A Cooperative Hypermedia Solution to Work Management in Real-time Enterprises

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ABSTRACT

Many ERP and project management systems are geared for monthly planning and analysis. Often, managers could not see what was going on in their businesses until it was too late to react. Real-time enterprises are emerging forms of agile organizations that can detect delays and respond fast. To meet the challenges met in supporting the emerging real-time enterprises, in this work, multiple complementary hypermedia services are developed in a cooperative hypermedia environment to support distributed project teams to create and modify a project plan cooperatively, to carry out the plan, and, more importantly, to monitor, analysis and adapt to changes in real time.

Categories and Subject Descriptors: I.7.2 [Computing Methodologies]: Document Preparation –*hypertext/hypermedia.*

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1. INTRODUCTION

The standard approach to project planning in industry today is to plan ahead of time – and typically to use a top-down approach. The only common and sustainable plan in a project or task is the original descriptions of work breakdown, Gantt-diagrams, discrete work parameter graphics, and job-lists prior to starting work. Some recent ERP and project management systems support project enactment and progress monitoring and reporting. However, in most of the systems the monitoring and reporting are geared for planning and analysis with a long interval period, typically every month. Often, managers could not see what was going on in their businesses until it was too late to react. Unpredictable customer demands and economic uncertainty challenge enterprise to detect problems and delays sooner and to respond faster. To survive and thrive, enterprise will have to work toward functioning in real time. Removing the delays that slow down the work and collaboration in teams will not be easy, but it can be done. Content management and collaboration technologies can help enterprises reach that goal [2].

EXTERNAL is an EU fifth framework project on information technology support for new way of working [3]. In this project it has been important to develop an approach that will open up for dynamic task planning and resource assignments. Team members should be able to simulate, re-do and re-engineer tasks with changes in plans and resource allocations. This would greatly support learning by doing, even in one-of-a-kind type of work.

In the project, we have developed an approach that helps people to identify the need for changes and to adapt the plan at runtime so as to meet the changing conditions (i.e., to apply a bottom-up approach to adapt the model created from a top-down planning). This approach uses multiple dynamic views upon a hypermedia based enterprise model to detect delays and respond by modifying the underlying enterprise models:

- A swim lane view that provides a computed view of a running process with ordered tasks in individual lanes for each respective team member.
- A tree view that provides an overview across multiple process structures of the alternative plans of a project or different projects.
- A nested view which provides a detailed local view at each level of a process structure.
- Diagram views (e.g., the actor backlog, estimation of costs) generated from computational simulations upon the project models.

The following sections provide more details on each of the cooperative hypermedia based services.

2. Swim lane view for monitoring

The flat swim lane view aims to support dynamic task planning and resource assignment. It may also act as a control panel for monitoring the task execution.

The swim lane view is a flat view where all tasks are presented on the same surface no matter which nesting levels they are. It presents multiple ordered task lists in lanes for each task performer (See Figure 1). Filtering criteria is supported to generate many kinds of task lists, such as to-do lists and overdue lists. This view supports dynamic task planning and resource assignment at any time, especially for last minute or just-past-execution changes.

It can also be used as a work list handler for task execution and as a task control panel for monitoring the task execution. Colours are used to show the state of a task: The green background colour is for ongoing tasks and the yellow is for to-do tasks. The green code with red quotation mark indicates overdue tasks. The yellow code with red quotation mark blue indicates delayed tasks. The white background colour is for not ready tasks. A variety of filtering and ordering criteria can be used to tailor the view. Unlike a to-do list in work-list handlers of most workflow systems, such swim lane view allows team members to get an overview of various task lists of all the team members. With such a browser, team members can identify delays, actor backlogs, and bottleneck tasks that require re-scheduling, resource re-assignment, and process structure modification.

