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**Integrated Project** Information Society Technologies

# D1.1 A Glossary on Meetings and Selected Meeting Scenarios

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# D1.1 A Glossary on Meetings and Selected Meeting Scenarios

Rieks op den Akker (UT), Jean Carletta (UEDIN), Dirk Heylen (UT), Iain McCowan (IDIAP), Bram van der Wal (PHI), Roeland Ordelman (UT), Weiqun Xu (UEDIN), Wilfried Post (TNO), Anita Cremers (TNO), Olivier Blanson (TNO).

Abstract: This report is organised in two distinct parts. The first part contains a glossary on meetings, which includes definitions of the principal terms and concepts related to meetings research in the AMI project. This covers analysis, annotation and modeling of meeting content, and is arranged according to different views of meetings, such as the conversational level (verbal and non-verbal communication) and the task level. The glossary is also available online at http://wiki.idiap.ch/ami/AmiGlossary/, where it will continue to evolve throughout the lifetime of the project. The second part of this report contains a description of the design project meeting scenario selected for study in the initial AMI data collection.

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# 1 Glossary on Meetings

Why a Glossary on Meetings? In a multi-disciplinary research effort such as the AMI project, researchers from different backgrounds meet to bundle their knowledge and expertise in efforts to come to new insights and to invent new combinations of existing methods and viewpoints in developing new technology. The research in AMI centers around meetings: (a) the multi-modal, multi-channel video and audio recordings of scenario-based and real meetings, (b) the annotation of a number of aspects of meetings that can be distinguished on various levels, (c) the development of methods and tools to semi- or fully automatically detect and identify speech, gestures, events and activities in meetings, to summarize meeting, (d) to store meetings in formats that are suitable for distribution and browsing, (e) the development of software tools for remote real time meeting participation and remote meeting assistants.

In AMI, researchers with backgrounds in speech recognition, mathematics, formal semantics, computational linguistics, human computer interaction, dialogue systems, social psychology, and conversational analysis combine in a joint effort to do basic research as well as to develop enabling technology that supports people in meetings.

People from different research areas, having different traditions, use different languages. And, what may even be worse, they sometimes use the same words to mean different things. This Glossary on Meetings contains the most important terms and concepts used in theories on, and models of, meetings and meeting phenomena as developed in the AMI project. These terms are used in specifications of the various annotation schemes and annotation guidelines developed in the project during the first year, as well as in models of certain aspects of meetings, such as models of conversational behaviors and decision making processes in small design project group meetings. The Glossary includes references to the most important source studies of the concepts defined.

The terms in this Glossary are organised in the following categories (main contributor between brackets):

- 1. Interaction Units (Jean Carletta)
- 2. Dialogue Structure (Rieks op den Akker)
- 3. Task Structure (Jean Carletta)
- 4. Focus of Attention (Dirk Heylen)
- 5. Social Presence and Modes of Communication (Bram van der Wal)
- 6. Conversational Roles (Rieks op den Akker)
- 7. Meeting Actions (Iain Mc Cowan)
- 8. Artificiality (Iain Mc Cowan)
- 9. Formality (Jean Carletta)
- 10. Modes of Operation (Jean Carletta)
- 11. Gestures and Postures (Rieks op den Akker)
- 12. Emotions and Involvement (Roeland Ordelman)
- 13. Summarisation (Weiqun Xu)

These categories have clear relevance to meetings, and particularly the methods used and developed in the AMI project to study meetings. Because a *meeting* is the predominant concept, the glossary terms are preceded by a description of meetings.

#### 1.1 Meeting

A meeting is when individual entities interact. Interaction is what happens in meeting. The most developed, most concrete form of meeting is when *people* meet, exchanging and sharing ideas, and feelings; when embodied minds meet. Meeting in a more abstract sense is when two balls meet, the composed effect of which is dependent on the impulses both bring in the meeting, or when two animals meet when they enter each other's territory, that becomes the theater of games of attraction and distraction, and of fights for the own territory, for group status, and ultimately for life or death. The primitive, less developed forms of meeting and interaction that are apparent in the lower forms of being are still present in the more developed intellectual forms of meeting, but as aspects, hidden in the more developed form ('aufgehoben'<sup>1</sup>). Primitive forms of interaction are covered by practical rules of good conduct and social behavior. The most developed conceptual form of interaction is when people interact by communicating ideas and express their emotions and feelings by means of language. Interaction means being in the same place, being aware of one's own and the other's presence, in mutual gaze. Interaction between individuals implies respecting each others rights, fighting for one's own privacy, one's own private space, one's own ideas. If we say something to express our ideas, we want others to receive this. Answering a question is basically an expression of accepting the other. People identify themselves with the ideas they have, expressing one's ideas is also expressing one's self. This means that also people's meeting remain necessarily, however much intellectual activities they have become, essentially emotional activities. Meeting is a joint activity, like shaking hands, and it seems quite essential that giving and taking occur simultaneously, and that both participants are aware of this meeting. You can't say that you met someone if that someone wasn't aware of his meeting with you.

Technology, especially communication technology, has a great impact on our conception of space and time, and hence on our understanding of what is essential in meeting, the concept of co-presence. The development of communication technology has made clear that interaction is possible between people that are not physically present in the same place at the same time. What impact technology has on the quality of meeting is a challenging question. It is an important question, for projects, like AMI, that do research developing future technology that supports meeting.

