

Business Negotiation Support: Theory and Practice¹

Aldo de Moor and Hans Weigand
Infolab, Dept. of Information Systems and Management,
Tilburg University
PO Box 90153
5000 LE Tilburg
The Netherlands
tel. +31-13-4663020, fax +31-13-466-3069
e-mail: ademoor/weigand@uvt.nl

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Abstract

Business negotiation support systems (NSS) are slowly entering the market, although they lack a clear theoretical basis as of yet. Negotiation is a complicated process with many aspects that have only partially been described with the formal rigidity needed to build support systems. Most theories about negotiation are descriptive and not prescriptive, which, among other things, prevents their use as a basis for negotiation support systems. Complicating matters is that a negotiation process consists of several distinct stages, each with its own characteristics. Furthermore, there are many types of negotiations, depending on the domain. This suggests that we should not strive for one general negotiation support system, but for a set of domain-specific tools. To ground the development and application of these tools in different scenarios of use, we propose an integrated theoretical framework. After giving an overview of existing negotiation support approaches, we construct a business negotiation support metamodel for NSS analysis. The metamodel is illustrated through analyzing the case of the MeMo project, which concerns contract negotiations in small and medium enterprises in the European construction industry. The MeMo system is one of the first business NSS with an explicit international orientation.

Keywords: business negotiation, negotiation support systems, metamodel, MeMo.

1. Introduction

Electronic commerce is quickly transforming from hype into reality. Many popular e-commerce applications have thus far focused on rather straightforward business-to-customer applications, such as information kiosks and ordering portals, and simple electronic auctions, in which vendors can offer consumer goods for sale and individual customers can bid on these goods.¹ However, for more complex forms of e-commerce, especially those in the business-to-business domain, more extensive support is needed. In many cases, it is not sufficient merely to facilitate the selection of business partners, retrieval of information profiles, ordering of products, or monitoring of order status information. Also, oftentimes quite complex negotiations need to be conducted for a deal to close. However, negotiation theory is still relatively young, and only a few applications have been developed that provide the kind of support actually needed in practical business cases. If theory is to progress and more adequate support systems for business negotiations are to be designed, then a clear conceptual framework should be developed and applied to the analysis of real-world systems.

In Section 2 we survey some concepts that are important to the development of a theory on business negotiation. In Section 3 we show how this process can be supported and give an overview of some influential negotiation support systems. Based on our discussion of theoretical concepts and practical support systems, we construct a business negotiation support metamodel. In Section 4 we describe and analyze empirical findings from the MeMo system, which supports complex business contract negotiations in relatively well-defined domains with many players. We end the paper with some conclusions and directions for future research in Section 5.

2. Towards a Theory of Business Negotiation Support

A mature theory on business negotiation support does not yet exist. On the one hand, there are several generic negotiation theories, drawing from such diverse fields as conflict resolution, game and decision theory, and even cultural anthropology. Important contributions have been made by Raiffa (1982) on decision-theoretic issues, Fisher and Ury (1981) on how to use win-win strategies, and Mastenbroek (1989) on emotional aspects, among others. However, these theories do not sufficiently meet the need for an applied business negotiation theory that can be used as a basis for negotiation support systems (NSS). This need is becoming increasingly clear as research on e-commerce progresses. A comprehensive theory is needed, in which elements from these generic negotiation theories are positioned in an integrated business framework. Robinson and Volkov (1998) have examined this objective with their framework for supporting the negotiation life cycle. Still, their work does not address important issues. We, therefore, will also refer to other theories that offer additional ideas relevant to business negotiation support models, with the aim of generating some high-level synthesis.

This paper presents only an initial outline of what such an integrated theory should look like. We briefly describe some key concepts and explain their relevance to a theory of business negotiation. First, we discuss the concept of negotiation itself. Then, we present several models of negotiation that show different ways of looking at this process. We discuss the contents of the negotiation process in more detail by examining negotiation stages, products, and roles. Finally, we consider the role of negotiation protocols and patterns in supporting the negotiation process.

