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## **REENGINEERING AND MODELLING PROCESSES IN ORGANISATIONS**

### **1. Introduction**

Integrated IT systems are used to operate processes of larger organisations in the United States and in the Western Europe countries. These systems are not common in Poland, except for joint-venture organisations. But the intensifying competition among organisations increases demand for comprehensive systems and efficient IT tools that would enable efficient management and optimisation of particular areas of activity.

The effective use of comprehensive IT tools in organisations depends on choosing the right system. There are dozen or so integrated systems for large organisations **and at least several dozens of systems for medium-sized and small organisations; available on the Polish market.** It has become an except difficult task for most of domestic organisations to choose an adequate system and to assess its functional value. It is impossible to compare hundreds or even thousands of system functions with organisation's requirements, i.e. With the specific method of running the business. Therefore, it is necessary to compare users' requirements and the new business running conception worked out in the phase of re-organisation with the desired functionality of the system on a continuous basis. Specialists from companies offering IT systems face a similar dilemma: how to present the potential of a system supporting organisation's business processes in a simple and comprehensible manner?

The task is even more difficult, as potential users of the system not always are able to describe their working environment and their information needs in a precise and clear manner or to word their expectations for the organisation's information system. Similarly, specialists from implementation companies often use enigmatic code words or a jargon of the system-specific terms. Thus, both parties have prob-



lems with finding a common language and translating business needs in a manner that would be comprehensible to IT specialists and vice versa.

## **2. Model as a tool for describing functions and processes**

To put it most briefly, a model is a simplified description of reality, where characteristic, unique, specific qualities of objects, systems and processes, their interactions and similarity of behaviour are used. Thus, the model should reflect (with a high fidelity) objective regularities, characteristic relationships and general rules of functioning of real processes being modeled (or simulated) in the course of process reconstruction or control (see also [Kubiak 1978, p. 95 and following]). The model is used to present problems or phenomena that are interesting to us in a comprehensible manner, which enables one to show the analysed object's or phenomenon's particular features and to omit the remaining features at the same time. Therefore, the model should be:

1) comprehensible, as only a model which is easy to understand will be used willingly. Any complicated models will be abandoned in no time at all;

2) relatively simple and inexpensive to construct. This means that the model should be simple and inexpensive to construct when compared with the cost of the undertaking it is going to be used for. It does not make any sense to build a model otherwise;

3) oriented towards objectives the achievement of which it is going to be used for. Even a comprehensible and simple model may turn out useless, if it describes features, regularities and relationships that are irrelevant and if it passes over relevant features.

The purpose to be achieved with the use of the model is one of more important aspects of process modelling. The modelling purpose determines our perception of processes to a high degree and this affects the form of the model in its turn. One may distinguish three following purposes of process modelling:

- process description, or more precisely, how the work is done in the organisation (e.g.: "this is how the client service process looks like"), in order to show the work to other people (e.g.: "this is how your work affects the client service process"), to create a basis for discussion on processes (e.g.: "this is how we work within the frames of the process");
- process analysis aimed at its improvement. As a result, one may answer the following questions: "What is the average process cycle?", "Are the right people involved in the process?", "Is it possible to achieve any improvement modifying the process in some particular way?", etc. Models built for the process analysis purpose are often a basis for a decision to change the sequence of actions, the responsibilities, the scope of competence;
- process "establishment" – this purpose of modelling was distinguished by Mark Greenwood with emphasis. It mainly appears in places where group work sys-



tems / workflow management exist or are expected to occur. For the workflow to be managed and controlled by the means of Workflow Management specialist software, the processes need to be defined in a form of the system's database. Modelling for the purpose of building a system like this determines the method of work to be invoked and controlled electronically [Ould 1995, p. 96 and following].

Process modelling causes many problems. Depending on the situation and the scale of the undertaking, they may concern various aspects, but the following is significant in almost every case:

- model completeness necessary to identify the significance of the problem on the whole undertaking's scale – the problem to be solved with the use of the model of the process being described. The higher the rank of the problem, the more detailed and accurate the model should be. One should remember however that there are always more details and specifics one may pay attention to. It is only the model author who is able to decide, whether they are useful and whether they compensate for the modelling labour intensity. No clear limit exists when one may state that the model is accurate and complete enough;
- model correctness, which is mainly determined by the fact, whether the process has been described from an adequate point of view (from the adequate perspective). Thus, if the process analysis focuses on narrow sections, the process should be modelled with regard to work distribution among individual participants of the process.

