Preface

BPM 2008 is the sixth international conference in a series that provides the most distinguished specialized forum for researchers and practitioners in business process management (BPM). The conference has a record of attracting innovative research of the highest quality related to all aspects of BPM including theory, frameworks, methods, techniques, architectures, standards, and empirical findings.

BPM 2008 was held in Milan, Italy, on September 2–4, 2008, and was organized by the Information Systems Research Group of the Department of Electronics and Information of the Politecnico di Milano. The present volume contains the research, industry, and prototype demonstration papers accepted for presentation at the conference.

This year, we received 154 full paper submissions. These submissions came from authors located in 36 different countries, geographically distributed as follows: 101 submissions originated from Europe, 19 from Australia, 16 from Asia, 14 from America, and 4 from Africa. As in previous years the paper selection process was extremely competitive. After a thorough refereeing process in which every paper was reviewed by between 3 and 5 program committee members, only 23 of the 154 submissions were accepted, leading to an acceptance rate just below 15%. Among the 23 accepted papers, there are 20 research papers and 3 industry papers.

In addition to these 23 papers, 3 invited keynote presentations were delivered by Paul Harmon (Executive Editor and Founder, BPTrends, USA), Michael Rosemann (Queensland University of Technology, Australia), and Peter Dadam (University of Ulm, Germany). We are very grateful to the keynote speakers for their contributions.

In conjunction with the main conference, nine international workshops took place the day before the conference. These workshops have fostered the exchange of ideas and experiences between active BPM researchers, and stimulated discussions on new and emerging issues in line with the conference topics. The proceedings with the papers of all workshops will be published in a separate volume of Springer’s Lecture Notes in Business Information Processing series. Finally, the present volume contains 6 prototype demonstration papers that were selected out of 15 demo submissions by the demo chairs and the reviewing committee they appointed.

We owe special thanks to all senior and regular members of the Program Committee of BPM 2008 as well as their sub-referees for their work. We are also very grateful to the numerous people who were involved in the organization of the BPM conference and its satellite events. In particular, we would like to thank the General Co-chairs – Barbara Pernici and Fabio Casati – as well as Danilo Ardagna for his outstanding support as Organization Chair of BPM 2008. We would also like to thank Massimo Mecella and Jian Yang (Workshop Co-chairs), Malu Castellanos
and Andreas Wombacher (Demo Co-chairs), Vincenzo d’Andrea and Heiko Ludwig (Tutorial / Panel Co-chairs), and the many other colleagues who contributed to the success of BPM 2008. Finally, we thank the conference sponsors for their support in making BPM 2008 another successful event in the series.

June 2008

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Companies have been striving to improve their business processes for decades, but, in the past few years, the emergence of a variety of new software technologies and the relentless competitive pressures on large companies to outsource and to develop a worldwide presence has taken the interest in business processes to a new level of intensity. In this talk we consider some of the roots of today’s interest in business process management (BPM), the growing resources available to those who want to undertake business process change, the emerging BPM systems that seem destined to transform businesses in the next decade, and the implications this transformation will have for those who work in the new generation of process-oriented organizations.
Understanding and Impacting the Practice of Business Process Management

Michael Rosemann
Queensland University of Technology, Australia
m.rosemann@qut.edu.au

This presentation will explore how BPM research can seamlessly combine the academic requirement of rigor with the aim to impact the practice of Business Process Management. After a brief introduction into the research agendas as they are perceived by different BPM communities, two research projects will be discussed that illustrate how empirically-informed quantitative and qualitative research, combined with design science, can lead to outcomes that BPM practitioners are willing to adopt. The first project studies the practice of process modeling using Information Systems theory, and demonstrates how a better understanding of this practice can inform the design of modeling notations and methods. The second project studies the adoption of process management within organizations, and leads to models of how organizations can incrementally transition to greater levels of BPM maturity. The presentation will conclude with recommendations for how the BPM research and practitioner communities can increasingly benefit from each other.
The Future of BPM: Flying with the Eagles or Scratching with the Chickens?

