A Decade of Research on Next Generation Process Management Technology: Challenges and Achievements

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Motivation

- Processes can become very large and complex
- Thousands of concurrently executed process instances
- High need for flexibility in all phases of the process lifecycle
- Support for application integration is fundamental
- Correctness and robustness are crucial features of any process-aware information systems
- Integrated support of all phases of the process lifecycle required
Process Science at Ulm University

Research Topics:
- Adaptive & Flexible Processes
- Human-Centric Processes
- Data- and Object-Aware Processes
- Handling Process Variability
- Mobile Process & Task Support
- Smart Processes

Application Areas:
- Healthcare
- Automotive Engineering
- Transport & Logistics
- Tourisms
- Sustainable Production
- ... (other areas not listed)

Methods, Concepts and Technologies for Next Generation Process Management Technology

Research Methods:
- Design Research
- Formal Methods
- Innovative Prototypes
- Empirical Research
Process Modeling: Quality Dimensions

- Semantic Quality
  (Business Process Compliance)
- Pragmatic Quality
- Syntactical Quality + Soundness
SeaFlows: Business Process Compliance

Process model to be checked

Generated counterexample:
Execution path and corresponding process context violating the constraint
C3Pro: Extending Business Process Compliance to Multiple Perspectives
Combining these areas raises numerous challenges.
ATAPIS: Handling Temporal Constraints along the Process Lifecycle

ATAPIS: Handling Temporal Constraints

Provop: Coping with Process Variability
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ENPROSO: Business IT Alignment
Corepro: Data-Driven Process Structures
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ProView: Collaborative Process Modeling
ADEPT: Process Flexibility

Enforcement
Guardrails (on a road) prevent deviation, but also prevent anything not predicted.

Guidance
Guidelines (on a road) show people where to go, but do not prevent deviations if they are necessary.

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

Charles Darwin
ADEPT: Process Flexibility

Process engineer / Process administrator

Evolve Process Schema
Create Process Schema

Execution Log

Create Instances

Process Monitoring

Process Execution

Process participant

ADEPT: Process Flexibility

Process Evolution

Process Configuration & Process Variability

Looseness in Process Models

Dynamic Process Adaptation

**ADEPT: Process Adaptation**

Many other fundamental issues:

- Ensuring soundness of dynamic process changes
- Providing proper end user assistance
- Enabling adaptations based on model abstractions
- Balancing process flexibility and security
- Mining of process variants and deviants

ADEPT: Technology Development

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Managing a complex world...

Adaptive Process Management with ADEPT2

Institute of Databases and Information Systems, Prof. Dr. Peter Dadam, Prof. Dr. Manfred Rechert

ADEPT2 Core Architecture
- Network architecture
- Object-oriented approach
- Fully integrated worklist
- Persistent and scalable data
- Graphical user interface
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- Persistent and scalable data
- Graphical user interface

Workflow Client
- Advanced workflow management
- Technically robust architecture
- Intuitive and automatic prioritization of work items
- Integration and escalation
- Personalized worklist representation

Organizational Model Editor
- Comprehensive model for mapping complex organizational structures
- Linking of arbitrary attributes to organizational entity types (e.g., enterprise-specific data)
- Efficient independent implementation of change from enables the use of any database

Process Test Environment
- Fully integrated test environment for process execution
- Various execution modes ranging from pure simulation to production mode
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- Comprehensive test module for manual and automatic process activities
- Integration of software components with graphical user interfaces

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ADEPT: Technology Transfer
AristaFlow: Technology Application

Flexible Support of Clinical Pathways
AristaFlow: Technology Application

Flexible Disaster Management

MARPLE: BPM Goes Mobile
My BPM Life with Hajo
My BPM Life with Hajo
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Our first joint paper 😊

Survey paper

Refactoring large process model repositories

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\textbf{Abstract:} With the increasing adoption of process-aware information systems, large process model repositories have emerged. Typically, the models in such repositories are re-aligned to real-world events and demands through adaptation on a day-to-day basis. This bears the risk of introducing model redundancies and of unnecessarily increasing model complexity. If no continuous investment is made in keeping process models simple, changes will become more difficult and error-prone over time. Although refactoring techniques are widely used in software engineering to address similar problems, so far, no comparable state-of-the-art has evolved in the business process management domain. Process designers either have to refactor process models by hand or are simply unable to apply respective techniques at all. This paper proposes a catalogue of process model "smells" for identifying refactoring opportunities. In addition, it introduces a set of behavior-preserving techniques for refactoring large process repositories. The proposed refactorings enable process designers to effectively deal with model complexity by making process models better understandable and easier to maintain. The refactorings have been evaluated using large process repositories from the healthcare and automotive domain. To demonstrate the feasibility of the refactoring techniques, a proof-of-concept prototype has been implemented.

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… and Hajo celebrating its acceptance.