If on the other hand, the focus is on involvement of individual units/persons in the efficient operation of the process, it is important to look at the process with regard to interfunctional interaction, without any particular insight into the methods and distribution of work in particular links of the process. Unfortunately, also in this case there is no rule that would define the correctness of the process clearly. In practice, each person undertaking to model the process adopts a different approach. As a result, the process may have as many models as many people modelled it.

### **3. Integrated information system in the light of functions and processes reengineering requirements**

One should ask oneself, whether there is no possibility to compare the system's functionality with the organisation's needs in a systematised manner when making such a serious investment like choosing an integrated IT system. There are several solutions at least. One of them is to test selected functions of the system's standard configuration that most systems offered on the market have. Another solution is to pay several reference visits to companies representing related business sectors, where the system already works. One may also suggest the company offering the system to make a prototype configuration of the system for one or several issues



the user is interested in. Nevertheless, none of the solution mentioned above eliminates all problems.

Therefore, the best approach is to read the information needs from the organisational strategy. This would be perfectly supplemented with finding a common language for the organisation choosing a system and the supplier - a language that can be used to describe both the system and the business environment it is expected to work in easily and clearly. The process description model constitutes a language like this.

#### **4. Reengineering versus process modelling in organisations**

One of the tasks in the process of choosing a system is to decide, whether the system's functionality meets the expectations concerning support to organisation's business and management. In other words, one should compare the existing or the targeted way of business functioning with the system's functions and procedures. It is impossible to do this in the section of the system's functional structure or for all functions and processes occurring in the organisation. Nevertheless, the model should enable a strategic and operational comparison of organisation's and system's significant functions.

Any organisation has its own unique style of functioning, which can be described in various ways, depending on the modelling method. Methods describing organisation's business processes are most popular, while other methods (e.g. describing organisation's single functional areas) are not as often used. Most of them make it possible to reflect the lowest level of details, i.e. elementary functions and operations. It is therefore possible to create a model which, depending on needs, would describe organisation's all or only selected functions and processes at the required level of minuteness (see also [Hunt 1997, p. 73 and following]).

Sets of functions and procedures existing in information systems can be described in a similar way as one does with organisation's functions. The description is often placed in reference models of the system, in implementation documentation or in a simplified form – as user standard menu.

If both models are available – of the organisation and of the system, one may compare more or less issues at various levels of detail. Usually, models delivered by the organisation offering the system, similarly as models built for the purpose of system selection do not include any specific information about the system's parameters or organisation's elementary functions and processes. Nevertheless, application of the model makes it possible to:

- 1) check, whether the system includes pre-defined functions for operating processes or functions that are important for the organisation,
- 2) identify preliminarily the system's capacity to aid (operate) organisation's basic processes,



3) become generally familiar with new conceptions of operating that are included in the logic of system functioning.

4) specify, on the basis of the system models, functional modules to be included in the future system implementation contract.

These models should be compared by persons appointed to choose a system and consultants of the potential provider together. Discussing the issues together will enable them to understand correctly and to identify models presented by both parties and consequently – to assess system's utility thoroughly.

## **5. Building a model which describes organisation's current and future business**

A system provider delivers a model describing system's functionality. The model to be built describes the organisation. The process of building any model begins with a simple question: for what purposes will the model be used?

When one knows the answer to this question, one is able to specify the subject, the method and the desired degree of model minuteness. Let us begin with specifying the subject of modelling, i.e.

- what is to be modelled?

The model should reflect the functions, i.e. Activities and operations occurring in the organisation. As a rule, functions are sufficient to describe a selected area of organisation's functioning in general terms. But in case of some concrete functions, such elements as printouts, information on the screen, labour intensity of operating may turn out significant and they should be taken into account when building the model. Selected objects can be modelled in the form of hierarchical sets of objects (e.g. a functional tree), a map of processes or in some other form.

The next problem that needs to be solved is included in the question: at what level of detail should the model be built?

Organisation's areas of particular importance should be modelled precisely. A comparison of reality with the system model should confirm (or reject) explicitly that the selected area of organisation can be aided efficiently and in conformity with the project objectives. One does not need to describe the remaining areas, assuming that business is run in a standard manner in the organisation's given area and that it is aided by the system efficiently.

The last question is to solve the dilemma:

- what modelling method should one choose?

There is at least a dozen or so systematised and described methods of modelling. Each method is valuable, useful and adequate in some circumstances. It is the environment where processes and systems will be modelled that determines, which methods are selected and how they are used. But many modelling undertakings are unique and use official methods to some extent only". This is a natural consequence of the fact that no method can ensure an absolute support to achievement of



purposes for which the models are used. But when selecting a method one should first of all take into consideration the possibility of modelling the selected objects, the existing resources (people, modelling tools, time, etc.) and the form in which the model should be made (an appropriate notation which ensures utility and comprehensibility of the model)<sup>1</sup>.