There are many types of meetings. People meet deliberately or by chance, have a social chat or have organized meetings in project groups to work on their task (not excluding the negotiation about what 'their task' is). Meetings are popular: not only is a lot of work time spent in meetings, they are also the subject of a large variety of research efforts. People complain about meetings, they are often inefficient. Technology is asked to supply new means to make meeting more efficient, and more effective. Measures for effectiveness and efficiency of meetings should be based on understanding what it is that constitutes the quality of meeting, in other words: what meeting means. The work and interaction in meetings is mostly realized by conversation, hence the importance of conversational analysis, particular as we find it in the ethnomethodological tradition, in meetings and the study of the relation between the level of conversation and the group task level, the theater on which the games are played.

A business meeting doesn't start when the meeting room is unlocked and participants enter the room looking for their spaces. A meeting doesn't end when the door gets unlocked again and people go their own ways. Meetings are not isolated events but special events in a continuous process in which the group works on its task. That's why the 'paradigm of the meeting cycle' in the scenario for design project meeting, containing a series of four group meetings, proposed and worked out by WP1 was so enthusiastically received by the AMI project. It's one of the distinguishing features of this project. Not only group meetings are recorded, but also the role specific communications that individual group meeting external, but group task internal communications adds to the understanding of what happens in the meetings.

<sup>&</sup>lt;sup>1</sup>In the sense of the German verb *aufheben* as used by G.W.F. Hegel. See his Phänomenologie des Geistes, for an exposé of how the mind develops through interaction with other minds. [1]

In face-to-face meetings speakers and hearers not only produce and receive speech, or text. Gestures and facial expression are 'channels' as important as speech, and speech is more than text alone, there is voice, melody that expresses the relations the speaker has to the ideas he expresses, and to his audience, the addressees and receivers of his speech. Some speakers show very expressive gestures, iconic and metaphoric gestures as well as beats that synchronize with the structure of speech, the staging of the imaginative material that is being presented, the various narrative levels, in an often remarkable way. There are certainly great individual differences between speakers, and cultural differences. Some speakers stand stiff, as stiff as a door nail, hands in pockets, others make lots of nervous and idle movements, but the general structural similarities between gesturing and speaking offer challenging perspectives for new multi-modal recognition techniques (see for references the section on Gestures and Postures). This brings us to a second feature that distinguishes the AMI project from many other projects on meetings and computer supportive cooperative work: its emphasis on multi-modality, the collection of extensive visual as well as audio data of meetings. These multi-modal recordings provide the research community a rich source for research in developing new techniques where information from both visual and auditive channels are fused based on analytical models describing the relations between non-conversational and conversational actions, and between the various modalities in which participants in a meeting express their ideas.

Certainly one of the most important criteria for success of meetings and group work is whether the participants in the meeting and the members of the group find themselves, i.e. find their ideas and contributions in the outcomes of the groups work. But equally important is whether they can identify themselves with the group as a whole. Successful groups are groups that meet the challenges the political and economical environment offers. Work on the group and work on the task are equally important for groups that want to persist over time.

I hope that this Glossary will do its work as a reference for the central concepts that play in the AMI project. Many of these will find their place in the conceptual structures that are the results of the analytical models of meetings, especially the models of decision making and argumentation as they are being developed in WP 1.

Enschede, January 2005, Rieks op den Akker

#### **1.2** Interaction Units

This section contains concepts from conversational analysis (see eg [2] and for a good Dutch text introducing the theory [3]).

**Contribution.** A contribution or utterance is a behaviour that may be made up of speech and/or nonverbal activity that is intended to convey a message to one or more other people. Most utterances are made by individuals but it is possible for a pair or set of people to act collaboratively in producing an utterance.

**On-record.** An utterance is *on-record* if it is intended to be observed by the entire group. ([4])

Side comment. A side comment is an utterance that is intended to be observed by one or a few persons, and therefore is not on-record. ([4])

**Turn.** A turn is an on-record utterance "behind which lies an intention to convey a message that is both referential and functional)". ([4]) Keeping in mind that by large, in discussion one person speaks at a time, so that it is possible to discern one current speaker, a turn can be defined mechanistically as the speech from one person from when they start until a speaker change. ([2])

**Backchannel.** A backchannel is an utterance that is not on-record because it consists solely of positive feedback encouraging the speaker of some recent utterance to believe that their message has been heard and accepted. ([4]; [5])

**Floor.** The floor describes where the "official attention" of the group rests ([6]). When there is a group focus of attention, it tends to be on one turn at a time; these turns can be describing as "having the floor". ([4])

**Collaborative floor.** A collaborative floor is a turn that is collaboratively constructed by more than one person. ([4])

**Turn sequence.** A turn sequence is the orderly sequence of floored turns in an interaction. ([7])

**Floor pattern.** A floor pattern is a turn sequence in which two persons alternate. This is common in small group discussion. ([7])

**Non-floor-holding turn.** A non-floor-holding turn is a turn that does not acquire the floor. ([4]) For example, a turn can be non-floor-holding because it fails in the competition to acquire the floor.

