Towards E-Government in Slovenia
The Role of Business Process Management

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INTRODUCTION

E-government is the execution by electronic means of interactive, inter-organizational processes and represents a shift in business doctrine that is changing traditional organizational models, business processes, relationships and operational models that have been dominant in the public sector in the past decades. The new doctrine of e-government requires organizations to integrate and synchronize the strategic vision and tactical delivery of services to its clients with the information technology and service infrastructure needed to meet that vision and process execution. In the next few years, successful countries will restructure their public sector, process and technology infrastructure for successful e-government execution.

Past experience in introducing e-government in the most developed countries (Singapore, Canada, Australia, New Zealand…) in this field has shown us that the root of the problems, which have to be solved in introducing e-services, has moved from the technological into the organizational and process domain (Government Centre for Informatics, 2002). The essence of e-government is to radically change the ways and mechanisms of operating administration and, as a result, also basic principles, on which these mechanisms have been developing in the last decades or even centuries. Therefore, the business renovation (BR) or business process renovation methods should be used in the framework of e-services introduction. BR integrates radical strategic method of Business Process Reengineering (BPR) and more progressive methods of Continuous Process Improvement (CPI) with adequate Information Technology (IT) and e-business infrastructure strategies. Process renovation is a re-engineering strategy that critically examines current business policies, practices and procedures, rethinks them through and then redesigns the mission-critical products, processes, and services (Prasad 1999). The simulation of business processes is suggested for use in BR projects as it allows the essence of business systems to be understood, the processes for change to be identified, process visions to be developed, new processes to be designed and prototyped and the impact of proposed changes on key performance indicators to be evaluated (Greasley and Barlow 1998).

In our paper a case study of business process modelling and simulation usage in the field of e-government enrolment in Slovenia is presented. In the Section 2 the role of BR in current efforts and plans for e-government enrolment in Slovenia are presented, followed by Section 3 in which a business rule-transformation approach to business renovation and the value of simulation modelling in BR projects are briefly discussed. The main part of the paper is Section 4, where the case business renovation project in one of the Slovene Ministries is presented. Benefits and problems of the simulation modelling usage in such projects are analysed and presented.

THE E-GOVERNMENT STRATEGY IN SLOVENIA AND BR

By adopting the "Strategy of E-commerce in Public Administration for the Period 2001-2004, SEP-2004" (Government Centre for Informatics 2001), in February 2001, the Government of Slovenia has defined the primary strategic orientations for the next essential phase of informatisation of public administration, which is the development of e-government. As a result, Slovenia is following a

number of most developed European countries, which are approaching the accelerated development of e-government in a similar way.

Although, as a result, Slovenia has started a new developmental cycle of technological modernization of administration and have launched a number of new projects, we have concluded that development is not progressing as planned and expected. This is not only a problem in Slovenia, but based on analyses carried out in EU, also a problem in mostly all other countries (Government Centre for Informatics, 2001). Due to the lack of experience in most cases, plans and deadlines for introducing e-government were in all places too optimistic. After a year or two, we can see that in most countries it was relatively easy to achieve the first (information) stage, which refers to the introduction of information services, as this step does not require specific changes in internal operations of administration and in business processes and procedures (Government Centre for Informatics 2001). Much more complex is the introduction of more demanding, so-called transaction services, which enable all phases of a selected administrative procedure or process to be executed electronically. As a rule, this requires a complete renovation of administrative operations, internal business processes and procedures, the integration of registers and public databases, the alteration and completion of material legislation and the development of new organizational regulations, classifications, and standards. At this point, the development of e-government in most developed countries has come to a standstill, which is evident from viewing web portals of these countries. We can find very little transaction services. The same has also occurred in Slovenian public administration.

Problems, which need to be solved as soon as possible, are, in a minor sense, of technological nature. They predominantly extend to the internal renovation of administration operations, its reorganization, greater process orientation and close coordination and cooperation among various departments, and even branches of power (executive, legislative, and also judicial). It has to do with deep structural changes in the operation of administration, which will be successfully and quickly implemented only with a total and well-considered approach, as used in the modernization and reformation of administration up to the present. BR projects should be focused on all related key business elements: business processes, people and finally the technology. E-government is not only enabling the redesign of internal organizational processes, but is extended into inter-organizational processes.