2.1. Negotiation

There are numerous definitions of *negotiation*; we provide three characteristic examples. Gulliver (1979: 79) defines negotiation as a process in the public domain in which two parties, with supporters of various kinds, attempt to reach a joint decision on issues under dispute. Robinson and Volkov (1998) view negotiation as a process in which participants bring their goals to a bargaining table, strategically share information, and search for alternatives that are mutually beneficial. According to Putnam and Roloff (1992), negotiation is a special form of communication that centers on perceived incompatibilities and focuses on reaching mutually acceptable agreements.

Although these definitions differ in their details, they share some common elements: in negotiation (1) there are two or more interdependent participants, (2) each of whom has some individual goals that may be partially incompatible. In some form of (3) process, (4) alternatives are investigated (5) with the purpose of agreeing upon one of them.

This definition is also applicable to business negotiation. We do not want to go as far as Gulliver, who sees disputes as the driving force of negotiations. Rather, we are especially interested in the kind of negotiations involving some form of mutual exchange of goods, services, and money. The driving force behind these negotiations is a voluntary cooperation between two or more business partners who would like to explore potential business opportunities that might result in a contract explicitly formalizing mutual obligations. Note that this particular type of business negotiation focuses on *trade*. Other kinds of business negotiations are conceivable, such as merger or labor management negotiations. Sometimes the negotiations are political in nature. However, we think that a focus on trade is important, as sales comprise the vast majority of business transactions. We hope that our analysis can be extended to other types of business negotiations later. Based on the analysis to follow, in Section 3.3 we construct a business negotiation support metamodel in. Such a metamodel offers a generic framework with parameters that can be tailored to the particular negotiation situation at hand.

2.2. Types of Negotiation Models

Negotiation models can be classified along different dimensions. A first key dimension is the degree of guidance that they offer in the actual negotiation support - their normative status, in other words. The second dimension is the perspective by which the negotiation is modelled.

Model Status. An important distinction in negotiation models is whether they are descriptive or prescriptive (Gulliver 1979; Kersten and Cray 1996). *Descriptive models* try to carefully describe what actually happens, whereas *prescriptive models* are normative in the sense that they prescribe what negotiators should do to achieve the desired result.

Kersten and Cray (1996) offer some guidelines that recommend the appropriate role in negotiation support for both kinds of models. Any negotiation supporting method should first of all be based on a descriptive model that analyzes and explains the cognitive perspectives and behavior of the participants without making unrealistic assumptions about their rationality. Only after this cognitive level has been described is it useful to provide predictive and prescriptive support at the instrumental level. Negotiation support should allow contrasting descriptive representations to be developed. Then, predictions and prescriptions can be generated based on an analysis of the needs of the opponent, the specifics of the situation, and decision-making conditions. Instead of trying to predict outcomes, often, only the decision options for the various participants need be identified.

The participants then make the actual decisions based on their interpretation of rich, albeit informal, context knowledge.

Next, we introduce some modelling perspectives. Although models of both a descriptive and a prescriptive nature can be developed in all the following perspectives, they are not always relevant in each case. For example, as we shall see, game-theoretical models often oversimplify reality so that their descriptive qualities are sometimes questionable.

Model Perspective. Negotiation models can be analyzed from different perspectives. These perspectives provide a focus for identifying key processes and structural constructs.

Many different classifications of negotiation models exist, some of which are described in Putnam and Roloff (1992). Because negotiation is very much dependent on the specific application *domain* in which it is conducted, some kind of domain classification is useful. Lim and Benbasat (1992) see political, economic, and social settings as important application domains; they therefore distinguish between political, economic, and social-psychological models. Political models aim to predict political behavior by analyzing potential conflicts of interest. Economic models are dynamic and focus both on process and outcome. They are often quite specific in terms of the domain covered and stress the formation of expectations regarding the behavior of the other negotiation parties. Socio-psychological models are mostly descriptive as opposed to prescriptive, analyzing various behaviors in socio-psychological terms.

Negotiation is not only characterized by content matter, but also by its *communication* aspects. There are three key characteristics of a communications perspective on negotiation: micro elements; dynamics; and systems of meaning (Putnam and Roloff 1992). First, communication processes consist of many micro elements that occur in a specific context. For instance, messages are related to previous and subsequent messages in the context of a particular goal. Second, the dynamics of communication need to be studied. For example, it is important to examine how offers are formulated and changed. Third, systems of meaning from individual, interpersonal, situational, and cultural perspectives need to be uncovered to guide the negotiation process in a proper manner.

