Chapter V

Metrics for Workflow Design: How an Information Processing View on Business Processes Helps to Make Good Designs

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ABSTRACT

On the way to process automation, an important issue is the definition of the various activities or work tasks within the respective business process. Design decisions on this issue considerably affect business performance. Several guidelines known in the area of workflow management exist, but do not give the inexperienced workflow designer much to hold on to. This chapter introduces a cohesion metric that can be used for the identification of weakly cohesive activities in a workflow design. Also, a heuristic is presented that is based on this cohesion metric to decide between various workflow design alternatives. A theoretical and an empirical evaluation are included in this chapter, both positively supporting the soundness of the metric. The inspiration for the introduced notion is derived from similar cohesion metrics in software engineering.

INTRODUCTION

Workflow management projects typically start with the design of a business process. This usually results in a model of the process as a network of related activities. After the
design phase, a formal version of the model can be used to configure a workflow management system. One of the functions of such a system is that it can allocate activity instances to the workers in that process at run-time (Jablonski & Bussler, 1996; Van der Aalst & Van Hee, 2002). However central the activity concept may be within such a setting, it is the author’s experience in various workflow projects (De Crom & Reijers, 2001; Reijers, 2003) that the knowledge of identifying activities within a business process is limited and can result in ill-defined activities.

The results of ill-defined activities on the operational performance of a process may be substantial. One may think of activities that are needlessly small. This increases the number of hand-offs between activities, with a corresponding increase of errors (Seidmann & Sundararajan, 1997). Activities that are too large may cause inflexibility within a business process, since its underlying operations must be performed regardless of their merits under the circumstances (Van der Aalst, 2000).

The aim of this chapter is to provide some tangible guidance for activity definition in the form of a heuristic, by making the intuitively appealing notion of a ‘logical unit of work’ operational. The application area is the design of workflow processes. The heuristic we propose is based upon a cohesion metric for activities, as inspired by similar notions in software engineering. In this way, insights from computer science are transferred to the business area, which in this case seems to be a successful undertaking.

The structure of this chapter is as follows. First, we will introduce some basic concepts and give a short overview of existing activity definition heuristics in the workflow management field. Next, we will present the cohesion notion we mentioned earlier, as well as a heuristic for its use. After its introduction and the presentation of some examples, we will subject the cohesion notion to both a theoretical and empirical evaluation. Some concluding remarks and directions for further research form the final part of this chapter.

ACTIVITY DESIGN IN WORKFLOW MANAGEMENT

Terminology

An activity is a specification of a part of work to be accomplished. We use ‘workflow process’ as a synonym for a specific type of business process. A business process itself is a conceptual way of organizing work and resources by distinguishing a set of related activities. Workflow processes are usually found in administrative contexts (e.g., banking, insurance, government, etc.). They are particularly suitable to be supported by workflow management systems.

Each single activity that is distinguished within a workflow process may be divided into a number of operations. Operations are used to identify small parts of work in a way that is still useful within the business context. In general, it is also possible to distinguish an activity without mentioning the operations it comprises (non-determinism).

We interpret the matter of activity definition as the formulation of a goal and/or the assignment of operations to an activity within the context of a single workflow process. Part of the work in defining activities involves an evaluation of its properties, such as its size, its workability, its performance, etc. Although a broader view on an activity definition may also include matters such as the development of work instructions, various views and
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