**Turn-constructional unit.** A turn-constructional unit is a unit of speech with which a speaker may set out to construct a turn. For English, typical unit types are sentential, clausal, phrasal, and lexical constructions, but depending on the genre, they can be larger (e.g. stories and lectures). ([2])

**Projectability.** Projectability is the property of being able to tell ahead of time when an instance of a turn-constructional unit will be completed. ([2])

**Transition-relevance place.** A transition-relevance place, or TRP, is any place where transfer of speakership can be effected. TRPs occur at the ends of turn-constructional units.([2])

**Transition.** A transition is a transfer of speakership at a TRP. ([2])

**Overlap.** Overlap describes a transition at which transfer of speakership is achieved by the next speaker beginning a turn while the previous one is still speaking.

**Gap.** Gap describes a transition at which transfer of speakership is achieved with a silence between the two turns (i.e., the first speaker finishes before the second one begins). ([2])

Latch. Latch describes a transition at which transfer of speakership does not involve overlap or gap (i.e., the first speaker ends at the same time as the second one begins). [Concept, but not term, introduced by [2]]

**Turn-allocation.** Turn-allocation is the process by which the speaker of the next turn is chosen. Turnallocation can be done by the current speaker selecting the next speaker (for instance, by a directed question) or by the next speaker self-selecting. ([2])

**Pause.** Pause describes a time interval within a turn-constructional unit (that is, not at a TRP) during which the speaker of the turn-constructional unit is silent. ([8])

Interruption. An interruption is a turn that begins outside of a TRP. ([4], [9])

**Turn-yielding cue.** A turn-yielding cue is a participant behaviour produced at a TRP that contributes to projectability, such as drawl. ([10])

**Side conversation.** A side conversation is an entire interaction with its own turn sequence occurring in the same physical space as the main interaction under observation, but among a subset of the participants who are not attending the main interaction. ([11])

Adjacency Pair. An adjacency pair "consists of two ordered utterances, the first and second pair parts, produced by two different speakers", where "the form and content of the second part depends on the type of the first part". The prototypical example is question followed by answer, but other examples are request/compliance and greeting/greeting. ([12], reviewing [13])

#### 1.3 Dialogue and Discourse Structure

**Dialogue act** is a contribution to a conversation. A dialogue act can either be realized verbally or non-verbally, by gestures, head nods. A dialogue act expresses a discourse goal or intention of the speaker and is addressed to either a selected set of participants, to one or to all participants in a group. There is a potentially infinite number of dialogue acts. Dependent on application and context they are classified into classes or types.

**Dialogue act type.** Dialogue act types can be organized into several layers, or communicative functions: turn taking, grounding, core speech acts (like inform, ask, order, promise), argumentative acts (elaborate, convince). (see also [14]) A dialogue act can be expressed in different verbal ways depending on the conversational situation. Some verbal utterances can be used for performing different dialogue acts. Within a speaker turn a speaker can perform several dialogue acts. On the other hand a dialogue act can stretch over several subsequent turns of the same speaker, shortly interrupted by some other participant.

- S1: "I should like to have a"
- S2: "yes"
- S1: "icecream"

Other terms used for dialogue act ([15]) are: unit of interaction ([16]), communicative act, dialogue move ([17]), conversational act (Traum and Hinkelman, 1992).

**Discourse.** A discourse is a piece of language behavior that typically involves multiple utterances and multiple participants.

**Discourse structure.** Discourse structure is a composite of three interacting constituents: a linguistic structure, an intentional structure, and an attentional state ([18]).

**Utterances.** The actual saying or writing of particular sequences of phrases and clauses - are the linguistic structure's basic elements.

**Intention.** Intentions of a particular sort and a small number of relationships between them provide the basic elements of the intentional structure ([18]).

Attentional state. This contains information about the objects, properties, relations, and discourse intentions that are most salient at any given point. It is an abstraction of the focus of attention of the discourse participants ([18]).

**Discourse Segment Boundary Indicator.** Linguistic expressions are among the primary indicators of *discourse segment boundaries*. The explicit use of certain words and phrases (e.g., in the first place) and more subtle cues, such as intonation or changes in tense and aspect, are included in the repertoire of linguistic devices that function, wholly or in part, to indicate these ([18]).

**Discourse Purpose.** From an intuitive perspective, the *discourse purpose* is the intention that underlies engaging in the particular discourse. This intention provides both the reason a discourse (a linguistic act), rather than some other action, is being performed and the reason the particular content of this discourse is being conveyed rather than some other information ([18]).

## 1.4 Task Structure

Our *task structure* concepts relate to the sort of task in which a group is engaged at any one point during their discussions.

**Project.** A project is "a set of activities in the service of a goal or goals. ([19], p. 118)" Groups are often engaged in more than one project at a time.

