

Towards *LivingAgendas* – Shaping the next generation of business meetings

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Abstract. Business meetings are omnipresent in all kinds of organizations. This paper presents an analysis of meetings at one specific medium-sized enterprise. By means of ethnographic studies, we observed collaboration and coordination problems in meetings. We address these problems with socio-technical meeting patterns, as documentations of good practices that help to understand and change the social interaction, the infrastructure, or both. These pattern-driven interventions helped us to gain insights into the socio-technical aspects of meetings. Finally, we created a first prototype of an integrated meeting support system.

Introduction

Virtual organizations are becoming more important these days. A virtual organization is “a temporary network of independent companies linked by the free flow of information” (Byrne et al., 1993). Meetings between collaborating members of different companies as well as meetings within individual partner organizations become an essential part for performing the business of the virtual organization. While we reported on cross-company meetings in previous work (Schümmer & Haake, 2009), this paper takes a closer look at meeting interactions at one specific company. We report on our observations of real-live business meetings at a medium-sized automotive supplier who provides services for several customer companies.

We first observed meetings using ethnographic methods and analyzed problems that arose from ignoring important properties of well-designed and well-organized meetings. We created a meeting pattern language containing descriptions of good practices. Patterns formed the basis for interventions, both at the level of group processes and at the level of supporting technology. Our interventions were triggered in a workshop in which the practitioners were introduced to the patterns. Our analysis focused on how social interaction would change when the observed groups started to apply the patterns on a social level while being supported by wiki technology. The feedback of the participants suggested that knowledge of the patterns forms a good starting point for improving meeting practices and for making informed use of groupware technology.

However, our users requested that standard technology could be improved so that there are fewer breakdowns caused by transitions between meetings, tools, and media. Based on this feedback, we created *LivingAgendas*, a first prototype of an integrated meeting support system.

Business meetings in virtual organizations

The question of how meeting quality can be improved has been subject of numerous, often management-oriented, textbooks and articles (e.g., Doyle & Strauss, 1976; Jay, 1993; Streibel, 2003; Kelsey & Plumb, 2004; Parker & Hoffman, 2006; Matson, 1996). Not surprisingly, all these books address comparable problems and come to comparable suggestions on how to improve face-to-face meetings. Although the advice often seems simple and straightforward, people still face difficulties following it in their daily meeting activities. In the research of Group Support Systems (GSS), meetings have been studied (e.g., de Vreede et al., 2002, Streitz et al., 2001), for instance, with the focus on the opportunity of equal participation during meetings, on the effectiveness and efficiency of meetings, on the quality of meeting results, and on the design of meeting room layouts, to name only some issues. Considering these guidelines and scientific studies, we derived ten fundamental properties of an efficient meeting:

Motivation and Reliability. Participants do not take the meeting seriously. Meetings are not considered as work. Participants arrive late or leave early and start to doodle.

Clear Goals. The meeting lacks an agenda and there is no concrete vision for an output or result of the meeting.

Information. Important information is not available in a meeting. Participants did not prepare in advance and thus lack important background information. As a result, no decisions can be made.

Context. The environment in which the meeting is held is inappropriate for the meeting's topic. The meeting is scheduled at the wrong point of time.

Focus and Efficiency. The participants gradually shift topics until they discuss issues that are totally unrelated to the agenda. They perform other tasks in parallel, which takes most of their attention.

Trust and Openness. Participants tell lies in the meeting. There are long discussions but no honest contributions. Conflict is avoided instead of being resolved.

Respect. Participants personally attack other participants. They start to look for mistakes made by others to make them lose their face.

Communication. Participants do not listen to one another. Too many participants speak at the same time.

Participation. Participants do not participate. Only few people engage in a discussion.

Results. There is no action after the meeting. Participants do not manage to implement decisions made. At the next meeting, resolved issues are discussed again.

Technology support becomes an important factor in virtual organizations since not all participants of a meeting are working at the same location. Even if meetings take place at the same location, the preparation is usually a distributed activity. One of the earliest works that investigated the role of technology support during the whole meeting life cycle is the *GroupSystems* study by Nunamaker and others (1991). They argued that an appropriate combination of group interaction tools could support processes and tasks as well as help to create a better structure for work processes. While these tools provided first clues towards integrated meeting support solutions, future developments mainly focused on specific phases of the meeting. Based on agent technologies, there are some systems for meeting scheduling for arranging meetings, some with more attention to user preferences (Jennings et al., 2003; Herlea et al., 2001). Bicharra Garcia et al. (2004) investigated mechanisms for increasing the quality of a meeting agenda, including the process of prioritizing agenda items suggested by prospective meeting participants. Other systems focus on in-meeting support. The system proposed by Vivacqua et al. (2008) makes use of scripts for creative facilitation, so-called *ThinkLets* (Kolfshoten et al., 2004). *ThinkLets* are tool-centered. They contain codified scripts as facilitation routines to execute actions and instructions. While *ThinkLets* already suggest a specific flow of interaction, they still require the practitioner to interpret the effect towards meeting properties. They also provide only limited support for embedding the interaction flow in an existing environment. The *Meeting Central* application (Yankelovich, 2004) focuses on sharing information and establishing speaker awareness within a meeting. Some systems focus on participation and involvement of all participants in a meeting: by means of interactive whiteboard applications or large computer screens, implicit interaction during co-located, ad-hoc meetings can be supported (Ju et al.,

2008; Smart Board, 2009). These systems enable, on the one hand, the visualization of shared information to all participants. On the other hand, they offer functions for direct modification of the presented content. *Roomware* augments the concept of interactive whiteboards to provide a coherent interaction experience using interactive and networked furniture (Streitz et al., 2007; Tandler, 2008). But again, these approaches do not offer sufficient support for the whole meeting life cycle. Systems like *Microsoft SharePoint* (2009) allow the collection of relevant information at a single place. They, e.g., list meeting objectives, attendees, the agenda, and relevant documents. They offer the possibility to create action items during meetings. However, they do not consider the collaboration processes involved in meeting preparation and execution.

