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Alaska Simulator – Supporting Empirical Evaluation of Process Flexibility

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Abstract

The Alaska Simulator is an interactive software tool developed at the University of Innsbruck which allows people to test, analyze and improve their own planning behavior. In addition, the Alaska Simulator can be used for studying research questions in the context of business process management and other related fields. Thereby, the Alaska Simulator uses a journey as a metaphor for business processes. In the context of business process management the simulator can be used to compare traditional rather plan-driven methods for planning and executing a business process with more agile approaches supporting different decision deferral patterns. Instead of pre-planning everything in advance decision deferral patterns allow interleaving process modeling and execution and provide mechanisms for effectively dealing with uncertainty. The biggest challenge thereby is to find the right balance between pre-planning activities and keeping options open. The Alaska Simulator allows to explore how much planning is needed under different circumstances.

1. Introduction

Providing effective IT support for business processes has become crucial for enterprises to stay competitive in their market [1]. In todays fast changing business world, flexible Process-Aware Information Systems (PAISs) are required to allow companies to adjust their business processes quickly and to react on changes in their environment [2]. However, the selection of the appropriate PAIS enabling technology mostly relies on vendor promises and qualitative reports as profound empirical studies and quantitative data are scarce [3].

This demonstration paper presents the Alaska Simulator which has been developed to facilitate the execution of controlled experiments investigating the strengths and weaknesses of different approaches fostering process flexibility. Section 2 introduces different approaches for process flexibility supported by the Alaska Simulator whereas Section 3 explains the journey metaphor. Section 4 sketches the implementation of the Alaska Simulator and Section 5 discusses related work.

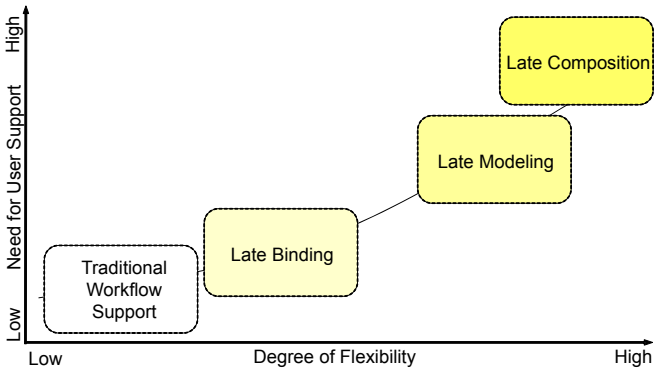

Figure 1. Decision Deferral Patterns

2. Background

As pointed out in the introduction, flexibility is crucial for the economic success of a company [4]. An examination of contemporary PAISs revealed general approaches for enhancing flexibility and deferring decisions about the process structure from modeling time to run-time [5]. Subsequently the patterns are outlined, ordered by the provided degree of flexibility and resulting need for user support (cf. Figure 1). The Alaska Simulator provides support for all of these decision deferral patterns fostering the systematic comparison of their strengths and weaknesses.

No flexibility for changing the process definition during run-time is supported by a *traditional workflow*, i.e., the modeled process schema *cannot* be altered at run-time.

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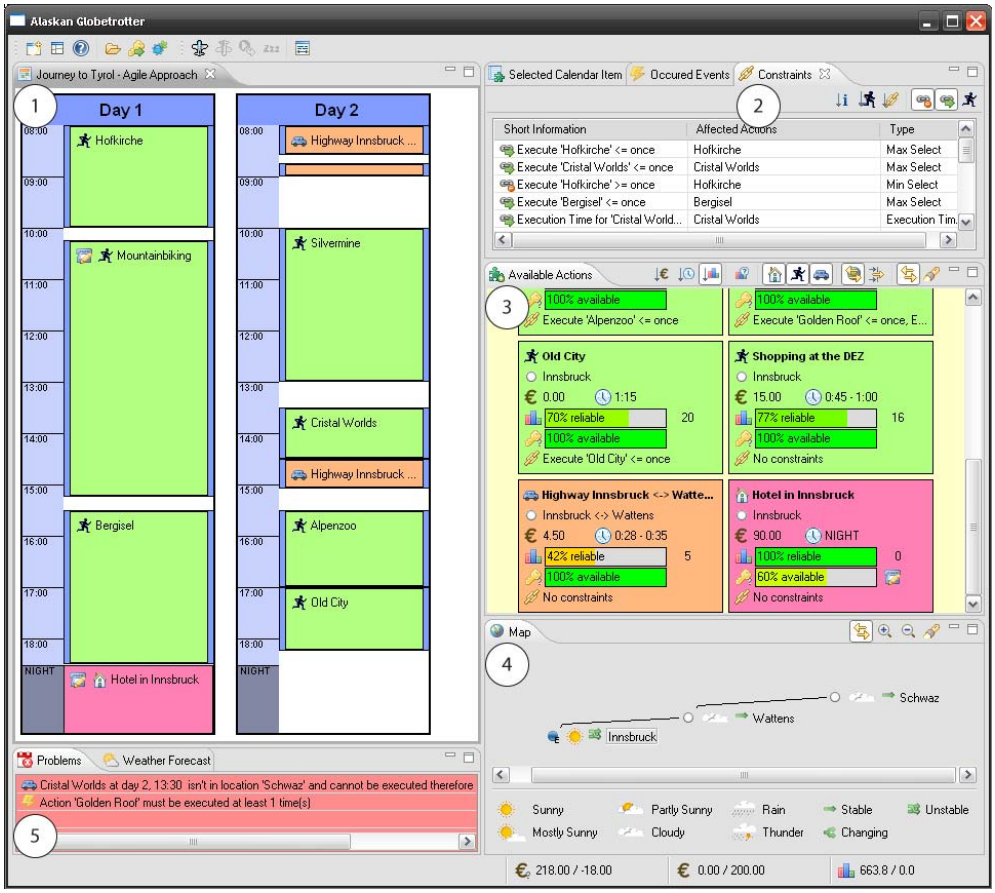