**Task.** A task is "a sequence of activities instrumental to completion of a particular project. ([19], p. 118)"

Step. A step is "an activity that is a proper part of a task. ([19], p. 118)"

**Group's production function.** A group's production function is its contribution to the organization in which it is embedded. ([19])

**Group's member-support function.** A group's member-support function is its contribution to its group members. ([19])

**Group's well-being function.** A group's well-being function is its contribution to the group itself, for instance, in keeping the group intact over time. ([19])

**Coupling.** Coupling is the degree of relationship among parts of some system (such as the degree of relationship among different members of a group). ([19])

**Inception mode.** A group is in inception mode when it is choosing a goal; i.e., when it is beginning and accepting a new project. ([19])

**Problem solving mode.** A group is in problem solving mode when it is choosing the means by which a goal can be met (or a project can be completed). ([19])

**Conflict resolution mode.** A group is in conflict resolution mode when it is resolving some conflict that involves political issues, such as determining policies. ([19])

**Execution mode.** A group is in execution mode when it is attaining a goal by executing the means by which a goal can be met. ([19])

**Social entrainment.** Social entrainment is synchronization among different behavioural processes that tends to make a behavioural system exhibit common patterns; for instance, entrainment might induce a group to follow the same pattern in their activity for two projects that they are addressing at the same time. ([19])

# 1.5 Focus of Attention

**Focus of Attention.** Focus of Attention The primary use of the term Focus of Attention refers to a perceptual variable indicating the object or person someone is "attending to" ([20]). A description of someone's focus of attention during an activity. At a semantical level the description of someone's focus of attention during an activity involves describing which actions, objects or people someone is attending to. At a syntactical level this could involve describing the spatial and temporal properties of someone's (visual) attention. As such this is not a directly observable category.

**Visual Focus of Attention.** As people often orient themselves towards the physical objects or persons they are attending to, the notion of focus of attention has a derived meaning referring to the physically observable behavior of orientation towards an object by means of posture, head orientation and/or gaze. This could be called the visual focus of attention. Psychological attention and physically observable attention do not necessarily coincide but are correlate highly. This is a generally held assumption ([21]).

**Discourse Focus of Attention.** The term "focus of attention" is also used within a (computational) linguistic context. In a theory of discourse structure, developed by Grosz and Sidner, three components of discourse structure are distinguished: linguistic structure, intentional structure, and attentional state. The attentional state is considered as an abstraction of the discourse participants' focus of attention. This state records the objects, properties, and relations that are salient at a given point in the discourse. ([18])

**Dialogic Attention.** Dialogic attention involves listening to a person (auditory mode of dialogic attention) or speaking to one or more persons (articulatory mode of dialogic attention). The focus of dialogic attention identifies these persons, the extent of dialogic attention describes the number of persons within this focus. ([22])

Annotating Focus of Attention. The most important issue is that in respect to annotating Focus of Attention we stick to Visual focus of attention of individuals, defined by the head orientation or eye gaze. So if someone is looking at a person but thinking about his upcoming holiday we will only label where he is or she is looking at.

## 1.6 Social Presence and Modes of Communication

**Social Presence.** is the degree to which the participants of a meeting feel as if they are with their communicative partners. - A quality of a given media that affects the degree of salience of a conversational partner in a one to one interaction. ([23])

**Media Richness.** is the degree to which a communication medium affords social presence. Media can be classified along a continuum from written text for a general audience on the one hand to face-to-face dialogue on the other. At the high end of the continuum, telephone conferences are generally considered to be below video conferences, which is below face-to-face interaction. Media richness affects efficiency and group performance. ([24])

**Communication.** Communication is the method by which people share their ideas, information, opinions and feelings.

**Verbal Communication.** Verbal communication is when a person puts across a message by speaking. The message can be sent to an individual, a team or a group.

**Non-verbal Communication.** There are numerous ideas, thoughts and feelings that are communicated without words. Only one third of a message is sent in a person-to-person exchange in words alone. People have the ability to read non-verbal cues. These cues are learnt from the environment and through culture and can therefore be misinterpreted. The following are examples of non-verbal communication.

- Yawn
- Tears
- Frown
- Crossing arms
- Averting eyes
- Non-verbal communication is divided into six types. They are:
- Body language
- Physical characteristics and appearance
- Voice
- Space
- Environment
- Time

**Bulletin board system.** A bulletin board system (BBS) is a computer or an application dedicated to the sharing or exchange of messages or other files on a network. Originally an electronic version of the type of bulletin board found on the wall in many kitchens and work places, the BBS was used to post simple messages between users. The BBS became the primary kind of online community through the 1980s and early 1990s, before the World Wide Web arrived.

**Chat rooms.** A chat room is a Web site, part of a Web site, or part of an online service such as America Online that provides a venue for communities of users with a common interest to communicate in real time. Forums and discussion groups, in comparison, allow users to post messages but don't have the capacity for interactive messaging. Most chat rooms don't require users to have any special software.

**Dialogue.** A dialogue (or dialog) is a conversation. The word dialogue comes from the Greek *dia logos* means "by means of words". Many authors use the word *dialogue* exclusively for conversations between two participants, either both humans or between a human and a machine. The word *multi-logue* has been invented to refer to conversations with two or more participants. The phrase *multi-party dialogue* has similar use.

Monologue. A monologue is a (long) speech by one person.

**Multilogue.** The term multilogue is used with the same meaning as multi-party dialogue: a conversation.

**Conversation.** A talk between two or more people in which thoughts, feelings and ideas are expressed, questions are asked and answered, or news and information are exchanged.

**Face-to-face meeting.** Meeting where people can see each other at the same time, so mutual gaze is possible. Meetings without any technical mediation are face-to-face.

**Telephone conference.** A meeting involving people who are in different places, but who are connected by telephones

**Videoconference.** A meeting involving people who are in different places, but who are connected by video and computers.

**Avatar.** Avatar: a virtual digital image representing a person. The term comes from a Sanskrit word meaning "an incarnation in human form".

Desktop videoconferencing. Videoconferencing on a personal computer.

