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Integrated Project
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D6.2 USE CASES AND USER REQUIREMENTS

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D6.2 USE CASES AND USER REQUIREMENTS

Abstract:

Based on data collection at three sites (Sheffield, TNO and Twente) we present multiple scenarios in which AMI technology might be used. We define separate use cases for the Meeting Browser and the Remote Meeting Assistant. Methods of collecting user requirements described in the literature and carried out by AMI partners are then outlined. Following this results of these studies are listed. Future requirements work will examine user responses to AMI technology and their requirements as a result of this exposure. Furthermore studies will examine browser user interface design requirements.

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1 Introduction

AMI research revolves around instrumented meeting rooms which enable the collection, annotation, structuring, and browsing of multimodal meeting recordings. For each meeting, audio, video, slides, and textual information (notes, whiteboard text, etc) are recorded and time-synchronised. Relevant information is extracted from these raw multimodal signals using state-of-the-art processing technologies. The resulting multimedia and information streams are then available to be structured, browsed and queried within an easily accessible archive.

AMI is particularly concerned with the application of multimodal processing technologies to develop meeting browsers and remote meeting assistants. A meeting browser is a system that enables a user to navigate an archive of meetings, viewing and accessing the full multimodal content, based on automatic annotation, structuring and indexing of the information streams. For example, navigation may be enabled using automatic annotations such as speech transcription and identification of participants. A natural extension of such a meeting browser is the concept of a remote meeting assistant, which performs such operations in real time during a meeting, and enables remote participants to have a much richer interaction with the meeting.

This document describes a set of potential use cases for the AMI Meeting Browser and Remote Meeting Assistant applications. From these, a primary use case for each application is identified. Methods for eliciting user requirements relevant to the primary use cases are then defined, and the resulting requirements documented.

2 Use Cases

The following describes a set of use cases for AMI technologies. There are 4 use cases for the Meeting Browser application (catching up on a meeting you are late for, auditing an unattended meeting, reminding about an attended meeting, re-accessing prior sets of meeting records during a meeting.), and 2 for the Remote Meeting Assistant application (attending a remote meeting, monitoring a remote meeting). For each case, the various tasks that users would carry out are described. Note here that our focus is on the use cases, and there is considerable overlap in the tasks related to each use case.

Context for Use Cases

In the following, use cases will be illustrated with reference to the following context:

Jane is working for *RealReaction*, one of the major consumer electronics companies, as a marketing expert. She and her colleagues, Sue, Jack and Alison, are assigned to a project to design an innovative remote control. Sue is the project manager, and Jack and Alison are industrial and interface designers, respectively. Both Lyn and Fry, who are not part of the project team, remotely participate in the project team meetings. Lyn is the project manager of a similar project and is interested in learning from the approach of the team. Fry is working for the components manufacturing department and has been invited by Sue to participate in order to get a better idea of the envisaged product. Since Sue is not a very experienced project manager yet, Peter, who is Sue's manager, wants to monitor Sue's achievements in order to be able to coach her.

To date, the project team has met twice. The first meeting was a kick-off meeting, which Jack unfortunately was not able to attend. During this meeting Sue introduced the project, the team members got acquainted and tasks were distributed. In the second meeting the team decided on the user requirements and the functional design of the remote control. Unfortunately Jane arrived 20 minutes late for this meeting. At the moment she arrived, Jack and Alison were in the process of giving an overview of possible functions and workings of the remote control. Following their presentation, Jane presented two possible target demographic groups, under-30s and over-30s. The team discussed the pros and cons of each target group and there were some heated exchanges between Jack and Alison regarding the implications of the choice on the design. As a result of the discussion people in the meeting decided on one of the target groups. In addition, Sue presented new project requirements she had received from her account manager. On the basis of these new project constraints decisions were made regarding some remote control functions. Jane agreed to do a trend-watching exercise for the chosen target group. Jack and Alison agreed to each develop concepts for hardware components and the user interface based on the agreed functionality.