Within the framework of development of a new "organizational paradigm", which will be based on the operation of e-government, all State Bodies and other institutions from the public sector will have to analyse in detail all (action and other) administrative procedures and processes and renovate them in accordance with defined starting points and principles of development of e-government, and the possibilities that information technology can offer as soon as possible.

BPR is an organizational method demanding radical redesign of business processes in order to achieve better efficiency, quality and more competitive production (Hammer and Champy 1993). It is also a method of improving the operation and therefore the outputs of organization (Kettinger and Grover 1995). It means analysing and altering the business processes of the organization as a whole. BPR was the buzzword of the mid-1990s, and although there were plenty of successes, there were many more failures (Hammer and Champy 1993). To many, BPR remains a dirty word, bringing back memories of head count reductions, budget cuts, facility closures, expensive consulting engagements and endless reorganizations that destroyed morale and confused employees, partners and customers. By the time it was recognized that successful BPR required careful change management, the damage was done. The BPR craze encouraged organizations to focus on internal process. Today, the e-business craze has reinvigorated interest in process, this time on a grander scale that spans organizations. The difficulties of formulating and adopting new process, a lack of cooperation between vendors, and the sheer difficulty of interorganisational coordination will likely lead to yet another era: the era of e-business.

Many leading organizations have conducted BPR in order to improve productivity and gain competitive advantage. A study by Dhaliwal (1999) showed that about 50% of firms surveyed in

Singapore (in some cases comparable to Slovenia) were engaged in BPR projects, with 37% of the firms indicated their intention to take up BPR projects in next few years. However, regardless of the number of companies involved in re-engineering, the rate of success in re-engineering projects is slightly over 55%, however, European organizations are less successful with the average success rate less than 50% (Al-Mashari et al. 2001). 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, shortage of creativity in process redesign, the level of costs incurred by implementing the new process, or inability to recognize the dynamic nature of the processes. Business renovation projects deal with more than just business process reengineering.

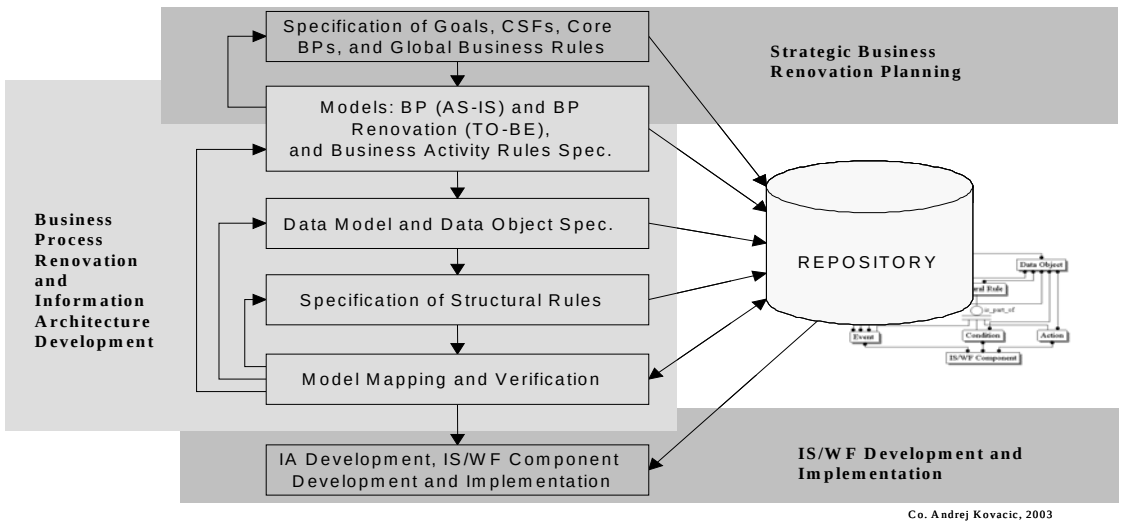
Business process reengineering remains a buzzword that brings back memories of head count reductions, budget cuts, facility closures, expensive consulting engagements and endless reorganisations that destroy morale and confuse employees, partners and customers. Besides the business process, business renovation (BR) projects should also include new technological options as well as different organisational, economics and social views of organisations (Davenport, 1993; Miller et al., 1994).

