

Experiences with teaching of process modeling as a starting point in design of information systems

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Abstract— This paper discusses how is modeling business processes being teach. Business processes used in the design of information management systems for higher levels of management. Object of interest are in most cases, manufacturing plants or service companies.

Keywords-process; model; modeling; procedural map; management; information control system, teaching

I. INTRODUCTION

Department of Cybernetics and Artificial Intelligence at the Technical University in Košice offers subject, which is mainly intended for study program “Business informatics” and for “Cybernetics and information - control systems”. This subject is called the “Information Systems of Business Processes”.

The goal of the subject is to acquaint students with the process management in the company. They learn what the difference is between functional management and process management. Also, the benefits of these approaches to corporate management. They have got review on standards designed for process management of companies. They deal with concepts such as vision, purpose and importance of planning.

Students create procedurals maps in practical activities. First, they learned created models to understand how to work with procedural map and how it should look like. Then use this knowledge to create their own semestral works, where they

modeled a process on the basis of their own choice. They choose organization or only a certain part of it. Accordingly, they describe the various procedural steps that are performed in the process. Let them think about how products are produced or how services are provided. Depending on what type of business was chosen by the student.

II. THE IMPORTANCE OF SERVER APPLICATIONS IN TEACHING

Using a server in the network is in practice a frequent phenomenon. Its main advantage is that it centralizes the data needed to work. The server enables the sharing and using dates. By allowing multiple users to connect to, it is possible to work together on a single application.

Subject “Information Systems of Business Processes” is using tool QPR ProcessGuide. It is a tool for simple and easily manageable process modeling with advanced options. The advantage of this tool is simple work and requires no training to work with it. Brief introduction is enough and students work in it intuitively.

QPR ProcessGuide instrument consists of two parts. One is for server and another is a client application development environment. Server is installed on computer in one of server rooms of the university. Client applications are installed on computers in the classroom of the department. Students have two options how to work in a given tool. Either operate without connection to the server and created model on their own

computer in classroom, or as clients connect to the server, where they can develop their models as well as if working locally. The results of their work are stored on this server. Of course, the possibilities to transfer (save) files are unlimited, and depend only on them if they will create models locally, or on the server. Figure 1. describe, how is created client-software architecture in teaching with distribution of software components. Particular architecture of QPR software components showed Figure 2.

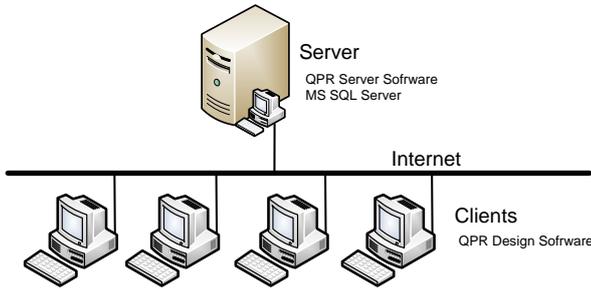


Figure 1. Client-server architecture

As students use the server through the client as a workstation, it forcing them to think about, what options have the other students. Whether they all have access to developed model, which is being created by student, or whether it can be open or edit. Student has influence on all of these attributes by the creating a model.

Work on the server is from this perspective very important, because thanks to that fact, student realizes what pitfalls arising out of such development models, respectively applications of any kind. It enriches his experience working on server computers, which are in practice widely used.

Package of installed QPR software is described on the Figure 2 [4]. It illustrates how QPR products interoperate. We use, for creating procedural maps, only parts ProcessGuide Designer and Server. It is necessary to include a database server.

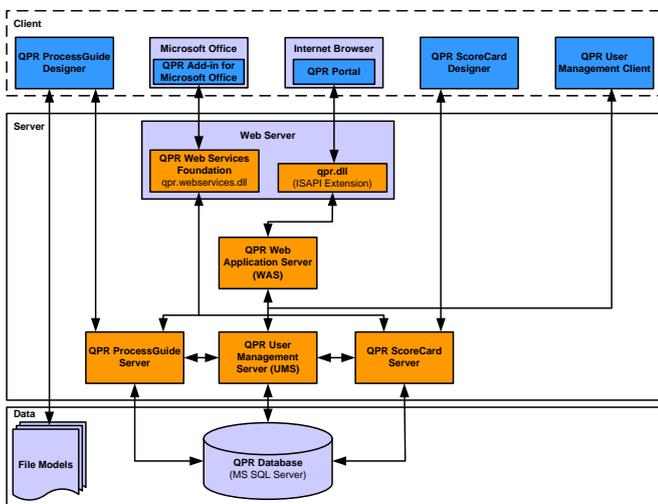


Figure 2. QPR System Architecture

III. PROCESS MODELING

Business process modeling is nowadays an important role in maintaining on increasingly competitive market. These models are used as a basis for designing information-control systems (ICS), process management, reengineering business processes or documentation for business processes (for quality certificates ISO).

