Chapter VII

Procedural Cuing Using an Expert Support System

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ABSTRACT

This chapter describes the development of a system to assist teams in determining which problems to address and what data to collect in order to incrementally improve business processes. While prototyping is commonly advocated for expert system development, this project used a structured development methodology comprising requirements analysis, knowledge acquisition, and system development. The knowledge acquisition phase resulted in a logical model, which specified the decision task and suggested a system structure. The field prototype developed from this model uses procedural cuing to guide decision makers through a decision making process. The system provides decision support, interactive training, and expert advice.

INTRODUCTION

Decision making support systems (DMSS) encompass a range of computer applications designed to assist managers at various levels in a variety of tasks including information management, people management, and production or process management. The ESS developed in this project assists teams in incremental
business process improvement, specifically in selecting projects, developing measures, and designing data collection plans to measure and monitor processes. Incremental improvement is effected primarily at the operational level where many workers lack the necessary experience, skills, and knowledge. Consequently, they require an expert they can call upon for support. However, it is difficult, if not impossible, to have an expert available on an as-needed basis. Our solution to this problem was to provide workers with a computerized expert, an ESS, to guide them through a data-driven quality improvement process. The system, DATQUAL, uses procedural cuing to present the decision structure and guide teams through it. The result is a system which combines decision support, training, and expert advice for a complex task consisting of a series of decisions taken over an extended time period.

The research reported here completes the first phase of development leading to a model of the task domain, a supporting knowledge base, and a prototype system. In this phase we first identified the task through requirements analysis with a client firm. We then gathered knowledge and developed a conceptual model. The function of the conceptual model was to present the acquired knowledge in a way that allowed us to understand the task. The conceptual model formed the basis of a logical model, which added the hierarchical structure and detail required to encode the knowledge in a computer system. The outcome of this phase was a DMSS, which details a series of decision making events and suggests the data needed at each decision point.

The purpose of this chapter is to describe the development process involving the specification of the task, design of the system structure, and development of a field prototype. The chapter is organized as follows: First we describe the nature of DSS and ESS. We then discuss the development environment, describe the development process, and present the system models and structure. We conclude by summarizing the project and suggesting benefits and future directions.

DECISION MAKING AND EXPERT SUPPORT SYSTEMS

Decision Support Systems

One of the earliest attempts at describing the concept of decision support systems (DSS) was that of Gorry and Scott-Morton (1971). They describe these new systems as “interactive computer-based systems which help decision makers utilize data and models to solve unstructured problems.” The significant concepts here include the use of data and models and their application to unstructured problems. Later, Keen and Scott Morton (1978) defined DSS as systems which “couple the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. It is a computer-based support system for management decision makers who deal with semistructured problems.” In this later
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