To summarize, the following positions within *RealReaction* are relevant:

- Design team:
 - Sue: project manager
 - Jane: marketing expert
 - Jack: industrial designer
 - Alison: interface designer
- Lyn: project manager of similar team
- Fry: manufacturing department
- Peter: Sue's manager

Primary Meeting Browser Use Case

Use Case B1: Looking up information on previous meetings

In this use case, the purpose of the browser is to help team members looking up specific details about a meeting, or a set of meetings, whether they have attended it or not.

Jane <has attended both meetings, was late for the second meeting, is interested in the second meeting>

A few days later Jane uses the Meeting Browser to remind herself about what went on and to check her action items from the last meeting to get started with her project work. To refresh her memory, she first requests a summary of the meeting, asking for more details about topics she is particularly interested in.

Subsequently, she wants to check her personal action items from the meeting. She browses the meeting for all action points and checks for those assigned to her. She finds one action by her name, which matches her personal notes. To make sure she understands the action item correctly and in order not to miss any background, context or details related to this action item, she searches for this information in a number of ways: by the topic or aspects of the topic the action item is dealing with (e.g. 'target group'); by quickly scanning the first twenty minutes of the meeting she had missed, to see if any relevant information was discussed there; by remembering that part of the discussion was heated and searching for this episode; by remembering that someone standing in front of the whiteboard was making an important remark, and reviewing that part of the meeting. She stores all relevant information in a usable format as a basis for working on her action item.

Jack <has only attended the second meeting, is interested in the first meeting>

Jack, who was not present at the first meeting, and had a heated discussion with Alison during the second meeting, feels he may lack some background information on the goal of the project and the team members, in order to avoid unnecessary conflicts in the future.

He decides to consult the first meeting to get an overview of everybody's roles in the project. Just to make sure, he requests a summary of the part of the meeting where all participants, including himself were assigned with their tasks in the project. Then he requests an overview of Alison's contributions, behaviour and attitude during the first meeting. In particular, he reviews the part of the meeting where Alison introduced herself. He feels he has a better understanding of Alison's motives now which may be of benefit in forthcoming discussions.

Sue <has attended both meetings, is interested in both meetings>

A week later project manager Sue is preparing for the next meeting. She wants to remind herself of what went on during the first two meetings to check the team's progress and in order to generate an agenda for the next meeting. She wants to get an overview of both meetings to see which goals were expressed, what was discussed, which decisions were taken and what action points were assigned to whom. In particular she wants to check whether the action items of the first meeting have been carried out properly and whether the project is still on track with respect to the initial goal. She stores this information to be included later in the forthcoming intermediate progress report she has to send to Peter, her manager.

She uses the action items of the last meeting and the remaining ones of the first meeting to compose an agenda for the upcoming meeting, which she sends immediately to all team members to remind them of their obligations.

Other Meeting Browser Use Cases

Use case B2: Auditing Unattended Meetings

Overview: In this use case, the purpose of the browser is to help a manager to audit the project team (in terms of cohesion, reviewing the basis for decisions, monitoring progress) without needing to attend the meetings.

Peter who is Sue's manager did not attend the meetings. He wants to:

1. **Get an overview of the meetings.** At first Peter wants to obtain a brief overview of the entire meeting. He then requests some more details about a particular phase of the meeting. He also wants to get an impression of the atmosphere of the meeting.
2. **Follow up on a specific person.** He also wants to know more about how Sue is performing in terms of leadership. Does she lead the discussion well? Does she make sure that everybody gets the chance to give his or her opinion? Does she summarize the discussion well and translate the results of the discussion into the right action items? He checks to see if Sue is involved during the whole meeting, views the parts where Sue is speaking during the target group discussion to see how the other participants react to her.

Use case B3: Reminding During Meetings about Contents of Prior Meetings

Overview: In this use case, the purpose of the browser is to retrieve specific or general information from prior meetings, or sets of meetings, to give context or to inform the current meeting.

