On inter-organizational trust engineering in networked collaborations : modeling and management of rational trust

Msanjila, S.S.

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Summary

On Inter-Organizational Trust Engineering in Networked Collaborations

Industrial organizations increasingly face more challenges in the market and society, among which the scarcity of resources, short delivery time requirement, frequent emergence of new technologies, demand for wide variety of competencies, and limited availability of up-to-date experts, can be mentioned. Coping with these conditions require continuous restructuring and changes in organizations, which is only achievable by large organizations. Due to their small size, lack of competitive capital and inability to acquire complex opportunities, *Small and Medium Enterprises* (SMEs) cannot cope with this needed speed of change. Instead SMEs seek other new approaches to remain competitive, such as collaboration within the networks of organizations, namely the virtual organizations (VOs). However, both research and practice has shown that dynamic time/cost-effective and fluid creation of VOs requires the pre-existence of the so called Virtual organizations Breeding Environments (VBEs). The main aim of VBEs is to create the needed commonality and preparedness in SMEs, prior to the moment of VO creation. One crucial preparedness aspect within the VBEs, addressed by this thesis, involves establishment of rational inter-organizational trust among the VBE members, which both enhances their chances of being selected for VO participation, and motivates their effective collaboration within the VOs.

The primary focus of the thesis is on: (1) *Identification of trust elements* considering variations of actors' preferences and requirements for trust establishment, (2) *Formulation of approaches and mechanisms* to support the analysis of inter-organizational trust and establishment of trust relationships, (3) *Development of trust management system* to support the management of inter-organizational trust within VBEs. The main innovative solutions introduced in the thesis, in relation to management / creation of rational trust among organizations, include:

- o *An approach to identify trust elements for organizations (Chapter 3)*: This is a three-stage approach applied to identify trust elements for organizations. The approach is also applied to analyze hierarchical relations among trust elements, impact relations between trust criteria and trust level, and causal influences among trust criteria.
- o *A customizable set of trust elements for organizations (Chapter 3)*: In collaboration with industrial VBE networks we have identified three large customizable sets of trust elements. Each set supports the realization of one of the three main trust objectives, namely creation of trust of: (1) One VBE member organization to another (2) One VBE member organization to the VBE administration, and (3) An external stakeholder (e.g. a customer) to the VBE.

- o *Conceptual modeling of trust elements (Chapter 4)*: We have applied three modeling formalisms, namely, object-based formalism, record-based formalism and ontology-based formalism to develop models supporting different actors' purposes, such as development of modules for trust management systems, designing relational database schema, and analyzing taxonomy relations among trust elements to enhance understanding of trust concepts by actors.
- o *Mechanisms for assessing trust level of organizations (Chapter 5)*: We have developed a modeling approach based on mathematical equations for formulating mechanisms that support the rational assessment of organization's level of trust.
- o *Development of trust management system (Chapter 6)*: We have proposed a model for supporting the development of services that are supporting the processes related to the management of inter-organizational trust. The model addresses users, requirements, functionalities, and architectures of the system.

The achieved results are evaluated and validated using three approaches, namely: (1) *Empirical validation – achievements in relation to VBE requirements:* focused on experimenting within running VBE networks. (2) *Self validation - with standard indicators & against other systems)*: focused on application of some standard (ISO) indicators to compare our approach against others. (3) *Peer reviewed validation - within scientific community:* focused on presenting our approach in scientific events and publishing our research results in cited Journals and peer-reviewed conference proceedings as well as book chapters.