## 6. Distribution process modelling

The issues described here can be illustrated with the following example. XYZ organisation, having carried out an analysis of its functioning and strategic goals decided to select and implement MRPII-class integrated IT system. The main purpose of the undertaking was to reengineer the product distribution chain and to improve the production planning. The system should ensure a complete support to the areas of organisation functioning mentioned here first of all. To facilitate the system selection (and further implementation), a decision was made to construct a generic model of the reorganised distribution chain which would reflect the process and its elementary functions. Dispatch is an important phase of the process, therefore this sub-process should be reconstructed in the model in detail. To perform this task, XXX software and a standard, simplified process map were used along with other resources. A simplified model of a section of the distribution process is presented on fig. 1. In the course of comparative analysis of this model with a functional model of the distribution system module (fig. 2), the following conclusions were made:

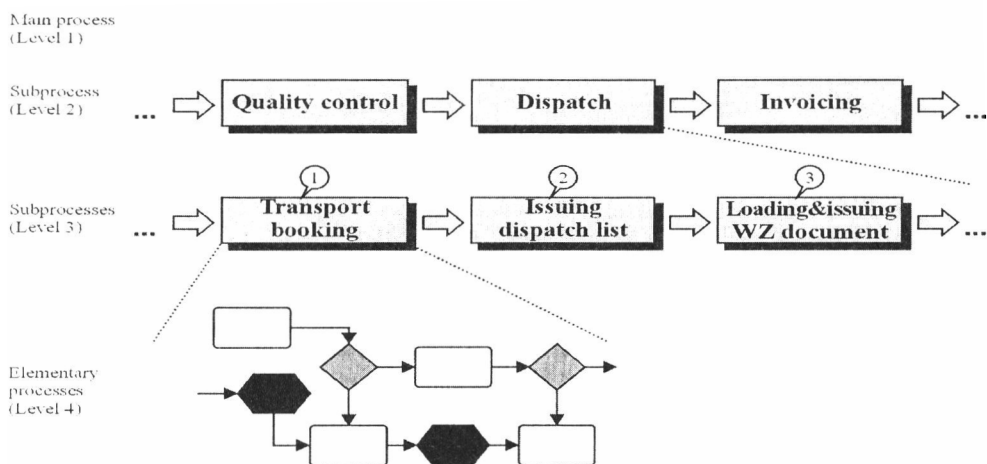


Fig. 1. Simplified model of the process "Product selling and distribution"

Source: own studies.

<sup>1</sup> Interesting consideration of the subject is presented by D.K. Carr and H.J. Johansson, [Carr, Johansson 1995, p. 135 and following].



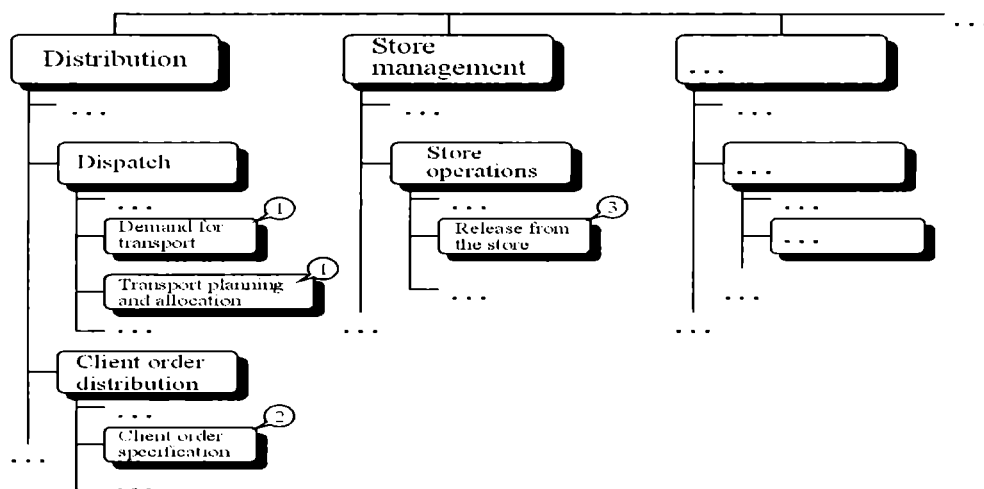


Fig. 2. Simplified model of system functions

Source: own studies.

