

# Increasing knowledge by teaching of modern BPM systems

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**Abstract**— This paper represent the appropriate software support for Process Management, and those tools which are used in a whole range of Czech and world-class manufacturing production and non-manufacturing enterprises as well as in organizations and other public sector administration institutions. The innovation in the tuition process lies in the fact that this software is not used for modeling the processes within the university (the organization itself) – but rather, that the students themselves model and analyze processes drawn from real-world praxis (working practices) in manufacturing production and non-manufacturing enterprises.

**Keywords**— ARIS (Architecture of Integrated Information Systems), Business Process Management, Education, FTE, Knowledge.

## I. INTRODUCTION

PROCESS management is an approach that today is becoming more popular and gets increasingly implemented in more and more companies. Process management can be understood from two perspectives. One is the process management as a managerial discipline. The second aspect understands the process management as a technology that supports process-oriented management. Process approach allows organizations to eliminate the biggest disadvantage of the traditional functional approach that cannot be considered as an approach appropriately flexible for changes in the corporate environment, variety of procedures, or excessive substitution of workers. Processes are always understood in relation to the customer. Only if the management processes are effective, then the companies can effectively manage, modify, improve efficiency, improve performance, identify and resist market risks [1], [2].

Moreover an electronic business environment changes more rapidly under the globalization, even small and medium size companies also change their business. With enterprises becoming bigger and bigger, the legacy business systems may

not be flexible enough to adapt this change and the discordance between business and information systems in their organization may occur [4], [5].

Second, it must be remembered that in the digital era, information fluency has become one of the most important capabilities for students [3]. Information fluency implied that students should be able to apply existing knowledge to generate new ideas, develop innovative products, or make use of technology as cognitive or productivity tools. From perspective of social constructivism, the function of individual differences on skills, aptitudes and learning preferences could have impact for the application of technology in classroom settings. Learners' learning styles affect the preferences of information process and prior knowledge affect the propositional network of the long-term memory. Previous studies have confirmed that matching types of instruction with learners' stronger learning styles could enhance learners' information and communication technology (ICT) skills and motivation [6], [7], [8].

## II. LITERATURE REVIEW

First of all, in this article we should evaluate the reasons which lead enterprises to exploit elements of process management in their working practices. The aim of Process Management is to develop and to optimise the daily running of an enterprise in a way which defines these work-related procedures (i.e. processes) as a unified flow or cascade of activities throughout the enterprise, where for each and every process its inputs are clearly defined as are the outputs or results, and where the associated responsibilities and personal responsibilities are assigned for each and every process or activity, while establishing a system for the measurement of the performance of these processes and tracking and evaluating each and every process [9].

These activities must be realised (i.e. implemented) such that:

- The quality of production will be maintained through given measurement parameters.
- All available resources shall be optimally exploited.
- All of the performance indices of the enterprise have been improved continuously throughout in line with previously agreed and known and measurable criteria [10].

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This however means that there is a need to describe just what distinguishes or characterises a process, which is a so-called “management process”. This means that such a process has:

- A defined, ranked set of steps to be taken and appropriate responsibilities allocated.
- A set of measurable parameters derived from customer demands or requirements, or internal standards – “owners” of the process/es.
- A permanent process team who meet regularly with the aim of seeking improvements to the process/es.
- An annual plan which contains the requisite outputs/outcomes/results for each and every key process, as well as appropriate budgets and demands on resources.
- A mechanism for the regular and interim controls of the process/es performance.
- Procedures and resources (i.e. the process team) for the resolution of problems associated with the process/es [10].

#### A. A Short History of Business Process Management

We should begin with the principles. Managers are often confronted, even in renowned magazines, with several similar terms and concepts which may be confusing or at least their correct content and principles may be misinterpreted on the basis of inaccurate information. What do the terms Business Process Management (BPM) and Business Process Reengineering (BPR) mean? What is their application in practice? In this subheading we would like to acquaint you briefly but precisely with these terms and their content.

From the point-of-view of management and Business Process Management development, authors such as King, Fingar, Smith etc. have offered various conceptions in order to comprehend the connections and differences between them. King, for instance, has distinguished between four development waves BPM [2].

He has mentioned the following in his publications:

- 1) the first wave of BPM – was concentrated on constant improving of the processes and coincides in many ways with the philosophy of TQM (Total Quality Management), a philosophy which leads to an increase in productivity, a simultaneous increase in quality and increased customer satisfaction while decreasing losses caused by poor quality production. TQM is thus a systematic and consistent application of several methods within the company organization clearly concentrated on quality and customer satisfaction.
- 2) the second wave of BPM - consisted of a focus on Business Process Reengineering, or in short Reengineering. This is regarded as the second wave involving the trend of management leading towards essential, radical and fundamental changes in the organization of applied work procedures or technologies. The achievement of not merely

incremental but has a radical rise in organization productivity as the expected result.

