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Business process model reasoning: from workflow to case management

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Abstract

Existing limitations and problems in the current life-cycle of software applications is expected to encourage new development paradigms. New technological trends, aimed at responding to current needs, such as flexibility, dynamics, scalability and creativity will drive the envisaged changes. This article describes the various types of business processes, ranging from structured workflows to semi-structured flexible business processes, and methods to model each type of business process. Development of business process models based on the knowledge economy, changing corporate strategy and organization design, and agile enterprise paradigm requires BPMS technology to support weakly structured business activities and emerging ad-hoc tasks. Increasingly, organizations are expanding the use of BPM beyond their initial focus on structured processes into more challenging, cross-boundary processes that include more unstructured components. Case management technology allows the modeling of cases in which a business goal is achieved by taking decisions in the context of documents and other content objects. Case management is considered dynamic because it focuses on unstructured and ad- hoc processes. It is likewise a continuing process that involves people, information, processes, and technical tools. Furthermore, it is adaptive and adaptable because it can be used by non-technical users and is versatile in its applications in different situations. With the use of case management, circuitous business processes, fragmented communication, repetitive operations, missing documents, and long approval times can be permanently abolished.

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1. Introduction

The term "business process" has multiple meanings and definitions. Presumably, it was originally used in the Structured Analysis and Design Technique (SADT) in the 1970s, which included functional system modeling. The SADT procedure was applied under the name IDEF (Integrated Definition Modeling Methodology) by thousands of specialists in different organizations. Derivative models such as IDEF0, IDEF3, and IDEF5 are still widespread. For instance, IDEF3 is extensively used in all modern languages of business process modeling, including UML, BPML, EPC, etc. In the 1990s companies were encouraged to think in terms of processes instead of functions and procedures. A process is a set of tasks or activities to be undertaken which:

- has deliverables to external or internal customers,
- responds to events that take place (triggers),
- can involve several organizational units (which could be outsourced),
- creates value.

Currently, the graphical modeling of business processes, automatic generation of executable codes, and using them to construct applications is one of the most active areas of development and competition among different BPMS vendors. The number of companies and knowledge workers enterprises using graphic modeling is increasing. Moreover, even the principles of constructing such models are neither standardized nor universally accepted, though practically all major software vendors are highly active in their development. It is challenging to offer a generally accepted standard of BPMS modeling and use that can support dynamic business requirements. Hence, a large variety of competing specifications are presently under development.

In addition, it should be noted that all the previous methodologies were created from the viewpoint of a consultant, either in-house or third-party. However, a consultant is not involved in the activities of the company whose business he/she is going to improve, and he/she does not know the psychology of its employees and managers or the undercurrents of relationships within the team and with the outside world. This results in an abstract model of the company's processes, which will then be introduced without these specifics and sometimes even without incorporating all the wishes of the employees and even of the management. As a solution, modern methodologies offer approaches oriented towards giving the initiative to users in the construction of business processes and then using a system involving these user-defined processes. Thus far, this approach is just a trend. Yet, there is an active discussion about such brand new approaches, whose cornerstone is to make it possible for the users to engage in constructing their own business processes.

As numerous discussions of the actual implementations of process approaches show, a significant proportion of such implementations not only produce no results for the company, but also remain as just a way of improving the company's image. For example, a company may announce on its website it is certified to a certain standard (for example, in Total Quality Management) and has implemented a certain methodology. However, actual processes are frequently run in a completely different and often traditional way, with minimal dependence on what methodology or what BPMS was implemented. Sometimes the reason for this is the fact that during the survey and implementation, the company, its environment and often its employees, have undergone significant changes, which necessitates new surveys and implementation. In modern BPMS, the solution to this flexible and dynamic environment is in methods and modules of continuous improvement of processes.

2. Motivation of research

The challenge of how organizations can successfully deal with unpredictable, dynamic, and constantly changing environments has been a prevailing topic in both industry and academia for the past few decades. This has led to terms such as «Enterprise 2.0», adaptability, flexibility, «agile enterprise», etc. In the knowledge economy concept, Enterprise 2.0 or KM 2.0 business processes have acquired novel properties.

