatory design group members.

Group member	Degree of experience	Uses computer at work	Has tried video conferencing	Has tried chat systems
EBS	very experienced	yes	no	yes
FEH	very experienced	no	no	yes
GT	-	-	-	-
HCH	(very) experienced	yes	no	no
KK	experienced	yes	no	yes (via FirstClass)
KS	very experienced	yes	no	yes
LNA	very experienced	yes	no	yes
SV	very experienced	yes	no	no

Figure 4. Group members' experience with IT systems.

Group member	Browser	Uses computer for
EBS	Netscape, MS Internet Explorer	text editing, spreadsheet, internet
FEH	Netscape Communicator (mainly)	text editing, internet, html
GT	-	-
HCH	MS Internet Explorer	text editing, spreadsheet, internet, distance teaching, distance work
KK	Netscape Communicator	text editing, spreadsheet, internet, communication via FirstClass
KS	Netscape	text editing, spreadsheet, internet
LNA	A home-made one, Netscape 3 gold, MS explorer 3	programming, internet
SV	Netscape	text editing, spreadsheet, internet , DTP (with Pagemaker)

Figure 5. Group members' use of software.

Group member	PC	RAM MB	DISK GB	Sound board	Modem	Screen	Printer	Scanner	Loud speakers
EBS	Pent. 166	48	6.0	yes	33.600	17"	yes	yes	yes
FEH	Pent. 60	24	3.5	yes	33.600	15"	yes		yes

GT	Pent. 90	40	1.2	yes	33.600	15"	yes	yes	yes
HCH	Pent. 133	32	2.0	yes	33.600	15"	yes	yes	
KK	Pent. 133	48	1.0	yes	33.600	15"	yes		yes
KS	486	16	1.2	yes	14.400	14"	yes	yes	yes
LNA	Pent. 75	24	2.0	yes	33.600	14"	yes	yes	
SV	486	32	1.05	yes	28.800	14"	yes		yes

Figure 6. Group members' equipment for communication within Magic Lounge.

The user group was selected as follows. One of the users had contacted the NIS group early on. This user is the project leader of the Isles and Countryside Bank of Ideas (URL: http://inet.uni2.dk/ ~infoanho/idebank.html) and thus has connections to several inhabitants of the Danish isles. He advertised the Magic Lounge project through the Bank of Ideas' infrastructure. It was set as a condition for participation that candidates should already have a computer and preferably also a modem. This would overcome the problem of Magic Lounge not having a budget for expensive computer equipment and training of novice users who eventually might turn out not to be interested in using a computer anyway. Six people responded to the advertisement. The final user in the user group of eight members was identified by contacting the Association of Smaller Danish Isles (URL: http://www.danske-smaaoer.dk/).

The group members received the Magic Lounge Project Work Programme. Additional information about the project has been exchanged via email, telephone and surface mail, as well as at the first Magic Lounge Workshop which took place at the Maersk Institute on 28-30 July 1997. Six of the eight user group members participated in the workshop. The issues discussed at the workshop were:

- gathering of participatory specification and design ideas from the "Danish Isles" user community;
- the functionalities to be included in the first demonstrator (after Year 1);
- how functionalities influence the interface design;
- approach to concepts and software tools development;
- establishment of the project's Quality Assessment Panel (QAP);
- the Magic Lounge policy for communication, dissemination and results uptake;
- the European IT Conference (EITC'97) Exhibition on 24-26 November 1997 in Brussels where the current version of the Magic Lounge prototype has been demonstrated;
- obligations and rights of participants.

2. Participatory Design of Magic Lounge: the Groundwork

a. Participatory design

The idea behind participatory design is not that the users *drive* systems design, telling the designers more or less exactly what the system should be able to do and how the user-system interaction should work. When the design space is large, advanced compared to the state-of-the-art, and in part deeply technical, as is the case for Magic Lounge, it takes a major effort to explore and chart the design space. Experimentation may be needed to find solutions that can satisfy the technical constraints. And

there are usability issues which may require simulation or other forms of experimentation as well. In such situations, what users can help with is to (a) express their needs with respect to the system, (b) provide detailed information on the tasks they might want to achieve by using the system, and (c) tell how they might envision doing those tasks based on general background information about the systems capabilities and limitations. The process of eliciting information from the users may well be iterative, so that one starts from a simple overall description of the system, elicits users answers to questions about (a) through (c) above, processes the elicited information, advances the design and specification, refines the description of the system, and asks the users about (a) through (c) again. This process may involve several iterations each of which contribute to deepening the understanding of the system's capabilities and limitations relative to the users needs and the tasks they want to perform, thereby achieving a comprehensive exploration of the design space around the artefact being developed. At some stage, asking the users in the abstract may be replaced by their participation to trials with system prototypes, recording their interaction and analysing the recordings, and eliciting their observations through such methods such as questionnaires and interviews. This is the approach to participatory design adopted at NIS. The present paper describes what came out of the first participatory design iteration.

b. Planning of the participatory design process

A main problem in planning the first participatory design iteration was to avoid priming the users through information derived from our own initial explorations of the design space. We wanted the users to explore the design space for themselves, thereby generating design ideas, solutions to design problems and novel design issues to be faced and resolved in the design process. This meant that we could not provide them with our own specification documents in whatever form, including the specification for the EITC'97 demonstrator (http://www.dfki.de/imedia/mlounge/internal/modules/nov-dem-spec-1.html). Doing so would run the very real risk that we would be setting the agenda for the users' exploration of the design space. Moreover, this specification is still preliminary and experimental and may receive considerable modification even in basic respects. So not only might the users be strongly primed by the specification, they might also be set off on a wrong track into design space.