The result of business process modeling is process map. Map represents a conceptual (implementation independent) model of everything that is performed in the organization. Shows the processes and their interactions in the system from starting point to one or more end points. The emphasis is based on display relations processes and objects related to them.

This detailed description of procedural steps includes all activities which carry out from the beginning to the final phase of process. Is it possible to identify activities that are carried out redundantly or completely unnecessary. This makes it easy to delete them from the process, and ultimately contributes to more efficient production and cost savings.

It is possible to simulate the entire process based on the created model. Each procedural step has assigned properties, the average length of the implementation of activities, inputs and outputs possibilities of performed activities, etc. We also can set tolerance of each run of simulation, with some degree of randomness.

Nowadays, is the modeling process normally supported as part of the design ICS of organization. In addition, regardless of the development of information-control systems, there are a number of specialized modeling tools to modeling, analysis and measurement of business processes. Modeling of business processes is increasingly being used as a basic starting point of integration ICS.

IV. DESIGN PROCESS MAP IN THE COMPANY

As was mentioned above, students use QPR ProcessGuide software to creating a process map.

First it is necessary to choose the organization and the main process, which will be modeled. They must know the process to be able to adequately and properly describe it. Therefore, they choose processes that are known to them. Either the processes are similar to those carried out in everyday life, which they know a lots about, or to base on their work experiences, which gained on brigades. We also observed that students are helping with the information offered by internet or documents on television.

In next step is necessary to think about on what inputs will the main process have and who will be a supplier. Is also important to determine the outputs of the process and determine requests of the suppliers. Each process consumes resources, whether human or technical. Resources should therefore be allocated to the process. We also should account the process borders. These are laws and standards to be followed. Following this work, student has concept from which can be reflected (Figure 3.). The main process is now necessary

divide to the sub parts - the procedural steps and connect them into a functional unit. At this point comes the work in the tool QPR ProcessGuide.

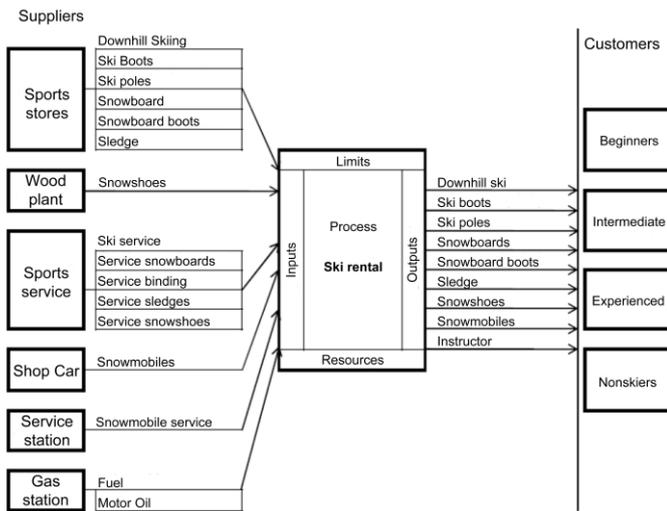


Figure 3. Concept of modeled process (Featured from student semestral work)

Students develop procedural model on computer locally, without connection to the server. It is not necessary, and they can comfortably manipulate with their files.

Procedural steps which are used on their models are:

- *Activity*, it is an essential element in which something is being produced. Representing a sub-process which is not divided more.
- *Core process*, Represents the highest level of procedural steps. It is composed of sub-processes or activities.
- *Decision*, element which represents branching of processes.
- *Subprocess*, represents a procedural step, which is divided into more procedural steps, and are modeled in the lower level.

Each process step has a defined owner. The person is responsible for the process and its implementation.

Steps are linked and form a specific network-oriented graph. The link between individual actions can have character:

- *Control flow*,
- *Information flow*,
- *Material flow*.

Already the names of flows shows what will through the link transmit. Linkages in the process are defining the inputs and outputs in each procedural step.

Models include repositories - *Stores*. We distinguish the *Information Store*, in most cases represents a database. And *Material Store*, which represents the storage of materials

needed in the implementation process, respectively storage of finished products and similarly.

All elements of the process map are assigned to the *Organization Items*. They represent a part of the company, where the associated procedural steps are carried out.

The offer includes other elements, but they are not necessary for modeling. They have more character of amendments, so we will not showing them.

Modeling tool QPR ProcessGuide allows simulating the modeled processes. We can eliminate process bottlenecks through the simulation, shorten the duration of the process and in practice to reduce costs for its implementation.

In the simulation process is necessary amount of data. For each procedural step is required to set up processing time. We specify either a constant time value, or indicative value. If it's given a constant value of process step implementation, in terms of time remains unchanged. Approximate value is the average value of entered period, in which will carried out a step. In this case, determining the deviation, or minimum and maximum execution time. So the time required to perform a procedural step changes at random every time you start the simulation.