Peter Dadam

Institute of Databases and Information Systems, Ulm University, Germany
peter.dadam@uni-ulm.de

Service-oriented architectures, business process management (BPM) systems, and BPM in general receive a lot of attention these days and the number of articles which describe the benefits and great potential of these technologies has significantly increased. It is something like a second wave after the first (and short) workflow hype in the middle of the 90’s. However, the contemporary hype in newspapers and IT magazines does not really reflect reality. In fact, much more companies are still thinking about whether and in which form they shall introduce these technologies rather than concretely performing projects in these fields. And many companies which have started respective projects are still in the phase of designing and implementing (web) services or in evaluating SOA platforms and repositories of different vendors; i.e., they are still not bringing (larger) processes into production. Nevertheless, expectations are very high: Everything will become easier and more flexible, implementation of cross-organizational processes will become business as usual, and process management systems will enable new kinds of process-aware applications which have to be performed manually today. In fact, BPM has a great potential. However, to realize this potential in practice, we have to face much more the challenges of the real world, we have to learn more seriously from how business processes are executed today, and we have to understand how actors deal with exceptional situations. It is not hard to predict what will happen with the current BPM hype if users discover that they cannot do much more with these technologies than with previous ones or, even worse, that they can do less. And no organization will accept to become inflexible. – It is partially up to us, whether BPM will become a big and sustainable success or whether it will share the fate of many other hypotheses (like Computer Integrated Manufacturing at the end of the 80’s). This talk will present real-world examples from different domains to illustrate where we jump too short. It will use the ADEPT project [12] to show how stimulating it can be also from a research point of view to face the reality as it is.

References


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Applying Patterns during Business Process Modeling

Thomas Gschwind\textsuperscript{1}, Jana Koehler\textsuperscript{1}, and Janette Wong\textsuperscript{2}

\textsuperscript{1} IBM Zurich Research Laboratory, Switzerland
www.zurich.ibm.com/csc/bit

\textsuperscript{2} IBM Software Group, Canada

Abstract. Although the business process community has put a major emphasis on patterns, notably the famous workflow patterns, only limited support for using patterns in today’s business process modeling tools can be found. While the basic workflow patterns for control flow are available in almost every business process modeling tool, there is no support for the user in correctly applying these simple patterns leading to many incorrectly modeled business processes. Only limited support for pattern compounds can be found in some tools, there is no active support for selecting patterns that are applicable in some user-determined context, tools do not give feedback to the user if applying a pattern can lead to a modeling error, nor do they trace the sequence of applied patterns during the editing process.

In this paper, we describe an extension of a business process modeling tool with patterns to provide these capabilities. We distinguish three scenarios of pattern application and discuss a set of pattern compounds that are based on the basic workflow patterns for control flow. We present an approach where business users receive help in understanding the context and consequences of applying a pattern.

1 Introduction

There is wide agreement that patterns can accelerate the process of designing a solution and reduce modeling time, while at the same time they enable an organization to more easily adopt best practices \cite{[1,2,3]}. Patterns enable participants of a community to communicate more effectively, with greater conciseness and less ambiguity. Furthermore, process patterns are considered as an effective means to bridge the Business IT gap. Bridging this gap is more critical than ever because IT advances have escalated the rate of development of new business functions and operations \cite{[2]}.

Despite the common belief in the importance of patterns, only limited support for using patterns in today’s business process modeling tools can be found. While the basic workflow patterns for control flow \cite{[4]} are available in most business process modeling tools and the YAWL system \cite{[5]} provides all workflow patterns, applying even a basic pattern is under the full responsibility of the user. It is thus not surprising that most modeling errors result from incorrect combinations of the \textit{exclusive choice}, \textit{parallel split}, \textit{simple merge}, and \textit{synchronization} patterns \cite{[6]}.
In this paper, we discuss flexible pattern support where users can apply patterns to unstructured process models, they obtain active support in selecting patterns that are applicable in some user-determined context, the tool gives feedback to the user if applying a pattern can lead to a modeling error and it traces the sequence of applied patterns during the editing process. We focus on the basic workflow patterns for control flow, because of their frequent usage during business process modeling and discuss a set of pattern compounds that can be built from them. We present an infrastructure that automates parts of the pattern application process. The infrastructure analyzes the consequences of applying a pattern with respect to the soundness of the resulting process model and enables only those patterns that are correctly applicable in a given context, which we describe using the category of the process fragments to which the pattern is applied. Information about the fragment category is obtained from the process structure tree that results from parsing the workflow graph underlying the process model [7,8].