Ethnographic evidences for the absence of properties

During an ethnographic study in MAPPER (IST-016527) we have observed the lack of the meeting properties in real life settings. While the project's main goal was the improvement of design and manufacturing processes, the ethnographic material also provided insights into how employees interacted in meetings.

In this paper we focus on *Alpha*, a supplier in the automotive sector. It produces several components like seat climate and motion control, head restraints, control cables, or gearshifts. It cooperates with several other suppliers where it is responsible for the project management. One way of dealing with interdependencies is using meetings as an arena for exchange, coordination, and planning. Empirical material about work practices was collected during two field visits in November 2005 and March 2006. During our first visit we were able to observe how projects are managed. We followed co-located and distributed meetings, project meetings as well as design reviews, and ongoing work at various workplaces in design, testing, and purchase. During our second visit we focused on the practitioners' interactions with the external suppliers and on the company's ways of managing projects, especially with a high level of innovation.

While the full set of work processes was documented elsewhere (Jacucci et al, 2006), this paper concentrates on observations made in meetings at *Alpha*. In this section we will first describe the regular project meetings and problems of current practices connected to these meetings. Then, we will show how participants get involved in meetings. Our main goal of this analysis is to identify, study, and analyze missing or weak properties in these settings.

Regular project meetings at Alpha with several to-do lists

Managers at *Alpha* called for weekly project meetings with the complete project team, no matter whether there were relevant issues for each participant. Some participants reported that it shows a lack of *respect* if they are invited to these

meetings and forced to be there for one or two hours without making any contributions, others said that the *goal* of the meeting is not clear and they do not know why they have to be present. This makes an active *participation* in the meeting almost impossible, also because of a lack of required *information* for preparing oneself before entering the meeting.

Sometimes project managers call for additional meetings. The main goal of these additional meetings is to discuss open issues or gather missing information for certain issues, mainly to prepare decision-making processes. These additional meetings are not in the scope of this paper.

Regular meetings are mainly seen as an arena for exchange, articulation and clarification. They should help to reach a shared understanding of the project's status and as a result create strategies and commitments for future steps. However, we could observe several issues in these meetings, which could be improved in many senses. First of all, only project managers are allowed to call these meetings and moderate them. Even if some project members did have, e.g., problems to carry out their tasks between the meetings or if they had certain important questions needed to be discussed in the project team, they did not have the possibility to call for an emergency meeting. While project managers were highly *motivated* in holding the meetings, project members would have needed meetings at other points in time. While project members were forced to respect the project manager's need for a meeting, the project members asserted a lack of *respect* for their individual needs.

Project meetings help project managers to assess the progress of the project, to clarify uncertainties, to define responsibilities, to set deadlines, to negotiate objectives, and to define new tasks. The main tool for orchestrating the setting is a *to-do list* (Figure 1): "As a project manager you are not anyone's boss, you cannot give orders, to-dos are a way of giving indirect orders, setting responsibilities and deadlines". The to-do lists are used as *meeting agendas*. They are stored as spreadsheets or text documents. Each line contains an (open) issue with responsible persons, deadlines, and status. Sometimes issues are grouped in categories to structure the subjects to deal with. The main problem participants have with the project manager's to-do list is that they are not informed about the content of these lists before the meeting. Except of items they know because they took their own notes during the last meeting, they are uncertain whether there will be new items which they personally will be made responsible for and whether they need to prepare information to discuss specific items in the agenda.

The effects of this lack of *information* are crucial: team members have no clear understanding of the meetings' goals since they do not know details about what will be discussed, they cannot answer issues arising in the meeting in an *efficient* way since they had no opportunity to prepare required information, and they may hesitate to provide open answers (*trust and openness*) since they were not able to discuss the answers with colleagues before.

The restrictive access to the manager's to-do list has also effects on the work between the meetings. Since not even a read access is permitted for project members, they cannot make use of the meeting *results* captured by the project manager. The only shared access to the to-do-list takes place during the meeting where it is projected to the wall. In a way, this supports the *communication* between all participants. However, the missing meeting minutes after the meeting causes an inefficient way of organizing and managing ongoing project activities.

| R & D. testing | | | |
|----------------|---|-------|-----------|
| Week.no | Issue | Resp. | Deadline |
| 38.1 | D-FMEA to be performed, component level. Meeting scheduled w545. | TOEK | w 539 |
| 40.3 | Verify styling on L-shape carrier due to open slots for brace. Meeting with customer w 544.4. | ANKV | w 42 |
| 44.1 | Track outstanding issues in TR. | TOEK | Follow up |

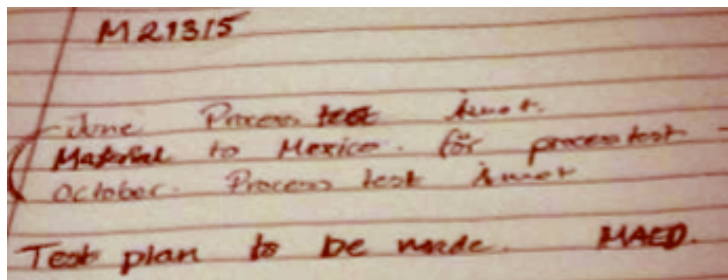


Figure 1. Computer-based to-do lists of project managers with general issues, responsible persons and deadlines (top) vs. handwritten to-do lists of meeting participants for individual use (bottom).

Having privileged access to the to-do list makes project managers special: They expect to have an overview of open issues and the status of work progress. However, this is only the case if they are informed enough. Work done in between the meetings is not transparent for them and is not reflected in the managers' to-do lists. This can be a problem, especially if they have to report to their managers. Sometimes the data is not up to date: project members have sometimes solved several open issues, but project managers are not informed, because there was no project meeting in the meantime. Such situations occur often and are not well seen in the company, especially if a customer acts as a partner in the project and is aware of inconsistencies in coordination and information flow in *Alpha*.

