

**10151 Abstracts Collection**  
**Enabling Holistic Approaches to Business Process  
Lifecycle Management**  
— Dagstuhl Seminar —

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**Abstract.** From 11.04. to 16.04.2010, the Dagstuhl Seminar 10151 “Enabling Holistic Approaches to Business Process Lifecycle Management” was held in Schloss Dagstuhl – Leibniz Center for Informatics. During the seminar, several participants presented their current research, and ongoing work and open problems were discussed. Abstracts of the presentations given during the seminar as well as abstracts of seminar results and ideas are put together in this paper. The first section describes the seminar topics and goals in general. Links to extended abstracts or full papers are provided, if available.

**Keywords.** Business process modeling, process life-cycle, modeling methods

## **10151 Summary – Enabling Holistic Approaches to Business Process Lifecycle Management**

Process modeling tools and techniques are used in different phases of a business process management project. At the level of modeling, the basic formalisms proposed for modeling business processes, tend to focus very heavily on the side of process, without enabling equally rich modeling of the data and information that is being manipulated by the processes. More broadly, the research is largely independent of the overall lifecycle of business process management, including evolution of business processes over time, and design of business processes from already existing business processes.

The purpose of this seminar was to bring together a cross-disciplinary group of academic and industry researchers from the areas of Information Systems/Business Process Management, Service and Software Engineering, Semantic Technologies and Human Computer Interaction to foster a better understanding of how

to manage the lifecycle of business process models, ranging from initial design, evolution, implementation, and monitoring. The primary emphasis was on paradigms and technologies that enable a more holistic perspective, including new modeling techniques, new conceptualizations and visualizations, applications of recommendation system and other social networking techniques, and more flexible implementations. While there have been a number of Dagstuhl Seminars focused on modeling issues pertaining to distinct phases of a modeling project, such as Process, Service or Software Engineering, there has not been a seminar to gather specialists from across several disciplines to study this lifecycle management challenge.

We believe that each of these technologies is separately important for advancing the state of the art in managing the lifecycle of business processes, and that a dramatic improvement can be obtained if the four areas work in a coordinated way.

*Keywords:* Business process modeling, process life-cycle, modeling methods

*Joint work of:* Abiteboul, Serge; Koschmider, Agnes; Oberweis, Andreas; Su, Jianwen

## The Active XML Artifact Model

*Serge Abiteboul (INRIA - Saclay, FR)*

Towards a data-centric workflow approach, we introduce an artifact model, the AXML artifact model, to capture data and workflow management activities in distributed settings. The model is built on Active XML, i.e., XML trees including Web service calls. We argue that the model captures the essential features of business artifacts as described informally in the Artifact model of Nigam and Caswell.

To illustrate, we briefly consider the monitoring of distributed systems and the verification of temporal properties for them.

Interesting issues are raised such as locating artifacts and novel approaches to concurrency control suggested by the model.

## Generalisation and Specialisation of Processes

*Joerg Desel (KU Eichstätt-Ingolstadt, DE)*

In data modelling, one of the most important abstraction concepts is generalisation, with specialisation being the converse. Although there are already some approaches to define generalisation for process modelling as well, there is no generally accepted notion of generalisation for processes.

We introduce a general definition of process generalisation.

Instead of concentrating on a specific process description language, we refer to labelled partial orders. For most process description languages, behaviour (if defined at all) can be expressed by means of this formalism.

We distinguish generalisation from composition, and specialisation from instantiation. For Petri nets, we provide examples of generalisation and suggest associated notations.

Our generalisation notion captures various previous approaches to generalisation, for example ignoring tasks, allowing alternative tasks and deferring choices between alternative tasks. A general guideline is that a more general process contains less features and/or less information than a more specific one.

We also consider the question of common generalisation of a set of processes.

Finally, we suggest a generalisation concept that goes beyond labelled partial orders, including additional behavioural constraints and process data generalisation.

