

## ON A NEW APPROACH TO THE BUSINESS PROCESSES MODELING\*

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**Abstract.** *This paper reviews new approaches to the modelling of business processes in the light of the FP7 project ReFLEX –Reinforcing flexibility of small and medium-sized enterprises by dynamic business process management. This approach includes a complex, modular and integrated solution tailored after the needs of SMEs. The solution is based on a competitive transaction logic on the one hand, and modern technologies on the other. It entails the dynamic business processes models which enable enterprises to react swiftly to the changes in internal and external conditions and thus improve their business operations.*

**Key words:** *business processes modeling, small and medium enterprises, dynamic models, ReFLEX*

### 1. INTRODUCTION

The world economy, these days with the crisis emerged, is changing rapidly. SMEs and their businesses are under constant pressure to adapt fast to these changes, consolidate infrastructure, reduce costs, and ensure governance across the enterprise. To thrive in today's competitive market, small and midsize organizations need to be agile, responding quickly to changing market conditions and exceeding customers' demands. Unlike larger

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companies, midsize organizations cannot lean on globally recognized brands: a lost customer, or a missed opportunity to recruit a new customer, may never be recouped. Therefore, they need to find unique ways of differentiating their offerings. With limited resources, midsize organizations must struggle to adapt to changing market conditions, whether these are reduced time to market, increased expected service levels, or price-cutting. On the other side, however, smaller size can be an advantage. By remaining flexible, midsize organizations can react faster to changing customer requirements than their larger, less agile competitors. In fact, by being smaller (i.e. easier manageable), they could allow themselves more dynamics in executing the business, which enhances their responsiveness on the highly-changing business environment. One important issue that can provide all those benefits is business processes modeling.

ReFLEX - Reinforcing FLEXibility of SMEs (Small and Medium Enterprises) by dynamic business process management [1] is the FP7 project (262305) financed by European Commission, with the goal to improve the business of SMEs. The project involves several research organizations (Forschungszentrum Informatik an der Universitaet Karlsruhe from Germany, Institute of Communication and Computer Systems from Greece and the Faculty of Electronic Engineering from Serbia), as well as SMEs (CIM, GAMA, VAJOMAG and INVEST). This paper will present some project achievements in the area of improving business processes modeling.

## 2. BUSINESS PROCESSES MODELING

Business Process Modeling (BPM) [2, 3] is the activity of representing processes of an enterprise, so that the current process may be analyzed and improved. A business process is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers. BPM is typically performed by business analysts and managers who are seeking to improve process efficiency and quality. With advances in technology, the vision of business processes models is becoming fully executable and coming closer to reality every day. BPM treats processes as assets that directly contribute to enterprise performance by driving operational excellence and business. The goal of BPM is to drive consistency and efficiency of operations by modeling and automating an organization's core business processes. In that context, BPM excels in modeling "best work practices" in companies that help them preserve capital, identify threats and minimize risks. It promotes business effectiveness and efficiency while striving for innovation, flexibility, and integration with technology.

The problem with the current software BPM solutions and models is that they are mostly tailored to the big companies with lots of processes that are well defined and quite stable (long lasting). On the other hand, one of most important competitive advantages of modern SMEs is their flexibility, the dynamics in the process execution, the ability to change their processes frequently and even on the fly. The existing solutions are also quite expensive and not affordable for the SMEs.

The continued evolution of business process models has changed the way many companies and government agencies operate. By leveraging BPM suites, organisations have streamlined and automated tasks, reduced turnaround time and helped ensure regulatory compliance. There is no doubt that BPM models have added tremendous value to organi-

zations in virtually every industry. However, traditional BPM suites and models do not address all the needs of today's dynamic work environment. In order to provide progressive organizations optimal value, BPM suites must solve the problems of information overload, lack of accountability and visibility while concurrently providing employees with the tools and information assets required to do their jobs better. The next generation of business processes models [4] has to be flexible and dynamic, allowing on the fly changes, insight into potential challenges and increased executive visibility into daily activities.

### 3. DYNAMIC BUSINESS PROCESSES MODELING

On the other side, the technology development in the last years is creating new opportunities for realizing the SME's flexibility. Especially important is enabling gathering much more information from a running business process or information relevant for its execution that can support their ability to be responsive (GPS, GIS, RFID, e-mail, public information streams on the web). In a way, this information enables the reaction on undefined changes in the right way and in the right (real) time. Indeed, the response time on changes is decreasing dramatically, which has created an enabling environment for the dynamic business process modeling. The dynamic BPM (dBPM) in this context means that the business processes will be aware of the changes in the (external/internal) environment and will be able to change/adapt themselves accordingly in order to keep the business process running well. Obviously, such a technology will enable a kind of continuous optimization of a process execution, which is on the other side very beneficial for SME's competitiveness. Therefore, such a BPM solution would resolve problems mentioned above: it would be tailored to the needs of SMEs and would provide clear business benefits to them.

