Dynamic Business Process Modelling Using ARIS

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Abstract:
In order to survive in highly competitive business environments, companies have to continuously change their business processes. It is apparent that developing dynamic models of business processes prior to their change could increase the success of reengineering projects. This research investigates a suitability of business process modeling tool ARIS for dynamic modeling of business processes. Information system modelling and simulation modelling are discussed from the business process change perspective. An example of business process modelling in Croatian insurance company is provided.

Keywords: business process modelling, simulation modelling, Information System modelling, ARIS, Croatian insurance company.

1. Introduction

Competitive conditions and pressures on global market are forcing companies to search for strategies of streamlining the entire value chain. To compete effectively, companies must structurally transform its internal and external processes. These goals could be reached by renovation of business processes.
One of the important methods in the implementation of business processs change is information system modelling. Awareness of IT capabilities should influence the design of business processes. In addition to investing in information technology, a new type of information systems models should be designed. The dynamic structure of information systems demands the implementation of process-oriented methods and tools.
Prior to business process change, companies need to assess the costs needed for setting up and maintaining the necessary infrastructure and applications, and they need to compare it with the expected benefits. Although the evaluation of alternative solutions might be difficult, it is essential because it reduces some risks associated with business process change. Simulation has an important role in modelling and analysing the activities in introducing business process change since it enables quantitative estimations of influence of the redesigned process on system performances (Bhaskar et.al, 1994; Van Ackere, et.al, 1993) .
The main objective of the paper was to develop a simple simulation model of insurance business process that could be used to evaluate the potential benefits and constraints of dynamic business process modelling. A relationship between simulation modelling and information system modelling is described in Section 2. Business process modelling tool ARIS is presented in Section 3. An example of modelling insurance processes is provided in Section 4. The applicability of simulation modelling and evaluating alternative business process strategies is investigated. Finally, Section 5 outlines the main findings of this research and provides concluding remarks.

2. Simulation Modelling and Information System Modelling: a Framework for Business Process Change

Process modelling is one of the most cost-effective and rewarding ideas to come along in years. As noticed by (Hommes, van Reijswound, 2000) the increasing popularity of business process modeling results in a rapid growing number of modeling techniques and tools. Many different techniques can be used for modelling business processes in order to give an understanding of possible scenarios for improvement (Eatock et.al, 2000), Flowcharting, IDEF0, IDEF3, Petri Nets, System Dynamics, Knowledge-based Techniques, Activity Based Costing and Discrete-Event Simulation. In order to realize the expected impacts of business process change, most of companies use simple accounting techniques (Activity Based Costing Analysis or Return on Investment) or static process modeling techniques, which have not the advantage of capturing the dynamic characteristic of business processes.

2.1 Business Process Change and Simulation Modelling

According to Curtis et al. (1992), a modelling technique should be capable of representing one of more of the following modelling perspectives: functional (represents what activities are being performed), behavioural (represents when and how activities are performed), organizational (represents where and by whom activities are performed) and informational (represents the informational entities – data). Business processes change involves changes in people, processes and technology over time. As these changes happen over time, simulation appears to be a suitable process modelling method. Deeper analysis of simulation modelling techniques suggests that these are suitable to address at least the functional, behavioural and organizational perspectives (Banks, 1997).

Kettinger et. al. (1997) mentions simulation as one of the modelling methods in their survey on business process modelling methods. Reasons for introducing simulation modelling into process modelling can be summarized as follows: simulation enables modelling of process dynamics, influence of random variables on process development can be investigated, anticipation of business process change effects can be specified in a quantitative way, process visualization and animation are provided, communication between clients and analyst is facilitated by simulation models. The final reason for using simulation modeling is the fact that it can be increasingly used by those who have little or no simulation background or experience (Irani et al, 2000).

2.2 Business Process Modelling and Information System Relationship

Modelling business processes consists of the following phases:

- examining and modelling the organizational structure;
- examining and modelling the existing business processes (“AS-IS”) and creating a base of the company's business processes;
- verifying business processes;
- analysing weak points;
- modelling advanced business processes (“TO-BE”).