*Joint work of:* Desel, Joerg; Petrucci, Laure; Choppy, Christine

## SAP Research BPM on Demand Vision

*Alexander Dreiling (SAP Australia Pty. Ltd. - Brisbane, AU)*

The past three years have witnessed a continued trend towards providing BPM on-demand. A range of start-ups, established BPM vendors, PaaS providers (Platform-as-a-Service) and other technology companies have created an emerging market in this space. Some of them focus on modelling, others on execution, yet others on enabling to build process-centric applications. BPM vendors in particular take their existing on-premise solutions and deploy them on the cloud. Analyst firms are closely watching this space and label some of the start-ups in particular as “cool vendors of BPM”.

The market for BPM Suites and BPM enabling technologies is considerable. Gartner estimates it to be around 3.6 bln USD in 2011. And both Forrester and Gartner agree on the fact that this market is amongst the fastest growing in the IT industry. In addition, the Business Process Outsourcing (BPO) market is estimated by Gartner to be around 172 bln USD in size in 2009. In particular the technology-enablement part of this market is of significant relevance for BPM on demand.

SAP Research’s vision to address this market is based on three pillars. The first is to support end users, hence approx. 85 percent of all employees in contemporary organizations (“not everyone who drives a car fixes it themselves”). Many of them use Facebook or e-mail regularly, but are not targeted by BPM solutions. The second pillar is community support. Wikipedia or LinkedIn effectively show that working community approaches can outperform established encyclopedias or corporate address books. We envisage “Processpedia” as a similar paradigm to come up with an organizational process landscape directly by end users who have the process knowledge. The third pillar is a support for

“bottom-up approaches”. Many solutions penetrate organizations without a formal tender or strategic decision, because middle management can subscribe to services offered. We want to use viral or “bottom-up approaches” for spreading our BPM platform.

A first incarnation of our effort is Gravity (screenshot on the right). Gravity is a fully-cloud based collaborative modeling environment within Google Wave. Several end users can collaborate on process design using automated components and include experts. Gravity models will be substantiated with Rooftop, a second prototype that constitutes an end user alternative SAP NW BPM Workbench and results from our investment into lightweight composition. Gravity has received overwhelmingly positive feedback by customers, analysts, partners and colleagues.

Gravity models can be executed through SAP NetWeaver BPM. We can monitor process execution live in the same place where the initial process design took place. Hence, the full BPM lifecycle of modeling, deployment and analysis can be conducted collaboratively (real-time or asynchronously) within an end user or consumer environment linking back to SAP systems.

*Keywords:* BPM Social Software

## Towards a Complete Method for Block-Structuring Process Models

*Marlon Dumas (University of Tartu, EE)*

Mainstream notations for representing business process models include UML activity diagrams, Event-Driven Process Chains, and the Business Process Modeling Notation (BPMN). In these notations, a process model is a graph consisting of at least two types of nodes: task nodes and control nodes. Task nodes describe units of work that may be performed by humans or software applications, or a combination thereof. Control nodes capture the flow of execution between tasks, therefore establishing which tasks should be enabled or performed after completion of a given task. Task nodes and control nodes are connected by means of directed arcs capturing the flow of control of the process.

Although BPMN allows process models to have almost any topology, it is often preferable that process models follow some structure. In this respect, a well-known property of process models is that of *well-structuredness*, meaning that for every node with multiple outgoing arcs (a *split*) there is a corresponding node with multiple incoming arcs (a *join*), such that the set of nodes between the split and the join form a single-entry-single-exit (SESE) region.

This talk presented the initial results of an ongoing research effort aimed at designing a complete algorithm for transforming a process model with an arbitrary topology into an equivalent well-structured process model. The motivation for such a transformation is manifold. Firstly, it has been empirically shown that structured process models are easier to comprehend and less error-prone

than unstructured ones. Secondly, a number of existing process model analysis techniques only work for structured models. Thirdly, a transformation from unstructured to structured process models can be used to implement converters from graph-oriented process modeling languages to structured process modeling languages such as BPEL.