We show how patterns can be integrated in a modeling tool such that they enable business users to move away from a drawing tool with drag-and-drop editing capabilities to a true business-level process modeling tool that allows users to arrive at models of higher quality with less effort. Although we only consider control-flow patterns, we see our contribution as an important prerequisite for extending powerful pattern support to more concrete business process patterns that describe best practices, because these patterns will usually contain control-flow information as one essential part of the pattern description [3]. We do not yet introduce a domain-specific vocabulary for the control-flow patterns, but we argue that it is necessary to do so in the future to make the patterns more easily usable by business users.

The paper is organized as follows: In Section 2 we revisit the basic workflow patterns for control flow and define three scenarios for the application of control-flow patterns during an iterative process modeling approach: (1) refinement of a single control-flow edge by applying a block-oriented pattern compound, (2) application of a pattern compound to a pair of selected control-flow edges, (3) application of a basic pattern to a set of selected control-flow edges. Sections 3, 4, and 5 present the three scenarios of pattern application in more detail. Section 3 also provides details on our infrastructure that is based on the process structure tree [7] and that enables us to extend the application of patterns to unstructured process models. Section 6 summarizes initial experiences with an implementation of the three pattern scenarios in a commercial business process modeling tool. The section also discusses the interplay of process patterns, process refactoring operations, and process model transformation. Section 7 gives an overview on the state of the art in business process patterns, while Section 8 concludes the paper.

2 The Workflow Patterns Revisited

When talking about business process patterns, many business process experts refer to the famous workflow patterns [4] that have their origin in comparing the runtime constructs available in existing workflow engines. Figure 1 shows the most widely used subset of the control-flow patterns. We selected these patterns to build active pattern support into a business process modeling tool.
The patterns as shown in Figure 1 are of course available in most business process modeling tools in the form of gateway icons that business users can drag and drop on a canvas and connect to other modeling elements. Unfortunately, this availability of the patterns in today’s modeling tools is insufficient to enable users to successfully reuse proven solutions to recurring problems. The workflow patterns are too fine-grained and not sufficiently enriched with information on the context and consequences to represent a reusable solution. A possible alternative, as for example implemented in the ADEPT2 system [9,10], is to offer block-structured pattern compounds and change patterns that allow users to model structured workflows by an editing process where processes are sound by construction.

In this paper, we are especially interested in pattern-support for the editing of unstructured process models where the soundness of these models is not guaranteed by construction. We developed a pattern-based modeling prototype by extending the commercial modeling tool IBM WebSphere Business Modeler with pattern compounds that we built from the basic control-flow patterns. Our special emphasis is on pattern sequences, i.e., how a model unfolds pattern by pattern and how a user creates an unstructured model by applying patterns in an iterative and tool-supported modeling process.

The process models that we consider are generalizations of workflow graphs that permit multiple start and end events. Following [11] we define them as follows:

A business process model is a directed graph $G = (N, E)$ where each node $n \in N$ is either a start or end event, an activity, or a gateway with the gateways partitioned into the types exclusive choice, parallel split, simple merge, and synchronization, satisfying the following conditions

1. there is at least one start event and at least one end event; each start event has no incoming edges and exactly one outgoing edge, whereas each end event has exactly one incoming edge but no outgoing edges,
2. the exclusive choice and parallel split have exactly one incoming edge and two or more outgoing edges, whereas the simple merge and synchronization have two or more incoming edges and exactly one outgoing edge; each activity has exactly one incoming and exactly one outgoing edge,
3. the graph is connected and each node $n \in N$ is on a path from a start to an end event.
We are adopting BPMN notation to draw the process models and pattern structures. This means that we use a diamond to depict a gateway and in the case of a parallel split or synchronization, a plus sign is added to the diamond. Activities are depicted with rounded corner rectangles, while a start event is depicted with an empty circle and an end event is depicted with a thick circle.

Table 1 gives an overview of three pattern application scenarios that we discuss in this paper. Each scenario is applicable to process models that are still unfinished, i.e., they may not fully comply to the definition above.