Especially in computer-mediated business negotiations, sufficient attention needs to be paid to developing an appropriate communication model. Patterns, such as those needed to construct offers or information requests, must be defined. Defining who can do what and how the various information products are changed in negotiation subprocesses is very important. Different sets of meanings adopted by, for example, business partners from different countries need to be carefully defined. In this way, computer support can be made sufficiently sensitive to the complexity and dynamics of real negotiation situations. Much research has been done on communication aspects in face-to-face negotiations (e.g. (Ulijn and Strother 1995)). However, most research in computer-mediated negotiations so far has focused on analyzing relatively simple context-free and artificial negotiation situations, while little is known about the determinants of, for instance, intercultural negotiations (Kersten and Noronha 1999). Some interesting work in this respect includes the Culture Classification Model of Schuster and Copeland (1996), which can be used to analyze differences between cultures in the roles of time, task, and relationships in making business negotiation decisions. These dimensions have implications for communication styles that should be acknowledged in the design of negotiation support systems.

2.3. Negotiation Stages

Each negotiation process has a life cycle consisting of a number of *stages*. Depending on the negotiation model used, the definitions of these stages differs considerably.

Some only take into account the planning and conduct of the negotiation itself, while not directly paying attention to final results. Robinson and Volkov (1998), inspired by the software life cycle, talk about the negotiation analysis, design, and implementation stages. The first two stages together form the preparatory stage, whereas the actual conduct of the negotiation takes place in the implementation stage (note that to them, implementation refers to the negotiation process, whereas often it concerns what happens to the end results once this process is complete).

An example of an elaborate decision theoretic stage model has been proposed by Lim and Benbasat (1999). They distinguish an issue identification stage, a range specification stage of the values of the negotiation variables, a utility definition stage in which participants specify their own utility curves and those of their opponents, and finally the negotiation dance in which the negotiation itself takes place.

One of the most extensive socio-psychological/cultural stage models is provided by Gulliver. In his developmental model of negotiation (Gulliver 1979: 82), he distinguishes eight stages: (1) searching for an arena; (2) formulating an agenda and working definitions of the issues to be negotiated; (3) making preliminary statements of demands and offers, exploring the dimensions and limits of issues, and emphasizing the differences between the parties; (4) narrowing the differences and reaching agreement on some issues; (5) preliminaries to final bargaining; (6) final bargaining; (7) ritual confirmation of the final outcome; and (8) the implementation of the outcome.

In summary, most process models agree that there is at least some form of (1) negotiation preparation, (2) actual conducting of the negotiations, and (3) implementation of the results, sometimes including their renegotiation (e.g. Gulliver 1979; Kersten and Noronha 1999). When constructing a particular negotiation model using a metamodel, not all stages necessarily have to be included, but at least their absence should be justified.

Bargaining. Some authors consider the negotiation and bargaining processes to be identical (Lim and Benbasat 1992; Putnam and Roloff 1992). However, we adopt Gulliver's narrower definition of bargaining as a subprocess of negotiation that consists of the presentation and exchange of more or less specific proposals for the terms of agreement on particular issues (Gulliver 1979: 71).

We focus on bargaining here because of the complex nature of communication involved, and because detailed protocols for it already exist. This stage in particular requires - and can obtain - automated negotiation support. The pre- and post-bargaining stages of the negotiation process also deserve attention, but especially in contract negotiations, bargaining is a key element.

The utility functions used for alternative generation in decision theoretical approaches offer one form of automated business negotiation support for the bargaining process. A participant first specifies his or her own utilities and then estimates those of the other party. Sophisticated (computer) analyses subsequently are done on these data, after which opening offers are made (see e.g. Belluci and Zeleznikow 1997; Lim 1999).

The use of utility-based bargaining processes is questionable in many types of negotiations (Kersten and Cray 1996). In many cases, such utility analyses can only be done informally by the negotiation participants. This seems an obvious limitation in, for instance, political negotiations because these are influenced by many subtle interests that are hard to formalize, let alone quantify.