In this talk, we outline a method for addressing this problem in the context of sound acyclic process models. The method relies on the computation of a graph of ordering relations between activities, where each edge in the graph is labelled by one of three types of relations: causality, conflict and concurrency. It is shown that a structured representation of a process model exists iff the modular decomposition of this graph contains no primitive modules. If this condition is satisfied, the modular decomposition of the graph of ordering relations can be used to synthesize a structured process model that is fully-concurrent bisimulation equivalent to the original process model.

The extension of this technique to cyclic models is ongoing. In this talk, we purport that this transformation can be achieved based on the theory of Petri net unfoldings.

## On the Lack of Abstraction in Process Modelling

*Ulrich Frank (Universität Duisburg-Essen, DE)*

Powerful abstractions are of pivotal relevance for systems design. Generalisation/specialisation is a key concept for expressing abstraction in conceptual modeling. A concept that is generalized from a set of similar concepts allows for abstracting from those features that are specific to the specialized concepts. The advantages of generalisation/specialisation are obvious: Whenever one wants to make an assertion that applies to a set of  $n$  special concepts, it is not required making this assertion  $n$  times. Instead, it is sufficient to make it only once for the generalized concept – thereby contributing to a massive reduction of (communication) complexity. For the same reason, generalisation fosters the efficient and safe maintenance of conceptual models: By abstracting the common features of a set of concepts, all changes that are related to these features have to be made only once, namely with the general concept. Generalisation/specialisation is an established concept for creating static abstractions, such as object models. Its potential benefits for process modelling are undisputed, too. Take, for instance, a larger number of business process models that were specified for a multinational corporation. If it was possible to define generalisation/specialisation relationships between these models, their maintenance would be clearly cheaper and safer at the same time. Unfortunately, defining an appropriate conception of generalisation/specialisation for this purpose is far from trivial.

To fully exploit the benefit of generalization/specialization it should satisfy the demand for substitutability: It should be possible to use each instance of process type  $p'$  where an instance of process type  $p$  (the supertype) is required

– without causing a problem. Substitutability is related to monotonic extensions: all propositions that hold for the supertype hold for the subtype, too.

There are only a few approaches to define generalization/specialization semantics for processes. They originate either in software engineering (object behavior) or focus on processes directly. Most approaches suggest specializing a process type by extending it, i.e. by adding further tasks and events. They all fail in satisfying the demand for substitutability and monotonic extensions respectively. This is the case to for rare approaches that propose a concept of process spezialisation that is based on eliminating features of a super process.

It seems that a conception of generalization/specialization that satisfies the quest for monotonic extensions is not feasible in general: Different from monotonic extensions, the location where an additional element (task, event) is placed in an existing process type matters. Therefore there is need for relaxed concepts of generalization/specialization that still offer abstraction advantages, but do not depend on monotonic extensions.

## Inter-organizational Reference Modeling Idiom

*Birgit Hofreiter (Hochschule Liechtenstein - Vaduz, LI)*

Inter-organizational systems have been implemented for several years using the concepts of electronic Data Interchange (EDI). In recent years, the Web Services standards stack has gained a lot of attraction for implementing inter-organizational systems. However, the design of interorganizational systems should not be limited to technical aspects only, disregarding the economic drivers of the information society. It has to consider the formalization of the semantics of new business models due to faster changing business environments, their support by appropriate business processes, and their implementation by means of flexible architectures. In a previous project, our project partners have developed an integrated methodology spanning from business models over business process models to their execution on top of a service-oriented architecture. Thereby, they built-up on state-of-the-art approaches - namely e3-value, REA ontology, UN/CEFACT's Modeling Methodology (UMM), Core Components, and Web Services - and connected the dots between these approaches.

When applying such integrated methodology we recognized that models for the same business case are similar, but still varying for different business partner networks. Accordingly, a systematic approach to derive a model from another model, i.e., from a reference model, is needed. Significant achievements have been made by the reference modeling community in finding ways to leverage the potentials of model reuse in business process modeling. In this project, we explore how the contribution of findings of reference modeling in the domain of business process modeling can be transformed to the domain of inter-organizational systems.