BUSINESS RENOVATION APPROACH, BUSINESS PROCESS MODELLING AND SIMULATION

In this section we provide the Business Renovation Approach (BRA) as an iterative methodological framework that incorporates the best practices of more than 10 business renovation projects conducted in Slovenia (Kovacic, 2003). BRA incorporates certain fundamental principles that are already known in business system planning, business process reengineering, and the IS development environment: business rules and business activity meta-model, iterative development and prototyping. It exploits 'contingency theory' and some advanced ascertaining of existing business-rule approaches (Ross, 1999; O'Regan and Ghobadian, 2002; Perkins, 2002; Kovacic, 2004). In other words, the impact of information technology (IT) on business performance is contingent on whether organizational processes, such as business renovation, have also been implemented. Specifically, doing more business renovation increases the return on investing in IT. In terms of BRA, IT and business processes are viewed as complementary factors, they must be changed in a co-ordinated way to improve performance. BRA uses an abstraction approach focusing on *business processes, business rules and data* in a system from which all knowledge of the business derives.

BRA planning, development, and the implementation process, as seen from the developers' point of view, can be divided into several iterative development phases, as follows (Figure 1): Strategic BR planning; Business process restructuring and IA development, and Information system/WorkFlow (IS/WF) development and implementation.

Figure 1 Business Renovation Approach: phases and results



Strategic BR planning

Strategic planning focuses on the direction of the organization and actions necessary to improve its performance Researchers recently demonstrates that CSF concept is interpretive in character and as such it may be employed for research on the system development process. In extended CSF approach, which is derived from the Pareto's Law (the philosophy of the "80/20"), CSF method of strategic control (van Veen-Dirks and Wijn, 2002), and some ascertaining of the business rule approach, the first steps are to establish the goals and objectives of the organisation as a whole, and determine its business strategy. The next step is to generate the critical success factors required to realize this strategy. This is done by electing critical information set from the top management and the key staff. The data obtained from the interviews and other sources is further refined and prioritised through group sessions during which the core business processes (CBPs) and key performance indicators (KPIs) are agreed. Core business processes are those with the highest total impact on the level of performance, and by management team opinion essential to fulfil the mission, goals, and CSFs of the organisation. The strength of using CSFs is that they provide the important link between the business strategy, business process renovation strategy and the information system development strategy. To be able to establish this link extended CSF approach, additionally to present results, recognizes and determines two distinct results: the key *information requirements* of top executives and business rules or business statements relating to overall business (*Global rules*). Information requirements and global rules should be written in business language. They should be concise and clear. They should state business requirements, not system requirements (Perkins, 2002). All these results are captured in the *rule repository* and used in next phases of BR methodology.

Business Process Renovation and Information Architecture Development

Many different methods and techniques can be used for modelling business processes in order to give an understanding of possible scenarios for improvement. IDEF, eEPC, Petri Nets, System Dynamics, Knowledge-based Techniques and Discrete-Event Simulation are only some examples of widely used business process modelling techniques.

Process modelling tools should be able to develop AS-IS and TO-BE models of business processes, which represent both existing and alternative processes. During this project phase the information architecture is defined. Information architecture is the planning, designing and constructing information blueprint that covers the business process rules on the activity level, and satisfies the informational needs of business processes and decision-making. It is derived from TO-BE business process model and the strategic business process renovation plan orientations. The results of the business renovation and information architecture development phase are company's *TO-BE business process model* (Process Architecture), *global data model* (Data Architecture), and *technological/organizational foundations*. Business process model consists of a profile of major business activities performed, how are they triggered (business events), they flow in a sequence and how are they executed (activity rules), and finally the data which is transferred from one activity to the next. Process modelling is a necessary prerequisite to the data modelling, and needs to be iterative, with well-defined deliverables. Here, and also in the further development of information architecture, rule "80/20" is used. Determination of the global data model or data architecture is the next step in information architecture development. Global data model is presented as Entity-Relational model containing company's major data entities and business rules in between them. It reflects global information needs of the company (van Veen-Dirks and Wijn, 2002).