In addition to the project manager's to-do-list, participants note down their *individual to-do lists* during the meetings (Figure 1). This is a necessity for the team members. They need to structure and prioritize their ongoing work, to highlight their deadlines, questions they have to answer, interdependencies they have to consider, to plan and organize their communication with others in the project or with external partners, to remind the documents they have to create or update, etc. Their only possibility to gather this information is making their own notes during the meetings.

There are some inconsistencies caused by the fact that there is *no common document or information space* where each project member has access to modify issues he or she is responsible for. Each time project members start with a new individual list. There is no link to previous lists, which makes it more difficult to focus on *results* and use these as *information* for the next meeting. Sometimes they forget things, sometimes there are misunderstandings, and sometimes they carry out additional work without considering the work of colleagues because there is no shared awareness of current *results* and agreements.

We did not observe how they document their activities between meetings, whether they add their remarks to their notes from the meeting or they create other documents not attached to their meeting notes or whether they did not document their activities at all. What we could observe is that there was no additional written document or an electronic space to access during the meetings, in order to see this type of *information*. It was mainly a verbal reporting to the question of the project manager. If a project member could not join the meeting, which is a sign of lack of *participation*, there was no way to find out what he or she has done, what is still to do, where the problems were, etc. This caused problems regarding *reliability*.

The dynamics of the meetings: Interactions, artifacts, conventions

Meetings at *Alpha* have their dynamics: participants interact, several artifacts are used, and articulation work is supported by mockups or prototypes. There are different levels of *participation*: People come and go, talk or stay quietly, are active or passive. We want to show such a setting by the following illustration. It is a meeting in a customer project for seat ventilation, a project in its very late stage, with production scheduled to start early the following year. Participants arrive with their notebooks and calendars and create their *context*. They setup their individual meeting environment before the meeting starts. One had brought the new prototype of the head restraint (Figure 2), which he then uses to indicate design changes and demonstrate what had been tested. This relevant *information* is brought in during the meeting, but in this case, it is bound to a real artifact that is difficult to distribute before the meeting.



Figure 2. Prototype of head restraint used during the meeting.

The project manager opens his updated to-do list, which is projected onto the wall and is used for organizing the meeting and for noting decisions. Notes taken are made visible for participants, however only during the meeting (analogue to the previous case). While they discuss the issues in the sequence given by the list, the project manager writes directly into the document, adding or changing text and highlights particular entries, using color (red), bold type, and language such as “very urgent”. This creates a shared *focus* during the meeting, but the *results* are still not shared afterwards.

There is a sequence in the flow of talking: First, the project manager starts talking by reading the issue from his to-do list, mentioning the open questions or decisions made so far, asking the responsible person, whether the task has been closed or whether there are problems, etc. This activates the person addressed by him. He or she looks for documents or tries to read from his or her computer before answering the question. Sometimes he or she uses an artifact to explain why he or she changed the course of action since the last meeting. It is important to note that the participants cannot prepare answers. *Information* may be unavailable with the effect that the addressed person cannot provide any answers.

For instance, the project manager asks the participants: “Did AA [the customer] accept the soft tool quote? – Commercially there has been no feedback so far, the updated quote was sent 21st of October.” First, no one answers this question. No one feels addressed by this question – again a question of *participation* and pre-established awareness of *goals*. There is an unpleasant quietness in the room. Obviously, the participants who fear to lose their faces consider this situation as dangerous. The managers were not aware of these feelings and ignored them instead of *respecting* individual uncertainties. The project manager repeats his question. One participant looks first to his colleagues in the room and then tries to answer it. The project manager is not satisfied by the answer and marks this issue as “very urgent” and colors it red. Now, he puts the name of this participant as the responsible person for this item without asking for his commitment. Although a *result* was noted in the manager’s to-do-list, there was no open discussion on how to proceed with this issue (*trust and openness*). In this sense, management ignored a potential conflict in the team.

After a while the project manager reports on a steering committee meeting scheduled at the same day where he is forced to send a clear reminder to the customer. This is obviously a critical issue for him, and it could have been avoided if the *information* was gathered during the preparation phase of the observed meeting.

The example shows how issues are dealt with, step-by-step, quite quickly, and only sometimes a discussion comes up. Participants rarely take an active role. We also saw that physical artifacts, such as materials or prototypes have an important role in these meetings.

We are not so much interested in the details of participants' negotiations here than in the meeting dynamics, which can be characterized as document driven – as we see the project manager's to-do list is the central but not the only document used and referred to in this meeting. Each participant creates his or her own list of open issues which he or she is responsible for. However, there is no shared *information* space.

Each issue ends up in a *result* – a new task, the reformulation of a task, confirmed or modified deadlines, and so forth. But the decisions are badly *communicated* in the group and most important not accessible for the group members after the meeting.

Participants act as owners of particular issues. They enter and leave the discussion as these issues arise. Sometimes, they leave the room physically for a couple of minutes based on a personal judgment of the timing of upcoming issues in the to-do list (*participation*).

Many issues indicate uncertainties that have to be settled as fast as possible – a customer order for particular design changes to be obtained, a specific test to be scheduled, a missing document to be retrieved, a knowledgeable person to be contacted, and so forth (*information, efficiency*).

Although there is no overview of the project history present in the meeting, some of it is present in the form of issues and tasks that have been formulated and agreed upon but not yet resolved and for which eventually new deadlines have to be defined. It would on the one hand support decision-making in the group and avoid repeating same discussions in the course of projects, and on the other hand contribute to *clear goals*, if changes to single items and to the project as a whole could be made visible.