Modelling the existing situation allows for the process to become clear and available to each employee. The basic advantage of this phase is the unified look at business processes which frequently lead to the creation of new ideas on how to advance the processes. Commonly, while documenting the processes, redundancies and illogical areas are revealed in the existing business processes, which were either not clearly visible earlier, or had been interpreted differently. In that case, advancements are integrated into the existing state. Certain analyses show that up to 80% of process advancements are defined in the phases of modelling the existing status (Sikavica and Novak, 1999). At the end of this phase, a database of business processes in the company is created.

After the model of advanced business processes is created, it is necessary to measure the objects of the process in order to see the efficiency of the proposal. Following implementation, the altered business processes need to be constantly monitored. Beginning with static controls of the process, which track the stability of the process through a large number of dynamic analyses including simulation which investigate costs of operations to determining satisfaction levels of internal and external customers, as well as the

owners of the process, and the employees and deliverers of the process.
In order to manage business processes, we need to document, analyse and model them. Information technology permits us to feed the described (modelled) business processes into databases adapted for the storage of business process models. Such a database is a key resource for management in making strategic decisions on their own organization.
In the majority of cases, the analysis of business process models is based on hand entered parameters such as time required to execute a given function, waiting time, availability and utilization of resources, etc. In cases where the business processes are supported by information systems, there is a transaction base which contains data on the processes, and it is necessary to develop an interface for the business process database, and to develop components with the task of exporting data from the production databases of a given information system and importing that data into the analytical bases, that is, to give parameters to the business process database.
In this way, the simulated process can be altered in a stepwise fashion, enriching the process model with the essential parameters in the beginning, then gradually measuring and testing simulation models by enriching the simulation and bringing it closer to the true level of operations. Such an enriched model provides us with the option of uncovering weaknesses in the process, not only in a linear fashion, but also provides us with the opportunity of monitoring the process over a certain time period. Such a model reveals ‘bottlenecks’ in the processes and optimises the required resources. It is evident that dynamic analysis (simulation) is focused on analysing the process under strain. The process created through simulated modelling permits a detailed understanding of the course and interdependence among processes.

3. Business Procss Modelling using ARIS

The web-based ARIS (Architecture of Integrated Information System) version 6.1 of IDS Scheer offers various functionalities for designing, analyzing, implementing and optimizing business processes. ARIS integrates business processes database and disposes of a browser enabled Front-End. This means platform independence for users, worldwide availability, high scalability and low administration costs (Scheer, 2002; IDS Scheer, 2000). Knowledge about company processes is stored in the ARIS database objects. Using the ARIS Toolset the enterprisebusiness processes are analzyed and described. Each object is defined through different perspectives (organization, function, data and process view) and attributes which could be used as the input parameters for ARIS Simulation, ARIS ABC (Activity Based Costing), and ARIS BSC (Balanced Scorecard) tool. Since ARIS Simulation is fully integrated in the ARIS Toolset, the data relating to the processes, recorded in the ARIS Toolset could be used as a basis for the simulation of business processes. This simulation supplies information about the executability of processes, process weak points and resource bottlenecks. There is also the interface toward CASE tools (ORACLE Designer 6i), Workflow management tools and project management tools.