- 3) the third wave of BPM – the authors [11] refer to activities leading to the creation of a process focused organization. This involves the application of main component procedures or process management consisting of the following:

- key process determination including the appointing of process possessors and customers;
- within the process description, their mapping and process map formation (a company process model) for recording process system management;
- the application of process maps (models) for cost intensity evaluation and increases in their efficiency;
- continual process improvement and measuring of efficiency;
- quality in the enterprise is mainly understood as the demand for quality standards which lead off the process model;
- information technologies considered as the process support in the enterprise;
- while the process model creates the basis of the process management, the strategy management is comprehended as the peak of the “pyramid” of process management;
- competence management is comprehended as the system enabling fulfillment of roles in individual processes (both management and key processes) by those people who have appropriate knowledge and abilities for them.

Consequently mentions as crucial [9]:

- the process model;
  - constantly improved processes – procedures for optimization and improvement of the processes;
  - strategy management;
  - competence management;
  - quality management.
- 4) the fourth wave of BPM – is a group of activities leading towards the achievement of competitiveness based mainly and exclusively on the processes.

It is essential to additionally adduce other authors for a better understanding of the differences and links between BPM and BPR; e.g. [12] when applying this managerial trend they recommend implementing process management in the organization first and consequently focusing on reengineering processes on the basis of the specific priorities of the organization.

According to an entire range of authors [13], the consistent realization of several steps is recommended for an increase in

the process productivity of the company. These three authors agree on this fact in large measure. This procedure can be defined as following:

- endorsement of fundamental rules within the process management application;
- formulation of the sense of such a project;
- identification and endorsement of crucial factors of prosperity;
- identification and endorsement of individual types of company processes;
- simulation of individual types of company processes (according to crucial prosperity factors) with the application of process teams – creation of a process map;
- determination of process priorities;
- measuring of process efficiency;
- optimization of company processes;
- additionally, the projects of the reengineering processes often follow in accordance with an individual scenario [16].

### III. PROCESS MODELLING TUITION- METHODOLOGY

The aim of Process Modelling is the creation of a process model of the organisation. The design of such a process model is highly-demanding on time, and it is only with great difficulty and with many restrictions that it can be mastered without the appropriate software.

A core component of the whole system for the documentation of processes is the mutual interlink age of all of an organisation’s document flows, which are broken down into three basic levels:

The Organisational – these define the organisation’s structures and their aims.

The Processional – these define the approaches and procedures that lead to the attainment of the organisation’s aims and goals.

The Performance – the level at which activities are carried out by the appropriate responsible employees.

#### A. How is such a process model created?

The whole problem and associated issues regarding the creation of a process model is covered in detail within the framework of the tuition of subject Computer Support of Business Processes at Faculty of Management and Economics, TBU in Zlin.

Processes can be broken down into categories according to the value-added they provide to external customers as follows:

- Management processes – These determine and ensure the development and management of an enterprise’s performance. They create the conditions for the correct functioning of other processes in that they ensure the management and integrity of an enterprise. Among these are, for instance, strategic planning, quality management, etc.
- Key/Core processes – These create value in the form of products or services for external customers. Value-added chains are created, representing key/core areas

of the enterprise’s business activities. For instance, production, sales, distribution, etc.

- Support/Ancillary processes – These ensure the conditions governing the correct functioning of all of the other processes in that they give/deliver them the products (tangible or intangible) – but which at the same time, are not part of the main or core processes. By these, we have in mind for instance economic (financial) management, human resource management, IT services and support, ecology, plant and equipment repairs and maintenance, etc. [8,16]

The aim here is to describe a process at its highest level, i.e. its main inputs and outputs and most important relationships. We describe the summarising characteristics of the process from both the customer and the performer of the process’ point-of-view. Depending upon the purposes of the process analysis, we track various characteristics of the process. For instance, in the case of an analysis intended for information strategies, emphasis will be placed predominantly upon working with information. The identification of the attributes of the process serves to define and delimit the borders of the process and the instructions for its detailed analysis.

The first description of the context of the process is not a final description, but rather the primary summarisation of information about the process prior to its even more detailed analysis. At this stage therefore, its internal structure is not described, nor are the actual processes that take place within that process. An example of such a model is set out in Fig. 1. The aim of this sample model is to show the ordering and ranking of the functions, and to provide an overview or perspective on the context of the process [15].

