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**Editorial: current trends in business process modelling**

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# Editorial Paper

# CURRENT TRENDS IN BUSINESS PROCESS MODELLING

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## INTRODUCTION

Globalisation trends and competitive pressure urge many organisations to radically change business processes. As organisations need to adapt to new trading conditions and respond to competition, various change management approaches such as business process re-engineering (BPR) are being adopted. This management concept relates to the fundamental rethinking and radical redesign of an entire business system to achieve significant improvements in business performance (Hammer and Champy, 1993). Business process reengineering and business process change in general have become one of the most popular topics in organisational management creating new ways of doing business.

Many organisations have conducted BPR as a means to improve productivity and gain competitive advantage. For example, Jackson (1996) a survey of 180 US and 100 European companies found that 75% of these companies had engaged in significant re-engineering efforts in the past three years. Regardless of the number of companies involved in re-engineering, the rate of failure in re-engineering projects is over 50% (Hammer and Champy, 1993). Some of the frequently mentioned problems related to BPR include the inability to accurately predict the outcome of a radical change, difficulty in capturing existing processes in a structured way, the level of costs incurred by implementing the new process, or inability to recognise the dynamic nature of the processes.

Many studies suggest that the 'success' of BPR projects could be increased by developing dynamic models of business processes prior to their radical change (Hlupic, 1998; Hlupic, 2001). Some publications argue that one of the major problems that

contribute to the 'failure' of BPR projects is the lack of tools for evaluating the effects of designed solutions before implementation (Paolucci *et al*, 1997; Tumay, 1995). Mistakes brought about by BPR can only be realised once the redesigned processes are implemented, when it is too late, costly and difficult to correct wrong decisions. Although the evaluation of alternative solutions might be difficult, it is essential to reduce some of the risks associated with BPR projects.

It is apparent that simulation modelling could offer a great potential in modelling and analysing business processes (Paul *et al*, 1999). For example, these models can dynamically model different samples of parameter values, such as arrival rates or service intervals, which can help discovering process bottlenecks and investigating suitable alternatives. Simulation models can provide a graphical display of process models that can be interactively edited and animated to show process dynamics.

Therefore, to support industry and academe with substantive literature on business process modelling, the *International Journal of Simulation: Systems, Science and Technology* has commissioned a Special Issue that is dedicated to Business Process Modelling, and this is the theme that the guest editor of this special issue is addressing in this paper.

## BUSINESS PROCESS MODELLING: CURRENT ISSUES AND TRENDS

The increasing interest in organisational change and business process re-engineering by academia and industry has resulted in a multitude of approaches, methodologies, and techniques to support these design efforts (Wastell *et al,* 1994; Harrison and Pratt, 1993). Kettinger *et al,* (1997) conducted an empirical review

of existing methodologies, tools, and techniques for business process change and developed a reference framework to assist positioning of tools and techniques that help in re-engineering strategy, people, management, structure, and technology dimensions of business processes.

Although simulation is mentioned as one of the modelling methods in a survey conducted by Kettinger *et al,* (1997), the authors identified a need for more user-friendly multimedia process capture and simulation software packages that could allow easy visualisation of business processes and enable team members to actively participate in modelling efforts.

Many of the business process modelling tools released on the market represent business processes by graphical symbols, where individual activities within the process are shown as a series of rectangles and arrows. A majority of software tools for business process modelling have an origin in a variety of process mapping tools that provide the user with a static view of the processes being studied. Some of these tools provide basic calculations of process times. Other, more sophisticated tools allow attributes to be assigned to activities and enable some sort of process analysis. However, most of these tools are *not* able to conduct *"what if"* analysis and show a dynamic change of business processes and evaluate the effects of stochastic events and random behaviour of resources, which is possible by using simulation models of business processes. Simulation software tools are able to model dynamics of the processes such as the build up of queues, which then can enhance generating the creative ideas on *how* to redesign the existing business processes. It is apparent that there is a lack of comprehensive, scientifically established design methodology to structure, guide, and improve business process modelling efforts. Many authors argue that one of the major problems that contribute to the failure of business process change projects is a lack of tools for evaluating the effects of designed solutions before implementation (for example, Paolucci *et al,* 1997, Tumay 1995).

## THE IMPORTANCE OF BUSINESS PROCESS MODELLING FOR BPR

Dynamic models of business processes can help overcome the inherent complexities of studying and analysing businesses, and therefore contribute to a higher level of understanding and improving these processes. In terms of the business environment, business process models usually focus on the analysis of specific aspects of an organisation, such as manufacturing or finance.