This explains why business operations and processes require various organization automation tools, depending on the model of organizational structure. These tools may include innovative ones for a function-oriented organization – support of the top-down management model (automation of the administrative office); for the process-oriented organization – automation of business processes based on BPMS, automation of electronic administrative procedures, public services, etc.; and for network organizations – knowledge management, forums, wiki, blogs, design work, corporate search and analytical systems, competence management, and canvassing for experts. Therefore, semi-structured business processes are vital in describing lower-level business processes initiated and performed directly by knowledge workers. This paper examines the evolution of business process modeling techniques towards achieving greater flexibility in conjunction with newer, more agile business processes and technologies to effectively support critical business functions and knowledge-intensive processes.

3. Shortcomings of classical BPM and new trends

In somewhat simplified terms, the classical BPM process approach involves a business analyst constructing a model of a process system using one of the multiple standards, and beginning from one of the first IDEF systems. These standards have developed into modern ones, such as ARIS and BPMN. The shortcomings of such an approach are well known, including the models' inherent lag from the practice, unsuitability for dynamically changing and multi-version processes, a gap between the company's IT services and managers and employees, and, hence, a failure to account for the fact that processes in the company may often run (and do run) in a way that is completely different from what is reflected in the analyst's model.

Current business and government services are becoming increasingly dynamic and knowledge-intensive. Therefore, it is quite natural that alternative approaches to process business process modeling are being researched. Such approaches should be based on process automation and suitability for dynamically changing and multi-version processes, projects, separate usage scenarios and even episodes, as well as for adaptive conduct of business (a single group user action to achieve the goal without a previously made plan, and assignment of responsibilities). The traditional approach to modeling of business processes and BPM does not adequately help in optimizing such processes. In this context, local systems of electronic document flow are much more flexible and better suit the adaptive conduct of business, as they actually include only single operations from which the users build chains on their own, which may either form recurrent processes or never repeat again. In western literature, such processes are often referred to as ad-hoc processes, i.e., those which form spontaneously for a case and are non-recurrent. Such processes play a significant role in the actual activities of a company, as, in fact, processes are more often built not by external analysts and consultants but rather by company employees through trial and error. As the instances of these processes have limited possibilities for their implementation, e-mail is the preferred means of communication.

4. BPM evolution

4.1. Workflow

Workflow supports structured processes, so a model should be described precisely for this model. This model is designed to simulate routine business processes, the structures of which are quite inflexible and do not support unexpected changes dictated by the business community, such as changes in laws, market requirements, technology, business opportunities, etc. However, even in highly structured environments, it is difficult or almost impossible to describe all the workflows (the entire sequence in the model), as it makes the model unreadable (see Fig.1).
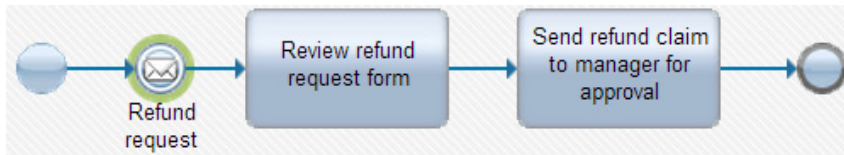
Fig. 1. Happy path (standard workflow)

4.2. Exception handling

The term exception is used in many areas of science and business practices. In general, the exclusion is rooted in the fundamental phenomenon that pre-planned operations, processes [1], business planning [2], or business logic violates a happy path due to unexpected events (see Fig.2).
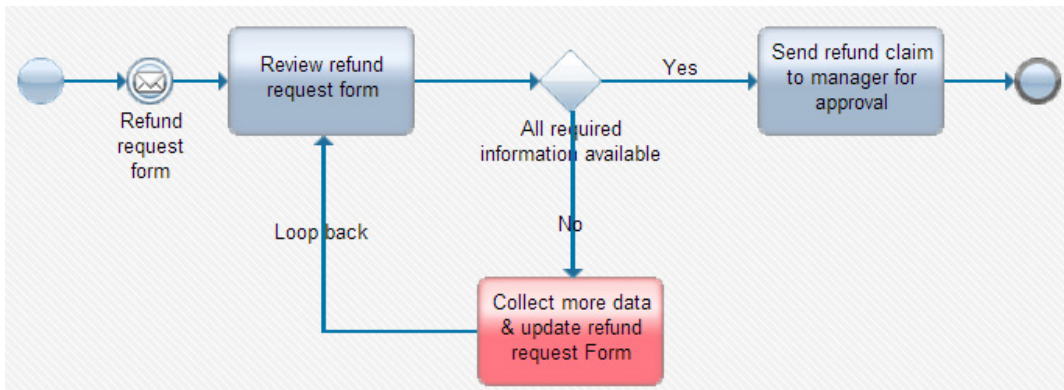