Simulation has an important role in modelling and analysing the activities in introducing BR since it enables quantitative estimations to be made on the influence of the redesigned process on system performances (Bhaskar et al. 1994). The reasons for the introduction of simulation modelling into process modelling can be summarized as follows: simulation allows for the modelling of process dynamics, the influence of random variables on process development can be investigated, re-engineering effects can be anticipated in a quantitative way, process visualization and animation are

provided, and simulation models facilitate communication between clients and an analyst (Bosilj-Vuksic *et al.*, 2003). The final reason for using simulation modelling is the fact that it can be increasingly used by those who have little or no simulation background or experience (Irani et al. 2000).

IS/WF Development and Implementation

In the phase of IS/WF development we presume that company's TO-BE business process model and global data model developed in previous stage contains its major business rules and information needs, and is a suitable foundation for further development activities. Those activities depend on the company's IS/WF development and implementation strategy.

Some of the benefits using BR approach can be directly evaluated and predicted, but others are difficult to measure (intangible benefits). This research investigates some of the benefits and outcomes of introducing new processes (time savings, workload reduction and increased throughput) that could be measured in advance by simulation modelling.

BUSINESS RENOVATION PROJECT AT THE MINISTRY OF EDUCATION, SCIENCE & SPORT

The Business renovation project at the Ministry of Education, Science and Sport (Ministry) started due to internal and external factors. Internal factors that caused business renovation were the integration of two ministries, Ministry of Education and Sport and Ministry of Science and Technology into the Ministry of Education, Science and Sport, versified business processes that were not well defined and duplication of activities. Externally, the Slovenian government that started the anti-bureaucratic program on the governmental level has stimulated the project. The goal of the program is, according to Action Plan E-government Up to 2004 (Government Centre for Informatics, 2001), to remove inefficiencies in business processes, to change organizational structure and to introduce suitable information technology that will support renewed business processes. The Business renovation project has three main phases:

- Identification of key business processes and their modelling;
- Analysis of key business processes on the basis of their models;
- Modelling renewed processes and proposing organizational changes.

The project started with formation of project group consisted by members from the Ministry and consultants from Business Informatics Institute (BII), Faculty of Economics, Ljubljana. In the workshop, five key business process groups were identified by discussion and brainstorming: (1) Strategic planning, (2) Working program preparation, (3) Laws and provisions preparation, (4) Financial processes, and (5) Administrative processes.

The processes were modelled by interviewing people from the Ministry who perform the activities. This phase of the project was very difficult and lasted for almost six months and models had to be changed several times. Since the scope of the project is too big for the presentation in the paper, only a fragment, subprocess "Promotion of the employees in education to a higher professional title of Administrative processes at General Affairs and Human Resource Service", will be shown in the next section.

In this study, iGrafx Process software was selected as the tool for business process and simulation modelling using the Process Maps technique. Process Maps are commonly used by many organizations, especially for business process analysis and modelling. They represent the standard modelling and analysis method for enterprise engineering and support particular reengineering activities such as simulation modelling. One of the major advantages of Process Maps is that little training is required for people to create and evaluate the process models (Chen 1999). Process Maps used by iGrafx Process provide a graphical interface to a behavioural modelling system, which requires no knowledge of a programming language; even unskilled people in business process

modelling can easily understand and use this technique. Another major advantage of this technique is that it helps to identify the crossing of organizational boundaries, as it shows which organizational unit is responsible for each activity.

The experience of using different business process modelling and simulation tools (ARIS, Income, iGrafx Process) in our research practices shows that due to the high insensitivity of communication with employees, simplicity and understandability could be assumed as one of the most important advantages of the modelling technique. In addition to its simplicity, iGrafx Process was selected as it integrates powerful and complete discrete-event simulation functions. Despite the advantages of iGrafx Process, some disadvantages have to be mentioned:

- There is no business process repository and business objects repository.
- There is no interface or tool to support the transformation of business process maps to information systems modelling tools (e.g. CASE tools).
- iGrafix does not provide realistic animations as some other simulation tools do.

Promotion of the Employees in Education to a Higher Professional Title

The Administrative processes group includes some of the most frequently executed processes and are therefore very interesting for a detailed examination and analysis in the BR and informatisation project as significant improvements in efficiency can be expected.

