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Sharing Project Experience through Case-based Reasoning Jürgen Dorn *

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Abstract

Today, most knowledge-based companies organize work in projects. Due to different reasons knowledge gained in projects is not documented and shared in an appropriate manner resulting in the problem that critical knowledge is lost. We propose case-based storage of relevant knowledge and an appropriate reasoning about this knowledge to support organizations in new projects. In order to achieve this objective, we have analyzed which kind of critical knowledge is gained in projects or other way round, which missing knowledge results in the failing of projects. A case is a pre-defined knowledge structure filled out by potentially different stakeholders of the project. After the first planning of a new project, if the project characteristics are entered, case-based reasoning is used to find similar old projects and derive from them additional attributes and to make potential risks visible. This is useful to better estimate the effort of a project, the required human competences and the required communication between stakeholders. This knowledge transfer can support also other phases of a project such as scheduling activities. In a closing phase, individual problems solved in the project can be documented as a kind of lessons-learned attempt.

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1. Introduction

In knowledge-based organizations most of the work is done today in projects and the learning from projects is one of the most important sources for competitive advantage of organizations¹. Project management literature defines a project in different ways. However, a general understanding exists that a project has a result, is temporally restricted (time constraints) and consists of activities performed by humans with sophisticated competences. Often a triangle consisting of quality of result, time and costs is used to visualize the constraining factors in project management. Other characteristics of a project depend on the type of the result and its stakeholders. A

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stakeholder may be a *customer*, but often also other groups of stakeholder are involved in a project and if they are not considered in project planning (e.g. the users of a new information system), the project may fail its objectives. The *result* of a project may be software and there may be a single customer ordering this software. However, a project may also resemble activities to do research or to deliver products for an anonymous market. A project is an organizational structure used in different industrial sectors (building industry, mechanical engineering, ...) and service provisioning. The typical feature distinguishing projects from other kinds of work such as processes, is that a project is always an individual development and thus requiring individual planning. If an organization is producing identical output, they will define a repeatable process that enables better quality management².

The problem solution described in this paper should be applicable in different application domains, but in the following we focus on management of IT projects. Based on theory and experience in quality management and business process management, software engineering defines here also processes. Although different software development processes (waterfall, prototyping, iterative and incremental development, spiral development, rapid application development, extreme programming and various types of agile methodology) were defined, the output (the software or information system) is still unique so that specialized project management techniques are required to manage the diversity and complexity.

Several organizations try to improve project management practice (e.g. International Project Management Association (IPMA), Project Management Institute (PMI), Association for Project Management (APM) and many more. The Project Management Institute defines project management as follows:

*Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorized into five Process Groups. These five Process Groups are: Initiating, Planning, Executing, Monitoring and Controlling, and Closing.*³

Although software engineering theory and practice offers many approaches to improve the development process, still many practitioners report on bad performance due to different reasons^{4,5}. The Chaos Reports giving every year an account of failed projects⁶ get high attention. They claim that projects fail more or less by extending deadlines, extending planned budgets or failing the quality of the expected result. Their definition of failed projects and their research approach is often criticized^{7,8}. For example, if a customer extends his requirements during project runtime and the project requires more resources and takes longer, this must not be seen as a failure. Nevertheless, a mismatch between planned and actual activities requires early adaptation and a project manager should try to optimize under changing environmental conditions and if stakeholders are unsatisfied with the project, a failure must be admitted.

Two steps in the software development process seem to be import for avoiding such failures: a risk analysis before starting a project and in the closing phase reflective activities like post-mortem analysis of failures or lessons learned sessions⁴. An experienced project manager will learn from prior projects and will avoid making failures twice. However, in an organization an important knowledge management process is the transfer of the knowledge from the closing phase of one project to the planning and risk analysis of new projects. For the whole organization this should be defined as a process supported by an information system. Today, usually explicated experiences are stored in files of a document management system¹. Moreover, due to time and cost constraints, often the required steps in the closing phase are skipped, because the work in new projects seem to be more pressing.

Our approach provides means to overcome these problems. We try to make the knowledge transfer more structured, simplify the acquisition and improve the automated reasoning. As a consequence, the effort for project participants should decrease and the support in planning and control should increase. In our research we want to answer the following research questions:

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