



## **Chapter VI**

# **Goal Modeling in Requirements Engineering: Analysis and Critique of Current Methods**

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## **ABSTRACT**

*In the field of requirements engineering, goal modeling approaches have received much attention in recent years by researchers and practitioners alike. This chapter identifies the uses of these approaches in different contexts of requirements analysis phases. It examines goal modeling in terms of five methodological orientations and defines a framework for their analysis. Using this framework it provides an analysis of goal modeling approaches in a systematic and consistent manner. The aim of this analysis is to understand the best fit for purpose of different goal modeling approaches and to highlight open issues that provide a foundation for further research in this important area of requirements engineering methodology.*

## INTRODUCTION

Since the mid-1970s when requirements engineering (RE) was established as a distinct field of investigation and practice, its definition has evolved from initially being concerned with software systems (IEEE-Std.'729', 1983; IEEE-Std.'830', 1984) to a broader perspective that extends to also incorporate aspects of systems and organizations (Greenspan, Mylopoulos, & Borgida, 1994; Loucopoulos & Karakostas, 1995; Pohl, 1996; Yu, 1997; Zave, 1997). In the last few years, the relation of RE to the organizational context has attracted much interest from the software engineering community. Research in this area is based on the premise that in designing software systems, requirement engineers aim to 'improve' organizational situations that are seen as problematic — or, at least, as less than perfect. Hence as a discipline, RE brings software engineering concerns closer to problems experienced in organizational settings. RE addresses the problems associated with *business* goals, plans, processes, etc., and *systems* to be developed or to be evolved in order to achieve organizational objectives (Loucopoulos & Karakostas, 1995; van Lamsweerde, 2001).

Coupled to the *goal-driven* nature of software systems is the way RE itself is performed. RE projects require the involvement of multiple stakeholders (the sponsor organization, the system developers and users, external regulators, etc.). The question here is how do stakeholders coordinate their actions in order to provide a common result.

Research in the areas of process modeling, work-flow analysis, and CSCW (Ellis & Wainer, 1994; Nurcan & Rolland, 1997; Schedin, 1995) endorses a goal-directed view. This view is based on the premise that in collaborative work situations, people do not strictly follow rules or procedures; rather they are aware of the personal and group goals and act accordingly (Smith & Boldyreff, 1995). This is especially true when people are not faced with well-structured, repetitive processes, rather they tackle ill-structured problems where both the intended outcome and the possible routes that can be followed to reach this outcome need be specified, which is usually the case in RE (Bubenko, 1995; Loucopoulos & Kavakli, 1997).

This goal-driven view of the RE process is also suggested in design problem solving (the research field that deals with the creation and transformation of systems). Research in this area indicates that unsatisfied goals or needs motivate and inform design activity, instigating design efforts and providing criteria for the evaluation of design products (Smith & Browne, 1993).

In addition, research in goal-driven RE has a cognitive basis in psychological research. This research has established much evidence for the influence of goals on human behavior, and for the use of strategic and goal-driven processes in many kinds of activities that humans perform (Dasgupta, 1994; Rasmussen, Pejtersen, & Goodstein, 1994).

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