Guided Support for Collaborative Modeling, Enactment and Simulation of Software Development Processes

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Introduction (1/3)

Key success factors in a distributed development environment

- Detailed guidance on the development process
- Comprehensive support in planning and enacting the process
- Communication of the development process among the team members

Integrated planning, enactment, and guidance support

- Helps meet milestones and budget, as well as to deliver quality
- Contributes to an early identification of deviations from the plan
- Leads to a significant reduction in project effort
Introduction (2/3)

Requirements to provide process guidance and comprehensive process planning and enactment support

- R1: Supports process elicitation, modeling, and guidance
- R2: Supports collaboration during the tailoring of the given development process
- R3: Supports further tailoring of the process during execution
- R4: Combines executable process models with detailed process guidance and resources
- R5: Supports improvement of the development process while learning from the practice
- R6: Supports testing of process behavior before implementation by means of simulation
Web-based process modeling, enactment, and simulation environment

- Consists of the SPEARMINT process modeling environment and the XCHIPS system
- Integrated via an XML interface for process model exchange and online-guidance interface
- Fulfills the requirements mentioned
SPEARMINT and XCHIPS (1/4)

- SPEARMINT/EPG
  - Aims at supporting the modeling and online documentation of development process
  - Splits descriptions of processes into different view types
    - Activities, artifacts, roles, tools, product flow, control flow, etc.
SPEARMINT/E PG (cont’d)

- Allows for the generation of electronic process guide (EPG)
  - Guides software developers in doing their tasks by providing the relevant information they need
  - Generates appropriate links from objects of the enactment environment to EPG fragment
XCHIPS system

- Supports collaborative modeling, tailoring, and enactment of work processes
- Allows many users can access and change a process model concurrently at any time
  - Based on group awareness
  - Supports synchronous collaboration between distributed users who need to negotiate and change their processes
- Provides a predefined graphical modeling language
- Enacts incomplete process models as well as complete process models
  - Supports software projects in which the plans cannot be totally defined before the project starts
XCHIPS system (cont’d)

User

Task list

Component for collaboration
Distributed process modeling and planning

SPEARMINT

- modeling with detailed descriptions of activities, artifacts, and roles
- specifying examples, templates of artifacts
- introducing methods and tools supporting the enactment
- integrating a small experience base, guidelines, standards, problems in performing the activities
- providing the control flows

- generating the EPG
- exporting an XML model ready to be imported by the XCHIPS
Distributed process modeling and planning (cont’d)

XCHIPS

- providing access to all process model
- providing the user with a list of all projects that are currently being planned
- initializing and tailoring the processes
- assigning team members to activities

※ each of model elements is labeled according to the users who are currently working with it

label
Process simulation

- Process can be simulated in XCHIPS in a type of synchronous role-playing
  - Running a project in a time-laps mode but not simulating it by means of using dynamic or discrete simulation models

- Check whether the preconditions are set correctly, whether resources are available, and whether the needed guides are available

- Ensure required documents flow correctly, and dependencies and associated task activation behave as expected
Process enactment

- Searches the tasks team members are assigned
- Provides a detailed specification of the work by the EPG
- Provides labels of the element that indicate the users currently working within them
Usage experience

- Scenario-based evaluation with distributed participants
  - XCHIPS and EPG is of great value for project participants who do not yet have any experience
    - Used the process model as the entry point for their daily activities
    - Searched for active tasks they were assigned
    - Found the tips and detailed descriptions of tasks in the guide
    - Appreciated the possibility of simulating the execution of a process
  - Limitations
    - Synchronous interaction did not occur often during the first usage experience
    - Quantitative comparison of the integrated approach was not performed owing to the lack of historical data
Related work

Project management tools

<table>
<thead>
<tr>
<th></th>
<th>MS-project, Autoplan</th>
<th>Mesa/Vista Enterprise</th>
<th>Maven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process enactment</td>
<td>Little or no</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Change support</td>
<td>Little</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Documented project guidance</td>
<td>No</td>
<td>no</td>
<td>No</td>
</tr>
</tbody>
</table>

Process modeling and enactment researches

- Endeavors, EPOS, SPADE, etc.
  - Do not provide project planning and management support
Integration of the SPEARMINT and the XCHIPS covers the presented requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Contents in this approach</th>
</tr>
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</table>
| **R1** (process elicitation, modeling, and guidance) | • Rich modeling features of SPEARMINT  
• Guidance provided by the EPG  
• Process overview provided by the graphical XCHIPS process models |
| **R2** (collaboration during the tailoring) | • XCHIPS allows synchronous and asynchronous collaboration during project planning and enactment |
| **R3** (tailoring of the process during execution) | • XCHIPS can be tailored during execution |
| **R4** (Combines process models with detailed guidance) | • EPG provides detailed process guidance and resources that are integrated with the enacted models |
| **R5** (improvement of the development process) | • Annotations on the EPG  
• Searchable repository of past projects  
• Possibility of role-playing processes before finally enacting them |
| **R6** (testing of process behavior) | • Role-playing is the mechanism used to test process behavior |
Discussion

- Lack of technology issues
  - How to simulate the process using a role-playing mechanism
  - How to reflect changes of a process during enactment

- Coverage of our tools for the presented requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Features of our tools (MODEL, LeadSPI, SymphonyPM)</th>
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</table>
| R1           | • MODEL provides UML representations for the process modeling  
               • LeadSPI provides the electronic guidance for CMMI |
| R2           | None                                               |
| R3           | Little (need the mechanism for reflecting changes of a process) |
| R4           | None                                               |
| R5           | Little (need the functionality to analyze the project results) |
| R6           | None                                               |