dBPM is a solution which enables enterprises to react to the ever-changing conditions of operation (both interior and/or exterior) and cater to the individual needs of their clients in a timely fashion (and even provide a practically instant response in case of critical conditions). Dynamic business modeling is defined as the enabler of a strategic advantage achieved by focused differentiation in any aspect of business (from marketing to finance to operations). This differentiation is achieved through how business is conducted: openly and dynamically defining the business model. Capital investment – human, physical and intellectual – must be aimed at allowing the definition of the business model to be dynamic. Dynamic business modeling recognizes that businesses dynamically evolve, re-inventing their (business) models to achieve strategic advantage. The business must begin with the principle that allows rapid tuning and/or re-definition of the underlying services and processes. This must apply at human and technological levels.

Modeling flexibility in business processes can be achieved by developing a new model (Dynamic BPM Model) for describing business processes that will take into account modeling of events that can lead to the changes in a business process execution, enabling in that way the dynamic changes in a process instance. It is also important to create a modeling framework (Dynamic BPM Editor) for using the functionality of the new models. These components can be based on event-driven process chain – a type of flowchart used for business process modeling and widely acceptable technique to denote business processes. An event-driven process chain is a graph of events and functions. It provides

various connectors that allow alternative and parallel execution of processes. Furthermore, it is specified by the usages of logical operators. The main elements of an event-driven process chain are: event (describe under what circumstances a function or a process works or which state a function or a process results in: message, timer, error, conditional, signal, link, multiple, escalation), complex event pattern (set of single events in some predefined time and sequence manner), function (activity which needs to be executed within the company: task, process step), gateway (control divergence and convergence in sequence flows in a process), organization unit, information, material, or resource object, logical connector (describes logical relationships between elements in model, that is, they connect functions and events), logical relationships (and, or, exclusive or), control flow (connects events with functions, process paths, or logical connectors creating chronological sequence and logical interdependencies between them), information flow (shows the connection between functions and input or output data), process path. An example of event-driven process chain is given in Figure 1.

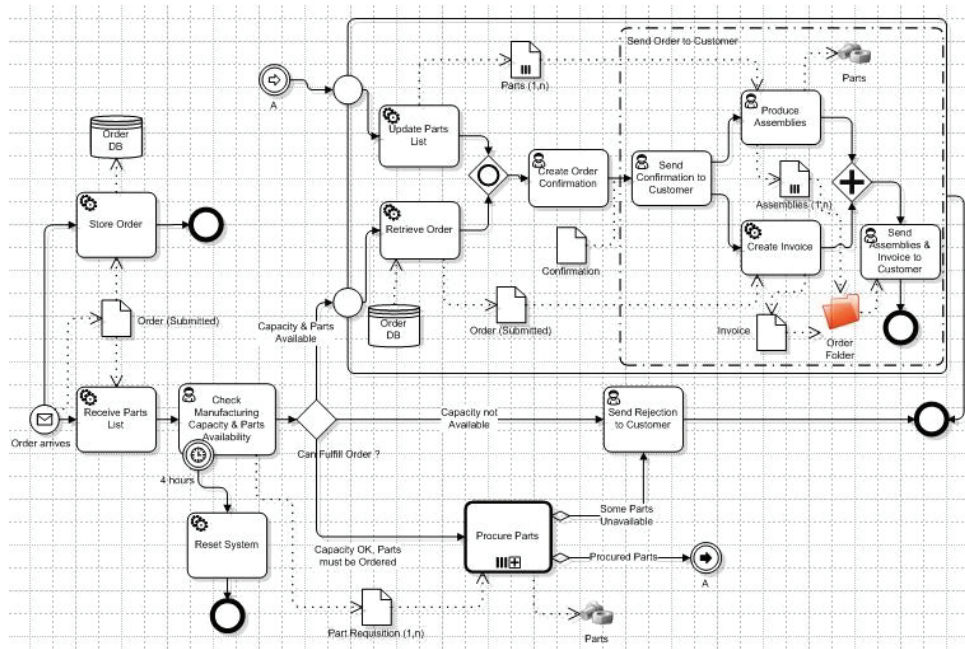


Fig. 1. An example of event-driven process chain

#### 4. REFLEX SOLUTION

Although event-driven process chains are a widespread process modeling technique, they suffer from serious drawbacks: semantics of an event-driven process chain is not well supported and dynamics in such chains is not well implemented. The language for describing dynamic behavior of business process should also contain the concepts of all basic process elements (events, situations, conditions, contexts, actions, relationships...).

Therefore, based on these requirements, ReFLEX solution is to use a language established on a model-theoretic semantics of concurrent transaction logic (CTR) [5]. CTR is a new deductive database language that integrates queries, updates, and transaction composition in a simple logical framework. CTR has proven to be very suitable for process modeling because it can model many complex process elements [6].