**Immersive virtual environment.** An immersive virtual environment is a virtual environment where real human can virtually meet other humans or computerized embodied conversational agents ([25]) presented by avatars. Current technology implies human participants to wear a head-mounted device to reach the effect of presence and co-presence in the meeting.

## 1.7 Conversational Roles

Sources of many concepts in this section can be found in E. Goffman's papers collected in [26].

Addressee. Addressee of a conversational act or dialogue act is one of the conversational roles the participants in a conversation can have, namely the one(s) the speaker talks to. (see also: conversational roles; addressing). Sometimes the term *target* is used instead of addressee, or the *receiver* of the (dialogue) act (cf. [16]).

Addressing. This is the way a speaker expresses whom he/she is talking to (directing his/her speech). The function of addressing is that the speaker obtains the attention from the one(s) he is addressing or to make clear to the other participants who he is addressing in particular. Mostly during a conversation (especially when only two participants interact) there will be no need for the speaker to explicate who he/she addresses. In meetings the use of explicit addressing will occur when it is not common knowledge of speaker and hearers who is currently addressed. There are several devices for addressing: by using a vocative ("Shall I answer this question, John?"), or by a mix of non-verbal acts like gaze, posture, prosody, or pointing acts, and verbal acts ("are you joining us? and what about you?"). The content (i.e. what is said) is important for determining the addressee; Addressing is called indirect when the speaker has the intention that the content of what is said is taken up by some other active participant then the one he is directly indicating as addressee. ("don't you think that he should do this?", in a situation where the speaker knows that 'he' is present.) In broadcasting or public announcements (like "Will the owner of the blue Volvo with licence number AA-77-11 come to the information desk.") the addressee is the whole audience, notwithstanding the fact that the speaker knows that only one person is actually referred by "the owner of ...". (see [27, 28].)

**Conversational roles.** These are micro-roles that the participants in a conversation can fulfill and that are associated with each single dialogue act (contribution to an interaction; also called conversational act). H.H. Clark (based on work of E. Goffman; see [29, 27]) proposed a taxonomy of conversational roles. People present in a meeting are divided into those who really participate in the act (active participant) and those who do not (non-participant).

Active participant. The active participants in a conversational act include speaker and addressee as well as side participants, those taking part in the conversation but currently not being addressed. Active participant in a conversation are participant who can take up the speaker and addressee roles in the conversation.

**Overhearer.** All listeners, having no rights to take part in the conversation, are called overhearers. Overhearers are divided in two groups: bystanders and eavesdroppers.

Bystander. Bystanders are overhearers whose presence the speaker is aware of.

**Eavesdropper.** Eavesdroppers are overhearers who are listening without the speaker's awareness.

# 1.8 Meeting Actions

Meeting Actions. These are actions or events in a meeting that concern the group of participants, rather than just individual participants within it. Examples may include the opening/closure of a meeting, periods of decision- making, brainstorming discussions, etc. Generally these may be any of the group phenomena defined in the meeting model (e.g. McGrath tasks; see [30]).

**Individual Actions.** These are actions or events in a meeting that concern only a single participant. Examples may include writing, speaking, standing up, leaving, etc. Generally these may be any of the individual phenomena defined in the meeting model.

# 1.9 Artificiality

These terms concern the manner in which the meeting is instigated or constrained. In AMI, meetings are referred to as belonging to one of the following categories: scripted, scenario-based, or real.

**Scripted meeting.** These meetings are held according to a pre-specified sequence of actions, where these may be actual words, or lower granularity actions such as presentations, decisions, usage of a white-board, etc. This is the most artificial and constrained type of meetings.

Scenario-based meeting. These meetings are motivated by a scenario or situation, which is given to participants before the meeting to guide their behaviour. The scenario may describe aspects relating to the meeting as a whole, such as the purpose, topic, contextual information, expected duration, etc. Other than these general guidelines, the participants behave naturally. These meetings allow aspects of the meeting content to be influenced without imposing the strong constraint of a script. In general, participants in these meetings will act as themselves, but perhaps will assume an artificial role (e.g. project manager). In social psychology, this methodology for studying groups is called laboratory experimental study. (Weingart, 1997) The aim is to set up groups that behave as much like real groups of the type being studied as possible whilst still being able to control the conditions under which data is collected.

**Real meeting.** These meetings concern real projects or issues, and have people behaving naturally, only constrained by data collection requirements (wearing of microphones, seating locations, available artifacts, etc). Unlike the other two meeting types, these are generally meetings that would have taken place independent of the data collection. In social psychology, this methodology for studying groups is one kind of field observation ([31]), although often field observation involves ethnography rather than working from recordings.

#### 1.10 Formality

Together, the formality concepts describe aspects of how discussive meetings are conducted that will affect how the participants interact.

**Status.** Status is a property of an individual with respect to an interaction, relative to the other individuals. The higher the status of the individual, the more important group members perceive that individual's contribution to be to the group task. Status consists of two components: one based on social or organizational standing, which is fairly static for an individual within the same group, and one based on expertise relevant to the current group task, which varies from moment to moment. Status is important for groups because it affects how much individuals will contribute and how much indirection they employ in their contributions ([32]).

Autonomous work groups. Autonomous work groups are "teams of employees who typically perform highly elated or interdependent jobs, who are given significant authority and responsibility for many aspects of their work, such as planning, scheduling, assigning tasks to members, and making decisions with economic consequences (usually up to a specific limited value). ([33], p. 324)." This style of working is colloquially called teamworking.