In the next meeting, Sue wants to communicate to her team about what occurred in a prior meeting and to provide relevant context to her team's forthcoming discussion about the remote control concepts. She uses AMI to:

1. **Get an overview of the prior meeting.** She reads or plays back the key information from the prior meeting to give everyone a quick overview of what occurred.
2. **Follow up on a specific issue.** She specifically wants to recall details about the decision regarding the target group, and review discussions regarding functionality, as these will have implications on the design to be discussed in the current meeting.

At the start of the next meeting, everyone checks the AMI generated meeting overview for accuracy. There is some dispute between Alison and Jack about who agreed to deal with the concept and in what way. Sue uses AMI to access topical information relevant to their discussion and the overview is altered to register that both Alison and Jack were dealing with different aspects of this.

Sue then runs through the action items for the previous week to check on progress. During the ensuing discussion, an item comes up that the group feels has been dealt with in earlier meetings so they search across the meetings database, browsing the agendas of prior meetings by date to remind them of when that item was discussed.

Use case B4: Catching Up on a Meeting you are Late For

Overview: In this use case, the purpose of the browser is to help people quickly review a meeting in progress so they have the required context to participate in the meeting once they join.

Jane is late for the meeting, arriving 20 minutes after it started. She wants to know what has happened so far and whether the issue of target groups has been discussed yet.

1. **Real-time overview.** She browses the overview of the meeting up to the point when she arrives, and sees that so far only functions and hardware design have been discussed. She quickly finds out more details regarding the discussion on functions, as this may influence the choice of the target group.
2. **Getting context for a prior item.** She puts on her headphones and listens to the important details of a presentation given earlier in the meeting.

Primary Remote Meeting Assistant Use Case

Use case R1: Monitoring a Remote Meeting

Overview: In this use case, the Remote Meeting Monitor (RMM) is used to remotely monitor a meeting while being able to continue carrying out regular tasks.

Fry cannot attend the meeting but is interested in any discussions involving remote control functions. He is also interested in what Jane has to say about the issue of target groups. He does not want to actively participate in the entire meeting and so attends the meeting passively and remotely, doing other tasks (at his office, at home, or while traveling) while the meeting occurs.

Half an hour after the start of the meeting, the RMM gives an alert, letting Fry know that a discussion started about the remote control functions. Fry sets the RMM to play live audio coming from the meeting. After the discussion, the RMM is set to silent again.

After a while, the RMM gives an alert, asking Fry to accept an incoming request from the meeting. When accepting, his colleague, who is attending the meeting on the spot, asks him a question on some technical issue; after answering the question, Fry continues working on his other tasks.

When Jane starts talking about the issue of target groups, the RMM again gives an alert. Unfortunately, Fry had to leave for a short while. When coming back, Fry sees that he missed an alert; the RMM fortunately stored a short abstract of what Jane said thus far. After catching up, Fry follows the live meeting via video and audio. When Jane says something Fry disagrees with, he sends a request to the meeting to give input. A few moments later, the RMM indicates that the chairman allows Fry to share his opinion with the meeting participants.

Other Remote Meeting Assistant Use Cases

Use case R2: Attending a Remote Meeting

Overview: In this use case, the purpose of the browser is to improve the experience, and thus effectiveness, of a remote meeting participant.

Lyn cannot attend the meeting onsite, and so has to participate remotely. She wants to make sure that her presence is registered and that she knows exactly what is going on in the meeting room. (again what follows is technology).

1. AMI allows Lyn to indicate her presence to other participants in the meeting room.
2. AMI allows the other participants to not only monitor Lyn's speech, but also potentially her gestures, emotional mood, or other aspects of her interaction in the group.
3. Likewise, AMI allows Lyn to not just hear the speech content, but also to experience other aspects of the interactions between other meeting participants.
4. AMI also ensures that Lyn is able to participate effectively, for instance, helping her to interrupt when she wants to contribute her perspective to a point being discussed.