Setting priorities is important when two or more procedural steps that are given to each other in parallel. On a priority basis of procedural step, will be determine the order in which they will carry out (resp. simulate).

Similarly, it is necessary to set the simulation values for all flows.

Simulation results are stored in files whose content can represent a table or chart. Based on data from the simulation, students can modify their models so as to shorten the period of implementation. Adjusted models they simulate and then compare with on the basis of data, then can they assess whether the modifications contribute to streamlining the process or not.

It should be noted that the sources of information of this nature are limited for students. They set simulation parameters at their discretion.

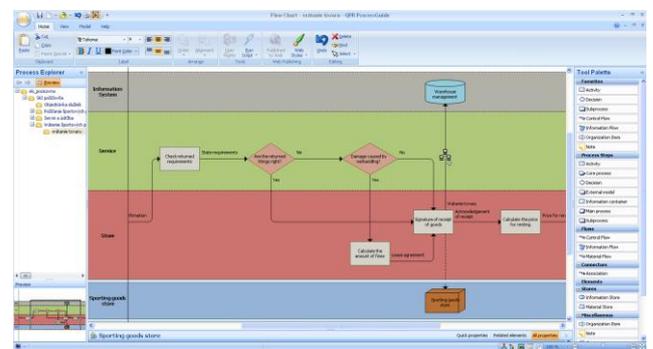


Figure 4. Process Model in QPR ProcessGuide (Featured from student semestral work)

The basic philosophy of process management is the perception of the organization as a summary of processes and

activities required to implement the final products and services. Management of processes can affect all the attributes of process steps, main as well as supporting processes of organization.

Processes become dominant in the process management. All it's subordinate to them and they produce results. All resources are governed by rules and people have clearly defined roles of the process. Process management has many benefits, especially the ability to adapt to change, enhance the effectiveness of planning, to integrating workflow, shortening the time of execution and the opportunity to manage processes between organizations.

Following the process introduction of management into the organization, employees become experts with vast amount of knowledge. The executive staff acquires the powers and responsibilities. Professional units with different functions are changed to work teams, where are consequently process owners formed, and they are responsible for their proper course. Required behavior is adjusted also according to customer's requirements. It is not rewarded for activities undertaken, but the results achieved. Progress is achieved on the basis of ability rather than performance. Part of the transition to process management is the fact that these processes will be continuously improved. The company acquires competitive advantage, when process management was applied. Such as: reduction, resp. minimize costs, increase, resp. maximizing profits and increasing product quality. That is why the process approach one of the key factors of success and competitiveness of the enterprise.

Process management in company is also reflected in the information-control system. ICS adapts to process map which was created, and supports and automates the process steps. In the case that the organization already has system like this, shall be adjusted. However, if there is new information management system, process map is created at the beginning of development. It serves as a pattern for better understanding of the activities in the company, which increases the efficiency of the proposed information-control system.

V. EXPERIENCES OF TEACHING PROCESS MODELING

Subject "Information Systems of Business Processes" is being taught in the first year of the second level of higher education at the Department of Cybernetics and Artificial Intelligence. The syllabus is based on trends of process modeling of practice. The student will get basic knowledge about process management in the company. They try to creating a process map in exercise classes. They become acquainted with the principles and rules of process modeling.

A student who finished this subject is in a better place in this part of labor market. Every company today has implement information-control system. This system is necessary to maintain and modify as required. Sometimes occur cases where it is necessary to create a completely new information-control system. This is when the original information system is no longer sufficient and the modification is too difficult or expensive. Also then if there is a new facility or service. In all cases, adjustment and development of these systems is

necessary to establish a procedural map. And just then are the experiences from the subject for graduate major plus.

Should not forget that the procedural map must be created for each organization that wants to meet the ISO quality certificate. The importance of process modeling is therefore not only in designing information-control systems.

These are the main reasons why a given theme is taught in our department. This is a relatively new subject which we will continue to be developed thereafter.

VI. CONCLUSION

Several lectures during the semester are reserved for experts from the practice. They have valuable experiences and interesting speech, which contributes to the quality of learning subject.

Students have to submit assignment consisting of three parts during the semester, The first part is an essay on the trend in the modeling of business processes or something that goes with it. The other two parts are interlinked. One is a preliminary outline of the process, determine the inputs, outputs, suppliers and etc. The third part is represented by a model created in software QPR ProcessGuide.

Educational materials and guidelines for instructing students have posted on the school portal "Moodle". Here are a teaching plan, guidelines for a semester projects, a list of essay topics and etc. With this portal the students hand over their semester projects.

In the future we require that students to develop a model in three or four-member groups. Thanks to this, they take advantage of the server on the network, where their processes will be created. At the same time they are better prepared for practice, because they work in teams. The effort is also to modify the software equipment in the classroom computer using virtual posts. This will contribute mainly to the easier administration of the laboratory.

We want also to use in teaching other parts of QPR Software. Especially QPR User Management System, QPR Web Application Server and QPR Portal for dynamic web publishing.

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