Table 1. Overview of pattern application scenarios

<table>
<thead>
<tr>
<th>Sc.</th>
<th>selected process elements</th>
<th>applied pattern compound</th>
<th>source</th>
<th>target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>single edge</td>
<td>well-formed sound block</td>
<td>sound</td>
<td>sound</td>
</tr>
<tr>
<td>2</td>
<td>pair of edges</td>
<td>gateway-guarded control flow</td>
<td>sound</td>
<td>sound/unsound</td>
</tr>
<tr>
<td>3</td>
<td>set of edges</td>
<td>gateway</td>
<td>sound/unsound</td>
<td>sound/unsound</td>
</tr>
</tbody>
</table>

In Scenario 1, a user selects a single edge in a model. This edge is replaced by a pattern compound that represents a well-formed process fragment. The user has four choices of pattern compounds that he can apply: sequence, parallel compound, alternative compound, and cyclic compound. This form of pattern application (sometimes also denoted as transition refinement) is always possible in our tool. When applied to a sound process model or fragment thereof, it preserves the soundness, i.e., it cannot introduce any modeling errors. Section 3 discusses this scenario in more detail.

By soundness of a process model, we mean the absence of deadlocks and lack of synchronization. In other words, no situation occurs where some part of the process is waiting indefinitely for another part of the process and no part of the process executes more often than intended because of two tokens that occur on the same edge. A formal account of soundness would go beyond the scope of this paper, but can be found in [12,7].

In Scenario 2, a user selects a pair of edges in the model to which he can add a new gateway-guarded control flow. Two pattern compounds are available to the user which we denote as alternative branch and parallel branch. This scenario allows the user to also create arbitrary cycles. The pattern application is always possible, but an unshielded application can introduce new modeling errors, i.e., a process or fragment with a sound underlying workflow graph can become unsound. We describe this scenario in Section 4 and discuss how potential soundness problems can be discovered and prevented.

In Scenario 3, the user selects a set of edges to redirect existing control flow such that it starts or ends in a newly introduced gateway. In this scenario, the basic control-flow patterns are directly available to the user. They can be applied to any process model or fragment thereof and either maintain soundness, yield an unsound model or correct an unsound model into a sound one. In Section 5 we describe an infrastructure that alerts the user of these situations and thereby extends the limited support for basic workflow patterns that is available today.

Our scenarios differ by the user-triggered selection of modeling elements and by the class of process models that the user can create with the patterns that are available for
each selection. The focus on the selection of modeling elements is important to help business users understand how to apply a pattern. Furthermore, it provides them with a simple and systematic description of the context of a selected pattern in the form of the surrounding process fragment, and the consequences in terms of soundness of the resulting model, while the modeling tool exploits this information to automate the pattern application. We believe that a higher degree of automation is essential because we are addressing non-technical users in contrast to software developers who traditionally apply software patterns in a mostly manual process.

3 Scenarios 1: Applying Patterns to a Single Edge

Our first scenario has been widely studied by the workflow community, e.g., as a form of transition refinement [13]. We introduce it here in order to review some essential prerequisites for structured workflow modeling that we then gradually relax in Scenarios 2 and 3. Scenario 1 provides the user with the most simple form of application of a pattern where he can select a single control-flow edge to further refine the business process model. Instead of selecting a single edge, the user can also select a single activity in the process model. In this case, our tool assumes that with this selection, the single outgoing control-flow edge of this activity is selected, i.e., the pattern is applied following the activity in the control flow.

In this scenario, we provide users with pattern compounds that represent a well-formed and sound block-structured fragment of a process. These pattern compounds have been studied within the context of structured workflows [14,15,16,17] and are also available in ADEPT2 [9,10]. Four types of block-structured pattern compounds are available to the user:

- **sequence**: a totally ordered set of connected activities,
- **parallel compound**: a parallel split followed by a synchronization that are connected by two or more branches containing one or more activities,
- **alternative compound**: an exclusive choice followed by a simple merge,
- **cyclic compound**: a simple merge followed by an exclusive choice.

Figure 2 illustrates this mode of pattern application, which restricts the user to model structured workflows, but which are guaranteed to be sound by construction. The initial sequence of activities in this example can be either created manually or by using the sequence pattern. Alternatively, we offer an auto-link transformation where the user only places the activities that he wants to be part of the initial sequence in an approximate horizontal arrangement. Then he invokes the auto-link transformation that takes a set of horizontally arranged activities and produces a fully connected sequential process model including a start and an end event.

Aalst [14] and Kiepuszewski et al. [15] showed that only a subset of all workflow graphs can be generated when using block-structured process fragments. However,

1 We do not consider here the refinement of a single activity into a subprocess, which is a completely different scenario.
2 The number of branches and the names of activities can be provided as parameters when invoking the pattern.