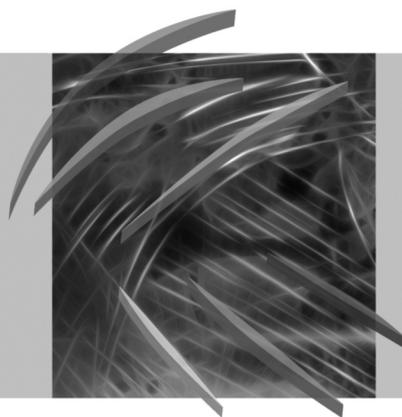


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A CASE FOR USING PATTERNS TO IDENTIFY BUSINESS PROCESSES IN A COMPANY

Abstract: The application of patterns in the initial analysis of the business processes has been discussed. It was carried out in relation to the information technology application and infrastructure development in a company. A specific case of such a research, performed for a transport company, has been described. The transport company sells fuel in a holding. The composition (structure) of the used pattern has been provided and the results received in this specific case have been generalized.

Keywords: business process, process pattern, business analysis.

1. Introduction

The subject of this paper is an analysis of the relevance for using patterns in the identification of business processes. Using practical experiment the authors have argued with opinions that reject an approach based on patterns. In the first part of this work the problem of a discovery and identification of the business processes has been discussed. The opinion formulated in a paper [Khan 2005] concerning the usefulness of the business patterns has been presented as well. The next part of the paper characterizes studies carried out in relation to a real project, in which the authors played a leading role. On this basis some general premises have been formulated and special advantages drawn by the authors from using patterns in this special case have been discussed.

2. Discovering and identifying business processes in an organization

Identifying business processes (BP) taking place in an organization can be described as a problem which needs the following data: an aim for process identification, sources of knowledge about processes, a specification language (a notation, a tool)

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and specification quality criteria [Rekuć 2009]. A solution to this problem is a process model specified in a given language which provides a given purpose to be achieved and has been created on the ground of given sources of knowledge and fulfilling estimation criteria. The aims of the process identifications are aim derivatives of broader enterprises, such as: improving/reengineering processes, automation of processes by means of business process management systems, identification and specification of requirements for information applications, or quality management. Sources of knowledge are usually divided into external and internal ones. The external sources of knowledge are primarily: external regulations, textbook knowledge of processes existing in companies, or process patterns/templates collected in general or branch process repositories. The internal sources of knowledge are as follows: basic documents of an organization, operational documents, tacit knowledge, own process patterns/templates, and event logs of information systems.

To solve the problem described above an analyst has specific methodologies and supporting tools. A system-like approach to the problem requires the identification of processes, starting from a process architecture level of the activity area investigated. The term “process architecture” is understood as a structure, whose elements are processes and the relationships between these elements are relations between processes. In order to discover processes, the different approaches are used, the essence of which is to find facts in the organization that indicate the process existence. A confirmation of the situation that a given process is present in a company could be, e.g.: aims (goals), business events, business actors or essential business entities, which may constitute a process inputs and outputs). After the existence of a process and its context have been confirmed, its structure needs to be identified. The internal architecture of the process may be identified by a discovery of its sub-processes and the relationships between them. The workflow of the process can also be established.

An important methodological proposal is an idea of using ready definitions, typical process models called patterns or templates. In literature there are known workflow patterns [van der Aalst 2002] and business process patterns [Atwood 2006]. MIT Process Handbook [Herman, Malone 2003] constitutes an interesting proposal as a repository of typical processes of business given in a form of an aggregation hierarchy of processes/detailed activities. In the paper [Barros, Julio 2010] the authors propose the process architecture patterns in a BPMN notation. The gathering and availability of so called good practices is a main premise of the process pattern elaboration. The patterns mentioned above are meant to serve this purpose. Designing new processes is often connected with their automation by means of business process management systems. In his work N.R. Khan [2005] noted some advantages of using patterns, such as: a possibility to use good practices, time shortening or cost reduction. However, in his opinion the possibilities to use patterns have turned out to be seriously limited because of their incompatibility with customers’ specificity. The use of patterns, instead of bringing savings, required bearing additional costs of

the adjustment to the customer's specificity. The paper mentioned above contains an analysis of the advantages of using patterns by a division of the processes into their components. Six components, and the same – patterns have been distinguished: a process map (workflow), business rules, roles and relationships between them, a user interface, interactions with other processes (integration), used and consumed information (database). Table 1 presents the results of the analysis.