We investigate how particular design techniques for reference modeling can be applied to solve conflicts of globalization and localization in modeling inter-

organizational systems. Hence, it is the goal of this project to adapt well established design techniques from reference modeling - configuration, instantiation, specialization, aggregation, and analogy - to our integrated methodology for inter-organizational systems. Since we stick to the existing languages, but use them in a special context, we call our approach an idiom for inter-organizational reference modeling. It follows, that we will identify those elements from e3-value, REA, UMM, Core Components, and BPEL/WSDL that are subject to model variations and, further, we develop a set of well-defined change operators for each of these languages to be applied when going from a reference model to a resulting model. This effort is complemented by a tool implementation supporting the change operators.

In order to fully benefit from a reference modeling approach for inter-organizational systems, all models must be publicly accessible in a registry. Thus, we develop a registry meta model for registering the artifacts on the different levels and defining their inter-dependencies. The resulting meta model will accommodate the specifics of the different kind of registered models and will be able to manage the inter-dependencies between these models to allow full traceability. We demonstrate our registry approach by a prototype implementation.

*Joint work of:* Hofreiter, Birgit; Huemer, Christian; Kappel, Gerti; vom Brocke, Jan

## **Social Software for Business Process Modeling Support**

*Agnes Koschmider (KIT - Karlsruhe Institute of Technology, DE)*

Social software such as Flickr or Facebook enjoys great popularity, especially due to Web 2.0 platforms. This type of software includes several techniques to manage information overload, like social networking services, social search engines or mashups, i.e. the creation of new content via reuse of exiting content.

The aim of this talk is to show how the use of social networks may help users to behave as modelers they trust. In this respect an modeling support system is presented to which “social” features are added. Two kinds of social networks are used to this end: (1) a social network from a process model repository and (2) a social network from a recommendation history. The social network from process models provides an organizational view of business processes. An example of the information that could be derived from such a network is the average distance between performers who belong to part of business process that is already modeled and the ones who belong to a candidate process. A user can apply this result to complete a process model in a way that is similar to earlier selected solutions. The social network from recommendation history shows the relationship among modelers who use the recommendation system. From its usage history, social networks can be generated that express the similarity between its nodes (users). Both approaches are presented as effective ways to exploit social relationships in capturing business processes in conceptual models, one of the key activities in the BPM domain.

*Keywords:* Challenge, BP Lifecycle

## **Challenge: How to support the very first stage of the BP lifecycle, creative design of processes**

*Steffen Mazanek (Unibw - München, DE)*

We see as an important research question how the initial creation of BP models can be liberated from the traditional “icon palette-drag and drop” mode, which enforces graphical precision prematurely in the design process. Traditional tools cognitively impose the tasks of drawing boxes and lines while business analysts should at that point think more about the meaning of business processes. Moreover, business modeling notations can be technically complex, hence making BP modeling inaccessible to non-technical people.

In the past decade we have seen emerging devices such as tablets, ipad, wii, ms surface with rather natural to use interaction techniques such as gesture, sketch or speech. We believe that these techniques can open up a new venue for supporting the initial phase of business process modeling when creativity is hindered by the traditional drag-and-drop technique. We have prototyped such business modeling tools, Inkus and BPSketch. Inkus allows business users to sketch freely and supports user-driven tagging as a mechanism to derive a BP model from a sketch. BPSketch processes business process sketches and attempts to recognize business components in order to compute the BPEL representation of the hand-drawn process. Other researchers have explored the potential of tangible process modeling or the use of RFID for process mining. All these approaches including ours are at a quite early stage; lots of work remains to be done, also with respect to user evaluation.

In conclusion, it is essential for a holistic approach to the BP lifecycle to consider the early phase of BP design. Traditional business process modeling tools are not targeted to support non-technical users in this early phase of the design. We attempted to open up this new area of research to better support the community of people whom traditional BP modeling tools intend to support but have not come close to being successful.