However, business negotiations also involve many factors that are hard to quantify, if not in theory then at least in practice. Much tacit knowledge, for example, is needed in business contract negotiations to assess credibility, trust, etc. Decision-making support in the form of automated utility analysis therefore should at most play a supportive, not decisive, role in business negotiations.

2.4. *Negotiation Products*

In the various stages of the negotiation process, a number of (intermediate) negotiation products are created and used as input. In general, negotiation products become more clearly defined in the later stages. Robinson and Volkov (1998) propose a negotiation support model in which they describe the products of the negotiation process and their relations. The four main types of products are agent models (issues, goals, and preferences), conflicts (goals and means conflicts), alternatives, and deals.

In business negotiations, all four categories of products are needed, although some products may need to be more formally and explicitly defined than others. Agent models are required to determine what participants want and why they do so. Conflicts must be modelled to focus negotiation efforts. Alternatives provide options from which the parties can choose. Deals come in the form of contracts in which commitments are made explicit. Other kinds of additional intermediate products are needed as well, such as many kinds of business documents and communication results.

2.5. *Negotiation Roles*

The negotiation process is executed by participants not acting as autonomous individuals, but playing different actor *roles*. To know what actions are acceptable for a particular participant, these roles need to be well understood.

Surprisingly, not much work has been done on actor role classifications. One of the most extensive classifications of negotiation roles is presented by Robinson and Volkov (1998). They distinguish six main roles: *owner* (main stakeholder of outcome), *analyst* (formulates owner's goals and analyzes domain alternatives), *designer* (plans the negotiation process), *technologist* (provides the communication infrastructure), *facilitator* (facilitates the actual negotiations), and *negotiator* (conducts the negotiations on behalf of the owner). A facilitator is also referred to as a mediator, who can be an interested party (directly related to one of the parties) or neutral in the sense of not having a direct interest in the outcome (Gulliver 1979). Others, however, consider a mediator to play a more controlling role than mere facilitation (Rangaswamy and Shell 1997). At any rate, role classifications and their integrations with other negotiation process constructs, like norms, could benefit from substantial future research.

2.6. *Negotiation Protocols*

If negotiation is to be adequately supported, it is not enough to merely *describe* the various aspects of this process. Instead, prescriptive guidance in the form of *negotiation protocols* is also needed. These can be defined as protocols that standardize agents' communication patterns through an ordered interchange of structured messages. Using this definition, Robinson and Volkov claim that

negotiation protocols regulate four types of behavior: revealing agent models; identifying conflicts; searching for alternatives/conflict resolution; and selecting an alternative. Using these protocols, *negotiation strategies* can be employed that consist of the plans by which agents interact with each other to achieve a desired goal (Robinson and Volkov 1998). Of course, such agents can be humans or machines, or a combination of both, although it is still theoretically unclear when to use what kind of agent.

In business negotiations, protocols can play an important role. They increase the transparency of the process and help engender trust. They also can make the negotiation process more efficient. To prevent the reinvention of the wheel again and again, standard protocols are very helpful. When the parties make use of a support system, it can implement the protocol by showing at each moment what actions are permitted or required and by making explicit the effects of a particular step at a certain stage (e.g., is this quote legally binding?). Protocols are necessary when the negotiation process is being delegated to software agents.

Being transparent and showing options or limits is very important in business negotiations. The parties involved are often strangers, especially in the new markets enabled by the Internet, and sometimes are not familiar with the acceptable cultural and technological practices. Trust in the negotiation process and knowledge of its context are therefore essential.

Negotiation Patterns. Given that proper negotiation classifications can be made, it should be possible to develop negotiation patterns (Weigand and van den Heuvel 1998). Sources of these classifications can be, for instance, organizational or cultural variables. The patterns can combine entities such as process steps, roles, products, etc., and can help configure quickly the negotiation protocols in a context-dependent way. Such patterns can thus act as reference models, which help increase the efficacy of the negotiation process, similar to the use of these models in structuring complex communication processes like information system specification (van der Rijst and de Moor 1996). So far, only little research has been done on the development of negotiation reference models and patterns. The creation of useful patterns will, to a large extent, depend on the analysis of numerous cases. The findings should be interpreted in theoretical frameworks generic enough to allow cross-case comparisons while at the same time sufficiently precise to deal with the specifics of each case.