Meeting patterns: a tool for socio-technical interventions in meetings

As we saw from the ethnographic studies, there are both technical and social factors that make meetings suboptimal. For instance, the restricted access to the to-do list both has a social aspect, i.e. that the manager defines his role through a surplus of information, and a technical aspect, i.e. that the used technology does not allow concurrent access to the to-do-lists.

In order to structure our interventions for improving meetings at *Alpha*, we created a meeting pattern language. It is a collection of good practices for meetings that gives the project team advice on how to improve their meetings. The idea of using patterns for studying and improving socio-technical systems has been discussed by numerous authors before (e.g., Schümmer & Lukosch, 2007; Schümmer, 2005; Herrmann et al., 2003; Guy, 2005; Carroll & Farooq 2007). Basically, all these approaches have their origins in the work of the architect

Christopher Alexander (1977), who had the vision that patterns could empower lay people to act like construction experts and thereby allow them to change their buildings and cities.

The patterns of Alexander can already be considered as socio-technical patterns. They contain aspects that change the way people interact (the social component of the pattern) and aspects that change the environment in which they interact (the technical component of the pattern). A random example is the ADVENTURE PLAYGROUND pattern (Alexander et al., 1977). Here, the authors analyzed the social interaction between children on a playground and stated the problem that “any kind of playground which disturbs, or reduces, the role of imagination and makes the child more passive, more the recipient of someone else’s imagination, may look nice, may be clean, may be safe, may be healthy – but it just cannot satisfy the fundamental need which play is all about” (p.368f). The authors further discuss the need for adventurous and imaginative play and conclude by giving advice to the designers of playgrounds (especially the people living in the neighborhood who act as designers of their environment): “Set up a playground for the children in each neighborhood. Not a highly finished playground, with asphalt and swings, but a place with raw materials of all kinds ...” This technical part of the solution is concluded with a sentence that explains the intended social interaction in the space “... where children can create and re-create playgrounds on their own.”

This combination of social and technical aspects in the solution of a pattern is very valuable when addressing changes in meetings what we applied in our case to empower our users. For that reason, our patterns make the different aspects of the solution explicit by distinguishing between

- a solution part that addresses primarily the *social interaction*,
- a solution part that employs *standard technology* that is widely available in the organization such as electronic mail, instant messaging systems, or wiki systems, and
- a solution part that informs designers of *integrated groupware* applications. This solution part makes use of patterns for computer-mediated interaction (Schümmer & Lukosch, 2007).

In this sense, our patterns can be used to bridge the gap between ethnographic observations and socio-technical interventions. This is closely related to the approach taken by Guy (2005) who presented a study where patterns were used to integrate use, evaluation, and design of collaborative systems. In our work, this connection is further underlined by relating the patterns to the meeting properties identified before. The absence of a property can guide the designing user to an appropriate pattern addressing the property.

In order to illustrate the pattern format used in our pattern language, we will now present an example pattern that addresses one of the most critical problems in the observed meetings at *Alpha*. It is a pattern that aims on making the agenda

a shared document. Note that pattern names will be shown in SMALL CAPS. Pattern followed by an asterisk can be found in (Schümmer & Lukosch, 2007).

An example pattern: IT'S MY AGENDA – IT'S MY MEETING

Context: You are calling for a meeting and create an agenda for it. There are stakeholders who have different backgrounds and interests.

Problem: The owner of the meeting normally creates an agenda. All other invited participants have only limited possibilities to participate in the agenda creation. This can lead to incomplete or wrong agendas.

Properties: Motivation, clear goals, and participation.

Symptoms: Apply the pattern to avoid the following to happen...

- Agreeing on the agenda takes a lot of time at the start of the meeting.
- Many new topics pop up during the meeting, which have not been foreseen.
- Not all interests are reflected in the agenda. People do not participate in the meeting, as it does not address their needs.
- Important topics do not make it to the agenda early enough for allowing good preparation of the topics.

Social Solution: Define a shared place where all invited meeting participants can collaboratively prepare the meeting agenda up to a specified deadline. Use this shared place also to collect input documents and presentations so that everyone can BE PREPARED. Mark those items in the proposed agenda that do not require face-to-face discussions in the meeting in order to reduce meeting time (see PRESENT WITHOUT PRESENTING and NO DISCUSSION). Creating the meeting agenda collaboratively helps creating a collaborative responsibility for the success of the meeting.

Standard Technology Solution: Before announcing the meeting, the meeting owner creates a wiki page with an agenda skeleton. For regular meetings, this skeleton contains entries for recurring agenda items. In the announcement message (sent by electronic mail), the organizer invites the participants to extend and/or modify the agenda. After changing the agenda, the participant informs all other participants by electronic mail that the agenda was changed. An easy way to do this is to reply to the initial invitation including all initial recipients as receivers of the notification mail. Shortly before the meeting, the meeting organizer sends a request for a VOTE* on the agenda.

Integrated Groupware Solution: The agenda and all agenda items are stored as shared objects. For concurrent modifications of the agenda, you should provide a SHARED EDITOR* for manipulating the agenda. The SHARED EDITOR* allows users to create new agenda items or edit existing agenda items. Changes to agenda items are instantly visible to all users of the shared editor. Users who are currently not using the shared editor or who currently have no focus on the modified item will receive CHANGE NOTIFICATIONS*. The SHARED EDITOR* can be connected with an EMBEDDED CHAT* so that users can discuss the content. An alternative for

asynchronous discussion of an agenda item is to add a threaded discussion to each agenda item object. Users can express their agreement with agenda items by means of an integrated (agenda item specific) VOTE*.

Drawbacks: If the agenda is created by the group, the meeting owner must still take care that it fulfills the requirements described, see NO AGENDA – NO MEETING and WHY SHOULD I BE THERE. The meeting owner should in this case act as a MODERATOR* to ensure that the meeting is still in line with the general meeting goals.

Related Patterns:

- WHY SHOULD I BE THERE: The discussion of the agenda can help the participants to better understand why they should be there.
- SHARED FILE REPOSITORY* and ROOM* can both be used to store the agenda and make it accessible.