Instead we chose to develop a questionnaire. The questions were based on our own experience in developing the specification for the EITC'97 demonstrator. We viewed the specification as a particular set of answers to a partially ordered series of questions about the functionality and usability of Magic Lounge. In asking these questions, we hoped to have the users join us in an exploration of the design space around Magic Lounge without overly influencing the findings they might make.

Having decided to use a questionnaire, the issue arose of how to focus the users' answers in order to avoid entirely irrelevant responses based on false initial conceptions of Magic Lounge. The approach we adopted was to produce a description of the purpose of Magic Lounge which could set the stage for answering the questionnaire. Obviously, this description should avoid influencing the users so that they would answer the questions in the questionnaire in certain ways rather than others. So we settled for a description of Magic Lounge which in our view was the minimum one imparted to the participants already, i.e.:

> The Magic Lounge is an electronic information space in which to meet, communicate, discuss and do joint problem solving. The Lounge has on-line connections to the rest of the world through the Internet and the World-Wide Web as well as through static and mobile telephone, mobile telephone with a screen, ISDN videolink and fax. It may be used

by any community of users, for instance by those living on the smaller and often remote Danish Isles.

This general conception of Magic Lounge had been communicated to all users through the Work Programme of the project and to some of them through their participation to the first Magic Lounge Workshop.

Given the introduction to the questionnaire, the next issue was to avoid technicalities in the questionnaire. The users have different levels of experience in operating IT equipment and were assumed to have different levels of understanding of how IT systems operate. The questions should give each user an equal chance to explore the design space, both in their actual wording and in their avoidance of technical issues. The users were invited to take an IT design approach to the questions if they so desired. But it was made clear that all questions could be answered without considering technology at all, merely through envisioning what one would like to do with Magic Lounge and which functionality and information the interface should provide for doing that.

A final issue was how many questions to ask, and in which order. Closer inspection of our own problem solving experience in defining the specification for the EITC'97 demonstrator revealed that the questions to be asked were to be of at least two main types. One type concerns the purposes and tasks for which Magic Lounge might be used. The second type concerns how to actually interact with Magic Lounge during sessions with the system. We decided to begin with the first type of question and then proceed with the questions about actual interaction. The latter questions turned out to form a partially ordered series, starting from accessing the Magic Lounge and proceeding through issues of self-representation, initial communication with others, if needed, finding rooms and going to them, holding a session in a room, temporarily leaving the room, concluding a session and planning a new one. Having discovered that, we tried to implement the idea in the questionnaire that the users should invent a scenario of use, i.e. a task which they would like to do with Magic Lounge, and then answer the partially ordered series of questions in "acting through" the chosen scenario. As the analysis below demonstrates, this did not work out as intended, partly, we believe, because the order in which the questions were presented was not optimal, and partly because we did not present the scenario idea in other ways than through the questions themselves.

In addition to the two types of question just described, the questionnaire finishes by asking whether there might have been other questions that we should have asked. As for the number of questions in the questionnaire, we arrived at a total of 20 questions when going through the process (described above) of re-expressing our specification for the EITC'97 demonstrator as a series of questions answered. When adding the questions about purpose, task and any other questions, we had 24 questions in all. It was clear that it would be a strenuous task for the users to address this many questions but we hoped that they would be able to do so nevertheless. They were, although some "questionnaire fatique" may be in evidence from the answers to some of the later questions in the questionnaire. The users were instructed to not necessarily answer all the questions but to answer primarily those which elicited reactions or ideas. Sketches were welcome and had to be submitted through ordinary mail with promise of returning the originals (none came). Discussion of the pros and cons with respect to a certain solution was welcomed. It was stressed that if one takes the time to answer the questions, it becomes possible to penetrate quite deeply into the Magic Lounge universe and to derive much fun from doing so.

c. The questionnaire

The 24 questions were:

1. For which purposes might you use Magic Lounge?

2. In your opinion, for which purposes might other inhabitants of the Danish Isles use the Magic Lounge?

3. Which would be the advantages of using the Magic Lounge compared to what ordinary citizens can do today using telephone, fax, travels, letters, emails, individual access to the www?

4. If you want to visit the Magic Lounge: what would you have to do when using your own present equipment (please describe the equipment you would be using)?

5. What happens then - where should one get to: to an entrance hall or to a specific meeting room?

6. How might you be represented when you turn up in the hall or meeting room? (Others using the same equipment as yourself might be represented in the same way or they might have several choices of how to be represented in the ML).

7. Ideally, how would you prefer to be represented (you might have several choices of how to be represented in the ML)? Should you have the possibility of deciding how others will be represented on your screen?

8. Imagine that you have a specific purpose in getting to the ML today: what is the purpose? (It would be useful if you would "act through" several ML visits serving different purposes when answering the questions to follow).

9. How do you establish contact with the people you meet or have planned to meet?

10. How do you find out who are "in your proximity" (in the hall or in other rooms)?

11. If you do not want to be disturbed by others during the session but want your own room, what do you do?

12. Before you decide on what to do, such as going to a separate room, how do you reach a common decision on what to do?

13. Which supporting instruments (tools, materials etc.) do you need for the session? Describe each of them.

14. Describe a full ML session. Be careful not to embark on a very complex account because the description may then easily run over many pages (which is OK if you can manage to do it). Refer to one of the purposes you mentioned under (1) above.

15. How do you communicate during the session? Which forms of communication do you use the most?

16. What does one do if one is too late for a session and needs to know what happened before one's arrival?

17. How does one find out who is presently contributing to the session?

18. If a group session is private, should non-invited ML visitors have the possibility of finding out that your group is in ML? Should they also have the possibility of finding out which persons are now meeting somewhere in ML?