Use case R3: Live Meeting Assistance

Overview: *In this use case, the purpose of the live meeting assistant is to support meeting participants (both the chairperson and other participants) real-time. This use case applies to conventional meetings and to remote/distributed meetings.*

During the meeting the assistant helps the chairperson with her regulating tasks. The chairperson wants to:

1. **Get warned to pay attention to a person.** Alison tries to get the attention of the chairperson Sue but other participants are far more assertive so Sue does not notice her. The assistant warns Sue to pay attention to Alison.
2. **Get informed about the emotional state of participants.** While Alison presents her vision on the implications of choosing the older target group Jack does not seem to agree, although he does not say anything. The AMI assistant knows that Jack is quite introverted and notices he looks frustrated. Hence the assistant informs Sue about the emotional state of Jack and advises to ask Jack for his opinion.
3. **Get informed about the knowledge of meeting participants and get advice about the next person to 'give the floor'.** At a certain point in the discussion about the functionality of the remote control both Alison, Jack and Lyn want to take the floor. The assistant knows a similar product was designed in Lyn's project and advises to give the floor to Lyn first to hear about her experiences.
4. **Get a real-time overview.** In order to close the current agenda point Sue summarizes the decisions, action points and topics that will have to be discussed again another time. The information for this summary is provided by the AMI assistant.
5. **Get a reminder that a topic still needs to be treated.** The meeting approaches its end and Sue is preparing to close the meeting. The AMI assistant reminds Sue of her promise made in the beginning of the meeting (when Jane was not there yet) to decide upon the exact choice of functions of the remote control later in the meeting.

During a distributed meeting the assistant supports the interaction between the participants. The participants use AMI to:

1. **Get information about gaze direction.** Alison is finishing her plea to choose for the older target group. She is very curious to know Jane's opinion so she looks at Jane when she asks for reactions. The AMI assistant informs Jane and the other participants about the gaze direction of Alison. Jane gives her opinion and the other participants expect her to do so and await their turn. Hence the turn-taking goes smoothly.
2. **Get information about a convenient moment to start speaking.** Sue wants to give her opinion too and the assistant notices she is about to start speaking. The assistant also notices that Jane wants to keep talking and advises Sue to wait for a moment. The moment Jane is about to finish her turn the assistant warns Sue so she can take her turn at the right moment.

3 Methods for Eliciting User Requirements

This section describes methods for gathering user requirements. These range from running questionnaires to interviews with users – including any supplementary artefacts (e.g. notes made by the participant) that can be used to aid the elicitation process.

Questionnaires

Questionnaires have been carried out by both AMI and non-AMI studies, a brief outline of the main remit of these questionnaires is given below.

- **Jaimes (2004)**. Jaimes uses two questionnaires to ascertain the user requirements for a proposed meeting browser. The first questionnaire examined both current use of technology in meetings and why meeting participants would make use of video recordings of meetings. The second questionnaire was concerned with examining the memory of participants for specific facts regarding the meeting and so the questionnaires were completed 1, 2 and 5 weeks following the meeting.
- **Lisowska (2003)**. Lisowska asks a number of subjects to pick a use case for a meeting browser from a pre-designed set and then to list all the questions they would ask of the browser given their chosen use-case. The questionnaire also examined the profession and experience of each questionnaire subject. The results were segregated into questionnaire subjects who were part of the meeting project and those that were not, finding significant differences between the questions asked by the two groups.
- **TNO**. The TNO study used questionnaires both before and after a meeting to examine the meeting participants experience of meetings and meeting technology and to examine their needs for meeting support.
- **Twente**. Student projects made use of questionnaires.

Interviews

- **Whittaker et al. (1994), Laban (2004)**. Both these studies used interviews to examine the note-taking practices amongst meeting participants. Laban also examined public meeting records and analysed meeting transcripts with regard to the personal and public records made by meeting participants. The interviews were based on a set of questions examining the use of notes and their associated failings. Participants were asked to highlight what they felt were significant parts of the meeting on a transcript and these significant parts were compared to the meeting record.

Protocol for Interviewing Real Meeting Participants, making use of their notes.

