Chapter VI
R^2–IBN:
Argumentation Based Negotiation Framework for MAIS–E^2 Model

Lobna Hsairi
SOIE: Institut Supérieur de Gestion de Tunis, Tunisie

Khaled Ghédira
SOIE: Institut Supérieur de Gestion de Tunis, Tunisie

Adel M. Alimi
REGIM: Ecole Nationale d'Ingénieurs de Sfax, Tunisie

Abdellatif BenAbdelhafid
CERENE-SILI: Université du Havre, France

ABSTRACT

In the age of information proliferation, openness, open information management, ***interconnectivity****,* ***collaboration*** *and communication advances,* ***extended enterprise****s must be up to date to the new strategic, economic and organizational structures. Consequently, intelligent software based on* ***agent*** *technology emerges to improve system design, and to increase enterprise competitive position as well. The competitiveness is based on the information management,* ***cooperation****,* ***collaboration*** *and* ***interconnectivity****. Thus, within these* ***interconnectivity*** *and* ***cooperation****, conflicts may arise. The automated negotiation plays a key role to look for a common agreement. Argumentation theory has become an important topic in the field of* ***Multi-Agent Systems*** *and especially in the negotiation problem. In this chapter, first, the proposed model* ***MAIS-E²*** *(Multi-****Agent*** *Information System for an* ***Extended Enterprise****) is presented. Then an* ***argumentation based negotiation*** *framework: Relationship-Role and Interest Based* ***Negotiation*** *(****R²-IBN****) framework is presented, and within this framework, the authors focused mainly on, argument generation module via inference rules and argument selection module via* ***fuzzy logic****.*

INTRODUCTION

Nowadays, a number of new concepts have been proposed, e.g., Virtual Organization, Supply Chain Management, Virtual and **Extended Enterprise**, etc (Tsung-Yi , 2008; Martinez, Fouletier, Park & Favrel, 2001). An **extended enterprise** is the **cooperation**, **collaboration** and **interconnectivity** of legally independent enterprises, institutions, or individuals. The **extended enterprise** will be characterized by intensively concurrent engineering based on open information both in management and technologies such as digitalization, computer network, and artificial intelligence (Tsung-Yi, 2008). The intelligent software **agent** technology provides a natural way to overcome such problems (Martinez, Fouletier, Park & Favrel, 2001). **Agents** help to capture individual interests, local decision making using incomplete information, autonomy, responsiveness, robustness, modular and distributed. A **Multi-Agent System** (**MAS**), as a society of autonomous **agents**, is an inherently open and distributed system. It is made up of a group of **agents** combined with each other to solve a common problem cooperatively. In addition, **negotiation** is a key form of interaction in systems composed of multiple autonomous **agents** (Bench-Capon & Dunne, 2007). The automated **negotiation** plays a key role in sharing information and resources to look for a common agreement. The research literature proves that **Argumentation Based Negotiation** (**ABN**) is an effective means of resolving conflicts in **MAS** (Bench-Capon & Dunne, 2007; Hsairi, Ghédira, Alimi & Ben Abdelhafid, 2008). Besides, the **fuzzy logic** of Zadeh (1965) opens new horizons in the vast world of information analysis and treatment. One of the present tendencies in the **fuzzy** modeling is generating models that take into consideration two fundamental conditions at the same time: interpretability (which is the description capacity of the modeled systems behavior) precision and fidelity of model towards the original system (Casillas, Cordòn, Herrera & Magdalena, 2003).
In this chapter, in the first place, we present our research efforts in developing a **MAS** architecture named **Multi-Agent** Information Systems for an **Extended Enterprise** (**MAIS-E²**). Then, we define the Relationship-Role and Interest Based **Negotiation** (**R²-IBN**) framework. **R²-IBN** framework is an extension of an existing one namely IBN (Rahwan, Sonenberg & Dignum, 2004). In this chapter, we present mainly the extensions made in two modules: the argument generation module via inference rules and argument selection module via **fuzzy** rules based system as an intelligent method in order to better estimate the desirability degree of the argument to send.
The remainder of this chapter is structured as follows: the *background* section describes **extended enterprises**, reviews **negotiation** approaches and related works. The ***MAIS-E²**: An Intelligent Model Toward An Inter-Enterprise **Cooperation*** section presents our research efforts and experiences in developing a **multi-agent** model for an **Extended Enterprise**. The ***R²-IBN**: Argumentation Framework* section describes our proposed **argumentation based negotiation** framework. *Future Trends* section presents emerging tendencies. Finally, in the *conclusion* section remarks and perspectives are given.

BACKGROUND

In this section, we first describe **extended enterprises**, then, we review **negotiation** approaches and finally, we review related works.