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Case handling in construction

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Abstract

Case handling is a new means for supporting flexible and knowledge intensive business processes. Unlike workflow management, which uses predefined process control structures to determine what *should* be done during a workflow process, case handling focuses on what *can* be done to achieve a business goal. In this paper, case handling is introduced as a new possibility for supporting construction processes. The construction of buildings and related facilities is a difficult and complex process, which requires both support and flexibility. This paper describes the application of the case-handling principles within Heijmans. Heijmans is one of the leading companies in the Dutch building industry and is interested in IT support for their construction processes. We have used the case-handling system FLOWer to provide automated support for preparing the construction of complex installations. In this paper, we report our experiences.

Keywords: Case handling; Process control; Process modeling; Workflow management; Process improvement strategies

1. Introduction

Construction processes are notorious for their complexity and changes during the process [10,19,25]. Many attempts to provide automated support for these processes have failed. Today's processes in manufacturing, logistics, and the service industry are supported by information systems. These systems help workers in monitoring, executing, and controlling business processes. This support is enabled by rigorously structuring the processes. Automated support of business processes typically improves performance (e.g., reduced flow times and increased throughput), reduces labor costs, and increases quality (e.g., less errors) [14]. Given these observations, it remains a challenge to apply these systems and principles to construction processes in the building industry [8].

Nowadays, many administrative processes are supported by workflow management systems. Workflow management systems such as Staffware, IBM MQ-Series Workflow, COSA, etc., offer generic modeling and enactment capabilities for structured business processes. By making graphical process definitions, i.e., models describing the life cycle of a typical case

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(workflow instance) in isolation, one can configure these systems to support business processes. Besides pure workflow management systems, many other software systems have adopted workflow technology. Consider, for example, Enterprise Resource Planning (ERP) systems such as SAP, PeopleSoft, Baan, Oracle, as well as Customer Relationship Management (CRM) software. Despite its promise, many problems are encountered when applying workflow technology. As indicated by many authors, workflow management systems are too restrictive and have problems dealing with change [4,6,7,11,13,15,17,18,27]. Many workshops and special issues of journals have been devoted to techniques to make workflow management more flexible [4,6,17,18]. Some authors stress the fact that models should be as simple as possible to allow for maximum flexibility [7]. Other authors propose advanced techniques to support workflow evolution and the migration of cases of one workflow model to another [11,27]. If the process model is kept simple, only a more or less idealized version of the preferred process is supported. As a result, the real run-time process is often much more variable than the process specified at design time. The only way to handle changes is to go behind the system's back. If users are forced to bypass the workflow system quite frequently, the system is more of a liability than an asset. If the process model attempts to capture all possible exceptions [24], the resulting model becomes too complex to manage and maintain. These and many other problems show that it is difficult to offer flexibility without losing control.

In this article, we focus on the application of workflow technology to construction processes. Given the fact that contemporary workflow management systems such as Staffware and IBM MQSeries Workflow have problems providing operational flexibility, it does not make sense to try and apply these systems to construction processes. Therefore, we propose an approach based on the case-handling paradigm [3]. This paradigm is supported by a case-handling system named FLOWer [22]. We consider construction processes in the building industry the acid test for case-handling.

The work reported in this paper is the result of a project conducted within Heijmans Bouw. Heijmans Bouw is part of Heijmans N.V. that operates in the construction industry and related industries. The main activity of Heijmans Bouw is the realization of buildings. Heijmans Bouw represents Heijmans N.V. in all sectors of the private and business housing. Fig. 1 is used to describe the scope of the project.

Heijmans Bouw divides its projects into four phases (Fig. 1): Project Development Phase (PDP), Preparation of Execution Phase (PEP), Realization of Execution Phase (REP), and after care. The main focus of Heijmans Bouw is on the execution, i.e., PEP and REP. Especially in the PEP, management and control of the project is important and can be very effective for the whole project. For managing its projects, Heijmans Bouw uses so-called project manuals. An example is the PEP manual. This manual contains standard documents and schedules and has been an important starting point for the work presented in this paper. It should be noted that despite the existence of project manuals, no computer support for controlling and managing any of the four phases shown in Fig. 1 existed.

The research project described in this paper focuses on the application of the case-handling approach in the PEP. We have applied this approach to the preparation

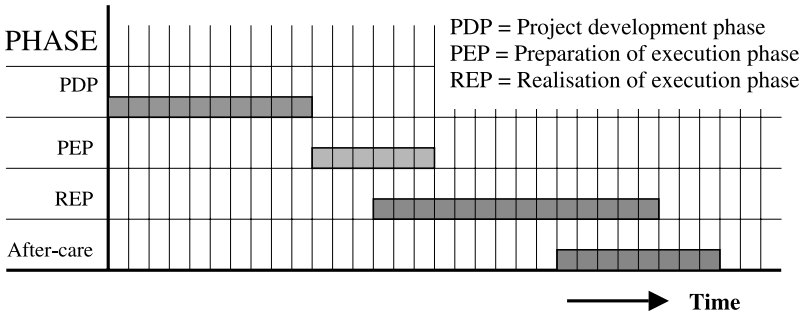

Fig. 1. Phases in projects.