SEPP/OT as a Management Concept for the Modeling of Workflows

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Topics

1. Introduction
2. SEPP/OT as a UML based Model for the Software Development Process
3. The Object Process Net (OPN)
4. SEPP/OT for the Modeling of Workflows
5. Tool Support
6. Summary and Further Work
Motivation

Strategic business objectives

Impulses for research

Cognitions of the organisation science

Abstraction methods

Lack of understanding

Economic Science

Computer Science

Preparation of Tools

Abstraction methods

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Strategic business objectives
Extending the UML
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The SEPP/OT - Framework

- Define scenarios (Interaction Model)
- Determine Use-Case-Instances (Object Process Model / User Interface)
- Incorporate requirements (Requirements)
- Designate Use-Case-Typs (Use Case Model)
- Specify structure of distribution (Distribution Model)
- Determine architecture of components (Component Model)
- Create model of persistence (Class Structure Model)
- Create logical architecture
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- PM-View
- M-View
- QM-View
- A-View
- CSM
- C
- M
- OPM/UI
- I
- UCM
- R
- Req
- DM
Processes -
The Four Columns of the Staircase

- **R** Requirements Specification
  - Collection of information

- **M** Modeling
  - Analyzation (what) and design (how) of the application

- **C** Code Generation

- **I** Implementation
  - not important for modeling of workflows
The Five Views from Outside

- **PM** Project Manager‘s View
  - focus on management perspective
- **M** Methodologist‘s View
  - focus on how is it done?
- **A** Adaptability View
  - focus on reusability and adaptability of a model
- **QM** Quality Management View
  - focus on quality control issues, assurance of quality standards
- **S** Security View
  - focus on software security features
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Petri Net Based Method for OO Modeling of Processes

Object oriented Paradigma

- Inheritance
- Re-Use
- Polymorphism

Object - Process - Net

Description of the dynamic aspects of a system

- Simulation
- Formalism
- Verification

Petri Net Theory
Object Process Net

Abstract object (class)

Process method of the related class

Class

<Instances>
<Attribut2>
<Attribut3>
...

Precondition

Postcondition

Class

Process

TimeAttr

Prio

directed arcs
conditions related to the attributes of the object
Color Classes of an OPN

➤ **ENUM**
- comparable to an enumeration type. The finite set of values has to be defined by enumeration of all elements.

➤ **INT**
- comparable to integers in programming languages.

➤ **SET**
- comparable to a container class, which can only contain one copy of each element (or comparable to a mathematical set)

➤ **MULTISET**
- comparable to a container class, which can contain more than one copy of each element (or comparable to a mathematical bag)
Operation / Operators

➢ Value changing operations

- modify the values of attributes, resulting in a value of the same color class
- e.g. incr or decr of INT-attributes

➢ Testing operations

- check the value of an attribute, resulting in a BOOLEAN value
- e.g. test for equality or inequality
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Creating a Business Process Model

Use Case Diagram

Activity Diagram

Class Structure Diagram

Object Process Net
Meta-model for business processes
<table>
<thead>
<tr>
<th>Business Reality</th>
<th>Representation within the Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process</td>
<td>Dynamic Behavior: Use Case Diagram, Activity Diagram, OPN</td>
</tr>
<tr>
<td></td>
<td>Static Structure: Class Diagram</td>
</tr>
<tr>
<td>Activity</td>
<td>Use Case in Use Case Diagram Activity in Activity Diagram Process in OPN Method in Class Diagram</td>
</tr>
<tr>
<td>Business Objects</td>
<td>Objects in OPN Objects/Classes in Class Diagram</td>
</tr>
<tr>
<td>Resources</td>
<td>Objects in OPN Objects/Classes in Class Diagram</td>
</tr>
<tr>
<td>Field of Work</td>
<td>Actor in Use Case Diagram Objects in OPN Objects/Classes/Roles in Class Diagram</td>
</tr>
<tr>
<td>Condition / Information</td>
<td>Conditions in Activity Diagram Pre- and Postconditions in OPN</td>
</tr>
</tbody>
</table>
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Tool support - OTW®2

Model Information Database / Repository

- Requirements
- Configuration Management
- Model Checking Tools
- Conversion, Reuse, Reengineering
- Verification (INA)
- Diagrams of Static View
- Diagrams of Dynamic View
- Diagrams of Architecture View
- Generation Import / Export
- Documentation
- Petri Net Tool (Peneca Chromos)
Design Patterns in the \( \textit{OTW}^\text{\textregistered} 2 \)

Reuse is realized by Design Patterns

- Design patterns for the creation of reference models or meta-models
- Patterns can be instantiated again and again
- \( \textit{OTW}^\text{\textregistered} 2 \) was the first tool supporting comfortable work with design patterns
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Summary

- UML as the first promising approach for standardization of object-oriented analysis techniques
- OPN as an additional means of description for dynamic aspects of a system
- Meta Model for business process modeling to simplify the work with OPN
- Design Patterns for the work with reference models
- SEPP/OT for both: Organization of software projects and modeling of workflows
Further Work

➢ Processes „C“ (Code Generation) and „I“ (Implementation) also for workflow modeling

➢ executable code

➢ Timed OPN with additional time conditions for processes

➢ improving modeling power

➢ Tool-supported, automated transformation of OPN into High Level Petri Nets

➢ possibility of formal analysis techniques