Agent-Oriented Engineering of Trust Management Systems***

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1 Introduction

This article is concerned with the engineering of societal information systems where technical components of a system - software agents - support the social network around which the system is centered. By software agent, we mean an autonomous software entity that can act in the system, perceive events and reason [1]. In information systems, software agents work on behalf of their owners in order to achieve the goals set for the societal information system, such as "find a store with a minimal overall price for my shopping basket" [2]. As opposed to multiagent systems consisting of just software agents, we focus on sociotechnical systems, where each software agent is paired with it principal participating in a social network. For achieving the goals set for a sociotechnical system, agents interact and exchange knowledge. As socio-technical systems are generally large open distributed systems, the interactions may be performed between agents that are not known to each other. The agents make decisions based on information provided by other agents. Moreover, their success may depend on actions performed by other agents. The question arising here is as follows: (To what extent) should an agent representing its principal in a social network trust another agent representing another person? To answer this question, we propose to extend a socio-technical systems with a trust management subsystem. Because of the limited scope of this paper, we hereby provide an overview of a general model of a trust management subsystem using agent-oriented modeling (AOM) [1], which is an approach for developing sociotechnical systems.

2 Method

Analyzing and designing the trust management subsystem (TMsS) by AOM consists of developing the following set of agent-oriented models: goal model,

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organization model, domain model, agent models and acquaintance model, interaction models, knowledge model, and scenarios. The goal model is shown in Fig. 1. As it can be seen from Fig. 1, we assumed that the overall goal of the TMsS is "Manage trust and reputation", which is further decomposed into the "Assess trust" sub-goal, representing aspects of the evaluation of trust towards a specific agent, and "Express trusted behavior" sub-goal. The latter represents a functional requirement of the TMsS enabling agents to express trusted behavior by selectively sharing their knowledge with each other. For achieving the goals described, the following three roles are required: Trustor, Trustee, and Owner, whereby Trustor and Trustee are in a peer relationship with each other and are both controlled by the Owner role. Additionally, AOM defines quality goals that represent non-functional requirements of the system, which are denoted with cloud symbols.

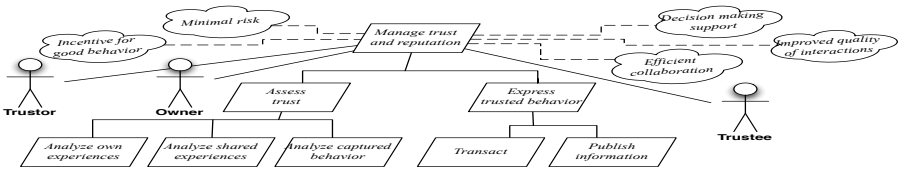

Fig. 1. Goal model for trust management sub-system.

3 Discussion

In this paper we described the analysis and design of trust management subsystems of socio-technical systems. The prototyped TMsS models trust relations between software agents representing their owners. We are currently working on the case study in the eHealth domain, where the main goal of the sociotechnical system to be designed is to assist a patient with drugs consumption based on the credibility of the physician who prescribed the drug and the evaluations and recommendations by other patients. The main purpose of the TMsS associated with this societal information system is to assess if the experiences of drug consumption shared by other agents are trustworthy. For assessing trustworthiness, trust assessments will be based on Qualitative Assessment Dynamics as it considers human-centric issues in trust modeling [3].

The future work includes the development of agent behavior and service models for the eHealth case study, as well as the implementation of agents for the case study. With the help of the resulting simulations, we will then evaluate the added value of the prototypical TMsS.

References

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