19. What should happen, if anything, if a participant temporarily leaves the session?

20. What will you do if you need to meet again later concerning the matter addressed in the session?

21. If you are to meet again, how should it be ensured that your private room is still available and has not been changed or modified in the meantime?

22. Should it be possible to address one or more selected session participants without the others watching or listening in?

23. Which kinds of rooms are needed, such as an entrance hall, private meeting rooms, others - which?

24. Are there any other questions which need to be asked?

d. Facts on the execution of the work

The questionnaire was designed during August 1997. The work with the users started on 1 September 1997 and was completed when the final questionnaire came in late October 1997. All eight users in the user group answered the questionnaire. Most users answered all of the 24 questions, some refraining from answering a certain question by saying, for instance "I don't know".

e. Comments on the process

Of the 24 questions in the first questionnaire, questions 1 to 3 concerned the purpose and advantages of using the Magic Lounge. Questions 4 through 23 addressed aspects of the actual use of Magic Lounge. Question 24 asked for suggestions for additional questions. Question 25 ('Other comments') was added post hoc because some of the users added commentaries at the end of their filled questionnaire.

Following the initial questions (Q1-Q3), questions 4 through 23 had been intended to allow each user to "play through" one or more self-selected scenarios of actual use of Magic Lounge, such as conducting a virtual meeting in a series of such meetings on the history of marine forces. The data received show that this idea did not work out. Only one or two users actually tried to consistently follow one or several scenarios in their answers to Q4-Q23. Instead, the answers received to Q4-Q23 mostly address each question more or less in general, abstracting from any particular scenario of use. This means that the data, rather than exploring particular scenarios, explore the large design space around Magic Lounge in a piecemeal fashion, guided by the questionnaire. Had the scenario idea

worked, it would have been necessary to maintain (anonymised) references to each user throughout Q4-Q23 in order to follow how, say, user U1 systematically developed a scenario in response to the questionnaire. As things stand, however, references to the individual users have been removed below because there is no precise scenario-based relationship between the answers provided by each user to Q4-Q23. We still feel that the idea of using self-selected user scenarios for exploring the design space around Magic Lounge is a good one and plan to do a scenario-based study later in Year 1.

f. Principles followed in handling the data

The data (in the Danish) were collected in a single file. Each data point (answer to a question) was marked with the name of its originator. This file is confidential and available on the Magic Lounge private web pages only as Bernsen and Dybkjær: Magic Lounge Participatory Design Questionnaire 1. The data. The Danish data were then summarised in English, still marked with the originators' names. The summary is confidential and available on the Magic Lounge private web pages only as Bernsen: First Magic Lounge Participatory Design Questionnaire. Raw summary of the data. A fellow researcher from the NIS group did an independent check of the correctness of the data summary by comparing the Danish data file with the English summary. Finally, based on the raw data summary, the data were structured as shown in Section 3 below.

General principles followed in structuring the raw data were:

(a) In Section 3 below, the answers received to each question have been structured whenever there was a felt need to do so. This was the case when answers to a certain question in the questionnaire reflected sub-questions which were not actually asked but turned out to constitute a further sub-division of the design space. For instance, the answers to Q1 concerning the purposes for which Magic Lounge might be used, turn out to address three different sub-questions, i.e. the collaborative *tasks* for which Magic Lounge might be used, the generic collaborative *activities* which Magic Lounge might be used for, and the communitarian *aims* served by using Magic Lounge. The distinction between tasks and activities illustrate a general observation on the questions in the questionnaire, namely that many of the questions can be answered at different levels of generality.

(b) For each question, a brief introduction to the users' answers has been added, highlighting issues such as the quality or pertinence of the answers, the quality of the question itself, or other points of interest for the participatory design and specification process.

It is important to distinguish between the data structuring presented in this paper and what might be generally termed "data analysis". As soon as one starts analysing the data beyond the provision of some sort of structure to them, the treatment of the data becomes relative to particular purposes which must be stated explicitly and consistently pursued during the analysis. Among such purposes are: theory development; the testing of existing theories, such as theories of collaboration or collaborative systems; task analysis; the contribution of the data to systematically uncovering the design space around Magic Lounge; differences among the users (data providers) in the way they address the questions in the questionnaire; agreement or disagreement among users with respect to particular questions; or the contribution of the users to our own design ideas on, and our own specification of, Magic Lounge. As long as one merely provides structure to the data, the data is still presented as answers to the question to which it belongs, even though the structure provided to the answers may reflect certain purposes rather than others. When data analysis proper starts, the data will be moved around, the questions may be removed, and the focus of data analysis will reflect a particular analytical

purpose. This is why we have decided to present the data in a structured, rather than in an analysed, form below. Data analysis proper will be done later for some of the specific purposes mentioned above.

3. The Design Ideas which came Out

This section provides a structured view of the data from the First Magic Lounge Participatory Design Questionnaire.
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1. For which purposes might you use Magic Lounge?

The answers received to Question 1 demonstrate a rich perception of the potential of Magic Lounge as a generic multi-party, multi-channel communication platform. For ease of review, the answers have been split into three categories (a-c) and ordered alphabetically within each category. The distinction between tasks and activities is not always clear-cut. Still, it would appear useful to distinguish between specific tasks that can be solved using the Magic Lounge, and generic Magic Lounge activities which are, or could be, common to many different tasks. The rich answers received to Question 1 could contribute data for, e.g., a taxonomy of meetings for collaborative systems design. The answers clearly demonstrate that all users believe that Magic Lounge can serve as a means of overcoming distance between themselves and the rest of the world.