Table 1. Evaluation of using patterns according to components in Khan's analysis

BPM Component	Cost	Value of Templates
Process Map	Low	Some
Business Rules	Medium	None
Roles & Relationships	Medium	None
User Interface	High	None
Integrations	High	None
Database	High	None

Source: own elaboration based on [Khan 2005].

The author notes benefits resulting from the availability of process maps, but he negatively evaluates the usefulness of the other components. Khan's experience is connected with a consulting company, in which a small number of patterns, probably rigid and difficult to modify, have been designed. The results described by Khan, which are only partially consistent with ours, are the reason why in this paper we present our own experiences in using patterns and their confrontation with Khan's opinions.

3. Approach analysis to discover processes by means of patterns on the basis of the completed project

3.1. Project description

The discussed case refers to studies the aim of which was a preliminary identification of business processes carried out in a real transport company.¹ Specific business processes were studied, including a detailed study on "the process of internal fuel trade" (IFT). The company is active in three business areas: fuel trade, rail and vehicle transport services as well as repair and maintenance services of a rolling stock and vehicle fleet. Also, the company is capital dependent on KGHM Polska Miedź

¹ The research was carried out as part of the agreement called "The initial business analysis for Pol-Miedź Trans" concluded between the Faculty of Computer Science and Management, Wrocław University of Technology and SYGNITY SA. According to it, a team supervised by the authors of this paper was a scientific partner of the company doing the project: "A prototype of a system to protect propelling fuel trade in power stations" (see [Grzech et al. 2011]).

SA, which is reflected in its BP (business processes) and the implementation strategy of information technology (IT) infrastructure serving its business. In a limited scope, an initial analysis of the company's business processes was carried out in connection with a system designed to protect propelling fuel trade. The broader scope included finding a multi-layer context for the functioning of this process. Due to funding from sources of European programs,² the study was carried out with a good access to knowledge, however with the very constrained and critical deadlines. The total time to complete the project was about one month. It was necessary to conduct quickly a broad research of business processes in the company, which consisted of a detailed IFT ("internal fuel trade") analysis and a general, but at the same time specific examination of the broad context of its functioning. The analysis of this context and common points with other business processes as well as the description of other processes were supposed to enable the researchers the identification of business chances to implement other applications and IT infrastructure. In order to ensure the high quality of the results and make the research process successful, an approach based on patterns of process architecture was used. The designed pattern included both the standards of the company realizing the project and the initially identified specificity of the object studied (company). The pattern had to provide the location of places and events connected with fuel consumption, ensuring the completeness of events and process phases identification, which requires a reengineering or using the new applications.

3.2. Approach based on patterns

The basic assumption was that the identification in majority was to concern the area of fuel trade and transport services. The identification of repair and maintenance of services concerning rolling stock and vehicles were to be expected into a lesser degree. In both cases a classic approach based on the identification and analysis of events was impossible due to time constraints, as the process of fuel trade would have had to be extended inductively by the knowledge gained from the three business areas. It would have been necessary to make a strategic phase comprising: aim analysis, difficulties and critical success factors, analysis of business areas and processes (sales and relations with contractors). In the conducted research, business processes were not discovered by means of a top down analysis of a goal hierarchy because it would have required time-consuming interviews with the strategic management, as well as with the decision makers of middle and operational management levels of the company. Otherwise, deadlines would have been exceeded, and they

² The enterprise was co-financed by the means of the European Union (Agreement Number: UDA-POIG.01.04.00-14-027/09-01 UDA-POIG.04.01.00-14-027/09-01, activity 1.4 Supporting 1 priority axis goal projects Research and development of new technologies and activity or 4.1 Supporting implementation of 4 priority axis B+R work results Investing in innovative projects of the Innovative Economy Operational Program 2007–2013).

had to be met as they fell at the end of the financial year and concerned the means from the European Union.