- the client order specification issued by the system on a standard basis is not always adequate to the dispatch list (the problem should be investigated in detail);
- transport booking is effected by the system differently than in the company - transport planning is optimised additionally (an opportunity to improve the process). In order to compare the possibilities of variant application in detail, the description of the transport booking process was made more specific.

The example illustrates the idea of using models only. In practice, using higher level models leads one to generalisation of organisation's selected, particularly significant processes or functions.

## 7. Process models in understanding organisation's business

The scale of processes and systems modelling use keeps growing. Models are more and more often used in documentation of systems implementation. Some integrated IT systems of ERP class are configured by the means of models and components. Workflow software integrated with these systems is also based on models. Thus, there are some grounds to use models in system selection projects.

The conception of model application presented here is not a comprehensive solution ensuring an optimum choice of a system - it is a complementary method only. Nevertheless, it is absolutely effective, when system implementation is one of many projects improving organisation's functioning, or when it includes business reorganisation, workflow management implementation, or implementation of ISO standards. In such cases, models are created by the means of a universal, multi-purpose tool. Numerous implementations of systems in Poland consist in encasing



the existing reality in functions of the system, without any attempts of improvement and the focus is on starting system's individual modules as soon as possible, with no due attention paid to effects. In such cases, there is no sense to build a model, as it makes the development more expensive and the cost is not reflected by the effects of implementation.

## Literature

- Adamczewski P., *Realizacja ZSIZ jako złożone przedsięwzięcie informatyczne*, [w:] *Human-Computer Interaction*, red. B.F. Kubiak, A. Korowicki, Fundacja Rozwoju Uniwersytetu Gdańskiego, Gdańsk 1997.
- Carr D.K., Johansson H.J., *Best Practices in Reengineering. What Works and What Doesn't in the Reengineering Process*, McGraw Hill, New York, London 1995.
- Hunt V.D., *Process Mapping. How to Reengineer Your Business Processes*, John Wiley & Sons, New York 1997.
- Kubiak B.F., *Problemy zmienności kosztów w transporcie samochodowym*, seria: Rozprawy i Monografie nr 2, Wyd. Uniwersytetu Gdańskiego, Gdańsk 1978.
- Kubiak B.F., *Rekonstrukcja procesów gospodarczych metodą reengineeringu*, [w:] *Informatyka i zarządzanie strategiczne*, Komisja Informatyki PAN, Wyd. Politechniki Szczecińskiej, Szczecin 1998.
- Kubiak B.F., Auksztol J., *Strategia dopasowania się organizacji do zmiennych warunków otoczenia*, [w:] *Informatyka i zarządzanie strategiczne*, Komisja Informatyki PAN, Wyd. Politechniki Szczecińskiej, Szczecin 1998.
- Kubiak B.F., Korowicki A., *Strategie informatyzacji organizacji gospodarczych*, (in:) *Systemy Informatyczne w Zarządzaniu Strategicznym*, red. R. Budziński, PAN Oddział w Gdańsku, Komisja Informatyki, Szczecin.
- Kubiak B., Korowicki A., *Restrukturyzacja zarządzania procesami gospodarczymi współczesnej organizacji z wykorzystaniem technologii informacji*, [w:] *Human-Computer Interaction*, red. B.F. Kubiak, A. Korowicki, Fundacja Rozwoju Uniwersytetu Gdańskiego, Gdańsk 1997.
- Kubiak B.F. (red.), *Strategia informatyzacji współczesnej organizacji*, Uniwersytet Gdański, Gdańsk 2003.
- Ould M.A., *Business Process Modelling and Analysis for Re-engineering and Improvement*, John Wiley & Sons, New York 1995.
- Wiśniewski D., Kubiak B.F., *Zorientowana na procesy metoda wdrażania zintegrowanych systemów informatycznych*, [w:] *Human-Computer Interaction*, red. B.F. Kubiak, A. Korowicki, Fundacja Rozwoju Uniwersytetu Gdańskiego, Gdańsk 1997.

## REINŻYNIERIA I MODELOWANIE PROCESÓW W ORGANIZACJACH

### Streszczenie

W artykule zaprezentowane zostały następujące zagadnienia:

- modelowanie jako narzędzie opisu funkcji i procesów w organizacjach,
- zintegrowany system informacyjny w świetle wymagań reinżynierii funkcji i procesów.



- reinyżynieria w porównaniu z modelowaniem procesów w organizacjach,
- budowanie modelu, który pozwala na opis obecnej i przyszłej aktywności gospodarczej firmy,
- modelowanie procesów dystrybucyjnych,
- modelowanie procesowe w rozumieniu działań rynkowych firmy.

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