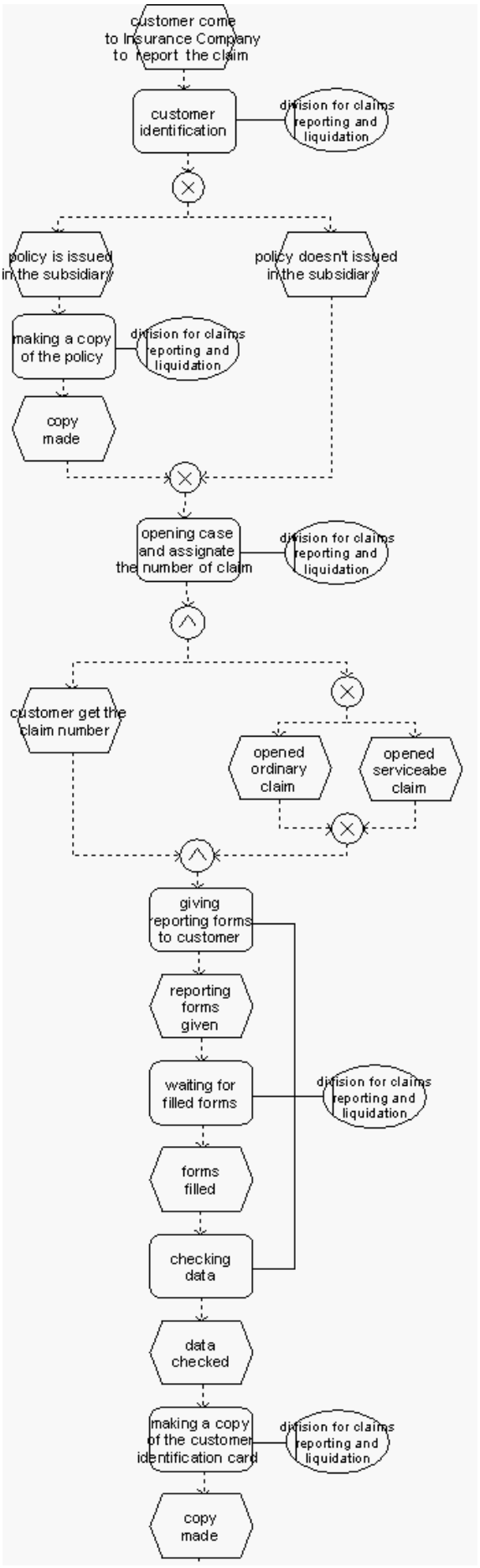
4. Case Study of an insurance company

This case study shows the establishment of a single repository of business processes through the example of an insurance company, with the help of the tool ARIS Toolset – ARIS Easy Design. A model of the company organizational structure was created, as were models of the business processes of the insurance company at several levels. A comprehensive database of the company's business processes was created. Following this, a system of managing business processes was implemented, namely, metrics and analysis were conducted on those processes. The creation of such a system clearly defines priorities and the best way on how to informationalize operations.

4.1. Simulation models for damage claims

Figure 1 shows the model of the business process of damage claims for comprehensive automobile insurance. This model represents the final level to which this segment of business operations can be modelled. In addition to the basic model of business processes in which simulations were made, the following models were also created:

- Organizational chart to map the resources available for the process (organization view)
- Shift Calendar
- Process installation model to specify frequency and distribution of the process



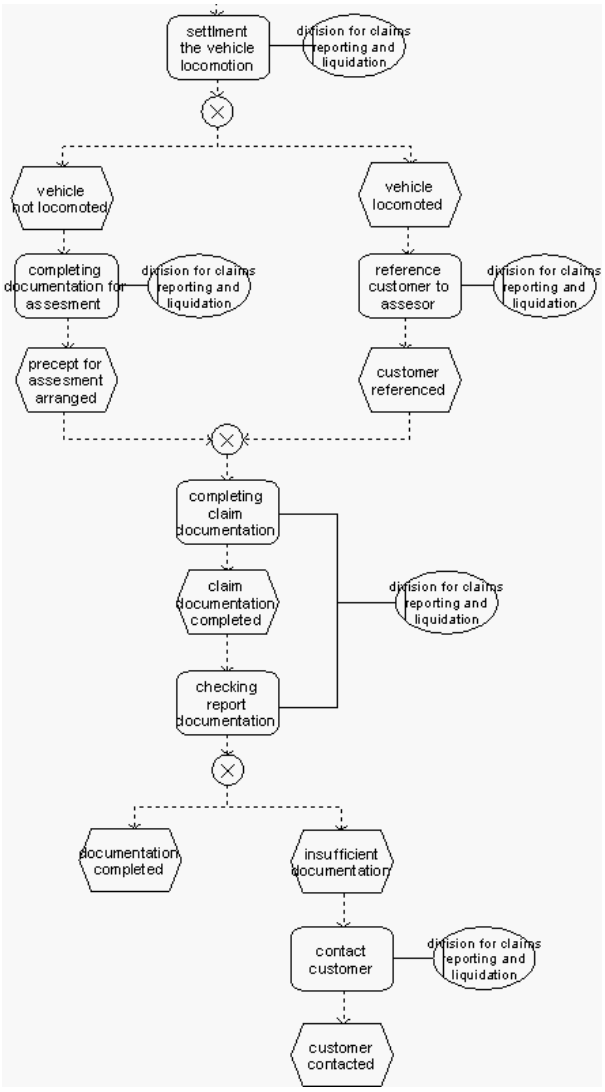


Figure 1: "AS-IS" model of business processes of filing damage claims for comprehensive automobile insurance

In the extended Event-driven Process Chain (eEPC) model, the attributes required for the simulation were defined. The frequency of appearance of the starting event (process trigger) was determined.