Fig. 2. Happy path with routine exception

Users add ad-hoc work to efficiently handle exceptions that may arise in the course of expected business processing without having to wait for developers to modify the application. For these exceptions, the event triggers are known, but the reactions to these events are not strictly described (see Fig.3).
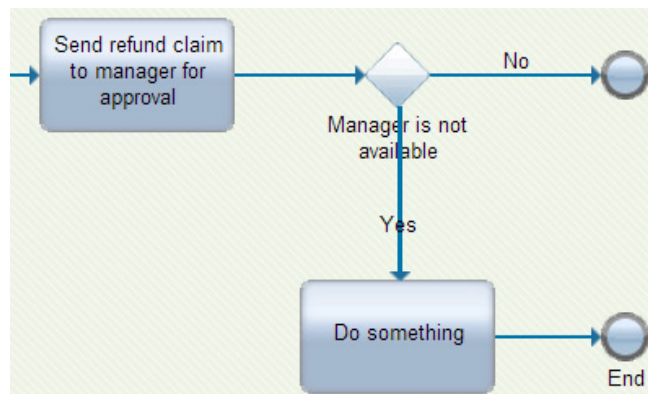

Fig. 3. Ad-hoc exception

The main problem with the exceptions in standard workflows is that quick action is necessary to respond to the exception. It requires either stopping the process execution and manually performing the exception, or canceling the process execution. However, since most of the common business processes are long-lived and complex, such interventions represent a poor solution [3].

4.3. Adaptive case management

A more modern approach assumes that some processes cannot be rigorously planned and exceptions should be treated as a normal situation and as a valuable component of creative work [4]. Such major exceptions cannot be predicted or predetermined.

Knowledge workers primarily deal with investigative, incident, or service-based projects. In order to achieve efficient results, these projects typically require the assembly of disparate data types, ongoing collaboration across a broad range of personas, and interaction with a variety of knowledge bases in unstructured, semi-structured and structured processes. For a more creative environment with unstructured business processes, the focus has shifted from the creation of automated workflow to systems that support collaboration, knowledge workers and cases [5].

Case management practices have recently been very influential on discussions around the subsequent evolutions of BPM. Researchers using BPM often refer to adaptive case management [6] or case handling [7], indicating the need for better support for weakly structured and knowledge-intensive processes.

The main focus in case management is not on the process but on the information about the case. It helps in avoiding so-called Context Tunnelling, when users have knowledge only about their assigned tasks [8]. By focusing on control flow, the context (i.e. data related to the entire case and not just the activity) is moved to the background. Typically, such context tunnelling results in errors and inefficiencies. Workers will have more freedom but ought to be aware of the entire case.

For example, to resolve a fund request claim, one might require a fund request form and customer data to complete the form, and a manager to review that form. Therefore, for a credit card dispute case, the solution must include these artefacts': Fund request form, Customer data.

Next, it is imperative to decide what sort of tasks will be needed and why (see Fig. 4).

Fig. 4. Subcase creation

Various tasks will be executed in the context of the parent case or one of its subcases. The coordination of the tasks is organized in a case hierarchy (subcases). The case will also have a business objective pertaining to

the case subject, and involve significant collaboration between various case workers to resolve the case. While processing these tasks, a case will possess content, often from multiple enterprise information or content management repositories.

5. Conclusion

A current challenge is to create methodologies for seamless BPMS implementation to enable rapid changes and to support weakly structured processes (knowledge intensive business processes). In a dynamic business environment, many processes evolve during process execution as employees are faced with new situations that require solving. While the main objective of BPM and workflow is to automate routine tasks and procedures, case management aims to support human beings in performing creative, knowledge-intensive work and provide flexible executable business processes (workflow). This allows workers to respond to unpredictable exceptions and effectively support knowledge-based work.

This paper provided an overview of the evolution of various BPM approaches from viewing a business process as merely a sequential process to the case supported business process. The dynamic nature of business processes has invited a new focus on knowledge management and agile enterprises that cannot be supported by currently available workflow management theory and applications. Dynamic case management allows organizations to support all categories of work (structured, semi-structured, or collaborative/unstructured) and all types of workers (transactional, knowledge-assisted, knowledge workers), and helps organizations expand beyond the traditional boundaries of their organizational silos.

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