

# New Perspectives on Interactivity in Project Management Tools

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**Abstract.** Software tools for project management are extremely complex desktop applications. Recently, we observe a shift from traditional project management where one project manager is responsible for creating the project plan and supervising its execution, towards a more agile multi-project management that involves project members early in the planning process. This shift demands the introduction of novel visualization and interaction techniques. This contribution summarizes our analyses of three typical scenarios and shows promising perspectives for the application of new interaction and visualization techniques. Our goal is to promote project management as an interesting and multifarious subject within HCI research.

## 1 Introduction

Project management in small and medium-sized companies is usually considered to be the responsibility of one person, the project manager. Project management software is designed for single users as conventional desktop applications. However, we observe a recent trend towards a more agile form of project management that integrates the whole team into early planning phases and crucial decision processes. Furthermore, a company usually runs more than one project. Its resources are thus concurrently demanded, which leads to conflicts that need to be resolved [1]. Hence, a computer-supported multi-project perspective on agile project management is required. Methods from the field of information visualization are rarely regarded within project management [2] and CSCW research but can be of great help to achieve this perspective.

In this paper, we describe results from the research project *Vizamp*, that aims to introduce novel interaction and visualization techniques to this scenario. The project is conducted in cooperation with a partner from industry, who develops project management tools and employs several project managers which were available to us for preliminary interviews. Little previous research is available on this subject. Thus, the main aim of this contribution is to characterize typical scenarios, analyze their demands and discuss existing applicable visualization and interaction techniques.

## 2 Project Planning

The most traditional scenario in project planning is the creation of a schedule and the assignment of staff to the project team. This is typically done by a single user in a desktop environment. Some project managers tend to add very specific details to specify project phases and work packages. We regard this process as top-down approach. A central aspect of our research is the examination of agility in multi-project management. Since the project manager cannot know each detail of the project activities, we propose a middle-out approach by combining top-down and bottom-up processes. Thereby, potential conflicts caused by multi-project management (MPM) can be foreseen before they occur or efficiently handled if they do arise. In this case, the project manager is only concerned with the most important project information and asks the project members to clarify the details. Hence, the project planning is split into several levels of detail and the in-depth knowledge of all project members is incorporated. As the interviews with our industry partner revealed, this already takes place in practice through direct communication. Nevertheless, traditional applications for project management are hardly suitable for this highly agile and collaborative middle-out approach, as they do not adapt to different situations and devices with respect to interaction techniques and visualization methods. The detailed project planning can be regarded as a separate scenario, but to a certain degree it is part of all of the following scenarios.

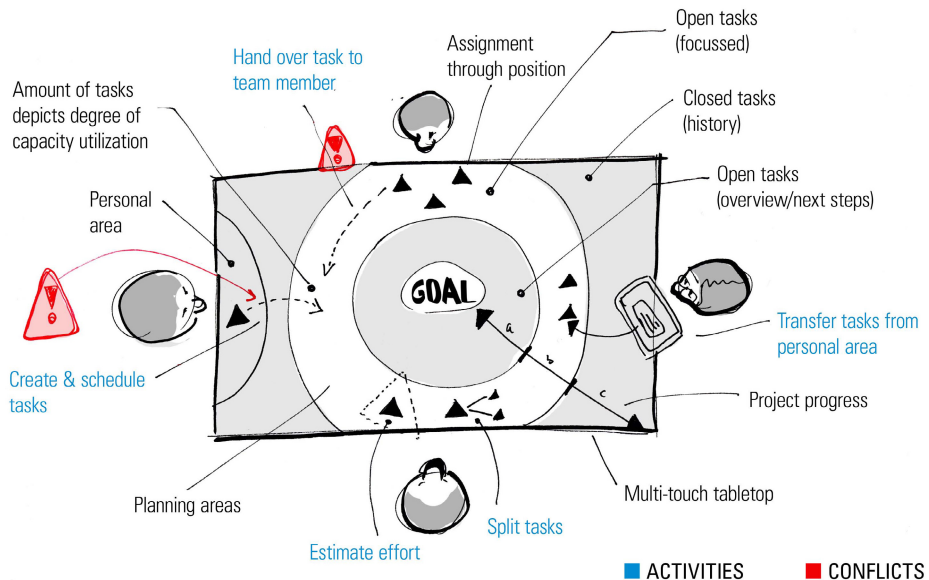
Timelines are a well known visual metaphor used in the context of project scheduling to visualize time-oriented data. Several more sophisticated techniques have been developed based on Timelines [3,4,5,6]. Gantt charts in particular are occasionally criticized due to the use of a large amount of white space. However, this problem applies to all of the before mentioned methods. The middle-out approach seeks to mitigate this problem. The visual output does not necessarily need to depict every detail, only the details required in a particular context. Thus, our approach can be used to control the level of detail by semantic zoom techniques. Data can be stored in a hierarchical tree structure. Reducing the complexity of the graphical representation reduces the needed display space. The gained space can, for instance, be used to advance existing visualization methods towards multi-project visualizations.