**Traditional work groups.** Traditional work groups are work groups that are not autonomous. They typical have one member of higher organizational status than the others who is authorized to make decisions. ([33])

**Chair.** A chair (also chairman, chair-person) is an individual authorized to control turn-taking in the discussion by designating the next speaker.

Free discussion. Free discussion is discussion for which there is no chair.

**Meeting facilitator.** A meeting facilitator is a special participant who makes what is otherwise free discussion run smoothly by watching the group interaction and intervening where necessary, especially on behalf of lower status individuals or to ensure discussions run to completion and don't get sidetracked or stall on unimportant issues. Some companies have full-time facilitators who only facilitate work groups, without relevant technical expertise or other involvement ([34]).

**Group size.** Group size is the number of active participants in an interaction (Hare, 1981). It is important because large groups behave differently from small ones ([35]).

# 1.11 Modes of Operation

**Brainstorming.** Brainstorming is a creative group activity by which the group generates many ideas as quickly as possible without further commenting on their utility, usually before winnowing the list and making a decision. ([36]). An intellective task (or problem-solving task) is one for which the group accepts there will be a correct answer (rather than a group preferred solution chosen from a set of possibilities). ([37])

**Decision making task.** A decision-making task is one for which there is no one correct answer, so that the group is seeking agreement about their preferred solution. ([37])

**Mixed-move task.** A mixed-motive task is one for which different members of the group have different preferred solutions, requiring negotiation. ([37])

**Coalition.** A coalition is an alliance among some subset of the members of a group addressing a mixedmotive task for the purpose of achieving a solution that the subset finds preferable to what would be reached if the subset did not act in concert. ([37])

# 1.12 Gestures and Postures

The definitions of the various types of gestures in this section are based on McNeills 'Best Psychology Book of 1992', Hand and Mind, what gestures reveal about thought ([38]).

**Conversational movement.** Movements of body parts can be distinguished in conversational relevant movement, being movement of body parts that are meaningful for the message being communicated, and other movements such as *idle* movements.

**Gestural space.** The gestural space is the physical space that speakers use to make arm and hand movements. This concrete space is used to represent an abstract imaginative space in which the speaker expresses his thoughts by gestures that support his speech.

**Gestures.** Gestures are conversational hand and arm movements and as such distinguished from head movements and body postures. Gestures made by speakers are semantic synchronous with speech: they present the same meaning at the same time.

**Beat.** (or baton) gestures. Beats are movements made by the arm. Beats show remarkable synchronicity with speech in melody. They are distinguished from hand gestures in that they are not semantically related to the idea expressed in verbal language.

**Iconic gestures.** Iconic gestures are gestures made by one or two hands in cooperation and that express some abstract property of the idea being expressed in speech. Example: the form or movement of the hand symbolises the unity of the group when saying "The group really is one", or hands showing the size of the fish that was caught. These types of gestures can express a dialogue act on their own, i.e. without accompanying speech produced (eg. the iconic sign formed by putting finger on closed lips, functioning as a request to be quiet).

**Metaphoric gestures.** . Metaphoric gestures are like iconic gestures but more complex in that they show some process or relation between imaganions expressed. Eg. the climbing of Winnie-the-Pooh in the tree. ([39])

**Deictic gestures.** These are gestures by which the actor points at some particular object (possibly imaginary) in the common focus space, to attract the attention of the hearers. Deictic gestures often are used with deictic words ('there', 'that', or personal 'you' or 'he') supporting the verbal communication.

**Postures.** Postures (bending over, leaning back, crossing arms) are movements or positions of the body. Postures sometimes express interpersonal relationship, (un)willingness to communicate, or indicate involvement in a conversation.

# 1.13 Emotion and Involvement

Affect bursts. Very brief, discrete, nonverbal expressions of affect in both face and voice as triggered by clearly identifiable events [40].

Attitudes. Relatively enduring, affectively coloured beliefs, preferences, and predispositions towards objects or persons (liking, loving, hating, valuing, desiring) [41].

**Categorical emotion labels.** Emotion in acted material can usually adequately be described using discrete category labels. Theorists in the discrete emotion theory tradition propose the existence of a small number of "basic" emotions, six for example [42], or seven [43]: anger, disgust, fear, joy, neutrality, sadness, surprise. However, given the gradations and subtlety of emotions occuring in natural data, the labelling of emotion using category labels is not straightforward and may result in emotional content being left unlabelled or labelled statistically unreliably [44, 45].

**Dimensional labeling of emotions.** In the dimensional tradition, different emotional states are mapped in a two or sometimes three-dimensional space. The two-dimensional approach consists of a valence/evaluation dimension (positive/negative, pleasant/unpleasant, agreeable/disagreeable) and an activation/arousal dimension (active/passive) [41, 44, 46]. If used, a third dimension represents control or power.

**Emotion.** Relatively brief episode of synchronised response of all or most organismic subsystems in response to the evaluation of an external or internal event as being of major significance (angry, sad, joyful, fearful, ashamed, proud, elated, desperate) [41].