3. Negotiation Support Systems

To enable the various negotiation processes across time and space, negotiation support systems (NSS) are needed. Such systems should not replace human participation in negotiations, but should be used to augment and mediate their involvement (Jarke *et al.* 1987; Rieke and Sillars 1984; Robinson and Volkov 1998). NSS can be defined as a composite of computer techniques that support the social or analytical aspects of the negotiation life cycle (Robinson and Volkov 1998). NSS are useful because, first, they improve the quality of negotiation outcomes through their various functionalities. Computers are better than people at providing many of these functionalities, e.g., keeping track of and ordering intermediate negotiation results. Second, as the frequency and amount of business being conducted electronically increases, the need for electronic negotiation support increases as well (Rangaswamy and Shell 1997).

However, attention must be paid to the following issues: (1) general purpose systems are too unconstrained, so NSS should focus on specific domains; (2) in practice, most systems tend to be used rarely in actual negotiations, so special care must be taken to adapt them to the context of their use; and (3) there is a trend away from quantitative (e.g. decision theoretic) systems towards systems that support more qualitative negotiation processes (see Belluci and Zeleznikow 1997 for a more refined discussion of these aspects).

Negotiation support systems evolved from the general class of decision support systems (DSS) (Kersten and Cray 1996). NSS consist of two parts: a DSS and some kind of group support system (GSS). As such, they can be considered a subclass of group decision support systems (GDSS). The DSS is used for example to rank alternatives and analyses; the GSS supports the communication process (Delaney *et al.* 1997; Lim and Benbasat 1992). Empirical evidence suggests that such comprehensive NSS result in more successful negotiations than do DSS without a GSS component (Delaney *et al.* 1997; Foroughi *et al.* 1995). However, most studies have been conducted in a restricted laboratory context, an exception being the comprehensive case study of real labor management contract negotiations in the University of Arizona's electronic meeting room (Carmel *et al.* 1993).

DSS can be useful in supporting the decision-making processes required for negotiation. They help prepare and weigh alternatives, calculate scenarios, etc. Such systems are becoming quite advanced. For example, Kersten and Cray (1996) propose increasing the reasoning capabilities of DSS by applying insights from cognitive science and artificial intelligence. Thus, in these cases, 'agentware' can be used, in addition to the groupware-systems that support human negotiators (Robinson and Volkov 1998). Some propose the use of intelligent agents that either have a complete set of possible strategies in their memory or are in the form of learning agents (e.g. Beam and Segev 1997). Such agents use automated negotiation techniques such as sophisticated goal analysis methods (which, for instance, classify goal interactions as being cooperative or conflicting) and resolution generation methods (which create new decision alternatives such as new values or goals) (Robinson and Volkov 1998). However, communication can only be formalized so much. Thus, human actors remain essential in providing the analytical capabilities needed for decision-making situations (Rieke and Sillars 1984; Weigand and Dignum 1997).

Empirical studies have shown that the GSS component of an NSS increases satisfaction among negotiators compared with negotiation support systems that do not use electronic means to communicate (Delaney *et al.* 1997). On the other hand, electronic communication can also slow down and inhibit certain parts of negotiations, especially the bargaining process. This results in a lack of synchronization between the different parties, which is problematic as bargaining phases alternate between differentiation and integration of opinions, positions, etc. Synchronization can be improved, however, by having a set procedure or agenda coordinating the moves, and the media not being too slow or too hard to learn (Poole *et al.* 1992).

3.1. NSS Components

The above is a conceptual subdivision that applies to each NSS. However, in practice, these systems consist of many components, which can be analyzed both based on the negotiation functionalities they provide and the tools by which they are implemented.