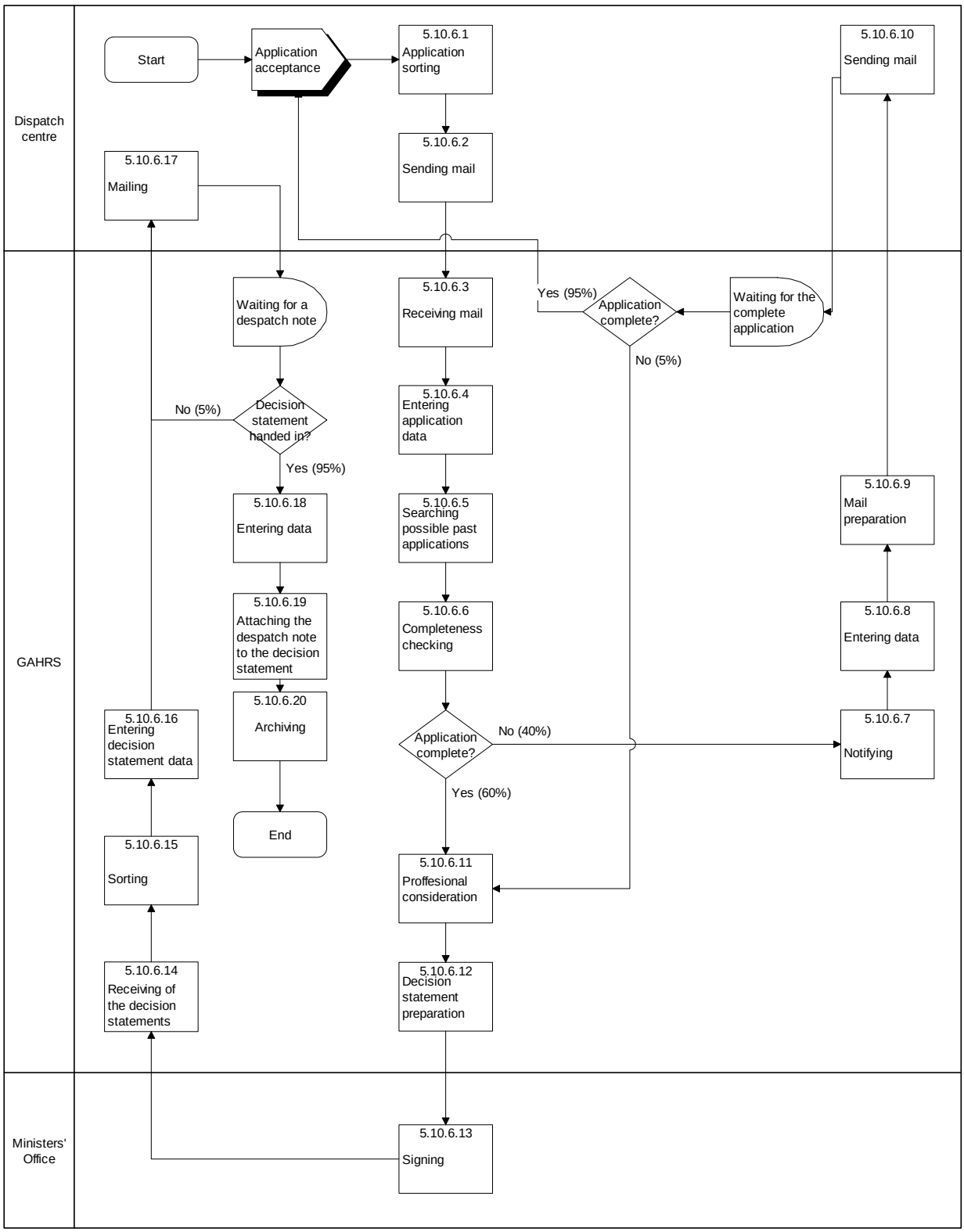
This group consists of more than 30 processes, however some of them are of the same type, but for different areas (e.g. elementary schools, high schools, universities) and therefore their substantial activities are executed in different departments. In the first phase of the analysis we have examined some processes with the highest application frequency in more details. One of them is "Promotion of the employees in education to a higher professional title" (Figure 2) which has about 2500 applications per year. The rate of complete application is 60%, after the completion of incomplete application this rate is 80%. The owner of this process is the General Affairs and Human Resource Service (GAHRS), where four officers (users) professionally execute the application. The applications are always accepted only in dispatch centre. The application state is recorded four times, always twice: manually and using a computer program. The Minister signs the decision statement.