For each function, the following was established:

- Static time – a time when the function cannot be processed, even if all required personnel and material resources were available (for example waiting for documents to be printed),
- Orientation time or warm-up period,
- Processing time,
- Capacity of resources (i.e. number of employees)
- Conditional events – probability (in %) that a certain event will occur triggered by the logical operator OR.

After this, the parameterized model was transformed into simulation model.

4.2 Simulation Results of business processes of filing damage claims for comprehensive automobile insurance

The simulation results are presented both in table and figure form. The data (Tables 1 and 2) show the results received in the simulation of models of business processes of filing damage claims for comprehensive automobile insurance at the company office, with the assumption that 40 claims are made daily, and 4 operators receive the claims. The data were obtained from the company's information system database.

Number of created processes	1
Number of finished processes	1
Number of executed functions	10
Static wait time sum	0000:00:02:46
Orientation time sum	0000:00:02:00
Processing time sum	0000:00:34:55

Table 1: Simulation results (Number of runs =1, Resoruce capacity=1)

Number of created processes	40
Number of finished processes	40
Number of executed functions	458
Static wait time sum	0000:02:03:34
Orientation time sum	0000:02:32:00
Processing time sum	0000:23:33:37

Table 1: Simulation results (Number of runs =40, Resoruce capacity=4)

Analysis indicates that the average amount of time spent processing each claim is 34 minutes and 50 seconds, and that this process needs improvement in order to reduce the time required to file a claim. The simulation results also showed that each individual claim administrator is utilized at 80%, and considering that the claims administrator also receives claims from other types of insurance, his utilization in the receipt of comprehensive insurance claims is too high.

4.3 "TO-BE" model of business processes of filing comprehensive insurance claims

The proposed model is based upon the development of an information system which will enable electronic operations, that is, filing claims over the Internet (Figure 2).

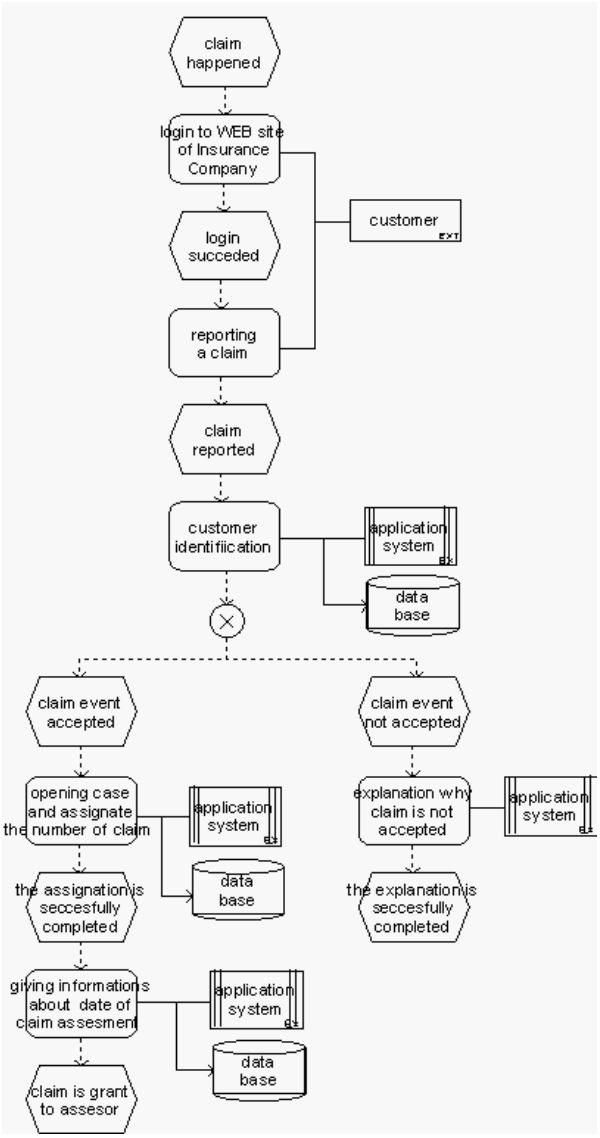


Figure 2: "TO-BE" model of business processes of filing damage claims for comprehensive automobile insurance

In the proposed model, claim filing would take approximately 10 minutes, without the participation of an administrator (the damage claim is filed by the insured using Internet technology and the company's information system), with the ability to receive claims 24 hours per day, 7 days per week. The significant advantage for the insured is the direct departure of the claims assessment officer (with the elimination of the previously required step of visiting the insurance office).

