

## Chapter 25

# Concept of Mobile Agent–Based Electronic Marketplace Safety Measures

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### ABSTRACT

*In mobile agent-based systems, the use of mobile agents in pervasive ubiquitous electronic marketplace (e-marketplace) environment requires very well protected, secure and safe infrastructure and networking services, if they are to be trusted. The important issues and functions of security, privacy, trust and audit complement the basic requirements of mobile agent-based systems. These must support e-marketplace trading in today's computing arena facilitated and driven by the Web, Internet and ad hoc networks. In this chapter, the concept and application of security, privacy, trust, and audit for normal business and digital forensics purposes under the single term safety measures are presented. These measures are the key drivers and principles of secure mobile agents for mobile agent based environments.*

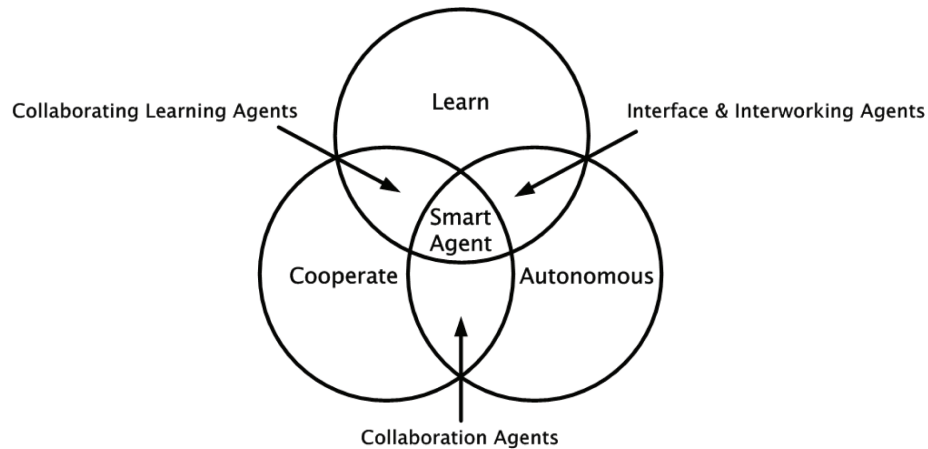
### INTRODUCTION

In this chapter, the basic concepts of Mobile Agent Systems (MAS) which support hosts, infrastructures and roving Mobile Agents (MAs) are extended to elaborate on the principles and address the key issues of security, privacy, trust, and audit for normal e-business and digital forensics purposes. The single term to encapsulate all of them is called *safety mea-*

*asures*. All of them have an impact in agent-based e-marketplace trading in the form of e-commerce or e-business. Many of these topics and the issues surrounding them are still in the Research & Development (R&D) domain. Some products from these efforts have become available for normal use. For those MASs having intrinsic value and affect business processes and individual's personal rights, these safety measures are vital, even in economic terms (Katos & Patel, 2008).

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*Figure 1. Primary dimensions of attributes for deriving smart intelligent agents*



## **BASIC DEFINITIONS AND CONCEPTS OF MOBILE AGENTS**

A *software agent* is a piece of software that executes on behalf of a program enacting the role of a process or end-user program. *Mobile code* is software downloaded from remote systems via a network and executed on a local system without explicit installation or execution by the recipient. MAs are specific incarnations of software agents and mobile code paradigms. They have great autonomy and different levels of intelligence as to what and how they can do their work. They are programs that can migrate from host to host across multiple platforms via networks when and where they choose. Their intermediate execution state is saved and transported to the new host where it is restored and the program continues running from the place where it paused.

Intelligent Agents (IAs) can handle dedicated but complex tasks on behalf of their users without repeatedly interacting with them to accomplish a task because they effectively communicate with other agents, users and service platforms against a given profile, which makes them highly intelligent and autonomous in the way they go about doing their work (Wooldridge & Jennings, 1995). A good example is a Web-based search agent

that is capable of retrieving desired e-market information on behalf of the user according to his/her intended profile. The MA is instructed what to look for, and then dispatched to carry out the search and return with the information. This level of intelligent knowledge operation implies that agents can be implemented and managed to operate in any way one wants, albeit either legitimately or illegitimately. Those that operate illegally are a threat.

IAs derive their smartness by self-acquired learning through a combinations of interactions with other collaborating learning and/or collaborating agents with a common purpose, and interface and interworking agents (Nwana, 1996) as shown in Figure 1. These IAs are sometimes termed “Intelligent multi-Mobile Agents (IMAs), which effectively make them smart MAs. For the purpose of the material addressed in this chapter, MA, IA, IMA are the same things.

For such interworking and interoperability to be successful, there needs to be a minimum set of MA norms or guidelines that provide at least:

- A commonly agreed set of rules (protocols with their syntax and semantics and execution conditions) by which MAs can communicate with each other so that they can

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