*Joint work of:* Mazanek, Steffen; Sukaviriya, Noi

*Full Paper:*

<http://www.steffen-mazanek.de>

## **Behavioural Profiles - A behavioural abstraction for reasoning about consistency of process models**

*Jan Mendling (HU Berlin, DE)*

Business process models are used at different stages of information system development and organizational design, ranging from high-level documentation of business operations to technical specification of workflow processes. While the



control flow orientation is believed to contribute to a narrowing of the notorious gap between business requirements and system implementation, there are growing concerns regarding the consistency of related models at different levels of abstraction. Checking the consistency of such related models is a major challenge for process modelling theory and practice. Notions of behavioural equivalence have been shown to be too strict for many questions in this context. Therefore, a new concept is introduced called behavioural profile. Behavioural profiles capture the essential behavioural constraints of a process model. These profiles can be computed efficiently, i.e., in cubic time for sound free-choice Petri nets w.r.t. their number of places and transitions. Furthermore, behavioural profiles can be used to define a formal notion of consistency, which is less sensitive to model projections than common criteria of behavioural equivalence.

## Process Quality Engineering

*Barbara Paech (Universität Heidelberg, DE)*

This talk discusses issues in the specification and assurance of process quality.

The motivation of our research is the integrated requirements and quality engineering for business, work and software system. The business system comprises the organization, while the work system focuses on individual users. Processes can be described on all 3 levels, and it is an open question how to relate these levels. Furthermore it is necessary to specify functional as well as quality properties. Thus, it is important to develop techniques and tools for the joint elicitation, specification, management and quality assurance for functional and quality aspects of these 3 levels.

A first step in this direction is a common terminology relating business processes, tasks, use cases, system functions and corresponding goals and strategies. A second step is an integrated definition of quality. While there are standards for software quality, there is no standard for process quality.

In this talk we present first results for these 2 steps. This includes an adaptation of the ISO 9126 for process quality and an evaluation of the BPMN wrt the expressivity of process quality properties.

## Integrated Process Lifecycle Support for Dynamic Processes

*Manfred Reichert (Universität Ulm, DE)*

*Barbara Weber (Universität Innsbruck, AT)*

The economic success of enterprises increasingly depends on their ability to react to changes in their environment in a quick and flexible way. Companies have heretofore identified business agility as a competitive advantage to address

business trends like increasing product and service variability or faster time-to-market. However, needed business agility is often hindered by the lacking flexibility of existing information systems. Once a process is implemented, its logic cannot be adapted or refined anymore, and no flexibility is provided to users. In this context process-aware information systems (PAIS) offer promising perspectives. By separating process logic and application code, PAIS are more flexible when compared to traditional information systems.

This separation, however, is still not sufficient for meeting today's need for greater system flexibility and for being able to deal with uncertainty, exceptional situations, and environmental changes. Major reason for this is the fact that most PAIS require a complete specification (i.e., plan) of a business process in advance, which is then used as the schema for process execution. However, dynamic processes demand a more agile approach which recognizes the fact that in dynamic environments plans are outdated fast and thus require closer interweaving of planning and execution. PAIS do not only need to be able to change the execution of single process instances on the fly and to efficiently deal with uncertainty, but must also support the evolution of business processes over time. The incorporation of feedback and learning, for example, through change reuse or recommendations based on previous process executions, is largely missing in existing PAIS.

In this talk we present our ProCycle approach which overcomes this practical limitation by capturing the whole process life cycle and all kinds of (dynamic) changes in an integrated way. Users are not only allowed to deviate from the predefined process in exceptional situations, but are also assisted in retrieving and reusing knowledge about previously performed changes in this context. If similar instance deviations occur frequently, process engineers will be supported in deriving improved process models from them. This includes statistical analyses as well as intelligent techniques for learning from past process adaptations. Based on this, engineers may evolve the PAIS and its process schemes over time.

