A Customizable Methodology for the Model-driven Engineering of Service-based System Landscapes

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Outline

• Overview
• Methodology Framework
• Methodology Content & Tool Support
• Use Case: Statoil
• End-user Evaluation
• Related Work
Overview

• **Background**
  – Modern business solution development require integrated engineering frameworks
  – These are complex, typically for a specific application scenario only a subset of the available techniques is needed
  – Methodological guidance that can be customized for specific scenarios are highly desirable

• **Solution**
  – Tool-supported framework for creating custom methodologies for individual system engineering projects
  – Implementation in Eclipse Process Framework: methods + methodology processes & tooling support
  – Continuing research on ‘Situational Method Engineering’
Integrated MDA for Service-based System Engineering (SHAPE)
Methodology: Overview & Purpose
Methodology Framework
Mapping to EPF
Methodology Content
Methodology Process CIM-level

- Ontology Building
- Transform (FRM)
- Data Modelling (FRM)
- Organization Modelling
- Business Motivation Modelling (FRMM)
- Transform (Business Rules)
- Business Rules Modelling
- EPC or BPMN?
- Business Process Modelling (EPC)
- Transform (EPMN)
- Business Process Modelling (BPMN)
Methodology Process PIM-level
PSM-level Methods
Creating Custom Methodologies

1. **Identification of relevant Engineering Techniques**
   by analyzing requirements and consulting the methodology & tool documentation

2. **Tool-supported Custom Methodology Creation**
   - Configuration of EPF infrastructure for project
   - Wizard for selecting required engineering methods with including runtime validation of user choices
   - Generation of valid custom methodology as EPF Delivery Process

3. **Refinement of custom methodology** via EPF editing facilities (optional)

4. **Publication of final custom methodology** as a website (optional).
Methodology Customization Tool
Use Case @ Statoil

- **Scenario:** Production & Process Optimization
  - Integrate information from various dwelling & production sites
  - Heterogeneous & complex legacy systems are used

- **Required techniques**
  - Flexible business modelling, esp. ERM & BPMN processes
  - SoaML for Service Modeling
  - Service Variability for simplifying business service
  - Semantics for integrating heterogeneous

- **Benefits of Integrated MDA Framework & Methodology**
  - All needed techniques in 1 integrated eng. framework
  - Customized Methodology provides relevant guidance for complete engineering project
Custom Methodology Creation & Usage

Aim: integrate & optimize production process
Issues:
- Loosely defined business processes
- Heterogeneous legacy systems
- Complex data structures & systems
Desired Techniques:
- Efficient business process modeling
- Services + Customization
- Semantic Technologies

(1) Requirements Analysis & Technology Identification

(2) Select Techniques & Methods

(3) Personalized Engineering Procedure

(4) Publish as Website

(5) Guidance for implementing the target system
End-User Evaluation

• **Evaluators**
  – 31 participants via online survey
  – Position: Researchers > Developers > Architects > Other
  – Background knowledge: medium in average

• **Main Results**
  1. Relevance of MDA Framework & Methodology: **HIGH**
     • Model-driven Engineering & Service-orientation widely used
     • Integrated engineering environments are desirable
     • Methodological guidance necessary, customizability is a plus
  2. Suitability & Usefulness of Customizable Methodology: **MEDIUM-HIGH**
     • Overall design of Methodology Framework is understandable & useful
     • Customized methodologies appear to be useful & suitable
     • A minority does not consider the SHAPE Methodology to be necessary or useful
  3. Usability of Methodology Customization Tool: **MEDIUM-HIGH**
     • Overall design is considered to be adequate
     • Correct usage requires extensive background knowledge or documentation studying
     • Tools are only research prototypes, not industrial-strength solutions
Related Work

• Methodology is essential for Software Engineering
  – engineering methods: guidance for using a particular technology
  – development methodologies: planning & controlling
• Numerous Engineering Methods for service-oriented & model-driven development
• ‘Situational Method Engineering’: reusable method chunks assembled into customized engineering procedures
  – Most recent development around EPF
  – OpenUP (open-source), Rational Method Composer (IBM)
• Main merits of our work
  – New: tool-support for custom methodology
  – Reusable: infrastructure & tools can be instantiated with methods for other integrated engineering environments (e.g. TEXO ISE)
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