**Face.** Face and related issues have been studied by Goffman ([47, 48, 49], [50] and [51]) According to Brown and Levinson, *face* is a person's public self-image. It has two aspects: negative face, the basic claim to personal territory and freedom of action, and positive face, the self-image or 'personality' which a person wants to be appreciated and approved of. Face can be enhanced, saved or threatened by certain acts in a dialogue. Face is related to floor keeping or grabbing behaviour, addressing, politeness, emotion and personality.

Full-blown emotions. Prime examples of emotion: anger, fear, surprise.

**FeelTrace.** Feeltrace is an annotation tool developed by the University of Belfast to allow observers to track the perceived emotional content of a stimulus over time. It is based on a two-dimensional representation of emotions called the activation-evaluation space. The space is represented by a circle on the computer screen and, as its name suggests, it is organised around two dimensions, activation and evaluation [46].

Interpersonal stances. Affective stance taken toward another person in a specific interaction, colouring the interpersonal exchange in that situation (distant, cold, warm, supportive, contemptuous) ([41]).

Landmarks. Landmarks in the context of the Feeltrace annotation tool, are key emotion words presented at strategic points within and on the edge of the Feeltrace circle. They are used as a guidance for annotators during annotation in the dimensional space and are not meant to function as categorical labels (See also the Feeltrace manual, [52]). **Mood.** Diffuse affective state, most pronounced as change in subjective feeling, of low intensity but relatively long duration, often without apparent cause (cheerful, bloomy, irritable, listless, depressed, buoyant) ([41]).

**Personality trait.** Emotionally laden, stable personality dispositions and behaviour tendencies, typical for a person (nervous, anxious, reckless, morose, hostile, envious, jealous) ([41]).

**Group interest-level.** This is the degree of engagement, interest or involvement that meeting participants display as a group during their interaction, as perceived through the audio and visual modalities by an external observer. Group interest level is used as a measure for relevance of meeting segments for the end users of meeting browsers in [53].

**Hot-spots.** Hot-spots are regions in which participants are highly involved in the discussion (e.g. heated arguments, points of excitement, etc.)([54]). Experiments have shown that involvement seems to be closely related to *activation* which is one of two basic dimensions that are useful to describe emotions ([55]). modeling. Hot-spots are thus regions in a meeting with a high interest level as defined in [53].

# 1.14 Summarization

**Summary.** Sparck Jones gave "an initial definition of a summary as a reductive transformation of source text to summary text through content reduction by selection and/or generalisation on what is important in the source" ([56], p.1). Text here should be understood in a broad sense. It may be something like article, speech, multimedia, hypertext, etc., or their collection or mixture.

**Meeting summary.** Meeting Summary, based on the general definition above, can be defined as "a reductive transformation of source text, i.e., a meeting or a series of meetings, to summary text through content reduction by selection and/or generalisation on what is important in the source meeting(s)". There are many different types of summary, ranging from extract, minute, note, headline, review, to abstract.

**Extractive summary.** Extractive summary is a fragmented selection of part of the original text.

**Abstractive summary.** Abstractive summary is a coherent, sketchy, and regenerated summary of the main points in the original text.

**Summarization.** Summarization is the process to produce a summary. Sparck Jones concisely formulated summarization as a three-stage process ([56], p.1):

- I source text interpretation to source text representation
- T source representation transformation to summary text representation
- G summary text generation from summary representation.

# 2 Meeting Scenarios

One of the main activities of WP1 in the first year of the AMI project has been the selection and definition of scenarios for initial meeting recordings.

The motivation for scenario-based meetings is two-fold: to ensure interesting data containing a rich range of behaviours for research across the project, and to provide a framework for controlled experiments for studying meetings. Data from scenario-based meetings is expected to be relatively natural, as it involves people behaving as themselves, albeit in assumed roles for a simulated project. While this is the case, to confirm general applicability of research results, it was felt important that a significant proportion of the corpus contain real, unconstrained meetings. For this reason, a mix of approximately 60% scenario-based and 40% real meetings has been recommended for the 100 hour Hub Corpus to be collected in WP2.

After consideration and discussion with the other work-packages, it was decided to focus on a *design* project scenario, as described in the following sections. The text and figures below have been reproduced from [57], to which the reader is referred for more complete details.

#### 2.1 Framework for Studying Meetings

Meetings should not be considered as isolated events - they occur within the context of an organisation as well as a cycle of actions: preparation, distribution of meeting outcomes, and execution of actions that have been agreed upon. This meeting cycle can be infinite, such as the meetings of a management board, but also finite, such as within a project or an operation. We propose a meeting paradigm that is based on this meeting cycle, and on aspects we have identified from the literature. We have organized these into seven basic factors. The categorization is based on the conceptual framework for studying the impact of technology on groups, as proposed by [23]. Figure 1 conceptualizes our meeting paradigm. This conceptualization should not be seen as a model of meetings, but as a mechanism for generating and measuring meeting behavior. It allows us to manipulate the various input variables and to measure the process and the outcome of the meeting cycle.

