Chapter VI
An Inter-Organizational Business Process Study from Agents Interaction Perspective

Joseph Barjis
University of Wisconsin–Stevens Point, USA

Samuel Chong
Accenture, UK

ABSTRACT

It is observed that agent (or software agent) based systems largely imitate organizations of human actors. Thus, the nature of agent-based systems can be better understood by first studying the ordinary human actors or organizations that own the agent-based systems. In this chapter, we first study agent systems and discuss characteristics of software agents. Then we introduce a generic pattern of agents interaction derived from the communication patterns of human actors. Agent-based systems are studied in the context of inter-organizational business process using diagrams and notations adapted by the authors. The methods and concepts used in this chapter are based on the semiotics approach and the language action perspective. For the illustration of our concept of agent-based systems, we discuss a case study conducted based on a real life business.

INTRODUCTION

Organizations of the 21st century are a dynamic, distributed, and complex network of interactions. Daily business operations of these organizations are governed, controlled, and accomplished not only by human actors but to a great extent, if not fully, by software agent systems (e.g., placing or receiving orders, processing payments, sending reminders, alerting of opportunities or new offers, gathering business data or analyzing customer data, using a search engine to find a book at

Amazon.com, using a loan approval tool to obtain a pre-approval in a bank, and so forth).[1]

The main objective of this chapter is to provide some insight into agent systems in an inter-organizational business setting. In this chapter, we define a software agent as a semi or fully autonomous IT system that has been delegated authority to cooperate with other agents to accomplish the common goals of the human actors. Thus, components of modern organizations consist of not only human actors but, to a certain extent, also consist of simplified agent-based systems (e.g., search engines) or more advanced agent-based systems (e.g., automated travel booking agent).

Agent-based systems have always being loosely classed under the artificial intelligence (AI) branch, and, over the years, the research in the area adopted a research paradigm and approach that is tailored to AI. Many social aspects that such systems can bring to society have been largely left ignored or seen as unimportant. For example, a human can merely delegate the authority to carry out a transaction but not the responsibility. The mainstream approaches focus heavily on capturing the technical obligations of software agents during the design. Many of these approaches are based on the object-oriented paradigm and extend an object to include additional properties such as *preferences, moods, and technical obligations*. An instance of these technical obligations is the obligation for a seller agent to send an auto-reply to the buyer agent. What is considered less important in these approaches is the capturing and formalization of exceptions to obligations and social penalties for the human actors when obligations or deadlines are missed. After all, one cannot bring an agent to court to settle any dispute when things go horribly wrong. In this scenario, fallback mechanisms that require the interventions of the human agents need to be put in place. Among others, this chapter argues that the "soft" factors, such as the simple example given, need to be fully considered during the design of such systems. The rest of the chapter is devoted to a discussion and application of two proven theories, namely organizational semiotics (OS) and the language action perspective (LAP), and how they can be or have been adapted over the years by the authors to enable the social aspects to be included in the design of agent-based systems, while not ignoring the important contributions made by the mainstream design approaches. In fact, this chapter furthers the research findings and results of Barjis, Chong, Dietz, and Liu (2002). The adoption of these two sets of theories to agent-based systems is novel and is the first treatment of its kind to understand the design issues of agent-based systems. The novelty of our approach is that an analyst can check and execute her agent system model via a simulation tool before designing or implementing an actual system. This will prevent system developers from the expensive trial and error design approach.

By tackling a few aspects of human actors' interaction, inter-organizational business processes, and agent systems, we put forward the following main hypotheses that this chapter aims to prove:

- To fully understand the social aspects of agent systems, we need to start from studying the communication pattern between human agents and software agents.
- A clear distinction between interactions and actions between customer and provider, and among the members of organizations will enable an agent-based system to better coordinate and support inter-organizational business functions.
- To further understand the current issues that agent based systems face, taxonomy and classification of agent-based systems and their purposes in our society need to be established.
- A clear distinction between the authority and responsibility of agents will enable a socially responsible agent-based system to be design and developed.

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