The conceptual architecture of the ReFLEX project is based on a number of modules that comprise the ReFLEX system (Figure 2). The main processing modules in the solution are Sensors and Adapters (collect events from environment), Dynamic BPM Modeler (enables modeling dynamic business processes by business users), Recommender (proposes changes in the dynamic business processes based on the events that are "surrounding" a business process), Complex Events Processing (CEP) Engine (detects the efficiently complex event patterns in a stream of data), Pub Sub Message Broker (enables the clients - other modules, publishers and subscribers to address messages to a topic or subscription term), Dynamic Workflow Engine (enables the execution of the dynamic business processes). They are all working together in order to achieve: modeling flexibility in the execution of business processes (dynamic business processes), calculating flexibility of business processes (on demand and in real-time) and executing dynamic business processes.

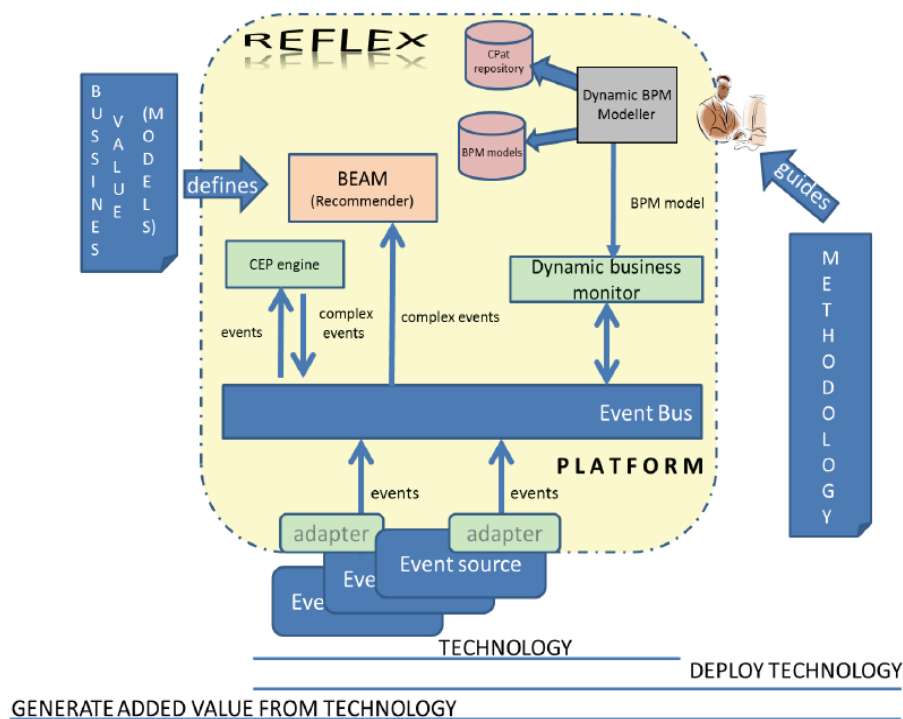


Fig. 2. A complete ReFLEX solution

## 5. CONCLUSION

These days, with the global economic crisis and all the changes it produces, on practically daily bases, small and medium enterprises are under constant pressure to adapt fast or disappear. They need to be agile, responding quickly to changing market conditions and customers' demands. That is exactly the goal of the ReFLEX FP7 project. It considers dynamic business processes models that enable enterprises to react fast to the changing interior and exterior conditions and improve their businesses. In such a way, it offers a new integrative solution that goes beyond the state of the art in this field of modeling dynamical systems. Dynamic business processes modeling recognizes that businesses dynamically evolve by re-inventing the models and allowing the rapid tuning and re-definition of the underlying services and processes to achieve strategic advantage. The solution offered by ReFLEX is based on using event-driven approach for logic-based complex event processing and modern technologies, like GPS, GIS, RFID and others.

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## O NOVOM PRILAZU MODELIRANJU POSLOVNIM PROCESIMA

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*Ovaj rad razmatra nove prilaze modeliranju poslovnih procesa u svetlu FP7 projekta ReFLEX – jačanje fleksibilnosti malih i srednjih preduzeća dinamičkim upravljanjem poslovnim procesima. Ovaj prilaz uključuje kompleksno, modularno i integrisano rešenje skrojeno prema potrebama malih i srednjih preduzeća. Rešenje je bazirano na konkurentnoj transakcionoj logici sa jedne strane i modernim tehnologijama sa druge. Podrazumeva dinamičke modele poslovnih procesa koji omogućavaju preduzećima da reaguju brzo na promene unutrašnjih i spoljašnjih uslova i na taj način unaprede svoje poslovanje.*

*Ključne reči: modeliranje biznis procesa, mala i srednja preduzeća, dinamički modeli, ReFLEX*