CHAPTER 4. BUSINESS PROCESS MODELING AND MANAGEMENT

4.1 APPLICATION OF ISSUE – TRACKING SYSTEMS FOR DESIGN AND DECISION MAKING IN THE MINING INDUSTRY

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4.1.1 Introduction

Systems for task management are widely used in the production of software. They apply for planning and management of the company.

The advantages of implementing such systems are that:

- The competitiveness of the company that is using such organization of work is increased;

- The management of the company becomes more efficient;

- The information required for the production reached more easily to the company employees.

Modern mining companies have complex systems. Their design and production operation require the implementation of such systems.

4.1.2 Purpose

- To present the main features and possibilities of application systems for planning and management of business processes.

- To discuss the application of these systems in data management systems and capabilities for using them in preliminary design and decision making in mining.

4.1.3 Systems for planning and management of business processes

In the field of corporate e-management (e - corporation) several systems for planning and management of business processes are created ([Blair, 2004], [Smart, 2007], [Comparison of issue tracking systems, 2011], [Eclipse Mylyn, 2012], [Understanding the IBM Rational ClearQuest Client for Eclipse, 2005] and [Kersten, 2007]).
Key features of the system under consideration are: Database for the system; Dynamic documentation integration/generation; Customizable workflow; Custom Fields and Revision control system integration.

4.1.3.1 System database

In [Comparison of issue tracking systems, 2011] different databases for the corresponding systems are shown. Each realization of the systems has a specific organization of the database. Common feature of these systems is the ability to manage the tasks (Issue Tracking).

An example of such a database is illustrated in fig 4.1-1. It represents a generalized model of the system task management. The example illustrates the basic table for organizing the workflow.

![Diagram](image)

**Figure 4.1-1 Basic scheme of the database for "issue - tracking" system**

The basic element of the system is the task (The table "Tasks"). Each task has certain properties like: title, project task, task type, status, a period during which the task is active, task performer. All properties are included in the database tables shown in fig. 4.1-1.

Fig. 4.1-1 illustrates one workflow. Table "Generation" describes how each change in the tasks' status generates a new task with certain status and type. Thus the presented scheme of workflows is very general. In addition it is possible to filter it for obtaining several workflows.

4.1.3.2 Dynamic documentation integration/generation

Some systems are able to automatically generate dynamic documents such as: reporting: integrated reports and charts and scheduled reports by mail.
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4.1.3.3 Customizable workflow

Workflow is a sequence of steps. Each step may be interpreted as a document, which contains information about tasks of the system users. Each document may create one or more subdocuments. The creation of subdocuments of tasks follows the workflows ([Fisher, 2000] and [Cravetz, 2006]).

Some systems have feature for customizing workflow by the user.

Business Process Modeling (BPM) in systems engineering and hardware engineering is the activity of representing processes of an enterprise, so that the current process may be analyzed and improved ([Williams, 1967], [Brian, 1994] and [Laguna & Marklund, 2004]).

A business model is a framework for creating economic, social, and/or other forms of value.

A business process is a collection of related, structured activities or tasks that produce a specific service or product for a particular customer or customers.

There are three main types of business processes: Management processes; Operational processes and Supporting processes.

Business Process Model and Notation (BPMN) is a graphical representation for specifying business processes in a business process model.

BPMN was developed by Business Process Management Initiative (BPMI), and is currently maintained by the Object Management Group [OMG BPMN].

Basic elements of BPMN:

"Event": An Event is represented with a circle and denotes something that happens (rather than Activities which are something that is done). Icons within the circle denote the type of event (e.g. envelope for message, clock for time).

"Activity": An Activity is represented with a rounded-corner rectangle and describes the kind of work which must be done.

"Task": A task represents a single unit of work that is not or cannot be broken down to a further level of business process.
"Sub-process": Used to hide or reveal additional levels of business process detail - when collapsed a sub-process is indicated by a plus sign against the bottom line of the rectangle.

"Gateway": A Gateway is represented with a diamond shape and will determine forking and merging of paths depending on the conditions expressed.

"Association": An Association is represented with a dotted line. It is used to associate an Artifact or text to a Flow Object.

4.1.3.4 Custom Fields

"Fields" are properties of the task. User can customize some fields in the system.

4.1.3.5 Revision control system integration

Revision control systems are the processes of assigning either unique version names or unique version numbers to unique states of computer software. At each stage versioning, such as story time, compares a version number. It is possible to make branching (branches) of a version. Within a given version number category (major, minor), these numbers are generally assigned in ascending order and correspond to new developments in the software.

At a fine-grained level, revision control is often used for keeping track of incrementing versions of electronic information, whether or not this information is actually computer software. The history of each task can be stored in version control in the form of versions with appropriate comments. Can, the comments on some systems to be introduced automatically according the tasks. The system ensures the correct operation of many workers. Overcoming the collisions takes place as at the time of execution of a task it is locked to other workers.