(a) Collaborative task contents

- agriculture: solve problems in agriculture;
- banking: face-to-face, more-than-two-at-a-time meetings with colleagues in other small independent banks to discuss common problems and solutions;
- business partners: contacts with business partners;
- chat;
- Church Contact Forum meetings;
- computer graphics development;
- computer programs development;
- customers: meetings with customers;
- distance education participation;
- distance teaching and teaching preparation;
- distance working;
- ecological propaganda creation and dissemination;
- energy: discuss solutions for tapping energy from the wind, the sun, or the waves;
- fishery: solve problems in fishery;
- history of the marine meetings;
- hobby club meetings;
- information collection tasks;
- labour union meetings;
- marine home defence (marinehjemmeværnet) members' meetings;
- organisational work meetings;
- planning: joint planning;
- political meetings;

- project group meetings;
- public administrations: communication with public administrations.

(b) Collaborative activities (with no mentioning of specific task contents)

- conferences and meetings with people from other islands or places;
- distribute minutes and call for meetings on my own island;
- exchange of ideas and experiences;
- face-to-face communication with friends and acquaintances;
- follow up on meetings;
- give talks;
- ideas development;
- larger meetings, such as conferences or general assemblies;
- make or cultivate personal contacts;
- meet people from other European countries who share my interests;
- professional meetings;
- support, extend and supplement personal projects;
- workshops.

(c) Communitarian aims served by using Magic Lounge

- avoid re-inventing the wheel through learning from the ways in which problems have been solved on other islands;
- counter a diminishing population;
- counter the need for receiving education away from the island;
- counter unemployment;
- create jobs for geographically separated people;
- early adoption of innovations as these are being introduced elsewhere in the country;
- enabling meeting participation which would otherwise be impossible because of the time needed for travelling (e.g. 6 hours of travelling for a two-hour meeting);
- reducing the distance to the rest of Denmark and the world at large;
- strengthening the common European identity.

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2. In your opinion, for which purposes might other inhabitants of the Danish Isles use the Magic Lounge?

The answers received to Question 2 add few specific task contents, activities or general aims to those provided by the answers to Question 1. Note, however, the "Other comments" section which contains several suggestions for future work. Note also, as Bryan Cleale points out, that there may be a risk that the users are simply looking beyond the island community with the help of Magic Lounge, ignoring the many purposes for which Magic Lounge might be used to support inter-island and intra-island communication.

(a) Collaborative task contents

- archeology study circles;

- cattle raising: consider, for instance, two farmers on different islands who both raise Charolais cattle - they will be able to use Magic Lounge for face-to-face meetings;
- home shopping in stores located outside of the island through human-human communication rather than through filling in forms.

(b) Collaborative activities (with no mentioning of specific task contents)

N/A.

(c) Aims served by using Magic Lounge

- in general, for any kind of communication which will become both easier and enriched compared to what is possible at present;
- in general, Magic Lounge will afford islanders hugely improved possibilities for cultivating their interests.

(d) Other comments

- most isles inhabitants have no clear expectations as to what advanced information technologies can do for them;
- ask them!
- ask the Idea Bank of the Danish Isles to find out about the purposes for which they use their "debating wall".
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3. Which would be the advantages of using the Magic Lounge compared to what ordinary citizens can do today using telephone, fax, travels, letters, emails, individual access to the www?

The answers received to Question 3 are related to, but mostly different from, those under Question 1(c) about the communitarian aims served by Magic Lounge. The answers to Question 3 concern the advantages derived from the actual communication in Magic Lounge, as compared to the use of more traditional means of communication. The answers demonstrate a keen awareness of the particular advantages of communication in Magic Lounge.

- application sharing wrt. spoken, textual and graphical information;
- cost reduction, for instance by not having to travel so often to achieve the same amount of communication, travelling being particularly difficult to and from the smaller Danish isles;
- improved quality of communication: communication improves when people can both see and hear one another - seeing the mimicry improves understanding;
- increased equality wrt. information level, especially if Magic Lounge integrates data collection and storage facilities so that, for instance, non-participants have the possibility of studying the meeting log;
- multi-functionality: one medium - all possibilities;
- multimedia co-operation;
- resources savings in communication, for instance through saving time and cost;
- simultaneity: much more communication can be done synchronously;

- time savings in communication, for instance because of the simultaneity and the reduced need for travelling;
- through the communitarian nature of Magic Lounge people will get to know one another.

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4. If you want to visit the Magic Lounge: what would you have to do when using your own present equipment (please describe the equipment you would be using)?

The answers received to Question 4 contain fairly limited information on the users' own present equipment, probably because they had provided us with this information already in response to queries independent of the questionnaire. The answers show a variety of initial situations of use of the Magic Lounge, such as "just going there" or "being called to a meeting". It now seems clear to us that the question is ill-phrased and could have been replaced by Q8 below. The intention was not to obtain information about the users' equipment but to have them envision going to Magic Lounge using various operations performed with their present equipment. Significantly, one user replied that he did not quite understand the question.

(a) Access to server

- accessing the server may be prompted by Magic Lounge showing the user who wants to communicate with him/her and when; the user may then choose to accept the connection;
- accessing the server may be prompted by, e.g., a blinking Magic Lounge icon on the screen activated by people who are already in Magic Lounge and who want to contact the user;
- accessing the server may be prompted by a message from Magic Lounge that a meeting is about to commence;
- type 'Magic Lounge' or the like, such as typing a web address in one's browser; or
- click on an Magic Lounge icon on the screen.

(b) Having accessed the server

- Magic Lounge shows available forms of communication and the user chooses among these;
- at this point, Magic Lounge may show the user who wants to communicate with him/her and when; the user may accept;
- use individual password to get in;
- the user tells Magic Lounge with whom he/she wants to communicate and through which media;
- several users express the wish to be able to see and hear the communication partners, using video camera, microphone and ISDN.

