Chapter III

Requirements Elicitation for Complex Systems: Theory and Practice

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Abstract

This chapter examines requirements elicitation for complex systems from a theoretical and practical perspective. System stakeholders, requirements sources, and the quality of requirements are presented with respect to the process, including an investigation into the roles of requirements engineers during elicitation. The main focus of the chapter is a review of existing requirements elicitation techniques and a survey of current trends and challenges. It is concluded with some views on the future direction of requirements elicitation in terms of research, practice and education. It is the intention of the authors that readers of this chapter will be sufficiently informed on the concepts, techniques, trends, and challenges of requirements elicitation to then apply this knowledge to system development projects in both industrial and academic environments.

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Introduction

If elicitation is considered the initial phase in requirements engineering, then it can also be regarded as the first stage of system development. It is at this point in the process where the needs of the users and the goals for the system are determined. Despite its obvious importance to the development of systems, requirements elicitation has only received significant attention in research and practice over the past decade or so.

Although seen as a fundamental part of the system development process, requirements elicitation is often considered a major problem area in projects for computer-based systems. Eliciting requirements for complex systems is a difficult and expensive process, and consequently a key issue in software and systems engineering. As part of essentially a social activity, the issues and challenges associated with requirements elicitation cannot be addressed by technical solutions alone. It is for these reasons that a structured and rigorous approach must be employed for this activity.

In practice requirements elicitation is a multifaceted, incremental, and iterative process that relies heavily on the capabilities of requirements engineers, and the commitment and cooperation of stakeholders. The type of system to be developed and its intended purpose will have a significant effect on the way in which this task is conducted. The specific techniques used to elicit requirements during a project will often depend on a number of additional factors, including time, cost, and the availability of resources.

In this chapter we will examine requirements elicitation for complex systems from a theoretical and practical perspective. It is intended, through a review of existing theory and an assessment of current practice, readers will be sufficiently informed of the techniques, approaches, trends, and challenges in requirement elicitation to then be able to apply this knowledge to system development projects in industrial or academic environments.

Background

The elicitation of requirements can be broadly defined as the acquisition of goals, constraints, and features for a proposed system by means of investigation and analysis. Furthermore it is generally understood that requirements are elicited rather than captured or collected (Goguen, 1996). This implies both a discovery and development element to the process.

Requirements can be elicited from a variety of sources using a range of different techniques and approaches. Invariably the system should be defined in terms of the operations it must perform, referred to as functional requirements, and the non-functional aspects of the system, such as performance and maintainability. In all projects it is important that during this process both the problem and solution domains are thoroughly examined (Jackson, 1995). By this it is meant that the goals for the system must be investigated as well as the options available to satisfy them.
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