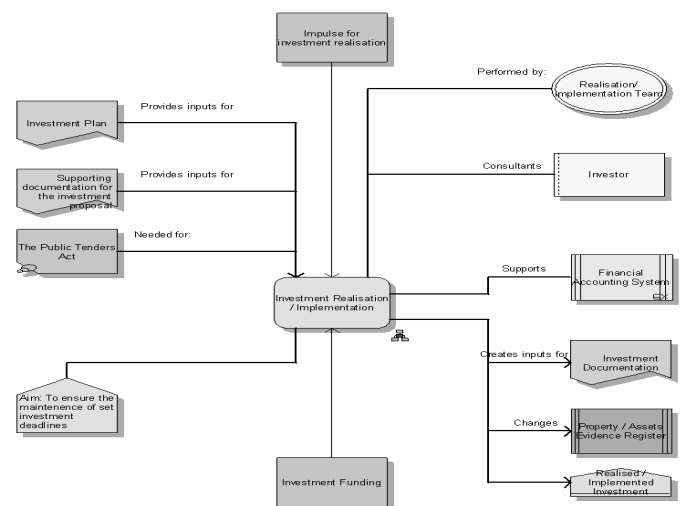


Fig.1. Description of the context of a process (ARIS Business Designer)

#### B. What study disciplines are Process Management taught in?

In the 2010/2011 academic year, Process Management is being taught in the following disciplines:

The Master's Degree Programme: Economics and Management, for full-time students, in the following Specialisations:

- Enterprise Economics;
- Industrial Engineering.

In the 2010/2011 academic year, Process Management will be included in all of the specialisation of the Combined (Distance/Lifelong) Studies programme.

In the 2011/2012 academic year, Process Management will be taught in all full-time specialisations [14].

Linkage of the Process Management studies:

In the first year of the Master's Degree Programme:

- In the winter semester, the subject: Reengineering – The Theory and Basics of Process Management is taught.
- In parallel with this, the subject: Computer Support of Business Processes (now called “The Theory of Industrial Business Systems II) is also taught; within the context of which students learn to work with ARIS Business Designer.

#### C. Benefits of Using the ARIS Software Tool

Tuition based on the use of the ARIS and Microsoft Navision enterprise applications in the Production Systems subject links onto the tuition of these applications in the preceding (parallel) subjects – except for the fact that it concentrates on the clarification of the management of commercial and economic (financial) processes. In so doing, it helps to make more attractive the position or standing of the Master's Degree study programme, or even of FaME in competition with other economics-oriented faculties (not only in the Czech Rep.).

It increases the attractiveness of the disciplines of Industrial Engineering and Enterprise Economics in that the freshly innovated content of these subjects contributes to a significant degree to the offer of a complex educational programme oriented on the exploitation of ICT in the management of production, logistics, commercial (sales), and economic (financial) processes.

These interlink age with other subjects within the framework of the study disciplines of Enterprise Economics and Industrial Engineering allows economics/managerial students to acquire a multi-professional knowledge in relation to the use of ICT [17].

#### D. The significance of tuition using the ARIS modules.

The main aim is to improve the quality of tuition of Process Management at the Faculty of Management and Economics, TBU in Zlín. Tuition will be concentrated on the area of exploiting these software applications on the basis of model situations based on the everyday practices of enterprises (a case-study approach). It allows students to also acquire practical knowledge and skills, which they will later be able to apply in their future careers.

It ensures close cooperation with entrepreneurial practices, which should allow – among other things, the presentation of model situations drawn from the working practices of manufacturing production companies. It makes connections

within the framework of the tuition of individual specialisations between the various types of knowledge that students have acquired (will acquire) within the framework of other subjects: i.e. Apart from the subject of Reengineering [14].

- In the subject of Production Systems – in the course of the tuition of discrete simulations using the Witness application.
- In the subject of Enterprise Information Systems using the ERP Microsoft Navision applications for the economics (financial), commercial (sales), and CRM fields.
- Or in the subject of Information Management using the Oracle E-business Suite 11 application for the management of production and logistics processes, which will - at FaME – Department of Production Management – Industrial Engineering, be realised in the form of a leasing arrangement – the ASP model and taught as an alternative to the Navision or SSA Supply Chain Solutions applications.
- (The last two subjects named above are taught in the summer semester of the 1<sup>st</sup> Year of the Master's Degree studies programme).

This way of teaching enables:

- Increases in the competitive ability of FaME graduates on the labour market.
- Making FaME more attractive and especially making its Master's Degree studies programme more competitive with regard to other economics-oriented faculties.
- Support of the building of hybrid careers as economists/managers in relation to the exploitation of ICT.
- Increasing the attractiveness of the disciplines of Industrial Engineering and Enterprise Economics by the offering of a complex educational programme oriented on the exploitation of ICT in the management of production, logistics, commercial (sales), and economics (financial) processes.
- The long-term further development of cooperative ventures between FaME and ICT providers, their customers, and this on the basis of extremely close ties between them and the educational process.

#### E. Previous approaches to teaching

Tuition using ARIS is realised through: (i.e. the client/server architecture)

- a) A Dell PowerEdge SC2950 server;
- b) 24 client PCs.
- c) A Microsoft SQL Server 2008;
- d) A 100 Mbit LAN.