NSS Functionalities. Rangaswamy and Shell (1997) distinguish between negotiation preparation and evaluation systems (to help individuals prepare and evaluate negotiation information), process support systems (to restructure the dynamics and procedures of the negotiation process in order to promote integrative bargaining), mediation systems (in which the computer model substitutes or assists the human mediator in prompting parties into action, while directing all communication through the mediator), and interactive bargaining systems (which enable parties to communicate directly). Robinson and Volkov (1998), on the other hand, distinguish between such categories as autonomous software agents, standard DSS, and so-called component configuration systems (systems that support policy definition or resolution of resource allocation conflicts), such as contract systems. Yet another classification of functionalities is provided by Lim and Benbasat (1992), who want NSS to first support requirements analysis, second, strategic analysis, including the assessment of the needs of the other party, and, third, the interaction itself. A sophisticated class of NSS are cognitive support systems (Kersten and Cray 1996). These systems allow decision makers to generate stories describing sequences of situations. Because the needs and abilities of the decision maker are paramount, metamodels are used to interpret the situation and assess problem parameters, which are both quantitative and qualitative. The systems build representations, select and organize the appropriate formal models, retrieve relevant information, and determine the order of processing.

Contract Management. It is interesting that in most perspectives, negotiation is only viewed as a *dialogue* - a process in which messages are exchanged - whereas in practice the collaborative drafting of *texts* often plays an important role - since the results of the negotiation can easily be lost if they are not recorded in some permanent form. In business negotiations, the texts are typically (versions of) contracts. So, when supporting contract negotiations, both the communication process and the structure and contents of the contract need to be addressed (Weigand et al., 2003).

The structure of the contract includes contract elements and the relations between them. Contract elements can be derived from templates and include unalterable as well as negotiable components (Gisler *et al.* 1999). There is a great variety of contract elements, depending on the domain, the purpose, and the users of the contract.

Contract management includes, aside from the core negotiation process, contract *validation* (ensuring that the contract satisfies the validity rules of the contract domain), contract *monitoring* (ensuring that the performed activities correspond to the contract), contract *enforcement* (ensuring that corrective action is taken if the contract has not been honored) and contract *arbitration* (settling contract disputes) (Gisler *et al.* 1999).

To model and provide automated support for contract negotiation processes, some formal language is needed. One such language is the Formal Language for Business Communication (FLBC) (Kimbrough 1998). FLBC allows for business communication processes to be modelled as sequences of speech acts, thus providing a powerful and comprehensive framework for describing the contents of business transactions as well as specifying precisely the roles that business partners are to play. This framework has been extended by Weigand and van den Heuvel (1998), who specifically define the semantics of the contract elements and negotiation processes.

3.2. NSS Tools

The required functionalities of NSS are implemented by sets of information tools, ranging from generic e-mail applications to dedicated web servers. The media or tools that are used in

negotiations are not neutral and actively shape negotiation situations and outcomes (Putnam and Roloff 1992). Furthermore, no single tool is best suited for all (sub-) stages of the negotiation process (Poole *et al.* 1992). Thus, to assemble successful support systems, the choice of the right mix of tools is not trivial, and complex social context factors must be assessed (Preece 2000). For example, e-mail-mediated negotiation is known to be less successful than face-to-face negotiation due to the lack of social context cues. Nevertheless, e-mail-based negotiation is known to be more productive when negotiators establish trust and rapport, which they themselves can promote by mutual self-disclosure. Experiments have shown how this can be facilitated by making available personal information about counterparts (e.g. through home pages on the web) and by having a non-task-related conversation prior to the actual negotiation process, mediated, for instance, by an electronic chat tool like ICQ (Moore *et al.* 1999).

Complex tool configurations can be represented as combinations of elementary media. For example, a (complex) computer conference system can be said to consist of a text editing tool plus a particular type of group decision support system (Poole *et al.* 1992). Furthermore, it is very important that elementary or more complex tools are matched to the particular negotiation stages or functionalities as described above. For example, for issue identification, electronic brainstorming plus an evaluation tool may be used, while for utility function definition a spreadsheet could prove useful (Lim 1999).

NSS Tool Examples. Many specialized NSS tools exist. In this section, we only describe a sample, as our goal is to illustrate conceptual elements of negotiation support systems, but not to be comprehensive in our survey.