Additional meeting patterns

Besides the IT'S MY AGENDA – IT'S MY MEETING pattern, other patterns were relevant for our interventions at *Alpha*. The complete meeting pattern language (Schümmer & Tandler, 2008) currently contains 21 patterns. For space reasons, we have only included one pattern in full length in this paper. The additional relevant patterns are shown in Figure 3 and summarized in the remainder of this section.

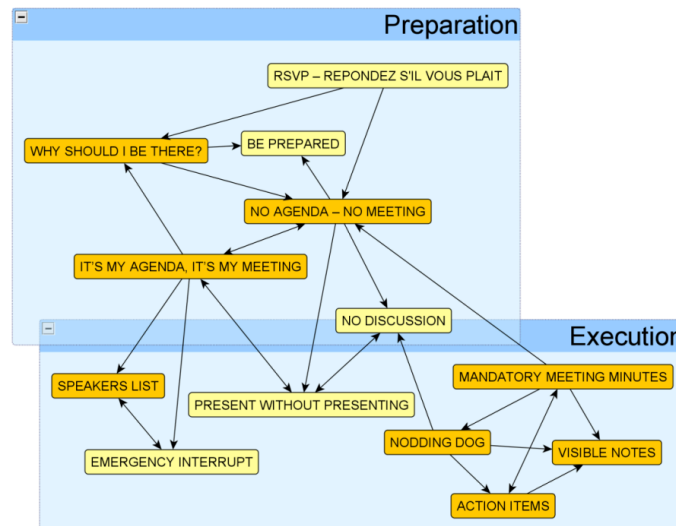


Figure 3: Excerpt of the meeting pattern language.

Figure 3 groups the patterns in two sections (Preparation, Execution). Patterns in the preparation cluster are mainly used before the meeting. They have the goal of helping the facilitator to create the most appropriate agenda and identify those people who can contribute to the agenda in order to make the meeting effective. The execution section contains patterns mainly applied during the meeting.

Obviously, results of patterns in the preparation cluster are used again during meeting execution (e.g., the meeting agenda). Dark colored patterns were selected as starting points for designing interventions in the *Alpha* case (see next section).

Patterns connected by an arrow are often used in combination. For instance, the ACTION ITEMS pattern is supported by the VISIBLE NOTES pattern: when participants establish a culture of creating action items for decisions, it is a good practice to show the action items during the meeting and make them part of the meeting minutes.

NO AGENDA – NO MEETING: Ensure that every meeting has an agenda. If not, cancel the meeting (motivation, clear goals, information, and focus).

WHY SHOULD I BE THERE: Give a reason why the receiver of an invitation should attend the meeting (motivation, clear goals, respect, and participation).

RSVP – RÉPONDEZ S'IL VOUS PLAÎT: Ask invited participants to respond to an invitation and modify the meeting plans if key participants cannot attend the meeting (reliability and participation).

BE PREPARED: Ensure that participants are able to prepare for a meeting (reliability, information, efficiency, and focus).

IT'S MY AGENDA, IT'S MY MEETING: Involve participants in the agenda creation (motivation, clear goals, and participation).

NO DISCUSSION: Plan agenda items without any discussions where participants only vote on a result (efficiency, focus, communication, and results).

PRESENT WITHOUT PRESENTING: Distribute presentation material before the meeting and thereby reduce the time spent on presentations in the meeting (information, efficiency, and focus).

SPEAKERS LIST: Manage a list of speakers and keep this list visible to all participants in order to facilitate awareness on upcoming contributions (respect, communication, and participation).

EMERGENCY INTERRUPT: Allow participants to signal a high priority speaker's request if their contribution addresses meta-issues, such as the end of the discussion or the request to vote for a final decision (efficiency, clear goals, focus, and results).

MANDATORY MEETING MINUTES: Ensure that decisions and action items are captured in minutes (information, clear goals, and results).

VISIBLE NOTES: Show the minutes to all participants while they are written and by that create a shared understanding of the discussion history (efficiency, focus, communication, and results).

ACTION ITEMS: Collect actions and responsibilities required for implementing a decision in order to ensure that these decisions are implemented after the meeting. Check the status of the action items periodically (reliability, clear goals, efficiency, focus, and results).

NODDING DOG: Quickly assess the level of commitment in the group so that the discussion can be stopped when agreement is reached (communication, participation, and results).

From indications to concrete interventions

The lack of properties detected in the ethnographic studies focused our interventions on five patterns, all related to the handling of issues and agendas. The selection of the patterns was driven by those properties that caused most problems in the observed meetings: the lack of *information* that would have been important for preparing for the meeting, differing levels of *participation* that caused participants to feel bored and consider the meeting as wasted time, and the lack of a shared artifact that documents the *results* of the meeting. In addition, we considered patterns that help to better *motivate* participants, mainly by means of improved information on the meeting's *goals*.

Three patterns were selected from the preparation cluster: The NO AGENDA – NO MEETING pattern was selected to convince the manager to provide more details on the topics of the meeting before the meeting takes place. In addition, the managers of the meetings were asked to explain the wanted participation of invited persons as stated in the WHY SHOULD I BE THERE pattern. The IT'S MY AGENDA, IT'S MY MEETING pattern was selected in order to give project members an opportunity to influence the agenda creation and bring up topics that were relevant for them. All three patterns have their focus on improving motivation, awareness of goals, and participation.

The selection of patterns for meeting execution was influenced by the fact that the VISIBLE NOTES pattern was already (partially) in place at *Alpha*. The meeting pattern language, however, suggests that notes taken should be accessible for all participants after the meeting (MANDATORY MEETING MINUTES). We thus proposed to fully implement the MANDATORY MEETING MINUTES pattern and to store the minutes in a shared space accessible to all project team members. The same advice applied to the handling of action items: again, we proposed to make ACTION ITEMS accessible to all team members and trace them through meetings.