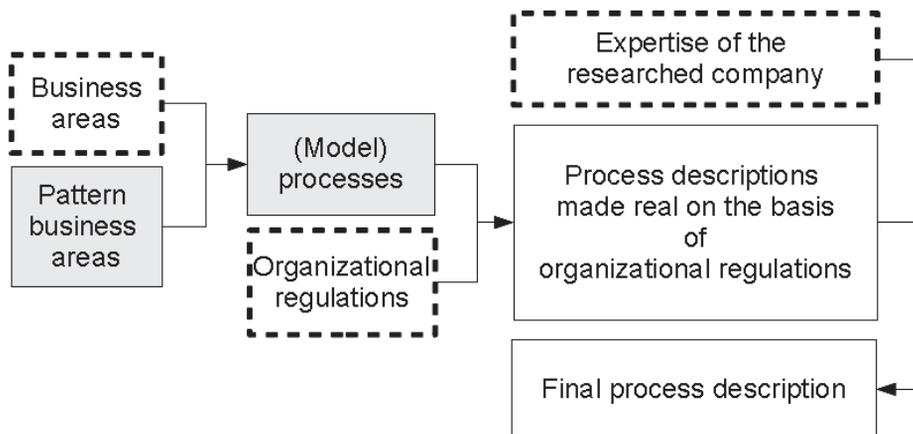


Figure 1. Diagram of the used approach

As a result, an original approach was applied which used the BP identification method together with the earlier accepted patterns. The approach was based on the following assumptions (see Figure 1).

1. First of all, the analytical team learns the specificity of the researched company by studying its strategic planning materials, its organizational regulations and by creating tools such as reference books of organizational units, repositories of BP parts ascribed to its units, etc.

2. Identification of the business and process areas in the company (types of its activities).

3. For each business area the approach of process patterns is applied, which uses the same decomposition pattern of the business area into nine processes: recognition of a customer market, trade development management, sales and marketing management, logistics and sales, settlements and post-sale services, technical infrastructure management, information, knowledge and IT infrastructure management, supply management, management of human, financial and other resources of the company concerning fuel trade.

4. IFT (“internal fuel trade”) process completes the list of 28 studied BP.

5. The pattern (structure) of each process consists of the following components:

- a heading for a process comprising its identifier and descriptor, description of its standard course and strategic identification component (process aims, problems with its accomplishment and key factors of success),

- description of sub-processes comprising their identifiers, descriptors, owners and participants, initial relations and information, model activities, products (produced by means of sub-processes established in the hierarchy of organization processes) and output connections.

6. The BP pattern described in item 5, which contains basic and auxiliary processes, can be adjusted to the standards of a potential executor of implementation. On the basis of the pattern, BP can be classified and the matrixes of relationships between processes can be created.

7. The results of parallel studies concerning technical infrastructure and IT software are plotted on “the map of process composition”, identified by means of patterns described in items 5 and 6. As a result, a useful matrix of covering business areas and processes by IT systems is created in the company studied. Its usefulness grows if the company lacks an official document describing the architecture and technology of the existing environment of IT systems, derived in the course of BP analysis.

8. The results of both studies (business processes and IT infrastructure) serve for an establishment of a direction of the detailed BP analyses and projects, using other pattern components, which are mentioned by N.R. Khan [2005], and in particular for a creation of the detailed maps of the BP flows.

As it can be noted, the discussed approach based on the patterns is directed towards achieving three goals: improving the process of protecting the trade of propelling fuel, an automation of this process by means of the business process management system, and an initial identification and specification of requirements for IT applications.

In the next part of this paper a discussion of the application of the approach based on patterns has been presented, which includes the observations and generalizations made by the authors in connection with the empirical research described above.

3.3. Discussion of the use of the approach based on patterns in BP analysis

The problem of usefulness of process patterns is closely connected with the problem of standardization. The greater the standardization is, the greater the possibilities to use patterns and the lower the costs of process discovering and identification are. Each company has a right to have its specific solutions (individual standards). Companies functioning in broader structures often have to accept standards adopted in these structures. The effective use of the SaaS idea (Software as a Service [Małyszko 2008]) may require standardization because it ensures lower costs of software (as a result of enlarging the scope of sale). If a given company accepts standardization, it makes sense (as well as it is cheaper) to use patterns.

The individualism of solutions raises the costs of using patterns, especially of these other components which are mentioned by Khan [2005]. Lack of possibilities for process standardization may appear in a case of certain business mechanisms in competition markets. On the other hand, it is possible to reduce the rigidity imposed

by standardization by means of using SOA paradigm (Service Oriented Architecture) (see e.g. [Brzostowski et al. 2010; Cox, Kreger 2005; Erl 2005]) in creating software which supports business processes, as SOA paradigms favour flexibility at a business level.