Figure 2. Screenshot of Alaska Simulator

The *Late Binding* pattern provides flexibility by allowing for the introduction of a placeholder during modeling. At run-time the user defines the content of the placeholder by selecting the most appropriate process fragment from a pre-defined set. *Late Modeling* further extends the concept of Late Binding by enabling the user to model the content of the placeholder during run-time – the activities users can insert may be restricted when creating the process model. *Late Composition* offers the highest degree of flexibility by allowing the user to freely switch between process modeling and execution, i.e., interweaving the phases.

3. Journey Metaphor

Due to the many similarities between modeling and executing business processes and journey planning the Alaska Simulator uses a journey as a metaphor (for details see [6]). The used metaphor is not only helpful to explain different approaches to process flexibility to people without significant experience in the business process management field, but is also an attractive context to be engaged in, thus increasing the willingness of students to participate in experiments. From a high level point of view in either situation planning (i.e., modeling) and execution (i.e., run-time) phases can be identified. In the context of business processes activities are executed, whereas on a journey tourist attractions (denoted as actions) are visited. Similar to activities, actions are characterized by their cost, duration and expected business value. In the domain of business processes the actual business value, cost and duration might not be exactly known when modeling a business process. When considering journeys this behavior is caused by weather uncertainty and unforeseen events. Furthermore, both scenarios are restricted by constraints, e.g., limited resources or interrelations between actions.

4. Alaska Simulator

Figure 2 shows the graphical user interface of the Alaska Simulator. The Planning Editor (1) provides a convenient tool for planning and executing journeys (i.e., the business process); the Actions View (3) lists available

actions. On the right top corner the Constraints View (2) shows constraints restricting the journey. To assist the user in developing a consistent plan, the Problems View (5) points out inconsistencies and constraint violations. The Map View (3) offers an overview of all locations as well as the traveler's current location.

Interested readers can download the latest version of the Alaska Simulator (including a travel scenario to Tyrol) as well as detailed documentation from the simulator's website: *http://www.alaskasimulator.org*.

In addition to the Alaska Simulator the Alaska Toolset comprises the Alaska Configurator supporting the definition of travel configurations and the Alaska Analyzer for analyzing journeys executed with the Alaska Simulaor.

5. Related Work

Main goal of the Alaska Simulator is to foster the empirical evaluation of different approaches to process flexibility. In [6] the Alaska Simulator was applied to investigate how well end users can effectively handle different levels of constraints when relying on a declarative approach. Further experiments focusing on the suitability of different traditional workflow technologies are described in (e.g., [3], [7]). Worth mentioning is existing work on change patterns [5], which provides a framework for the qualitative comparison of existing flexibility approaches and as such is complementary to what we aim to achieve with the Alaska Simulator.

References

[1] Y. Antonucci, "Using Workflow Technologies to Improve Organizational Competitiveness," *International Journal of Management*, vol. 14, no. 1, pp. 117–126, 1997.

[2] W. van der Aalst and S. Jablonski, "Dealing with Workflow Change: Identification of Issues and Solutions," *International Journal of Computer Systems, Science, and Engineering*, vol. 15, no. 5, pp. 267–276, 2000. [Online]. Available: http://ref.q-e.at/65/

[3] B. Weber, B. Mutschler, and M. Reichert, "Investigating the Effort of Using Business Process Management Technology: Results from a Controlled Experiment," *Science of Computer Programming*, (to appear).

[4] M. Poppendieck and T. Poppendieck, *Implementing Lean Software Development: From Concept to Cash*. Addison-Wesley Professional, 2006. [Online]. Available: http://ref.q-e.at/57/

[5] B. Weber, M. Reichert, and S. Rinderle, "Change Patterns and Change Support Features - Enhancing Flexibility in Process-Aware Information Systems," *Data Knowledge Engineering*, vol. 66, no. 3, pp. 438–466, 2008.

[6] B. Weber, H. Reijers, S. Zugal, and W. Wild, "The declarative approach to business process execution: An empirical test"," in *Proc. CAiSE'09 (to appear)*, 2009.

[7] N. Kleiner, "Supporting usage–centered workflow design: Why and how?." in *Proc. BPM'04*, 2004, pp. 227–243.