1. Start with some warm-up questions about the interviewee:
 - Role, expectations, involvement, present/absent, knowledge about material under discussion.
2. Ask people to provide an overview of the meeting (without their notes), ask them:
 - What were the most important things about the meeting?
 - What happened in the meeting?
 - What was your general impression of the meeting (referring to atmosphere)?

The idea is that we try to find out how people mentally represent the meeting, how they try to remember key facts about it, and the problems that they have in remembering. We hope to elicit the abstractions people remember (affective factors, emotions, hotspots, power/hierarchy).

Use various follow up questions, e.g.:

- what do they remember: about particular participants?

- about the decision process?
- about the interactions/relations between participants?
- about obligations/tasks allocated?
- etc.

Prompted versus spontaneous response shows us the importance of issue, i.e. if people spontaneously mention an agenda item in a meeting, we assume it was highly salient to them, if we have to prompt them about it, then its less salient.

In the end ask people if there are things important to *them* they did not mention yet.

3. Ask participants to generate a short summary of the meeting (we need to be specific about what we mean by a summary, which may involve piloting).

They will do this using their meeting notes, and we will ask them some questions about their notes, afterwards, e.g. what things were useful about their notes, what things were missing from their notes, maybe by asking them to supplement their notes with things that they now want to know. By analyzing people's notes we can see which things people consider during the meeting are important to note down. By asking about the utility of notes we can see whether people's impressions of what will be important actually turn out to be useful in practice, as well as what an ideal version of the notes would be like.

4. Then ask very specific questions relating to the agenda and purposes of the meeting:

- E.g. who was there? outcome, agenda decisions, action items, follow up

Again we should allow them to do this with notes, commenting about how useful their notes were and what was missing from their notes.

5. Ask them some general questions about the things that they most frequently forget about meetings in general - that they need to remember and also the main things that are missing from their notes, e.g:

- if you had a magic device that could remember just three things about the meeting, what would it help you remember?

Retrospection should be used: let people answer the questions first and question them immediately afterwards about their thinking processes during question answering. This method is known to be less precise (it is easy to get unreliable answers by e.g. a suggestive way of questioning) but it does not affect the thinking processes.

4 User Requirements

Referring to the studies outlined in section 3 and the use cases B1 and R1 the following results seem to be salient for the user requirements.

Jaimes (2004)

- Items meeting participants are able to recall include:
 - i. Names of known participants.
 - ii. Roles of participants.
 - iii. Major topics discussed.
 - iv. Use of auxiliary equipment (whiteboards etc.)
 - v. 'Significant' slide.
- Items that participants had difficulty recalling:
 - i. Date and day of the meeting.
 - ii. Start and end time of the meeting.
 - iii. Location of the meeting.
 - iv. Participants dress.
 - v. Posture and gestures.
 - vi. Emotions.

Lisowska (2003)

- 15 % of queries require data from a number of meetings.
- Queries include references to non-events (e.g. what wasn't discussed)
- Queries include references to non-verbal events (e.g. who left the meeting early?)
- Queries largely reference specific topics or participants.

Laban (2004)

- Public meeting records have the following functions:
 - i. Track group progress.
 - ii. Serve as a public record of past actions and decisions.
 - iii. Remind people about their commitments.
 - iv. Resolve disputes about commitments.
- Public meeting records have the following limitations:
 - i. Minutes are occasionally inaccurate.
 - ii. Not all meetings were minuted.
 - iii. Lacking in enough detail to allow participants to carry out personal responsibilities.
 - iv. Not timely.
 - v. Laborious to produce.
 - vi. Don't capture the experience of participating in the meeting.
 - vii. Don't capture awareness information.
- Personal recording have the following main functions:
 - i. As personal reminders.
 - ii. To provide enough contextual information to carry out personal actions.
 - iii. To check the accuracy of the minutes.
 - iv. To brief others about the meeting
- Personal meeting records have the following limitations:
 - i. Taking notes reduces the ability to contribute to discussion.
 - ii. Personal notes sometimes lack both accuracy and comprehensibility
 - iii. Their esoteric nature made them difficult for non-attendees to understand.

