Chapter VI

A Language/Action Based Approach to Information Modeling

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INTRODUCTION

There are several different views of the functional role of information systems. Two of the most important ones are the model view and the communicative action view. According to the model view, the primary purpose of an information system is to provide a model of a Universe of Discourse (UoD), thereby enabling people to obtain information about reality by studying the model. In this respect, an information system works as a passive repository of data that reflects the structure and behaviour of the UoD. In contrast, the communicative action view states that the major role of an information system is to support communication within an organisation by structuring and coordinating the actions performed by the organisation's agents. The system is seen as a medium through which people can perform social actions, such as stating facts, making promises, and giving orders. In certain cases, the system can itself take on the role of an agent and perform actions on its own initiative.

Most representation techniques used in systems development are based on the model view of information systems. For example, Entity-Relationship diagrams or object-oriented class diagrams are used to represent the static and structural aspects of a UoD. Other examples are entity life cycle diagrams and interaction diagrams, which describe the behaviour of objects. Another technique, which also addresses communicative aspects, is the data flow diagram technique by which the information and control flow between agents in an organisation can be represented. These types of techniques have received widespread acceptance and are now important parts of several systems development methodologies. However, the techniques have also been heavily criticised, see for example (Auramäki, 1988) and (Coad, 1990). One

line of critique argues that the basic concepts of the techniques are inappropriate for describing the activities of an organisation. When using the techniques, an enterprise is viewed as a collection of physical places or objects, and the work performed is accordingly analysed as physical activities such as sending messages and storing data. This focus on the physical transfer of data results in a computer and technology biased representation of the communication taking place in an organisation. Thus, from a communicative point of view, the very starting point of many modeling techniques are themselves flawed and should be replaced by an approach that focuses on the communicative actions of an enterprise.

A promising approach for modelling communication structures is the language/action approach, which is based on theories from linguistics and the philosophy of language. In the language/action approach, business processes are modeled using the notions of speech acts and discourses, which provides a basis for distinguishing between distinct communication phases, such as preparation, negotiation, and acceptance. The purpose of this chapter is to investigate how the language/action approach can be used as a foundation for the information modeling of the communicative aspects in an organisation. This will be carried out by showing how a language/action approach combined with deontic concepts can be used to construct and organise analysis patterns for information modeling. These analysis patterns can be used in information modeling by supporting reuse, validation, and analysis of conceptual schemas. The information model can also be used to suggest how to organise the components that realise the communicative aspects of an information system into a three-tier architecture. The paper is organised as follows. Section 2 briefly discusses related work. Section 3 introduces an information model based on the language/action perspective. Section 4 shows how this model can be used to organise a number of analysis patterns. Section 5 discusses a number of applications of the model for reuse, validation, and systems architecture. Section 6 concludes the paper and gives suggestions for further work. This chapter extends previous work presented in (Johannesson, 1999).

RELATED RESEARCH

The theoretical foundations of the language/action approach come from linguistics and the philosophy of language, in particular speech act theory, (Searle, 1969). The basic insight of speech act theory is that language can serve purposes other than that of representing the states of affairs of the world. Certain statements are equivalent to actions. For example, when someone says "I apologise", "I promise...", or "I name this ship...", the utterance immediately conveys a new psychological or social reality. An apology takes place only when someone admits having been at fault, and a ship is named only when the act of naming is complete. In such cases, to speak is to perform. Statements such as those above are called performatives or speech acts, and they make it possible to use language as a means both for acting and for coordinating action. The study of speech acts has been an active research area in analytical philosophy since World War II, and the most influential approach to date is speech act theory as developed by John Searle, (Austin, 1962; Searle, 1969). Searle proposes a taxonomy for speech acts consisting

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