The workshop at *Alpha*

In order to introduce the patterns, we conducted a two-day workshop with a selected project team (5 people) of *Alpha*. During the workshop, the participants were trained in detecting the need for the patterns as well as using wiki technology for supporting the social solutions of the patterns.

On day one, the participants discussed the patterns from the pattern language. We asked them to report on their experiences with meetings at *Alpha* and thereby helped them to map the abstract problem descriptions of the meeting patterns to the concrete context of *Alpha*. The discussion showed that the problems we observed were no single instances. Instead, all participants of the workshop reported that they have experienced the problems over and over again. Participants started to think about how the patterns could be used in their daily business utilizing the socio-technical infrastructure that was in place at *Alpha*. At

the end of day one, the participants were introduced to a wiki solution for the selected patterns.

The wiki solution based on the CURE wiki (Haake et al., 2005) models agendas, agenda-items, and action items as wiki pages. Special overview pages available in the CURE wiki were used to aggregate information from the individual agenda-item pages and the action item pages. Unlike most wikis, CURE supports in place editing of information visible in the overview pages.

The system was used in an artificial meeting setting on the second day. The goal was to experience the patterns in practice. Therefore, the project team members were confronted with a concrete task (“Organize the 20th anniversary event for *Alpha*”) and had to organize the meeting in which this task was addressed. One workshop participant took the role of the meeting facilitator and created a first draft of an agenda in a new meeting workspace. He then invited the other participants to the meeting space. CURE supports this by issuing virtual keys to these users (Haake et al., 2004).

Together with the invitation, the meeting organizer was able to provide a free text comment providing more details why participation is important (WHY SHOULD I BE THERE). This feature was not used as expected. Participants wrote messages like “please join our planning meeting” but did not consider the concrete roles of the invited participants. We cannot exactly name the reason for this but have two hypotheses: First of all, the observed setting was artificial. Roles were not clearly set up and it was thus difficult to identify concrete responsibilities for the participants. Secondly, the users reported that the usability of the invitation process could be improved. There is especially a missing link between the invitation and the agenda items referenced in the invitation.

After accepting the invitation, the participants could enter the virtual meeting space in the wiki and help to improve the agenda. We could observe that the participants brought in their ideas for agenda items that would be important for the meeting. This way, the agenda evolved until the participants were satisfied with the topics for the meeting.

Once the agenda was finalized, the team started the meeting after a short coffee break. Again, this is not the same setting as it would be present in a real meeting where participants have longer times between the finalization of the agenda and the meeting (in order to BE PREPARED). Additional findings were required to find out whether or not the preparation process was improved by the applied patterns. We conducted a survey at the end of the project asking also employees of *Alpha* for their perceived impact of the project. *Alpha* reported that setup time for meetings was reduced by two thirds. We cannot say to what extent our agenda handling patterns influenced this judgment but can consider this as positive feedback on the whole meeting preparation process.

During the meeting, the agenda items were used as a skeleton for MANDATORY MEETING MINUTES. The minutes were projected to a wall of the meeting room

(VISIBLE NOTES). Figure 4 provides an example of a meeting minutes page that was created during the workshop. Participants used a comment field present in each agenda item to summarize the discussions. In addition, they added ACTION ITEMS (on the bottom of Figure 4) to the minutes.

Minutes: Minutes
 These minutes capture decisions made in the meeting: [Kick off meeting](#)

Results from the individual agenda items

| # | Name | Minutes |
|---|------------------------------------|--|
| 1 | Decide on location | Björkhaga Hotell in Mulsjö has a nice conference room. We could also go to the Mulsjö missionskyrka. |
| 2 | Organize cake | The group prefers chocolate based cakes. |
| 4 | Decision on music | |

Buttons:

Global meeting notes

Action items

| Name | Responsible | Due | Status | New |
|--|-----------------|------------|---------|-----|
| Book the band | Gunnar Svensson | 2007-10-11 | running | YES |
| Do more cookies | Till Schümmer | | | |
| <input type="text" value="Check availability of locations"/> | ... | | | YES |

Buttons:

Figure 4: Supporting the IT'S MY AGENDA - IT'S MY MEETING, VISIBLE NOTES, MANDATORY MEETING MINUTES, and ACTION ITEMS patterns in CURE.

After the workshop, the participants were asked for free-form feedback on the meeting patterns and the support technology. This feedback showed that the proposed social processes were understood by the participants and considered as valuable advice for improving their meeting culture. Some participants stated that they would start to modify parts of their behavior based on the given advice.

They were more skeptical with respect to the supportive technology, mainly for two reasons: Firstly, it is not integrated with the IT infrastructure of *Alpha* but a stand-alone wiki. A tighter integration would be needed if the technology support was to be deployed in the whole organization. Secondly, the participants detected several interaction breakdowns in the presented implementation. It is, e.g., difficult to trace the life cycle of an agenda or action item when it is discussed in more than one meeting. This was also true for the solution that was in place at *Alpha* before our intervention, but now that the participants became aware of this (also due to the ACTION ITEMS pattern that explicitly discussed this issue) they wanted to have a solution that allows follow-up activities for agenda or action items.

Another difficulty with the infrastructure was a lack of coordination mechanisms. Participants especially requested the presence of a SPEAKERS' LIST

and a mechanism for quick polls (NODDING DOG). These patterns address problems that we could observe especially in the distributed meetings during our ethnographic observations. They were not so critical in the co-located workshop setting. But the fact that the participants asked for such an integrated functionality is a further indication that the principles of the patterns were understood and the potentials for an improved meeting support system became clear.