(c) How to get people to access the server

- it might be possible to ask Magic Lounge to call a meeting with specified participants; or
- one might use email independently of Magic Lounge to organise meetings, stating which Magic Lounge room will be used.

(d) Other ideas

- in my own house, I would like to be able to use Magic Lounge in different ways from different rooms;

- connection should happen through one's Internet connection. If the network is too slow, one must be able to connect through a number.

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5. What happens then - where should one get to: to an entrance hall or to a specific meeting room?

The strong and detailed answers received to Question 5 do not fully support the idea that one always first enters the entrance hall when visiting Magic Lounge. In addition, those answers introduce many proposals for requirements on entrance hall functionality, such as which information should be available in the entrance hall or which selection functionality should be provided in the entrance hall. As expected, the users do not agree among one another.

(a) Where to go

- one goes to the entrance hall, as in a hotel or conference centre;
- where to go depends on one's purpose in visiting Magic Lounge;
- enable direct access to a specific meeting room, by-passing the entrance hall.

(b) Functionality of the entrance hall

- use the entrance hall for displaying meeting invitations on a blackboard;
- use the entrance hall for displaying ongoing and planned meetings on a blackboard. Regular meetings are indicated, possibly through links;
- the entrance hall should contain boards showing public events as well as closed events and meetings. The boards should be used for selection of what one will participate in;
- the blackboard should include a general internet search function, such as in MS Netmeeting or Netscape 4's conference function;
- use the entrance hall for displaying who is around in Magic Lounge at the moment;
- provide the entrance hall with a reception function where rooms can be reserved for groups, meetings or conferences;
- equip the entrance hall with the functionality needed to organise meetings, including the function of being able to go to a specific room.

(c) Functionality of individual meeting rooms

- equip individual meeting rooms with lists of participants showing, for instance through the use of colour, who is logged in at the moment.

(d) Other alternatives

- have a sitting room for public chatting with those present.

(e) Other ideas

- distinguish between open and closed meetings; let the participants decide;
- distinguish between meetings announced to others;
- closed meetings may require passwords; security is important in closed meetings;
- distinguish between private and public rooms.

6. How might you be represented when you turn up in the hall or meeting room? (Others using the same equipment as yourself might be represented in the same way or they might have several choices of how to be represented in the Magic Lounge).

The answers received to Question 6 contained several important design ideas for consideration, especially concerning the dependencies of particular representations on other factors. User customisation emerges as an important factor in Magic Lounge usability.

(a) Forms of representation

- no representation;
- representation by name or alias;
- representation by short and precise Magic Lounge ID;
- representation by a picture icon with a name under it.
- representation both as individuals and as members of a group;
- in smaller meetings, my name might come up blinking and possibly accompanied by a picture of me, live or stored;
- a person description might come up or be called up by those who want it;
- with two persons in a graphical environment, use a large video image with high resolution; with 3 to 6 participants, use small video images with reduced resolution; with more than 6 participants, use a name icon;
- in a text-only environment, a small square containing a name may be used. In all cases, clicking on the icon should provide access to brief information on the person in question.

(b) Who decides on how to represent people

- each user should be able to define how (and whether) others are being represented on his/her equipment. The most important thing is to be able to organise one's own workspace.

(c) Dependencies concerning how people are represented

- in many cases, no representation of others is needed. What is needed is to only represent the stuff that the meeting is about;
- the representation depends on the number of participants at the meeting and on whether, e.g., a user has the right to speak or vote;
- the representation depends on the equipment used by the others. Speech-to-text might be useful for those using a telephone.

7. Ideally, how would you prefer to be represented (you might have several choices of how to be represented in the Magic Lounge)? Should you have the possibility of deciding how others will be represented on your screen?

The somewhat tentative and cursory answers received to Question 7 tend to ignore the question of ideal self-representation, raising other, more practical issues and ideas instead. As in the answers to

Question 6, user customisation is emphasised. This line of questioning might be better developed after the users have gained some experience, through Demonstrator 1, of what the possibilities are for different representations in Magic Lounge.

(a) Preferred self-representation

- each user can define a self-representation, such as an icon, which is then offered to the other users;
- short and precise Magic Lounge ID;
- both as an individual and as a member of a group;
- as a small image.

(b) Who decides on how to represent people

- each user should be able to customise all representations on his/her screen.

(c) Dependencies concerning how people are represented

- the representation depends on the available hardware. With strong hardware: strong resolution; with weaker hardware: low resolution. With a telephone: a speaking machine announcing who is present at the conference;
- offer a default set-up for new users and others who might prefer that one;
- there should be a default plus several options;
- distinguish between different representations, their use, and their location within the sequential interaction.

(d) Other ideas

- the data on people and subjects in Magic Lounge should be well-organised, easily accessible and full. For instance, it should not be necessary to leaf through 300 images in order to call a person;
- a Danish version of the system should appear simultaneously with the English version.
_____

8. Imagine that you have a specific purpose in getting to the Magic Lounge today: what is the purpose? (It would be useful if you would "act through" several Magic Lounge visits serving different purposes when answering the questions to follow).

The answers received to Question 8 contained a number of individually very different scenarios, one of which was described in great detail. This strongly supports the idea of having users "act through" these or other self-selected scenarios in a future exercise in Year 1. The 'Other ideas' section shows how some users answered Question 8 more or less in general, abstracting from particular scenarios, and produced valuable input on the different types of meeting possible in Magic Lounge as a result.

(a) Purposes

A: Distance working (graphics and programming);
   ideas development (research and development using chat, conferencing and graphics);

organisational work on eco-propaganda;
personal contact using chat, conferencing and graphics.