Arguing with Khan, it is worth noting that this author perceives the problem of using patterns in a narrow perspective, namely from a point of view of a certain consulting company which invested in a set of patterns and faced a disappointment. The discussed issue can also be looked upon from a position of a broader community dealing with business processes. The idea of generally accessible repositories of processes made and maintained by such a community creates a possibility to design multi-variant process specifications comprising all their components. This fact can be proved by works that have been done on MIT Process Handbook as well as by [Barros, Julio 2010].

However, there are other aspects connected with using patterns. The experience gained from the use of patterns in the discussed case concerns *general conditionings, organizational structures* and *executive team management*. As far as *general conditionings* are concerned, it can be stated that the arbitrary aim of *the BP analysis determines components of patterns* (see Table 1) taken into consideration. An initial BP analysis was conducted, necessary to identify the context of the main process (IFT “internal fuel trade”). A detailed analysis will require other components.

Customers expect that their projects will be completed in shorter and shorter periods of time. *Short time horizons of business analysis* in IT projects *encourage using patterns*. In the discussed case the approach of patterns guaranteed meeting the deadline for completing the contract, retaining the quality of the analysis results. Additionally, *difficult access to knowledge* of BP *encourages the use of patterns*. Using a pattern in the case of a restricted access to business people and their unwillingness to share their knowledge turned out to be very helpful.

The factor of *organizational structures in using pattern* is very crucial in relation to the accessibility and acquisition of BP knowledge. In the discussed example the centralization encouraged the mother company to force the use of standards. On the other hand, the central imposing of an external coordinator of IT implementation with unclear competences in a holding created an excuse to resist the use of patterns.

Using patterns *raises the effectiveness³ of managing the team making the analysis*. They ensure the necessary level of regularization, standardization and integration of tasks connected with the BP analysis in all functions of team management. It is especially important if a company studied is active in different business areas and each area is analysed by a separate team of analysts. In the discussed case *the*

³ Due to a limited scope of the documented analyses, some interesting issues concerning the influence of using patterns on the quality of the team work and the product of the team work have not been discussed.

same pattern of process framework was used for all business areas. As a result, the effect of repeatability of the team's activities was achieved (in preparing interviews, unifying reports and identifying the unrealized processes). Apart from that, using patterns *improved communication between the teams* in the phase of verification and integration of their work results. It became particularly important in finding mutual relationships between processes, which is one of the most crucial stages in the business process analyses. The quality of the results influences the usefulness and credibility of the whole IT enterprise.

4. Conclusions

The research described in this work has shown that the usefulness of patterns needs a multi-aspect analysis. Among others, these aspects can be as follows: an enterprise aim, organizational, financial, competence and executive conditionings. Depending on the aim of the enterprise, different patterns will be used. It has been revealed that the process framework pattern can be used even to achieve aims connected with initial analyses of the business processes. In connection with executive and organizational aspects, the use of patterns was successful – it enabled the researchers to gain the analysis results in the assumed short time and at the acceptable level. The usefulness of the pattern was confirmed in the conditions of a limited access to expertise. The organization of the executive team work was regulated due to the use of a uniform pattern for different business areas.

Despite the criticism of patterns, encountered in literature, they should be considered as useful tools in discovering and identifying business processes. Surely, in further studies of these issues, some other pattern components will be taken into consideration.

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PRZYPADEK ZASTOSOWANIA WZORCÓW DO IDENTYFIKACJI PROCESÓW BIZNESOWYCH W PRZEDSIĘBIORSTWIE

Streszczenie: Ogólnie rozważano wykorzystanie wzorców we wstępnej analizie procesów biznesowych, wykonywanej w związku z rozwojem aplikacji i infrastruktury IT przedsiębiorstwa. Opisano konkretny przypadek takiego badania, wykonanego dla firmy branży transportowej handlującej paliwem w holdingu. Podano skład (strukturę) zastosowanego wzorca procesu oraz uogólniono wnioski z przedstawionego przypadku.

Słowa kluczowe: proces biznesowy, wzorzec procesu, analiza procesów biznesowych.