Process measures are taken during the execution of a cycle at particular points in time (e.g., directly after a meeting). For instance, the status of the individual and shared information and knowledge, workload, group cohesion, etc. may be determined with measuring instruments such as questionnaires and tests. Outcome measures may include the speed and timeliness, the quality and quantity of the end product, and the satisfaction of the participants. We distinguish means, methods, individual factors, team factors, task factors, organizational factors and environmental factors. Means refer to systems and tools that support a meeting-related tasks (e.g., an interactive large screen display). Methods refer to prescriptions of how to do a particular task (e.g., a procedure to chair a meeting). A team is a group of individuals who see themselves and are seen by others as a social entity [33], which is also the case for the participants of a meeting (e.g., a management team). Team processes are influenced by individual characteristics [58], in particular the different roles that the individuals play [59] (e.g., the chair). The task refers to the work that must be done to reach certain goals. Through the task, team members become interdependent. Tasks can be described as individual tasks (e.g., design) or as group task [23] (e.g., negotiate). Organizational factors refer to aspects such as organizational structure and culture. Environmental factors refer to aspects external to the organization, such as the market. The success of teams and organizations strongly depends on how they manage the unexpected dynamics of the environment.

In order to examine meeting behavior and outcomes in the meeting paradigm, TNO developed an environment that simulates the context for a cycle of design project meetings within a particular organisational setting. The environment helps generate replicable meeting behavior while at the same time facilitating natural meeting behavior. The environment specifies all input factors from the above paradigm: what means and procedures are used, what roles the individuals play, the configuration of



Figure 1: Conceptualisation of the meeting paradigm. The process and the outcome of cycles of meetings depend on several input factors (reproduced from [57]).

the team, a definition of the task, the specifics of the organization, and the environmental developments. Participants are asked to carry out a certain task (i.e., to reach a common goal), and we make them interdependent by providing role-restricted information. This requires that they all need to confer about the same matter, but it does not prescribe how and when. As is the case in many organizations, the subjects can use e-mail, a web browser, and PowerPoint for information presentation. However, we maintain control of the way they can exchange information. We do this by simulating an office environment, in which we control the tools they use, the information they can find on a simulated web, and simulate e-mail communication from individuals in the environment (such as head of departments, and parties outside the organizations). The particular design project context developed for the initial AMI data collection is described in the following.

#### 2.2 AMI Design Project Scenario

The scenario we have chosen focuses on design project meetings. These types of meetings are common in many (commercial) organizations that could certainly benefit from a more efficient process and a higher quality outcome. Partners in AMI are familiar with researching and participating in design projects, and so know what real-life design behavior should look like. Further, since a project is finite, and a concrete product is designed, measuring the process and outcome of meetings is expected to be relatively straightforward.

The proposed scenario is instantiated as follows: a dynamic market (changing fashion), an organizational context (a particular company, budget cuts), a task (a design project), a team (consisting of 4 participants), individual characteristics (with particular roles), a method (four defined design phases), and means (laptops with the e-mail, a web browser, PowerPoint, four individual offices and a meeting room including a beamer). The details of the scenario, which is illustrated in Figure 2, are described next.

Four subjects, acting as employees of a consumer electronics company, join a project on designing an innovative TV remote control (RC). The project roles are: project manager (PM), marketing expert (MA), user interface designer (UID) and industrial designer (ID). The overall project method that has to be followed has three phases: functional design, conceptual design, and detailed design. Each phase is followed by a meeting. After having prepared their role individually (for which they receive a short training) and the first meeting, they meet, bringing their role-specific laptops. The participants get acquainted, and the project manager starts the meeting officially by providing the project plan and the



Figure 2: A schematic representation of a sample series of meetings held according to the AMI design project scenario (reproduced from [57]).

division of work until it is clear to everyone. After the meeting, individual work is carried out, including the preparation of the next meeting. During the preparation of the second meeting, PM gets e-mails on budget cuts, MA receives a marketing report with user requirements and desires, UID devises the remote control functions, based on examples found on the (simulated) web, and the ID devises the functionalities of the RC, also inspired by the web. They all prepare (pre-structured) PowerPoint presentations. During the next meeting they exchange their findings and ideas, and come to an agreement on the functional design. They then split up again, to carry out individual work. Now PM gets e-mails about deadline changes, MA gathers market changes and evaluation criteria on the web (fruit is the fashion, yellow the most popular color), UID finds examples of old and new RC interfaces (such as scroll wheels and speech control), and the ID on components, properties and materials. During the meeting that follows, they present their PowerPoint slides, and try to reach agreement on the conceptual design, also dealing with the changing project constraints and market. The last phase starts with individual work again. PM gets more budget, MA develops an evaluation scheme, and UID and ID work together on a clay prototype. They present their prototype, which is assessed according to the criteria of MA. The project is concluded with a small party.

During the project, various process measures can be obtained. Information use can be logged (i.e., opening an e-mail or a web page). At certain points in time, subjects can be asked automatically to fill out questionnaires, e.g. work load. At the end, the outcome of the project can be measured. Since the scenario will contain objective criteria for the design, the quality of the design can be determined.

### 2.3 Future meeting scenarios in AMI

As discussed previously, the above meeting scenario will form the basis of approximately 60% of the initial AMI data collection. It is considered that it will provide a rich source of natural interaction for AMI research, while allowing a controlled experimental setup. Over the duration of the current AMI project, as well as any follow-on projects, it is expected that this scenario will be modified to include (1) technologies emerging from the project, and (2) remote aspects. For instance, by conducting a further round of data collection in which the same scenario is applied, but in which participants have access to a meeting browser between meetings, some evaluation of the browser in terms of its impact on group effectiveness and efficiency will be possible. A further deliverable report devoted to defining these meeting scenarios is planned in the next period.

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