Designing Control Mechanisms for Value Exchanges in Network Organisations

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Abstract. Contracts and organizational controls to monitor contract compliance are important tools to enhance trust in a fair business transaction in network organisations and electronic commerce in general. In this chapter, we propose a design methodology for such contracts and supporting controls, utilizing inter-organisational value models. We argue that a framework for designing control mechanisms should include three steps: design of an inter-organizational value model, analysis of possible violations of contractual obligations underlying this value model, and design of control mechanisms to detect or prevent such violations. It is shown how the e^3-value methodology, which was developed to design business value models, can be extended to model obligations of parties. We use concepts and ideas from deontic logic (the logic of obligations and permissions) to develop an extension of e^3-value called e^3-value+. The e^3-value+ approach is a design tool for modelling violations of obligations, which can be used in contract drafting and contingency planning for inter-organisational collaboration in network organisations.

1 Introduction

As is well-known, lack of trust is one of the main reasons that companies and consumers do not engage in electronic commerce.[1] Technical means, such as encryption technology and digital signatures to build trust-facilitating services, are available right now. Additionally, current research topics in computer science such as web services and peer-to-peer networking enable providing inter-organisational business processes, which are required for trust enhancing procedures [Bar01,FKT01]. However, advanced technology will never develop trust models without a proper underlying organisation design. For example, although technically speaking an electronic signature is much more reliable than a hand-written signature, the historically proven "paper and

[1] See, e.g., [MCC98,TT98b].

pen" way of signing a contract is more trusted. One can surmise that the reason is because an electronic signature is not backed with a proven infrastructure of legislative practices and underlying control mechanisms that make it possible to solve any disagreement between parties.

In [TT98b] a generic model of trust for electronic was introduced that explains how trust can be created by developing party trust and control trust. In this chapter we focus on control trust. In traditional organisations, control mechanisms, with their main focus on management control, have been studied extensively (see [AG03] and [Ouc79]). For electronic commerce, however, the design of control mechanisms is rather uncharted territory. What is needed is an understanding how to design trustworthy control mechanisms on top of technical possibilities of electronic commerce.

Our definition of *control mechanisms* is as in [TT98b]: procedures and protocols that control and monitor the successful performance of a transaction. Contract negotiation can be seen as a way to ensure legality and protect interests of all parties involved in electronic commerce. Technology-oriented research on electronic contracting[2] typically assumes that a plain textual, natural language representation of the contractual content that can be read and interpreted by business people and lawyers suffices. However, business studies[3] indicate that incomplete contracting practices result in increased opportunism and failure of inter-organisational cooperation. In [DS97,TT01] a need for contract negotiating and drafting methodology and tools is identified. In this chapter we suggest that in electronic commerce incomplete contracting practices have to be solved by the negotiation of a contract as well as its supporting controls. This is a multi-disciplinary task, and it involves obviously legal aspects. Also, computer science issues are relevant (many controls take the form of computer software), as well as inter-organisational business process design (many contracts say how, and in which order, business transactions should be carried out, and by whom). In addition, in electronic commerce a thorough understanding of the corresponding business value model is often lacking [Gor02], which makes contingency planning of contracts more complex.

The main contribution of this chapter is that we propose a methodology for designing contracts and control mechanisms for inter-organizational economic exchanges, in particular between enterprises in (virtual) network organizations.

This chapter is structured as follows. In Section 2 we introduce a methodology to design control mechanisms. The methodology consists of analysing *ideal* and *sub-ideal* situations in economic exchanges, and designing control mechanisms to prevent sub-ideal situations. Subsequently, we address the modelling of the ideal situation in Section 3, and propose some ideas for modelling sub-ideal situations and control mechanisms in Section 4.

[2] E.g., [LS03].
[3] E.g., [Luo01].