B: Assumption: six-person, informal, non-chaired, non-voting group meeting. The group monitors the work of the organisation of Danish Local Authorities (Communes) in developing electronic patient journals for use by mobile infant health care workers in the Communes. A representative from the Steering Group is present and has to present a progress report. I follow the meeting as an observer because the system is planned to be extended later on to general private health care. The meeting is closed. My password provides access, through a list, to summaries and full minutes (replays) of the previous meetings as well as to the meeting material in advance of the meeting (e.g. the overheads). A home page provides public access to the work. One access might be through real-time VR using head-mounted high-resolution display and microphone. One is virtually present around the table and turning of the head provides realistic feedback. Zooming is also possible. Screen shots and video clips show scenes from the actual work done by mobile infant health care workers. These are accessible from the meeting minutes, from the public web pages and from links to elsewhere. My 15'' screen presents the present speaker and the overheads shown through live ISDN. I hear the voices of the others present but am not always able to see them as they speak. A larger screen would in addition present images of all the people present, marking the present speaker(s). Magic Lounge might be able to send overheads by fax to those who are linked up by telephones.

C: What are they thinking on the other islands?

D: Business meeting;
group education meeting.

E: A common discussion evening on the history of the marine.

(b) Other ideas

There are different types of meetings, depending on the number of participants, whether all or only some are allowed to speak, whether the speaking order is wholly or partially fixed, as in panel debates, whether or not the meeting is being chaired, whether or not voting is involved. The need for participant self presentation depends on the nature of the meeting. For meetings attended over the phone, earcons might be used to signal imminence of right to speak or of having to stop speaking. Push-button technology might be used for getting onto the list of speakers. For some meetings, secure speaker identification is essential, e.g. in the case of voting.

_____

9. How do you establish contact with the people you meet or have planned to meet?

The answers received to Question 9 illustrate how some users respond with a particular scenario in mind whereas others respond more generally, thinking about a variety of different situations of use.

(a) Ways of establishing contact

- click on an icon in Magic Lounge to contact that person;
- use the Magic Lounge board to announce public meetings, fix a date at the previous meeting, or use email;
- use fixed meeting times at which the participants should or could log in;

- indicate the meeting room in meeting announcements;
- I send them a signal that I want to meet. When responding within a deadline proposed by me, they should simply be able to push a yes- og no-button or just turn up at the agreed time;
- by direct contact or by announcing my presence so that others may contact me;
- I have sent an email to my history of the marine group inviting them to an evening about Danish U-boat constructors. I then went to the Magic Lounge to reserve a room for the evening. The meeting being closed, I received a one-time password which I then mailed to the other participants. When they arrive in the entrance hall, they will see the announcement "History of the marine - Danish U-boat Constructors". When they knock, they will be asked their password, following which they will be allowed into the meeting;

(b) Other ideas

- enable search based on descriptions of people, their recorded actions, or desired competencies.
_____

10. How do you find out who are "in your proximity" (in the hall or in other rooms)?

The answers received to Question 10 mainly focus on the consulting of lists or people.

(a) Ways of finding out

- Magic Lounge should provide lists of those present in the hall and in any non-private meeting room. The lists are accessed through clicking on the room name;
- start from the board showing planned and ongoing meetings. From there, link to rooms including lists of those present. Lists of those present might be impractical for large meetings but search for specific people present might be useful;
- I just need to know if those with whom I need to meet are present;
- Magic Lounge does that depending on whether I am looking for a subject or a person;
- through a check in/check out list?
- I click on the room, select the list of "others present" and study it.

(b) Other ideas

- people might subscribe to certain meetings which would open up on their screens when they initiate a Magic Lounge session, possibly marked by earcons as well;
- Magic Lounge might tell me if someone arrived looking for me.
_____

11. If you do not want to be disturbed by others during the session but want your own room, what do you do?

The answers received to Question 11 are all to the point and seem to require no subdivisions.

- two possibilities: meetings can be "invisible" to others by default or meetings can be made "invisible" by the participants. In both cases, it must be possible to select between a "visible" and an "invisible" meeting;

- show a closed door for closed meetings. Use a password to get in;
- we need to be able to activate a blocking mechanism: if somebody knocks it is up to those present to open the door from within;
- turn on the "red light";
- get a room in the reception.

_____

12. Before you decide on what to do, such as going to a separate room, how do you reach a common decision on what to do?

The answers received to Question 12 are all to the point and seem to require no subdivisions.

- everything has been agreed on in advance;
- through spoken or written discussion;
- depends on the situation: whether the invited meeting is open or closed, synchronous or diachronous;
- through discussion in the entrance hall;
- click on the person I want to talk to in the list of those present and then agree on going to a room;
- once they have met, people will use speech as their main vehicle for discussion and decision making.

_____

13. Which supporting instruments (tools, materials etc.) do you need for the session? Describe each of them.

The answers received to Question 13 show that the question was taken by several to refer to Magic Lounge access devices rather than to the tools and materials to be used by the participants during the meeting itself. Answers are therefore rather poor. We need to clear this up in the planned, scenario-based approach to participatory design. Meanwhile, all answers referring to access devices have been removed below.

- in general, what is needed is application sharing of text, layout, images, audio, databases, programming tools;
- in advance of the meeting: a list of summaries and full minutes (replays) of the previous meetings as well as to the meeting material (e.g. the overheads). A home page provides public access to the work done in the group. Screen shots and video clips of scenes from the actual work done by mobile infant health care workers. These are accessible from the meeting minutes, from the public web pages and from links to elsewhere.