4.1.4 Planning and decision making in mining

4.1.4.1 Information hierarchy

Mining companies are more often automated systems ([Velev, 1988], [Anachkov & Konstantinov, 1988], [Dermendziev & Stojanchev, 2007], [Pazdziora, 1988] and [Hoek, 2007]). The designing of the processes in mining company includes the choice of model for the operation of systems and their description. The hierarchy of basic operations in mining production may be presented in different layers, such as equipment for processing, operations and corporate levels (fig.4.1-2).
As an example of this system MineSuite™ Company Maptek™ is considered. The main features of the system are:

**Data Collection and Production Management**

MineSuite is a Management Information System of the mine processes, systems and disciplines, bridging the gap between the Process and Enterprise level.

**Fleet Management**

MineSuite provides Fleet Management as a natural consequence of automated production monitoring.

**4.1.4.2 Example of workflow**

The determination of system development and its parameters is related to technology solutions for extraction and preparatory work. Standard work processes are implemented in the mining project. Example of a workflow representing a sequence of estimates of parameters of the system development is given in fig. 4.1-3.
Figure 4.1-3 Sequence of calculations of parameters of the method of mining

Figure 4.1-4 Graph of permissible technological variations

Design solution for system development takes place in conditions of insufficient information. It is used multi-criterion evaluation of: safety, productivity, capital and operating costs. Fig. 4.1-4 presents the graph of eligible technology variants. With technological reasons in mind the preferred options are determined (Table 4.1-1).

<table>
<thead>
<tr>
<th>Variant I</th>
<th>1.1</th>
<th>2.1</th>
<th>3.1</th>
<th>4.1</th>
<th>5.1</th>
<th>6.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variant II</td>
<td>1.1</td>
<td>2.1</td>
<td>3.1</td>
<td>4.2</td>
<td>5.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Variant III</td>
<td>1.1</td>
<td>2.2</td>
<td>3.1</td>
<td>4.1</td>
<td>5.1</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Separated in Table 4.4-1 variants are analyzed by quantitative parameters and performance indicators. As a result, one variant is broadcasted.
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The book highlights theoretical issues and practical research results in the field of e-Governance and open government, knowledge generation, sharing and dissemination in public administration and business management. The chapters have been compiled by selected papers presented at three consecutive conferences “e-Governance”, held in Sozopol, Bulgaria and organized by the Faculty of Management at the Technical University-Sofia; by technical papers resulting from the work on a project “Research and education centre for e-Governance”, funded by the Bulgarian National Science Fund; by documents on good administrative practices included in the virtual library, established within the project and by invited papers, that refer to book’s main topics.

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Management of public and business administration processes

Preface

The book aims to present the results of theoretical study and practical research in the field of knowledge acquisition, dissemination and generation, collaboration and business process modeling in the field of public administration and business management. The selected papers have been presented at three consecutive conferences on the topic of "E-governance", which have been organized by the Faculty of Management at the Technical University of Sofia.

The research and practical results obtained contribute to the accumulation of knowledge on the involvement of E-governance in the public sector and process management therein. The knowledge framework is focused primarily on information models, methodologies and processing technologies directed at facilitating the involvement of E-governance in the public sector. Its relevant aspects concern: information modeling of administrative process workflow and design of automated processes in E-government procedures; methodologies for user-oriented system design for enhancing service offering and achievement of more effective services in the public sector combined with the establishment of roadmaps for identification of potential usability issues that are expected to result in better decision making; models for dissemination and information flow from national registers and databases to European Commissions, international organizations and programs; architecture of a virtual library for good administrative practices as a unified store for dissemination of explicit knowledge among interested parties; technologies for identification of data from multi-page paper documents used in mass processing by the state administration; methodologies for unification of the presentation of administrative objects and activities in management systems resulting in a standardization of administration and management processes as basis for providing tools for decision making and enhancing the efficiency of administration.

Besides the explicit knowledge the digital store of papers contains knowledge that is hidden, has to be revealed, extracted from the good practices concerning actions, procedures, routines and ideas. This implicit knowledge has to be shared by means of relevant tools and methods in a virtual environment. This knowledge is of high value for management because it reveals unknown and unexpected facts, links and relationships which support and facilitate decision making. The profound analysis on implicit knowledge generation models and methods that is presented takes into consideration the type of data to be processed for extraction of hidden knowledge, i.e. digital data store or text document pool. The proposed analysis framework includes the relevant initial requirements, processing methods and highlight of the types of extracted knowledge. As shown it is in the form of categories, groups, associations and factors of influence. Practical results on document classification are obtained by implementing the framework for analyzing text documents on good practices stored in a digital library. It is argued that the extracted knowledge is in a form that can be explicitly stored and consequently socialized and implemented as explicit for management improvement. As public