## 3 Team Meeting

The team meeting is a highly collaborative scenario with interaction not only between project manager and team but also amongst the team members. The project manager is the session chair. The purpose of the team meeting is the refinement of the lower levels of the project plan's tree structure, i.e. work packages and tasks, and the assignment of staff to particular work packages. This also includes effort estimation for open and not yet finished parts of the project. In case of delays, the project plan has to be adapted or new planning content has to be created.

The team meeting is a typical roundtable situation and predestined for multi-touch tabletop interaction, since it allows meeting attendees to interact vis-à-vis.

Consequently, they foster communication as opposed to single-user systems, and a positive impact on task execution time is likely [7]. However, none of the traditional visualization techniques like Gantt charts are appropriate for this scenario since they require a one-sided orientation. The same applies to conventional applications for project management, which are in general controlled with pointing devices. AgilePlanner [8] supports face-to-face collaboration during planning meetings even though it is not designed for MPM. Tools coming from the CSCW research are mainly focused on interaction techniques and not on visualization. In the team meeting scenario, the project plan has to be intelligible and simultaneously editable from all directions. This suggests circular layouts, radial methods for information visualization [9], support for artifact orientation [10] and the manipulation of hierarchical data [11,12]. More promising insights for this scenario could be reached through the personalization of content depending on its location, the integration of a public and several personal areas [13], or the use of private interactive displays [14]. Even though several approaches already exist, some challenges still remain. A very particular problem in roundtable scenarios is textual information. As far as possible, text should be replaced by pictographic elements. Götzelmann [15] introduced several techniques to generate well-laid-out annotations for interactive images. The main challenge in this scenario involves the combination of data-driven visualization methods and interaction techniques, which allow some sketchiness while planning. This may be a reason for the common creation of text documents during team meetings, and as a consequence, the additional effort to convert the documents into planning data. Figure 1 shows a conceptual sketch of the visualization and system functions.



**Fig. 1.** Conceptual sketch of the team meeting scenario

## 4 Management Meeting

Another collaborative scenario is the management meeting. Its primary purpose is to resolve conflicts caused by managing multiple parallel projects. We focus on measureable and quantifiable conflicts, such as scheduling conflicts and the unbalanced distribution of workload. At our industry partner 5 to 8 of approximately 12 project managers participate in this meeting. The agenda of the meeting is a list of conflicts, which are processed consecutively. Every conflict may be related to different sub-groups of managers, so that the chair moderating the discussion has to change from time to time. We believe that communication is the most important aspect to resolve these conflicts efficiently. Thus, the system should be subtle supporting the conversation and a projection wall setting comes into consideration. To allow the changing chair to take control of the system, we have tested a gesture-based system which allows distant interaction without additional devices [16]. Recent work in this field has been applied to simple applications [17], but transferring these techniques to complex scenarios is challenging. Explicit and implicit interaction has to be combined in a way that allows reliable gesture recognition and natural behavior during conversation at the same time. A challenge with respect to the visualization is to reduce the complexity of the multidimensional data connecting projects, work packages, and resources. This can, for instance, be achieved by only taking the affected project managers into account.

## 5 Conclusion

In this paper we described three fundamental scenarios in the context of agile multi-project management. All scenarios feature high potential for collaborative work and are essential parts of the proposed middle-out approach. We stressed that conventional software for project management is not suitable for these scenarios. This does not only apply to the graphical representation but also to the corresponding interaction techniques. Part of our future work will be the further development and investigation of the described approaches. One of our main objectives is to bridge the gap between all scenarios and to bring together aspects from the fields of HCI, information visualization, and project management.

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