## The Death of the Process Model

*Hajo A. Reijers (TU of Eindhoven, NL)*

A business process model can be used for a variety of purposes, such as support for the communication between business professionals or as specification for an information system that needs to be developed. A relevant question is whether for all these purposes a process model is always the optimal vehicle. In this talk, it is argued that in a workflow context another type of model may be more attractive to drive the process that needs to be executed. This view is supported by ongoing research at Eindhoven University of Technology on the method that is coined 'Product-Based Design' (PBD). Previously, a so-called product-data model was created first according to PBD, which has roughly the same function in a services environment as a Bill-of-Materials has in a manufacturing environment. The product-data model, which captures the informational elements of

a service that needs to be delivered, was consequently used for the derivation of a process model that would capture the most attractive way to deliver that service. However, in an alternative approach that has now been developed, the product data model is directly used by a workflow-like system to assign work tasks to process participants. A prototype has been developed on the basis of the existing ProM and DECLARE frameworks to arrive at a highly flexible and performative workflow environment that is no longer driven by a business process model. An open question is whether this particular development should also trigger us to reconsider the use of process models in other contexts.

## **Flexible Processes Everywhere: Inhouse, Collaboration, Cloud**

*Stefanie Rinderle-Ma (Universität Wien, AT)*

Process flexibility is one of the most crucial challenges for any Process-Aware Information System (PAIS). While different approaches for inhouse processes (i.e., processes running entirely within a company) have been developed over the last years, flexibility for newly arising scenarios such as process collaborations or cloud processes have not been paid too much attention to so far. One important distinction between inhouse processes and the other scenarios is the different degree of information that is available for checks becoming necessary in the context of process changes. One important kind of checks are correctness checks that guarantee robust process execution after changes have been applied to the process. Other issues refer to providing proper migration strategies for running process instances after changes. These issues - in the context of inhouse processes - have been investigated in literature for the last decade and are implemented within research prototypes and commercial products. In this presentation, we want to address the complete story from existing inhouse approaches to challenges that arise in the context of flexibility of process collaborations and cloud processes. For process collaborations, for example, changing one partner's private process might affect its public process and subsequently the public and private processes of its partners as well. Research questions in this context are, for example, how we can decide whether changing one partner's process does affect the other partners' processes or not and how the collaboration can be still kept in a consistent state (e.g., without having one partner waiting for a message that is never be sent anymore). Specifically, we will present details on our Cloud Process Execution Engine (CPEE) as a building block for creating a lightweight, extensible, and reusable cloud-based infrastructure. During the design of CPEE we rethought many concepts of traditional integrated PAIS and came up with a stripped down process execution engine that is a service itself. Altogether, we believe that supporting flexibility for process collaborations and cloud-based process solutions marks a milestone in current process management technology.

## Commitment-Based Service-Oriented Architecture

*Munindar Singh (North Carolina State University, US)*

Existing service-oriented architectures are formulated in terms of lowlevel abstractions far removed from business services. In a new SOA, the components are business services and the connectors are patterns, modeled as commitments, that support key elements of service engagements.

*Keywords:* Commitments, architecture, service engagements

*Joint work of:* Singh, Munindar; Chopra, Amit; Desai, Nirmit

*Full Paper:*

<http://www.csc.ncsu.edu/faculty/mpsingh/papers/mas/computer-09.pdf>

*See also:* IEEE Computer. volume 42, number 11, November 2009, pages 72-79.

## Toward a Business-Level Understanding of Business Processes

*Munindar Singh (North Carolina State University, US)*

Because of their importance to IT practice, business processes have drawn a lot of attention from the research community. Unfortunately, however, we find that current approaches to business processes take a primarily technical stance. Specifically, first, they over-emphasize low-level representations and operational details, such as control and data flows. Second, they generally assume a single perspective from which a process is designed and enacted. Doing so inevitably violates the autonomy and the heterogeneity of the participants in a business process. This clearly limits the applicability of current approaches to single-enterprise settings. But even in single-enterprise settings, often multiple business units and human participants are involved in important processes. Third, existing approaches provide no business-level notion of correctness for a process. When all you have modeled are the operational details, any deviation from such details is potentially erroneous. As a result, the flexibility of enactment is limited and both the handling of exceptions and the felicitous treatment of emerging opportunities becomes harder. The foregoing limitations are at the heart of the much-lamented Business-IT Divide in today's IT practice.