LivingAgendas – an integrated meeting support system

The requests of the workshop participants led to the design of a prototype called *LivingAgendas*. It is a web-based meeting support system that supports groups in the collaborative creation of an agenda and in implementing the agenda during a real meeting. We put special attention on the interaction breakdowns that were detected with the previous wiki-based prototype. Figure 5 shows how the prototype was used in a real meeting. Before the screenshot was taken, the meeting organizer invited the participants. The system supports this by providing forms for explaining the need for participation to the invited person (not shown in Figure 5). All invited participants were allowed to propose changes and additions to the agenda. *LivingAgendas* enables automatically recalculating the time schedule and sending updated invitations to required participants.

During the meeting, the agenda is used as a template for the meeting minutes. Figure 5 shows the personal view of the participant named “Peter T.” who is currently taking the notes for the first agenda item. On the right part of Figure 5, one can see two lists that ease in-meeting coordination. The SPEAKERS LIST shows all participants that want to contribute to the current agenda item. Meeting members can add themselves to this list by pressing the “request to speak” link. They can also remove themselves from the list (by clicking on the “ok” link). The time information behind each participant is an estimate on how long it will take until the person gets the floor.

The second box on the right part of Figure 5 supports voting, both for testing the group’s current opinion (NODDING DOG) and making the final decision on a topic. Votes can be added to each agenda item by following the “Add Decision” link (also before the actual meeting takes place). As long as the facilitator does not forbid test votes, the voting is available immediately and interim results become instantly visible.

Once a decision is taken, the system suggests creating action items for implementing the decision. In Figure 5, the first agenda item has two associated actions. The actions are tracked automatically and added to the next status meeting for exchanging results or status information on the action items. This supports the entire life cycle of important action items or their corresponding agenda items. The same is true for tracking related agenda items over time. Both,

meeting preparation as well as meeting execution thus contribute to the meeting history of the team.

The screenshot shows a web application interface for a meeting titled "WP4 USE-CASE PLANNING". The interface is divided into several sections:

- Navigation:** Preparation | Execution | Follow Up
- MY MEETINGS:** Paper Discussion, Pre-Project Meeting, Target Setting Meeting
- UPCOMING MEETINGS:** Supplier Conference, Division Meeting, Interview
- Meeting Details:**
 - Location:** Skype
 - Date:** 2009-10-15 08:30:00 UTC
 - Participants:** Jörg Haake, Hilda Tellioglu, Peter Tandler, Till Schümmer
 - Agenda:**
 - 08:30-09:15: Release of first prototype**
 - Goals:** - negotiate core use cases
 - Duration:** 45
 - Facilitator:** Till Schümmer
 - Notes:** We discussed whether or not the main focus should be on collaborative editing. Selecting this scenario would allow us to improve tools for tighter collaboration. However, most of the collaboration up to now takes place in an asynchronous setting.
 - Decisions:** --> Use collaborative Editing in Use-Case 1 (Yes: 2; No: 2; Don't care: 0)
 - Actions:** --> Evaluate available shared editors that can be embedded in web-based systems. (Assigned: Hilda Tellioglu)
 - 09:15-09:40: Definition of test group**
 - Goals:** - availability of engineers -availability of sales representatives
 - Duration:** 25
 - Facilitator:** Jörg Haake
- Speakers List:** Hilda Tellioglu (2*) 2x, Jörg Haake (3*) 2x, Till Schümmer (8*) 2x
- Open Decisions:**
 - Topic:** Release of first prototype
 - Decision:** Use collaborative Editing in Use-Case 1
 - Yes: 2
 - No: 2
 - Don't care: 0
 - Topic:** Definition of test group
 - Decision:** Target seat comfort group
 - Yes: 0
 - No: 0
 - Don't care: 1

Figure 5: The prototype *LivingAgendas*.

LivingAgendas supports direct manipulation whenever possible. Agenda-items can, e.g., be moved by dragging them to the new position in the agenda or votes can be submitted by pressing on the circle. Technically, it is a web-based client-server application that uses Ruby on Rails as well as JavaScript frameworks that allow a rich usage experience.

Anecdotal experiences with the prototype make us think that *LivingAgendas* may be able to improve our concepts of pattern-guided meetings not only in the context of research but also in “real” work environments.

Conclusions

In this paper we presented an ethnographic study and showed how the absence of fundamental meeting properties we derived can be used to identify problems in meetings. The analysis of the properties aids a better understanding of areas for intervention.

We proposed a socio-technical meeting pattern language that allows a co-evolution of both the social processes required in a meeting and the supportive infrastructure. The patterns guided concrete interventions for opening up the process of agenda creation for all participants. The interventions were implemented by users themselves. They tailored the environment and thereby added more structure to their meeting infrastructure. However, users also detected interaction breakdowns that arose when they tried a wiki on their own. These problems together with findings from other research on meeting interaction helped us to better focus onto the development of a new meeting infrastructure called *LivingAgendas*. Our patterns are not tool-dependent; they are identified and studied in cooperative work settings. With *LivingAgendas* we aim at facilitating the whole meeting life cycle.

Our current and future work comprises three main research and development areas: (1) we are working on a public release of *LivingAgendas* in order to test it with a broader audience, (2) we plan to run ethnographic studies for the use of the *LivingAgendas* system looking deeper into the socio-technical effects of the meeting patterns, and (3) we are working on extending and improving the meeting pattern language, especially for addressing additional challenges of in-meeting interaction. The early feedback from the users encourages us to continue this path helping to make meetings more efficient.

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References

- Alexander, C. (1977): *The timeless way of building*, Oxford University Press, New York.
- Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I. and Angel, S. (1977): *A pattern language*. Oxford University Press, New York.
- Bicharra G. A. C., Kunz, J. and Fischer, M. (2004): 'Cutting to the chase: improving meeting effectiveness by focusing on the agenda', *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW'04*, Chicago, Illinois, USA, November 06-10, New York, NY, pp. 346-349.
- Byrne, J.; Brandt, R. and Port, O. (1993): 'The virtual corporation', *Business Week*, vol. 8, pp. 98-102.
- Carroll, J. and Farooq, U. (2007): 'Community-based learning: Design patterns and frameworks', *Proceedings of ECSCW 2007*, Paris, pp. 307-324.
- de Vreede, G.-J., Vogel, D., Kolschoten, G. and J. Wien (2002): 'Fifteen Years of GSS in the Field: A Comparison Across Time and National Boundaries', *Proceedings of the 36th Hawaii International Conference on System Sciences (HICSS'03)*.
- Doyle, M. and Strauss, D. (1982): *How to make Meetings Work*, Jove Books, New York.
- Guy, E. S. (2005): '"..real, concrete facts about what works..": integrating evaluation and design through patterns', *Proceedings of GROUP'05*, ACM, New York.

