Chapter III

The Agent-Oriented Methodology
MAS-CommonKADS

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Abstract

This chapter introduces the main concepts of the methodology MAS-CommonKADS that extends object-oriented and knowledge engineering techniques for the conceptualisation of multi-agent systems. MAS-CommonKADS defines a set of models (Agent Model, Task Model, Expertise Model, Coordination Model, Communication Model, Organisation Model, and Design Model) that together provide a model of the problem to be solved. Each of the components of the model is a generic component for the sake of reusability. Readers familiar with object-oriented analysis will find it easy to apply most of the techniques of MAS-CommonKADS in the development of multi-agent systems and will be introduced to the application of knowledge engineering techniques for specifying the knowledge of the agents.

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Introduction

MAS-CommonKADS is an agent-oriented software engineering methodology that guides the process of analysing and designing multi-agent systems. MAS-CommonKADS distinguishes several development phases: conceptualisation, where the system is conceived as a multi-agent system and where agent properties of the system are identified; analysis, where different models are developed in order to analyse the system from different points of view; design, where the different models are operationally focussed; and development and testing, which are not addressed explicitly in the methodology.

MAS-CommonKADS (Iglesias, 1998; Iglesias, Garijo, González, & Velasco, 1998) can be used in combination with other methodologies. For example, some of its conceptualisation techniques, such as Class-Responsibility-Collaboration (CRC) cards (Beck & Cunningham, 1989; Wirfs-Brock, Wilkerson, & Wiener, 1990) and User-Environment-Responsibility (UER) techniques (Iglesias & Garijo, 1999) can be used for conceiving a system from an agent point-of-view and be combined with other methodologies such as Rational Unified Process (RUP) (Kruchten, 2000) or eXtreme Programming (XP) (Beck, 1999); or use another agent-oriented methodology. In the same way, every analysis model can be used in combination with another methodology.

MAS-CommonKADS has as one of its goals to be usable by professionals who want to include in their projects this new and exciting computation paradigm—agents. In this way, MAS-CommonKADS extends well-known modelling techniques, such as CRC cards, use cases, Message Sequence Charts (MSC) (ITU-Z.120, 1996) or Specification and Description Language (SDL) (ITU-T-Z.100, 1994) diagrams, with new perspectives driven by the agent metaphor.

This makes many of MAS-CommonKADS techniques easy to learn and practice. The recent addition of MSC and SDL diagrams to Unified Modelling Language (UML) (Salic, 2004) makes MAS-CommonKADS even easier to practice with standard object-oriented CASE tools that can be enhanced with stereotypes for some of the new modelling entities (for example, software actor or environment).

The MAS-CommonKADS Methodology

The origins of MAS-CommonKADS come from CommonKADS (Schreiber et al., 1999), a well-known knowledge engineering methodology, and from object-oriented methodologies such as Object Modelling Technique (OMT)