In contrast, we have been developing a more natural approach that offers first-class status for the key elements of a real-life business process, specifically, (1) its participants (individuals and organizations) and the business relationships among the participants, and (2) how such relationships are created and progress during the lifecycle of a business process. The business relationships of interest can be thought of as declarative contracts among the participants. We formalize these contracts mainly in terms of commitments, each commitment being directed from one party to another and arising within a particular organizational

context. Using commitments as the unifying framework helps address some important questions pertaining to business processes. Specifically, we can address representation and reasoning (commitments as semantics for business artifacts along with associated logic for reasoning); correctness (each party must satisfy its commitments); enactment (manipulating commitments such as by creating, delegating, assigning them to produce flexible executions); architecture (business entities and relationships provide a higher level, but computationally valid, account of architecture that compares well both to technical but low-level and high-level but vague descriptions of systems); and administration (how the stakeholders in a business engagement jointly govern their processes in settings where neither can unilaterally change a process).

## **A Framework for User Interface -Business Process Alignment**

*Kenia Sousa (UC Louvain-la-Neuve, BE)*

Organizations are adopting processes as an efficient tool to manage and control the business. Naturally, business processes are an important source of requirements for system analysts and developers when designing and implementing the systems. These systems cover more and more business activities, gradually automating and improving the overall efficiency of the organization. This automation effort tends to be done in a hurry to follow the business dynamicity, but the alignment between business and IT becomes overshadowed. The initiative to keep processes and systems aligned came from IT that developed techniques to control the alignment of business processes and their systems, which is the enthusiasm behind the Service Oriented Architecture. However, there lacks a solution that addresses a major aspect of systems: their user interfaces. The negative impact of focusing only on functional aspects is that many changes on business processes that affect user interfaces are not carefully considered. Therefore, our solution is a framework for aligning business processes with user interfaces of systems by adopting a user-centered perspective. This framework establishes an unbroken chain of links between business processes models, task models and abstract representations of user interfaces. Once the models are linked, the framework is able to predict the impact that any change on these models may produce in other models. Such support is targeted at large organizations in order to enable them to be more capable of managing those links with consistency. This approach is an innovative strategy that integrates researches on interaction design and business process management with practical implications. Its main differentials include using simple models; considering light actions; preserving the independence of technology; and adopting a human-oriented approach assuring that every managed information impacts people and not only systems, thus enabling fast adaptation to the business dynamism.

*Keywords:* User interfaces, business process models

## Missing

*Victoria Torres (Universidad Politécnica - Valencia, ES)*

Business Process Modelling constitutes a very relevant task within the business process management life cycle. In fact, the correctness of the process models generated during the modelling step has impact on the executable process models that are required for the implementation step. However, building correct and error-free models depends on different factors such as the capabilities/skills of the modeller, the expressivity of the process modelling language/notation used, the availability of tools that implement the used process modelling language and the complexity of the domain being modelled. For this reason, it is necessary to provide not only guidance and assistance during the modelling task but also languages/notations, techniques, methods and tools that contribute to improve the generated models. In addition, when the modelling task involves handling with variability issues, this step gets even more complicated. Depending on the nature of the business process being modelled, variability can appear either at design or run-time. At design time, modelling variability involves identifying all the possible variants that can be applied for a specific context of use. The context of use can be determined before implementing the business process (by configuring a reference process model) or at run-time (by updating the current context based on a predefined set of properties). At run-time, modelling variability involves taking into account that new variants not considered at design time can appear, and the corresponding executable process should be reconfigured according to these new variants. It is accepted in both academia and industry that business processes in use are subject to change during their whole life cycle. Therefore, this necessity of change requests the existence of languages and execution environments that facilitate the enactment of flexible business processes. There is an extensive body of work on the business process variability at both design and run-time. However, a holistic approach that deals with the challenges that arise during the modelling and execution phases is still needed. During the modelling phase, adequate mechanisms (languages/notations, techniques and tools) should be provided to facilitate the definition of business process commonalities and differences based on the context of use. As a result of this phase, users should be capable of building business process models that are error-free, scalable, understandable and reusable. On the other hand, during the execution phase, strategies to reconfigure running processes are required. In addition, to link these two phases, code generation mechanisms such as the ones provided by the Model Driven Engineering field are required. These mechanisms would allow moving automatically (and error-free) from the modelling to the execution phase.