- Haake, J. M., Haake, A., Schümmer, T., Bourimi, M. and Landgraf, B. (2004): 'End-user controlled group formation and access rights management in a shared workspace system', *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW '04*, Chicago, Illinois, USA, November 06-10, ACM, New York, NY, pp. 554-563.
- Haake, A., Lukosch, S. and Schümmer, T. (2005): 'Wiki-templates: adding structure support to wikis on demand', *Proceedings of the International Symposium on Wikis, WikiSym'05*, San Diego, California, October 16-18, ACM, New York, NY, pp. 41-51.
- Herlea et al. (2001): 'Secure Meeting Scheduling With Agents', in R. Steinmetz et al. (eds.): *Proceedings of IFIP CMS 2001, Communications and Multimedia Security Issues of the New Century*, May 21, Darmstadt, Germany, pp. 327-338.
- Herrmann, T., Hoffmann, M., Jahnke, I., Kienle, A., Kunau, G., Loser, K. and Menold, N. (2003): 'Concepts for usable patterns of groupware applications', *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work*, Sanibel Island, Florida, USA, November 09-12, GROUP'03. ACM, New York, NY, pp. 349-358.
- Jacucci, G., Tellioglu, H. and Wagner I. (2006): *Report Kongsberg Automotive*, MAPPER, Model-based Adaptive Product and Process Engineering, IST/NMP Project, 016527.
- Jay, A (1993): 'How to run a meeting', in R. Baecker (ed.): *Readings in Groupware and Computer-Supported Cooperative Work*, Morgan Kaufmann Publishers, pp. 130-144.
- Jennings et al. (1995): 'Agent-based Meeting Scheduling: A Design and Implementation', *Electronic Letters*, vol. 31, no 5, IEEE Press, pp. 350-352.
- Ju et al. (2008): 'Range: Exploring implicit interaction through electronic whiteboard design', *Proceedings of the ACM 2008 Conference on Computer Supported Cooperative Work, CSCW'08*.
- Kolfschoten, G., Appelman, J., Briggs, R. and de Vreede, G. J. (2004): 'Recurring Patterns of Facilitation Interventions in GSS Sessions', *Proceedings of the 37th Hawaii International Conference on System Sciences*, IEEE Press.
- Kelsey, D. and Plumb, P. (2004): *Great Meetings! Great Results*, Hanson Park Press, Inc.
- Matson, E. (1996): *The Seven Sins of Deadly Meetings*, Fast Company, April. http://www.fastcompany.com/online/02/meetings_Printer_Friendly.html.
- Microsoft SharePoint (2008): <http://office.microsoft.com/en-us/help/HA011154391033.aspx>, <http://office.microsoft.com/home/video.aspx?assetid=XT010944071033&width=884&height=540&startindex=0&CTT=11&Origin=HA010930841033>
- Nunamaker, J. F., Dennis, A. R., Valacich, J. S., Vogel, D. R. and George, J. F. (1991): 'Electronic meeting systems to support group work', *Communications of the ACM*, vol. 34, no 7, July, pp. 40-61.
- Parker, G. and Hoffman, R. (2006): *Meeting Excellence: 33 Tools to Lead Meetings That Get Results*, Jossey-Bass.
- Schümmer, T. and Haake, J. (2009): 'Shaping Collaborative Work with Proto-patterns', in V. Pipek, M. B. Rosson, B. de Ruyter and V. Wulf (eds.): *End-User Development. 2nd International Symposium, IS-EUD 2009*, Siegen, Germany, Springer, LNCS 5435, pp. 166-185.
- Schümmer, T. (2005): *A Pattern-Approach to End-User Centered Groupware Development*. Eul-Verlag, Lohmar, Cologne.
- Schümmer, T. & Lukosch, S. (2007): *Patterns for Computer-Mediated Interaction*. John Wiley & Sons., Chichester, UK.
- Schümmer, T. and Tandler, P. (2008): 'Patterns for Technology-Enhanced Meetings', in: L. Hvatum and T. Schümmer (eds.): *Proc. of EuroPLOP 2007*, UVK, Konstanz, Germany, pp. 97-119.
- SMART Board™ interactive whiteboards: <http://www2.smarttech.com/st/en-US/Products/SMART+Boards/>
- Streibel, B. J. (2003): *The Manager's Guide to Effective Meetings*, McGraw-Hill, New York.
- Streitz, N.A., Tandler, P., Müller-Tomfelde, C. and Konomi, S. (2001): 'Roomware: Towards the Next Generation of Human-Computer Interaction based on an Integrated Design of Real and Virtual Worlds', in J. Carroll (ed.): *Human-Computer Interaction in the New Millennium*, Addison-Wesley, pp. 553-578.
- Tandler, P. (2008): *Synchronous Collaboration in the Age of Ubiquitous Computing*, VDM Verlag Dr. Müller.
- Vivacqua et al. (2008): 'Assisting meeting facilitation through automated analysis of group dynamics', *The 12th International Conference on Computer Supported Cooperative Work in Design, CSCWD 2008*, pp. 951-956.
- Yankelovich, N., Walker, W., Roberts, P., Wessler, M., Kaplan, J. and Provino, J. (2004): 'Meeting central: making distributed meetings more effective', *Proceedings of CSCW'04*, ACM Press, New York, pp. 419-428.