_____

14. Describe a full Magic Lounge session. Be careful not to embark on a very complex account because the description may then easily run over many pages (which is OK if you can manage to do it). Refer to one of the purposes you mentioned under (1) above.

The answers received to Question 14 describe scenarios which it might be interesting to have systematically "acted through" in a second round of exchanges with the isles users.

U describes a two-person session in which (a) one person helps the other in problem solving on compiler installation, (b) both discuss web page layout and do joint problem solving. During the session, components are being exchanged electronically.

V describes how Magic Lounge first reminds him on an imminent meeting with his Taiwanese business partners who will help solve a problem with a new information system which is being installed at Bornholm. Then the system gracefully closes his current work and places him in the Magic Lounge where the Taiwanese have just arrived. They promise to return with a solution at 8 AM local Danish time. At 7.45 AM Magic Lounge reminds him of the meeting and at 8 AM they have brought a technician with them to the Magic Lounge. The technician tells him that a spare part is on its way from Berlin, using the screen to show the blueprint for solving the problem and asking if he has any further questions. The technician is eating his dinner in the Magic Lounge whilst KS has his breakfast there.

W (repeated from 8 above) assumes a six-person, informal, non-chaired, non-voting group meeting. The group monitors the work of the organisation of Danish Local Authorities (Communes) in developing electronic patient journals for use by mobile infant health care workers in the Communes. A representative from the Steering Group is present and has to present a progress report. I follow the meeting as an observer because the system is planned to be extended later on to general private health care. The meeting is closed. My password provides access, through a list, to summaries and full minutes (replays) of the previous meetings as well as to the meeting material in advance of the meeting (e.g. the overheads). A home page provides public access to the work. One access might be through real-time VR using head-mounted high-resolution display and microphone. One is virtually present around the table and turning of the head provides realistic feedback. Zooming is also possible. Screen shots and video clips show scenes from the actual work done by mobile infant health care workers. These are accessible from the meeting minutes, from the public web pages and from links to elsewhere. My 15'' screen presents the present speaker and the overheads shown through live ISDN. I hear the voices of the others present but am not always able to see them as they speak. A larger screen would in addition present images of all the people present, marking the present speaker(s). Magic Lounge might be able to send overheads by fax to those who are linked up by telephones.

X wrote: Hi x, y and z, I cannot solve these question - might you help me? I propose to meet at [time] to do it together.

Y wrote: I would like to start an eel farm. I use the blackboard in the entrance hall to find out if there are others who share my interest. If there are, we go someplace for ourselves, turn on the "red light" and continue the planning. If there aren't any, I post an advert on the blackboard and wait.

Z wrote: We have an evening discussing the history of the marine.
_____

15. How do you communicate during the session? Which forms of communication do you use the most?

The answers received to Question 15 include a few references to access devices. It is clear that speech is a favoured mode of communication by most of the users in the user group. Given that communication is central to the ethos of the Magic Lounge, the users' answers are as a whole rather sparse. As in the case of Question 7 above, this line of questioning might be better developed after the users have gained some experience, through Demonstrator 1, of what the possibilities are for different forms of communication in Magic Lounge.

- through speech, application sharing and exchange of systems components;
- through speech and graphical images;
- through typed language as in chat applications, threaded answers;
- through speech and presentation of images/drawings;
- we all have cameras, mikes, loudspeakers, screens (a big one with a smaller one on top!), keyboard, mouse, and an A4 table top which can be used both as overhead projector and copier as well as ordinary canvas screen. The screen provides both blackboard and canvas screen, as well as pictures of the participants. The speaker is automatically on but others can push themselves on as desired;
- letter writing followed by telephone;
- video meeting with up to 6 participants.
_____

16. What does one do if one is too late for a session and needs to know what happened before one's arrival?

The answers received to Question 16 suggest the desirability of a meeting log which may be inspected by newcomers. One user raises the issue of log availability over time and hence of the "memory" of Magic Lounge.

- there is a log of what has happened before which one can inspect;
- the log is available for on-line inspection for a week. After that, replay must be ordered in advance;
- one of those present provides a quick summary;
- then one has a problem - unless Magic Lounge will store the data for retrieval when desired. One could also ask one of the other participants;
- get hold of a file containing a log of the session;
- one asks one of those present, possibly the chairman, to provide a quick summary, allowing other participants to step in and add or correct when needed.
_____

17. How does one find out who is presently contributing to the session?

The answers received to Question 17 are all to the point and seem to require no subdivisions.

- if there are only two persons present, the problem does not exist;
- from the voice and from the "picture" of the person, in whatever way the person is being graphically represented;
- the contributing person's name changes colour or blinks;
- show a name or a picture of the person. In formal meetings, one gets listed as a speaker using a push-button. When one gets the right to speak, one is being told by Magic Lounge and Magic Lounge informs the others on who is speaking;
- Magic Lounge sends an ID signal to the log;
- from the log;
- one can see and hear who the speaker is.
_____

18. If a group session is private, should non-invited Magic Lounge visitors have the possibility of finding out that your group is in Magic Lounge? Should they also

have the possibility of finding out which persons are now meeting somewhere in Magic Lounge?

The answers received to Question 18 demonstrate that the issue of privacy is a highly controversial one which will have to be studied carefully during the design of Magic Lounge.

- no;
- this depends on the chairman. Consider using ideas on how to establish authorisation levels from FirstClass from SoftArc;
- this depends on the group's decision;
- a blackboard showing meetings might be the opening screen for Magic Lounge. Regular meetings are indicated, possibly through links;
- this is OK with me. The participants to a closed meeting will still be able to decide whether to let a certain person in on the meeting. And interested persons will then know who to ask, at some other time, for admission into meetings;
- yes, the blackboard in the entrance hall will show that a meeting is going on. But it should not show who are present. This is just like in a hotel. A knocking functionality would be useful for those seeking admission, for some reason, into an ongoing meeting.