The approach to tuition using the ARIS Business Administration within the framework of the subject “Computer Support of Business Systems is equivalent to the needs placed on the participants of the training programme

provided by the IDS Scheer Company. We cooperate with IDS Scheer CR by preparing our lessons.

Among all of the above-mentioned subjects, a logical interlinkage has been created which means:

- a) That the subject of Reengineering is linked in the field of process modelling of the use of the ARIS system through practical applications to Process Management and in the course of the complex definition and design of enterprises' processes within the context of the whole company, including analyses and optimisation.
- b) That the subject of Production Systems complements and fills out students' experience with knowledge of the discrete simulation of production processes.
- c) That the subject of Enterprise Information Systems is linked through the use of the ERP Microsoft Navision in the fields of economics (finances), commerce (sales) and CRM. Enterprise Resource Planning (ERP) implementation has become more popular and suitable for every business organization; it has become an essential factor for the success of a business. Data Mining is overwhelming the integration in this model by giving support for applying best algorithm to make the successful result. This model has three major parts, outer view-CRM, inner view-ERP and knowledge discovery view. The CRM collect the customer's queries, EPR analyze and integrate the data and the knowledge discovery gave predictions and advises for the betterment of an organization [4].

#### IV. THE CURRENT CASE STUDY

Currently finishing a project in the Barum Continental Ltd., company which mainly involved students. For the purpose of our project, we have used two of the number of diagrams that the tool ARIS offer. This is a Value Added Chain Diagram (diagram of production of added value - MTPH) and a diagram of detailed description of the process eEPC, one of them is illustrated in the following figure.

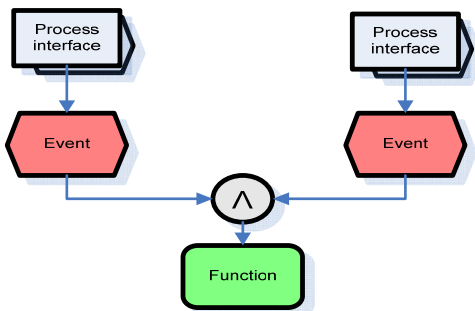


Fig.2. Diagram of detailed description of the process (eEPC)

The analysis was carried out at one of the department of energetic, which role is to ensure the operation of manufacturing and office building of the company. The project was aimed to:

- 1 Mapping and analyzing the processes in selected area;

- 2 Suggestions for Improvement: process optimalization, organizational changes and rationalization of activities.

One of the constraints of the project surely was the fact that it does not work with data on process costs and running of the project was influenced by emotions that emerged from previous analysis/activities in this department.

We can develop both types of desired outputs - map with the main processes and detailed process maps - on the basis of all the necessary information obtained through questionnaire. These maps show the running of all processes in the department and they also serve as a visual aid for verification of correct understanding of information obtained by questioning.

To quantify the results of the analysis we used an indicator of FTE (Full Time Equivalent) (1), (2) - equivalent of working time, expressed as the coefficient, when 1 FTE expresses 1 employee during the reporting period. E.g. 0.5 FTE means an allocating 50% of the worker's time in the process per year (if the period is 1 year) [18]. FTE in the aggregate data indicates how many workers are needed to perform each activity. Using collected data of the duration of each activity in hours and frequency of their occurrence per year, we have quantified the duration of all activities for the year. This figure was subsequently used to quantify the FTE for each activity according to the following formulas.

$$1 \text{ FTE} = \frac{\text{worked hours per year}}{\text{number of employees}} \quad (1)$$

$$\text{FTE} = \frac{\text{duration of activities[hours/year]}}{1 \text{ FTE}} \quad (2)$$

Mapping of all processes, drawing up the process maps and quantifying the results by using the FTE was performed in order to analyze activities adding or not adding value, which is illustrated in the table and the graph. By means of this analysis, it has been found that almost 70% of all activities at this department do not add any value. Results are influenced by the philosophy of department - detect and repair failures as soon as possible. The main purpose is to avoid the shutdown of production, because it would cause big losses for the company. For this reason, employees walk up and down the factory several times a day and check the equipment whether everything is ok [18].

In terms of process management, each one of described analyses revealed several problematic issues, which are briefly summarized below:

- No conceptual approach:
  - Absence of concept of development and rehabilitation of equipment;
  - Maintenance and monitoring without the categorization and prioritization of equipment.
- No systematic procedure:
  - Performance of control perambulation activities;
  - Performance of redundant activities.
- Human Resource Management:

- There is no documentation for training of workers.
- Maintenance management is based solely on experience and knowledge of people:
  - There is no common standard.
- Software support:
  - No concept of development management system;
  - A low rate of its utilization.

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