In addition to cutting the time required to process damages, this model also reduces the cost of operations, due to reduction in the use of standing resources (claims administrators) and the elimination of paper documentation, in

addition to the implementation of technology for automatic document management (DM). The complete documentation is collected, stored and processed in digital format. The new model permits for rapid and efficient two-sided communication between the insured and the insurer, and the availability of information for the insured (tracking the status of the claim). Furthermore, improving the quality of services influences the company's rating on the market.

The costs of replacing the existing information system and creating new applications should not be significant, considering that the existing information system is already based on Internet technology (companies' intranet has already been developed). The success of the proposed model would depend mostly on external factors: on the number of Internet users in Croatia and on their knowledge and affinity for using Internet based business services. The assessment is that in the starting phases no more that 10-15% of users would use the Internet claim filing system, while the number of users that would track the status of theirs claim via the Internet would be substantially greater. Since the model is in the phase of implementation, the benefits and the results should be explored through further research.

5. Conclusions

Successful world companies are under constant pressure to increase profits and to take increasing market shares. In order to succeed in that goal, they must frequently adapt their business models, and with them, their business processes. To do so, they use software tools for modelling business processes, which integrate components for dynamic modelling and measuring the performance of the processes. Furthermore, they are connected with tools for developing information systems, which substantially decrease the time required to create the company's information system and to permit fast and simple tracking of operations. These possibilities are shown in this study with the example of the ARIS tool. Since nowadays, the majority of Croatian companies are involved in ERP systems development, this case study could serve to adopt a process centric approach introducing business process modelling standards and rules and developing information systems modelling standards based on integration with dynamic business process modelling tools and techniques. With the application of such a model, Croatian companies could approach world business trends and enter into world market flows.

References:

1. Banks, J., Carson, J.S. and Nelson, B.L. (1997), Discrete Event Simulation, Prentice Hall, New York.
2. Bhaskar, R., Lee, H.S., Levas, A., Petrakian, R., Tsai, F. and Tulskie, B. (1994), "Analysing and Reengineering Business Processes Using Simulation", in: J.D. Tew, S. Manivannan, D.A. Sadowski and A.F. Seila, ed., Proceedings of the 1994 Winter Simulation Conference, Lake Buena Vista, Florida, USA. pp. 1206-1213.
3. Curtis, W., Kellner, M.I. and Over, J. (1992), "Process Modelling", Communications of the ACM, 35, 9, pp. 75-90.
4. Eatock, J., Giaglis, G.M., Paul, R.J., and Serrano, A. (2000), "The Implications of Information Technology Infrastructure Capabilities for Business Process Change Success". In: Henderson, P. (Ed.), *Systems Engineering for Business Process Change*. Springer-Verlag, London, pp. 127-137.
5. Hommes, Bart-Jan, Van Reijswoud, Victor (2000), "Assessing the Quality of Business Process Modeling Techniques". 33rd Hawaii International Conference on System Sciences, Vol. 1, January 4-7, 2000, Maui, Hawaii.
6. IDS Scheer (2000), "ARIS Methods Manual; Version 5", Saarbrücken.
7. Irani, Z., Hlupic, V., Baldwin, L.P. and Love, P.E.D (2000)., "Re-engineering manufacturing processes through simulation modeling", Logistics Information Management, Vol. 13, No. 1, pp. 7-13.
8. Kettinger, W.J., Teng, J.T.C., and Guha, S. (1997), "Business process change: a study of methodologies, techniques, and tools", MIS Quarterly, 21: (1), pp. 55-80.
9. Scheer, A.W. (2002), "Business Process Excellence , ARIS in Practice" , Springer-Verlag, Berlin Heidelberg.
10. Sikavica, P. and Novak, M. (1999), "Poslovna organizacija", Informator, Zagreb.
11. Van Ackere, A., Larsen, E.R. and Morecroft, J.D.W. (1993), " Systems Thinking and Business Process Redesign: an Application to the Bear Game", European Management Journal 11, pp. 412-423.