Cremers (2005)

- The recordings required by the participants were:
 - i. Shared notes (minutes).
 - ii. Agenda.
 - iii. Used documents.

- iv. Presentations
- v. Transcribed speech.
- vi. Personal notes.
- The favoured means for searching the recordings were:
 - i. Decisions taken.
 - ii. Participants / Speakers.
 - iii. Topics.
 - iv. Agenda items.
 - v. Arguments for decisions.
- To catch up on a missed meeting participants require:
 - i. An automated summary.
 - ii. An overview of things to do.
 - iii. A gist of the contents of the meeting.
 - iv. Browse the smart minutes

5 Conclusion

This document has described the user requirements for the AMI project. Separate use cases were defined for the Meeting Browser and the Remote Meeting Assistant. Methods of collecting user requirements described in the literature and carried out by AMI partners were then outlined. Following this results of these studies were listed.

Further user requirements work will examine both the functional requirements of the meeting browser and the reactions of users to working prototypes of the meeting browser and paper designs of potential meeting browsers. The proposed protocol for these studies is to set users a number of general tasks which they will carry out using prototype browsers (potentially using synthetic annotations) and to collect feedback on their experiences. Following this, paper designs of browsers will be shown to users and, again, feedback will be collected. These studies should provide user reactions to novel AMI technology and also collect more functional requirements than those described in this document.

6 References

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7 Appendix

The following table contains a list of questions designed to elicit user requirements for the defined use cases.

Question	Requirement
<p><i>What is the most important information for you to remember from a meeting?</i> After they answer freely then ask them specifically about the following: (names, dates, decisions, own action items, rationale for decisions, others' action items)</p>	What types of information the system needs to represent and what types of queries it should support.
<p><i>What kinds of information do you note down during a meeting?</i> After they answer freely then ask them specifically about the following: (names, dates, decisions, own action items, rationale for decisions, others' action items)</p>	What types of information the system needs to represent and what types of queries it should support.
<p><i>What things do you most often forget after a meeting?</i> After they answer freely then ask them specifically about the following: (names, dates, decisions, own action items, rationale for decisions, others' action items)</p>	What types of information the system needs to represent and what types of queries it should support.
<p><i>When you forget something from a meeting, what techniques do you use to try and remember it?</i> (if no answer then cue with look at notes, look at minutes, look at agenda, look at artefacts/slides, look at someone else's notes, ask someone)</p>	Information sources and how they get used
<p><i>If you have to rely on memory to remember what happened, how do you try to do this?</i> (think of the relevant agenda item, think of who said the thing that you are trying to remember, think of when it occurred in the meeting)</p>	Processes by which people remember information (so that know what indices should be available in the browser)
<p><i>How useful would the following system features be for you?</i></p> <ol style="list-style-type: none"> 1. ability to access specific facts by key word search of meeting transcript 2. ability to access various regions of the meetings <ul style="list-style-type: none"> • browse by speaker 	Testing utility of specific features

<ul style="list-style-type: none"> • browse by topic/agenda item • browse by agenda item • browse by emotional tenor (e.g. look at places where everyone is disagreeing) <ol style="list-style-type: none"> 3. meeting summary (containing various agenda items, decisions and actions) 4. access agenda, drawings and diagrams associated with the meeting 	
<p><i>How often do you need to remember information from prior meetings (i.e. those happening prior to the last one)?</i></p>	<p>Access across sets of meetings</p>
<p><i>How often do you need access to information from meetings that you didn't attend personally?</i></p>	<p>Requirement for vicarious access</p>
<p><i>What types of information do you want from meetings that you didn't attend?</i></p> <ol style="list-style-type: none"> 1. overview information 2. specific facts 3. information about specific agenda items/topics of interest? 	<p>Testing utility of specific features</p>
<p><i>Is there any information you would not want to have publicly available? What types of information are private?</i></p>	<p>Ethics, privacy support</p>