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19. What should happen, if anything, if a participant temporarily leaves the session?

The answers received to Question 19 are relatively "thin", suggesting that "questionnaire fatique" has set in and/or that we are approaching the limits of imagination given the very basic idea of Magic Lounge used in the introduction to the questionnaire.

- that person's "picture" gets dimmed;
- depends on, i.a., the size of the meeting;
- this participant is put on stand-by;
- it is up to the participant;
- when the participant comes back, he must be briefed on what happened in the meantime.

_____

20. What will you do if you need to meet again later concerning the matter addressed in the session?

The answers received to Question 20 again indicate that different metaphors and different scenarios of use underlie the answers provided by the users.

- we agree on a future meeting date and time and simply come back to an untouched Magic Lounge room, the same as we used before. We use the log for preparation;
- we agree on a future meeting date and time and the system will advise each of us in advance that the meeting is imminent;
- we agree on the time for a new meeting;

- it would be useful to be able to reserve a room for the next meeting via Magic Lounge - this would be easier than having to start a new meeting from scratch;
- reserve a room in the reception and get a password before leaving the present meeting.

_____

21. If you are to meet again, how should it be ensured that your private room is still available and has not been changed or modified in the meantime?

The answers received to Question 21 agree that some sort of password is needed to protect a room to which a group wants to return. As in 16 above, one user raises the issue of the "memory" of Magic Lounge.

- by using authorisation levels for access to the Magic Lounge room;
- by using passwords for the log and the documents involved;
- (repeated from 20 above): it would be useful to be able to reserve a room for the next meeting via Magic Lounge - this would be easier than having to start a new meeting from scratch;
- for long-term projects, a long-term password is provided to all participants. When the room has not been used for 3 months, the reception sends a message to the participants that the room will be cleaned up and used by others if it has not been used for another month.

_____

22. Should it be possible to address one or more selected session participants without the others watching or listening in?

The answers received to Question 22 mostly, but not fully, favour this idea, pointing out, however, that there may be both dependencies and technical difficulties involved in its realisation.

- yes;
- this depends on the session;
- maybe use a typed chat window: one clicks on another participant who gets a chat window. How about the telephone scenario?
- good idea, provided that no one gets disturbed;
- no;
- yes, by using email.

_____

23. Which kinds of rooms are needed, such as an entrance hall, private meeting rooms, others - which?

The answers received to Question 23 range from the purist (a shared workspace only) to the ideas of basing Magic Lounge on a certain metaphor (the hotel) and including a cantina!

(a) Types of rooms

- the shared workspace;
- a third possibility is a big conference hall where you cannot see the audience as a series of individuals;

- a cantina!! One builds one's own rooms and I assume that there will be access to, e.g., knowledge rooms in libraries and any other kind of room on the web;
- entrance hall, common rooms, private rooms;
- use the organisation of a hotel or conference centre - something which people are familiar with. Start in the entrance hall. Have a reception where rooms can be reserved for groups, meetings or conferences. Have a sitting room for public chatting with those present. Have private rooms which can be allocated for private talk. The entrance hall should contain boards showing public events as well as closed events and meetings. The boards should be used for selection of what one will participate in.

(b) Other ideas

- place the Magic Lounge in a virtual garden.
_____

24. Are there any other questions which need to be asked?

The answers received to Question 24 were few but managed to raise the very important issue of synchronicity vs. diachronicity in the use of Magic Lounge.

- enable "slow" diachronous meetings, e.g. with people in other time zones;
- which needs could be served by Magic Lounge?
_____

25. Other comments.

The answers received to Question 25 were few, presumably because we did not explicitly ask for additional comments.

Magic Lounge needs more AI to do more than can be done already. This user is sceptical as to what can be achieved in the Magic Lounge project given the resources available for developing the application. He has implemented an Magic Lounge link page and a conference and chat application. The Magic Lounge LinkPage:

<div align="center">

http://home5.inet.tele.dk/nyboe/MagicLounge/
Conference and Chat:
http://www.netage.dk/webboard/$webb.exe/~2/login/
loginname: mlounge
password: egnuolm (mlounge in reverse)

</div>

It is important to note that needs differ among the islands depending on size and geographical location. Emphasise that qualifications and the possibility of acquiring new qualifications are the primary conditions for innovation which, again, is the condition for developing new products and services and hence new jobs. It would be great to be able to argue that Magic Lounge is the best solution.

4. Conclusions and Future Work

The qualitative data received in response to the First Magic Lounge Participatory Design Questionnaire have provided a wealth of information on how the users view the design space. The next steps in our research will be:

(a) To do proper data analysis (cf. Section 2.f). Two studies are ongoing for this purpose. One is to create a typology of virtual meeting places based on the users' input. The second is to structure the users' input in accordance with a basic task model for interacting with Magic Lounge. The eventual basic task model will be used to support the continued design process.

(b) To confront the users' input with our own developing design ideas for the three planned Magic Lounge demonstrators, thereby exploring further the design space around Magic Lounge and confronting the many design decisions which need to be taken during the coming months.

(c) To deepen the participatory design process through visiting and interviewing the members of the user group. Among many other things, this study will help answering the question of how the small sample of volunteers who constitute the user group can legitimately be connected to the wider community of island inhabitants they represent. In addition, this will provide an opportunity for carrying out proper scenario-based studies of how the users envision interacting with Magic Lounge and for which purposes. The question then becomes how subsequent work can develop on the theme of users interests.

(d) To make Magic Lounge available to the users for hands-on experience with the developing system.

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