Chapter 149
Workflow Systems and Knowledge Management

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Category: Organizational Aspects of Knowledge Management

INTRODUCTION

The business reengineering movement has left two lasting benefits: One is the identification of an organization as a set of processes (Davenport, 1993); the other is an emphasis on knowledge management (Davenport, 1997). The process orientation finds an expression in workflow systems. Processes have to be supported by knowledge management. Our purpose here is to provide an outline of how knowledge management relates to workflow systems.

The main source of information on workflow systems is the Workflow Management Coalition (WfMC). In 1994, the coalition published a 55-page *Workflow Reference Model* (available from its Web site *www.wfmc.org*), which establishes a common vocabulary, a description of key software components of a workflow management system, and interfaces between these components. The WfMC has been publishing an annual workflow handbook, an example being Fischer (2004). This volume contains an evaluation of the Workflow Reference Model (Hollingsworth, 2004). For a textbook with exercises refer to van der Aalst and van Hee (2002). Important pioneering work in this area was done by Schael (1998). A somewhat dated bibliography has been compiled by the ISYS group of the University of Klagenfurt (ISYS, 2000).

We start with a few definitions, based in part on the 65-page *WfMC Terminology and Glossary* document (also available from the WfMC Web site *www.wfmc.org*), and on van der Aalst and van Hee (2002). A *business process* is a set of linked activities that collectively realize a business objective or policy goal, and *workflow* is the result of automation of this process, in whole or part. A workflow comprises cases and resources. Cases are instances of the business process, and resources support the process. For example, the set of resources of an automated process that provides information about flight arrivals has to include a constantly updated database of flight data and a set of telephones. Every enquiry submitted to this system is a case.

A workflow system (WfS) manages the routing of cases through a workflow: A case "flows" from

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one station to another, and at each a task is performed on it. The task can be manual, automatic, or semiautomatic, but the definition of workflow as given suggests that the tasks of an *ideal* WfS should be automatic. It is important to realize that the ideal will not be achieved in the foreseeable future. Most WfSs of today are semiautomatic because they have to deal with unanticipated situations that only a human operator can handle. Moreover, software, the platforms on which it is implemented, and communication links can break down, requiring transfer of control to people. It is therefore important that the skills of these people be maintained by occasionally switching to a totally manual mode of operation.

The term "workflow," which we take to be a way of writing "flow of work," is appropriate because the cases move between workstations connected in a network. Indeed, implementation of workflows would have been difficult before computer networks became commonplace. A *workflow management system* (WMS) is a software package for the implementation of a WfS; adaptation of the generic WMS to the needs of a specific application turns it into a WfS for this application. This means that the WfS is also a software package. A distinction has to be made between the movement of cases between stations and the tasks performed at the stations. The movement, which is what the WfS controls, is normally fully automated: After a case has arrived at a station, the task is started automatically, or the system prompts a person to start the task; the task is then started at once, or after a delay. The delay may be due to a backup of cases or because the task is to be performed within a specified time window.

In the next section, we present a background survey, namely a discussion of processes that relate to workflows, and a discussion of information and knowledge. Then, we consider the management of knowledge in the context of workflow systems. We look to the future and offer a conclusion.

BACKGROUND SURVEY

Software Processes

In our view, the key concept of workflows is the use of software. With any software system, one has to consider: (a) the processes that create the software; (b) the software being created, which also defines a process; (c) the capabilities needed to implement and manage these processes; and (d) the knowledge resources involved throughout. As regards (a), the software development process can be regarded as a workflow system—this follows from the insight that the software development process is itself software (Osterweil, 1987).

Having established that a WfS is essentially a software system, we need to take a closer look at software development. The software process is made up of people, tools, and procedures. The people have to possess a set of capabilities that are to allow them to understand and make full use of the tools and procedures. For software development, such capabilities are defined by the Capability Maturity Model (CMM-SW) of the Software Engineering Institute (1995), and the more recent CMMI-SW (CMMI Product Team, 2002).

Under CMM-SW there are three types of processes: (1) a generic software development process; (2) processes derived from the generic process for the development of specific applications; and (3) these application processes. In addition, there is a process that assists in the conversion of process (1) into an instance of processes (2). In our context, the WMS would correspond to type (2): a process adapted from a generic software process that takes into account the specialized needs of WfSs. However, the workflow community has been understandably more concerned with business processes than with principles of software development. As a result, WMS is an abstraction of the features of application processes. Never-