Analysis of the simulation results

The simulation of the process that we have carried out showed that the mean execution time for one application is 49 days. The effective work time is less than one day. The rest of the time is the delay in the process (signing, transfers of documentation, waiting for the completion of the application etc.). One of the important benefits of using simulation in BR projects is the possibility to discover which inefficiencies are worth to deal with, as for some changes a lot of effort is required.

In the analysis two different waiting times have to be observed: the one that the Ministry cannot change (e.g. waiting for the complete application) as they depend on the regulations and on the customer (applicant) behaviour and the delays that can be decreased by the improved organization and process flow. The former type of waiting times represents 40% of the total waiting time or 38% of the total cycle time. A great part of the delay is caused by the relatively high rate of incomplete applications. As shown by the simulation with a changed scenario, with no incomplete applications the average cycle time would decrease from 49 to 41 days. Therefore it would be worth to put some effort to better inform the customers about the process itself. What can be also observed is those highly educated professionals spend a lot of their working time on administrative work, such as searching possible past applications etc. Some changes in the process have already been implemented, for example the Minister has authorized the head of the GAHRS to sign the decision statements.

Figure 2 Promotion of the employees in education to a higher professional title



However, the quantitative results of the simulation experiment as presented in the simulation report, regardless of how precise and detailed the simulation may be, are only one aspect of the business process analysis. Business process maps themselves can frequently show many problems that have not previously been observed.

In the modelling phase, several problems were observed. Beside the problems with data collection presented in the previous section there are also some difficulties related to the tool as not all the situations from the real world can be directly modelled. Some examples are (Tarumi et al. 2000):

- Other predominant processes can interrupt process flow.
- Multiple processes compete for a common resource.
- Many other kinds of exceptions can occur, such as the absence of personnel.
- Human behaviour cannot be predicted (e.g. some persons start tasks as late as possible to meet the deadline).

Due to these stated problems, one must keep in mind that the results obtained when using simulation modelling of business processes should be used cautiously, as the figures cannot be considered exact values. As such, its primary use is in analysis and in understanding the process itself, in observing the problems in process operation (e.g. bottlenecks), in evaluating and comparing alternative scenarios, in supporting decisions on process informatisation, renovation, and in the introduction of organizational changes, etc. It has to be understood that modelling and simulation is a discipline used to promote a deeper and more complete understanding of how things work; it does not provide answers.

CONCLUSION

The results of the simulation show several drawbacks of the existing process, which are the consequence of dysfunctional organizational structure, functional instead of process orientation, unnecessary activities, nonexistent tracking of document flow etc. This can be seen from the low ratio between the effective work time and the mean execution time. The simulation shows also the bottlenecks in the process execution (e.g. Minister's signature), which can be diminished by the process redesign. Apart from the quantitative view on the process, the qualitative analysis of the process simulation also adds value to the understanding of the process and the possible improvements.

The above mention results of the analysis will be used for two purposes:

- The first one is to redesign the existing business processes. The important part of the project is to start thinking about the process orientation instead of functional orientation, well define processes ownerships, and that they start-taking processes as their responsibility. For this purposes efficient tool is visualization of process simulation that efficiently shows the process as a whole.
- Successful e-government implementation requires interconnected and harmonized business process renovation, adequate information technology, and e-government strategy.

The goal of our project is process renovation, examination and reengineering of current business policies procedures and activities before the e-government implementation. We believe the new e-government paradigm can be embraced only by:

- Creating an environment of technology, enlightenment and receptivity;
- Treat this as a holistic organizational transformation, not a technical issue;
- Challenge your core assumptions and value propositions;
- Proactively establish a distinctive Internet presence.

With this case it has confirmed that the analysis and carefully used simulation of business processes is useful since it provides insight view of policies, practices, procedures, organization, process flows and consequently shifts people's minds from functional to process organisation.

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