## **A View-based, Model-driven Approach for Reconciling the Business Process Life Cycle**

*Huy Tran (TU Wien, AT)*

Our work aims at addressing two major issues in business process life cycle. Firstly, the complexity of process development and maintenance quickly increases along with the number of the involving elements and their relationships and becomes hardly manageable. This occurs as the process descriptions comprise various tangled concerns, such as the control flow, data dependencies, service invocations, etc. Secondly, the lack of explicit links between languages used for modeling and those used for implementing processes lets the stakeholders confronting with disconnected artifacts at different development phases. As a consequence, this hinders the analyzing and tracing back and forth between artifacts, understanding and maintaining the business processes. We propose a view-based, model-driven approach that, on the one hand, supports the stakeholders managing the complexity of process development and adapts to their particular expertise, as well as offers traceability methods and techniques and model-aware repositories for establishing and maintaining the relationships between artifacts during the process development life cycle.

*Keywords:* Business process life cycle, view-based, model-driven, traceability, model-aware repositories

## **Interacting Processes and Business Artifacts**

*Mathias Weske (Hasso-Plattner-Institut - Potsdam, DE)*

Traditionally, process orchestrations are in the center of attention, both in business process management research and industry uptake. In recent years, however, the view broadens: Not only local process orchestrations are investigated, but also interactions of processes, i.e., process choreographies. This talk discusses the evolution of the Business Process Modeling Notation regarding process choreographies. In particular, we show how recent research results have helped shaping the BPMN, and we point out research questions in choreography design and analysis. The short presentation provided input for the process interaction working group, where the relationship of interacting processes and business artifacts were discussed. This is highly relevant, since business artifacts are exchanged between partners during a business transaction. So far, process interactions have focused on the behavioral aspect, rendering data second class citizens. Therefore the study of business artifacts and the relationship of their behavior with respect to interacting processes is very interesting.

## Partial Automation for Partial Reuse of Workflows

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We propose a tool chain for identifying reusable parts in a given library of workflow models. The tool chain includes a large number of already existing tools. All mentioned tools are available under [www.service-technology.org](http://www.service-technology.org).

We start with translating workflow models into formal models, e.g. Petri nets. To this end, existing tools *BPEL2oWFN* and *UML2oWFN* can be used. Then, the resulting Petri net model of the original workflow can be decomposed using *Diane*.

*Diane* computes the unique finest decomposition such that the components communicate via asynchronous message transfer and compose to the original model. *Diane*'s decomposition does not necessarily yield semantically meaningful components. However, we conjecture that every reasonable component is a composition of the atomic components produced by *Diane*. We believe that, in future work, additional information such as data types, role annotations and the like can be employed to extract meaningful components from the atomic ones.

In a next step, we propose to reduce the number of obtained candidates by comparing them across borders of a single workflow model.

We believe that several components can be obtained from others by composing them, constructing adapters between them, or by modifying them slightly. It is thus sufficient to keep and maintain only a subset of the identified components. Existing tools like *Marlene* for constructing adapters, or *Cosme* for checking equivalence can help in this stage.

For retrieving components, it is important to store components in a registry. To this end, we can make the communication behavior of a component explicit, resulting in an artifact we call operating guidelines. *Wendy* has proven to be able to calculate operating guidelines in an efficient way. *Safira* can aggregate information from individual components as needed in a registry context.

It is clear that more research is required to adjust and complement the tool chain. In particular, the control flow perspective taken in all of the mentioned tools must be lifted to a more holistic view on business process. However, it seems to be possible to give a lot of support to the task of identifying reusable functionality in workflow models.