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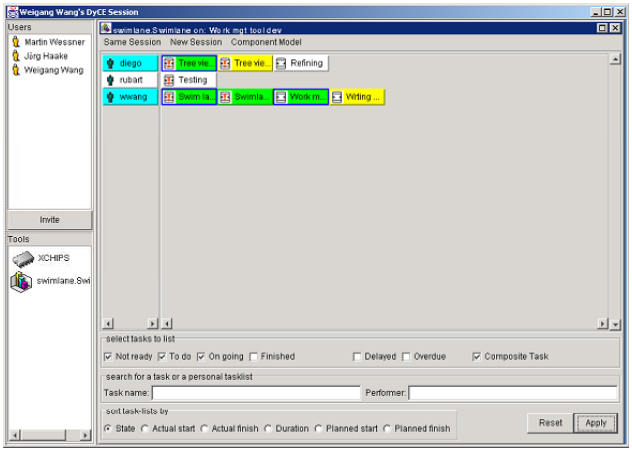

Figure 1. Swim lane view

3. Tree view for an overview

A tree view provides an overview of the task (process) breakdown structure of a single process or multiple processes. It also shows all the resources related to the tasks. A browser for this view is a hierarchical structure navigator, which can fold and unfold a hierarchy to show all the sub tasks and all the resources (such as roles, persons, and information objects) associated with the sub tasks. The tree view may help team members to go up and down a process hierarchy of a single process or a set of processes, so as to identify a task in an overall context and find all the sub tasks and all the resources relating to the task. With such a clear view about a task, when there is anything wrong with it and needs a change, team members could easily see the scope of its impact and learn the changed process structure.

4. Nested view for local details

A nested view presents the details at each level of the task break down structure (i.e. sub-process structures). A cooperative hypermedia browser for this view allows team members to navigate in the nested structure and to create and modify a project plan (i.e., a process structure and its related resources) cooperatively. For instance, when an overdue task is identified in the swim lane view, the team members can open the task node in the nested view browser and break the task down to two sub tasks and allocate the tasks to team members who agree to help in completing the delayed task.

5. Diagram views for analysis

There views are not the graphical views of nodes and links, rather they are diagrams (e.g., PERT chart, Gantt chart, or actor backlog diagram) generated upon a hypermedia based process model using various computational simulation algorithms. They can provide valuable feedback for planning and monitoring a project model.

6. Cooperative browsers of the views

For supporting synchronous cooperation and dynamic work management, the above-mentioned views are presented in cooperative browsers (See the inner frame in Figure 1). Upon a (composite) task node a menu can be activated for team members to select a view (among the four choices). Once opened, the content view will be dynamically updated in real time when any changes happen to the objects underlying the views.

When there is a need for a group of team members to jointly navigate, comment and modify a sub-model, one of the team members can initiate such a co-operation by inviting other team members to join his cooperative working session. Figure 1 shows the user interface layout of a cooperative session browser (the outside window). All the participating members can be seen on its up left part; while all the tools opened in the session are listed on its lower left part. By selecting a tool icon in the tool list, one of the views, i.e., an internal frame for the tool comes to the front in the space on the right-hand side of the session window.

7. Concluding remarks

This paper describes a hypermedia approach to supporting real time enterprises. Four kinds of views are defined to monitor and adapt the underlying project models to meet changing situations.

The hypermedia structural services and the browsers for realizing the views are developed in the XCHIPS hypermedia environment [1]. Such services provide multiple linked views onto a shared hypermedia based enterprise model, with transcluded nodes between views. The enterprise model is in conformant with a hypermedia schema that defines the semantic types as well as the constraints in linking and containment. The knowledge in the schema is exploited by the structural services to generate the views. For instance, the swim lane service makes use of the Role-filledBy-Person and Role-assignedTo-Task relationships to compute task list for each person. For space reasons only one screenshot is provided here, but readers can go to EXTERNAL Web Portal [3] to see a demo movie showing multiple views in action (in a Cooperative Resource Allocation demonstrator).

The need for such tools and the methodology to use them were identified and developed after the first round use case evaluation of the EXTERNAL project [3]. The extended tools were used in an action list management use case in the second round of use case studies. Feedback from our users indicated that with the swim lane view and diagram views it is easier for team members to identify problems than before when they had to browse parts of the process structures using the nested view browser; and that the nested views and tree views were more useful for identifying the details and their context, and for making changes to the underlying models so as to fit into the changing situations.

The work management methodology and tools will be further developed in a follow-up project we have proposed in the EU 6th Framework program for supporting process improvement and real- time enterprises.

8. REFERENCES

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