Chapter 1.9
Engineering of Experience Based Trust for E-Commerce

Zhaohao Sun
Hebei Normal University, China and University Of Ballarat, Australia

Jun Han
Beihang University, China

Dong Dong
Hebei Normal University, China

Shuliang Zhao
Hebei Normal University, China

ABSTRACT

Trust is significant for sustainable development of e-commerce and has received increasing attention in e-commerce, multiagent systems (MAS), and artificial intelligence (AI). However, little attention has been given to the theoretical foundation and intelligent techniques for trust in e-commerce from a viewpoint of intelligent systems and engineering. This chapter will fill this gap by examining engineering of experience-based trust in e-commerce from the viewpoint of intelligent systems. It looks at knowledge-based trust, inference-based trust and their interrelationships with experience-based trust. It also examines scalable trust in e-commerce. It proposes a knowledge based model of trust in e-commerce and a system architecture for METSE: a multiagent system for experience-based trust in e-commerce. The proposed approach in this chapter will facilitate research and development of trust, multiagent systems, e-commerce and e-services.

INTRODUCTION

Generally, trust is a positive belief or expectation about the perceived reliability of, dependability of and confidence in a person, an intelligent agent, organization, company, object, process, or system (Schneiderman, 2000). Castelfranchi and Tan (2001) assert that e-commerce can be successful only if the general public trust is established in the virtual environment, because lack of trust in security is one of the main reasons for e-consumers and e-vendors not to engage in e-commerce. Therefore, trust has received an increasing attention in e-commerce and information technology (IT). For example, Finnie and Sun (2007) investigate trust in e-supply chains. Olsson (2002) examines trust in
e-commerce. Pavlou (2003) integrates trust with
the technology acceptance model to explore the
customer acceptance of e-commerce. Salam et al.
(2005) examine trust in e-commerce and notice
that “many customers may still not trust vendors
when shopping online”. Wingreen and Baglione
(2005) study the customer’s trust in vendors from
a business viewpoint. Xiu and Liu (2005) pro-
pose a formal definition of trust and discuss the
properties of trust relation. Xiong and Liu (2002)
propose a formal reputation-based trust model
by combining amount of satisfaction, number of
interaction and balance factor of trust in a peer-
to-peer e-community. However, the majority of
studies are on trust in online purchase settings,
whereas there is relatively less research on trust
in e-commerce from a viewpoint of logic and
intelligent systems.

Multiagent systems (MAS) have been success-
fully applied in many fields such as e-commerce
(Sun & Finnie, 2004) and e-supply chain man-
agement (SCM) (Finnie, Sun & Barker, 2004;
Finnie & Sun, 2007). MAS has also been used
as a development methodology in many studies
(Henderson-Sellers & Giorgini, 2005). Further,
trust has drawn some attention in MAS. For ex-
ample, Chen et al. (2005) propose a fuzzy trust
model for MAS taking into account direct trust,
recommendation trust and self-recommendation
trust. Xiu and Liu (2005) discuss trust in distrib-
uted systems. Tweedale and Cutler (2006) discuss
trust in MAS by proposing a trust negotiation
and communication model for MAS architecture.
Schmidt et al. (2005) apply a fuzzy trust model
to an e-commerce platform. However, they have
not examined engineering of trust in multiagent
e-commerce system (MECS), which is of prac-
tical significance for multiagent e-commerce
and e-services. This chapter will be devoted to
engineering of trust and experience-based trust
in MECS.

Experience-based reasoning (EBR) is a rea-
soning paradigm using prior experiences to solve
problems, and could be considered an advanced
form of knowledge-based reasoning (Sun &
Finnie, 2007). This chapter will apply EBR to
trust among intelligent agents within the MECS.
In particular, the use of experience in establish-
ing trust in other agents will be explored. Any
organization has some history of dealing with
problems relating to orders and perturbations in
the network and the solutions applied, as well as
some formal processes for dealing with these. To
respond automatically, software must be capable
of reacting as one would expect a human agent
to do. The information available to the agent
may come from a variety of sources, including
analysis of historical information/experience at
the information/planning level (Finnie & Sun
2007).

The major contribution of this chapter is the
establishment of a basis for understanding the
new field of EBR and engineering of experience-
based trust in e-commerce and the role it may
play in the MECS environment. In addition, the
issue of scalable trust and the role of experience
in automating trust in e-commerce are appreci-
ated. This chapter will resolve these issues by
providing some methodologies, engineering and
intelligent techniques for experience-based trust
and scalable trust in e-commerce and MECS.
These involve the use of EBR to enable agents
in e-commerce to learn from prior experience
in dealing with brokers and sellers and issues
relating to trust and scalable trust in MECS.

There have been no studies that provide a
unified treatment of trust and scalable trust in
e-commerce, so far. This chapter will fill this
gap by examining experience-based trust and
case-based trust in e-commerce and their inter-
relationships from the viewpoint of intelligent
systems. It will look at knowledge-based trust,
inference-based trust and their interrela-
tionships with experience-based trust and scalable
trust in e-commerce respectively. The proposed
approach in this chapter will facilitate research
and development of trust, scalable trust, MAS,
e-commerce and e-services.