

Trust in Electronic Negotiations

Mareike Schoop

Informatik V (Information Systems), RWTH Aachen, Germany; schoop@cs.rwth-aachen.de

Electronic negotiations are a challenging research topic since, on the one hand, they can benefit from applying efficient information technology techniques while, on the other hand, the current state is still far from satisfying for the users. One of the main problems is that electronic negotiations remove the direct interpersonal element which seems to be so important in traditional negotiations. There will always be contexts in which the electronic form of interaction cannot and indeed should not replace traditional negotiation processes. However, in our experience there are many branches that would use efficient forms of electronic negotiations.

In recent years, research on negotiations focused on the automation of electronic negotiations. For example, there have been many approaches dealing with efficient auction settings (e.g. Klein and Loebbecke, 1999; van Heck and Ribbers, 1999) while a further dominant direction was that of agent-based negotiations (e.g. Dignum, 2001). In contrast, a third category aims at supporting human negotiators in their complex tasks rather than automating the transactions (Schoop and Quix, 2001; Weigand, 2001). One representative of this category has been presented at RSEEM before (Schoop, 1999; Schoop, 2000). It is based on speech act elements and combines structured message exchange and document management.

The problem of trust in electronic negotiations must be approached from different angles. In general, it can be stated that trust in the negotiation process can be problematic since trust in the business partner is more difficult than in traditional interactions. Electronic negotiations are non-co-presence situations where the business partner cannot be assessed from a personal angle, from his or her reactions, gestures, mimics, and the general direct impression. To overcome these problems, different measures have to be taken. Firstly, the technology must appear trustworthy. For example, comprehensive security measures must be in place that ensure the anonymity, integrity, and non-repudiation of the message exchange. Furthermore, a marketplace provider can impose certain criteria (e.g. financial history, reputation, number of employees) that companies have to fulfil to become a member of the marketplace. In this paper, a different approach to trust will be presented. The reader should bear in mind that we deal in the following with peer-to-peer negotiations in business-to-business electronic commerce.

During each negotiation, a number of obligations will occur and will be accepted by the negotiation parties. However, it is not always clear to each negotiator whether a certain obligation can be accepted in the current context. Therefore, we will introduce a monitoring tool that can test the satisfiability of obligations. The satisfiability can concern both intra- and inter-organisational issues.

On an intra-organisational levels, obligations need to be checked against internal data such as capacity, delivery and manufacturing times, budget allowances etc. For example, before accepting an obligation to deliver certain goods the seller will have to check the availability of these goods. Likewise, a monitor could issue a warning if the delivery times promised in an offer cannot be met. The intra-organisational constraints can be tested using company data. The companies will most likely not provide the complete databases but the required amount of data for those checks. Some of these intra-organisational checks can be performed by enterprise resource planning (ERP) systems.

The more interesting and complex problem is that of satisfiability on an inter-organisational level. In our model, a negotiation starts with an offer by the seller or a request by the buyer. In the latter case, the seller can either accept or reject the request or counter-offer with a new proposal. The buyer then has the same three possibilities to reply. Usually, a cycle of counter-

offers follows until the negotiation ends successfully (i.e. with a final acceptance) or is terminated unsuccessfully (i.e. with a final rejectance). A counter-offer concerns certain items of the current offer that will be modified. Other items will remain the same. Thus, the context of the negotiation changes in each step. Therefore, new obligations must be checked against the new reality including the history of the negotiation, i.e. the obligations already accepted. Since complex negotiations can last a considerable amount of time, the negotiation partners (who are usually involved in other negotiations as well) cannot always check the satisfiability of their intended obligations themselves. The monitoring tool would perform this task for them. The examples of inter-organisational issues to be checked that we have collected from interviews with users include the following. They range from simple computations (e.g. the delivery time is two weeks thus the delivery date needs to be adapted to the current date) to complex constraints (e.g. some terms in the contract are contrary to the terms of business of one of the companies; the same negotiation stage has occurred before, i.e. there is a cycle in the negotiation, etc.). The complex checks are enabled by the formal basis of the message exchange (Schoop, 2000; Schoop and Quix, 2001). The formal logics used in the present work enable obligations to be specified, workflows to be defined and thus the above criteria to be tested.

The monitoring tool can be seen as the implementation of a trusted third party acting as an active monitor on the negotiation phase (Schoop and List, 2001) of an electronic commerce transaction. In terms of trust, such a satisfiability test will contribute to more unambiguous and thus less problematic exchanges. There is no guarantee that each business partner will use the tool for intra-organisational issues. However, if one of the partner wants the monitoring to start, (s)he can be sure that the monitoring is activated for their inter-organisational exchanges. Misunderstandings can be avoided since each obligation is made explicit and the contract is satisfiable by both parties. Of course, this does not mean that problems will not occur. If the negotiation ends successfully and a final contract is drawn up then that does not mean that the contract will be fulfilled successfully. However, these types of problems are problems of fulfilling obligations that could have been fulfilled. (except in the case of unforeseen circumstances such as strikes etc.). Therefore, it is argued that the ideas described can enhance trust in the process of electronic negotiations. In the end, the users will decide whether and when to use such an additional service. The satisfiability tool needs to be integrated into the message exchange introduced in (Schoop and Quix, 2001) and combined with other trust approaches emphasising different issues (e.g. Chircu et al, 2000; Clark and Lee, 1999; Mayer et al, 1995; Merz et al, 1994). Thus, multidimensional and multidisciplinary approaches are called for. Taken together, we would expect that these approaches can enhance trust in an electronic marketplace significantly.

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