There are relatively few examples of using simulation (as an example of dynamic business process modelling method) available in the literature. In one of articles related to business process simulation, authors (Tumay, 1995) discovered that over 80% of BPR projects used static flowcharting tools for business process modelling. Static modelling tools which are predominately used are deterministic, and do not enable evaluating alternative redesigned processes. The use of business process modelling tools is usually focused on modelling current business process, without a systematic approach to evaluating business process alternatives. On the other hand, simulation models can incorporate and depict dynamic and random behaviour of process entities and resources. A physical layout and interdependencies of resources used in processes under consideration can be shown visually, and the flow of entities among resources can be animated using simulation as a modelling tool.

Simulation models provide quantitative information that can be used for decision-making, and can be regarded as problem understanding rather than problem solving tools. A simulation model can be easily modified to follow changes in the real system and as such can be used as a decision support tool for continuos process improvement. Simulation models can capture the behaviour of both human and technical resources in the system and can incorporate the stochastic nature of business processes, and the random behaviour of their resources. Simulating the effects of redesigned processes before implementation improves the chances of getting the processes right at the first attempt. For example, visual interactive simulation models together with a variety of graphical output reports can demonstrate the benefits of redesigned processes, which is useful for business process re-engineering approval, and models could also be useful for focusing "brainstorming" meetings, where various new ideas can be tested using a simulation model, and informed decisions can be made on the basis of model results.

This special issue brings together a number of leading experts across Europe who have worked extensively in the area of business process modelling. These authors present their expert views on the modelling aspects of BPR and the potential of discrete event simulation for developing business process models in general. The reader is provided with the insight into current

approaches and issues relevant for improving the success of BPR through developing models of business processes before implementing their changes.

This special issue starts of with *Giaglis et al.* presenting an analytical framework and a development method for inter-organisational business process modelling. The paper presents a business process modelling approach for addressing the problem of predicting the implications of ongoing transformations in industries through the combined effect of technological advances and new business opportunities. An analytical framework and model development guidelines have been proposed. The paper also presents a case study in the media sector to highlight how the proposed method can be utilised to identify transformations in advertising practices in the evolving market of digital television.

*Bosilj-Vuksic et al.* then present a methodology that responds to some of the problems organisations are faced with in their BPR projects. An example of "business to business" electronic commerce process modelling using simulation tool iGrafx Process is presented. The main objective of the paper was to investigate some potential benefits and outcomes of introducing new processes that could be assessed in advance by using simulation modelling.

Then, *Eatock et al*, argue that advocates of Business Process (BP) approaches believe that the real value of IT is that it provokes innovative changes in business processes. They postulate that despite the fact that many BP and IT academics and practitioners agree on this idea, BP and IT design are still performed separately. The paper then describes the ASSESS-IT project, which examined this domain and proposed the use of simulation techniques to achieve BP and IT integration. The outcome of this project gives indication that describing the dynamic behaviour of IT could be very helpful for BP modellers in predicting the impact that the insertion of IT may have on organisational processes. The rationale of the simulation framework used in the ASSESS-IT project and analysis of the results obtained when applying this framework to a case study are presented. The paper also reflects about the advantages and limitations of this approach and identifies possible areas for further research in this domain.

*Kovacic et al.* discuss business renovation efforts and some aspects of the business process and information modelling. Renovation is presented as the key element of e-business orientation and as the highest level of strategy for managing change that usually cannot be handled by continuous improvement and traditional reengineering methods. The paper also presents different business rules categories and discusses the relationships that exist between business rules and other business-related concepts addressed in business process modelling.

Subsequently, *Patel* and *Hlupic* compare dynamic modelling (using discrete-event simulation) with static modelling techniques. The comparison is based on modelling processes related to a helpdesk of a large multinational company using both static and dynamic modelling techniques. The results obtained from both techniques are compared and discussed.

Finally, this special issue, dedicated to Business Process Modelling, concludes with a paper written by *Nikolaidou et al*. In this paper, the authors present a case study of modelling and automating business processes in the Loan Monitoring Department of a medium-sized Bank. Business process modelling was conducted using the Modified Petri-Net (MPN) model, which allowed the description of ad-hoc and collaborative business activities. Business process automation is also described. The automation was performed using Lotus Domino/Notes groupware platform. The direct mapping and support of MPN main entities within Notes environment ensured the accurate and complete implementation of all business processes and reduced significantly programming cost. Loan Management System has been described as the integrated environment build to support loan monitoring activities. Authors' experience with this study and the potential of the business process modelling and automation approach are also presented.

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