An example of a sophisticated tool is the INSPIRE (InterNeg Support Program for Intercultural Research) (Cray and Kersten 1999). This system supports negotiation using conjoint analysis for utility construction, a messaging facility for the argumentation process, and a visualization facility for the construction of graphs representing negotiation dynamics and history. It applies a phase-model of negotiation: the negotiation phase consists of climate setting, presenting, mid-point bargaining, and closing. The post-settlement stage consists of the support system checking the efficiency of the compromises made by taking into account the entered utility values.

Three commercially available business-to-business NSS tools are Fair Internet Trader, diCarta and Ozro Negotiate. An example of a simple communication model-based NSS is the Fair Internet Trader.² One can act either as a buyer or a seller. An offer is negotiated using some simple parameters like product, quantity, price, and VAT. An order is then produced, and a payment can be made. For this reason, the system pays a lot of attention to security. diCarta³ provides negotiation support in the context of contract management, which considers the complete contract life cycle, including negotiation, contract drafting, fulfilment, renewal and evaluation. diCarta offers substantial support for the management aspects of contract negotiation, such as planning, proper party involvement, authorizations, version control, etc. The negotiation process is based on collaborative document drafting. Ozro Negotiate⁴ also offers business-to-business negotiation support. Negotiation here is considered to be the exchange of requests and offers using standardized forms that typically include bill-of-materials lists and standardized contract terms (e.g. delivery terms). Increased speed, reduced error, and security are mentioned as key benefits of this system.

In summary, there are many advanced NSS tools. Still, their functionalities are generally specialized and hard to change, as process models are embedded in the software and not parameterized. Matching complex negotiation functionality requirements with the restricted

functionalities provided by these tools is not a trivial process. To adequately support complex communication processes like negotiation, such functionality matching deserves careful attention (de Moor and van den Heuvel 2001).

3.3. The Business Negotiation Support Metamodel

Negotiation being such a complex process, support systems must help in identifying context factors, tailoring process model and support system designs, and making implicit assumptions explicit. A metamodel would be valuable here, as it would provide a checklist of components to consider. It could also be used to compare different models and support systems, allowing for strengths and weaknesses of a particular system to be identified and benchmarks to be developed.

Figure 1: The Business Negotiation Support Metamodel

Previously in this paper, we defined the core components necessary in the construction of useful negotiation support systems. In Figure 1, we relate the most important of these elements in a Business Negotiation Support Metamodel. Our model only includes the basic categories of constructs to be considered, leaving further subdivision open to others. The model does, however, allow for theoretical constructs and practical findings to be defined, related, and seen in their context.

Each negotiation process is embedded in a social context. More or less explicit *norms* govern acceptable behavior of the negotiators. For example, various cultures have different norms with respect to acceptable task, time, and relationship aspects (Schuster and Copeland 1996). Based on these informal norms, explicit *protocols* can be defined that prescribe acceptable negotiation steps, communication moves, and decision making process procedures. These protocols formalizing the norms are the foundation of automated negotiation support.

The following are the core elements of the *negotiation process*:

- Each negotiation process consists of a sequence of *stages*. These stages comprise the preparation, conduct, and implementation of negotiation results, although their particular classification is left up to the users of the model.
- In each stage, participants play different negotiation *roles*. Although the specific roles differ per negotiation model, they should include such responsibilities as defined in Section 2.5, like owners, analysts, designers, and facilitators.
- The participants in their various roles interact in a *communication process*. Such a process consists of sequences of communication moves, like series of related speech acts. Acceptable moves are governed by norms that are operationalized in communication protocols. For example, a negotiation owner is permitted to request that a negotiator present alternatives to the opponent, after which the negotiator can accept them or request additional instructions.
- Embedded in this communication process are one or more individual or group *decision-making processes*. These processes can be partially automated, for example in the form of utility analysis software. Human interpretation also plays a role here, for example in selecting the best alternative from a set of options prepared by the analysis software. Decision-making processes are triggered by communication moves. In the negotiation preparation stage, for instance, decision making must take place for relevant agenda items.

Decision-making software can analyze participants' priorities, calculate expected durations, and furnish a recommended set of agenda items to be evaluated by the negotiators. This process could be triggered after the negotiation participants have agreed to create an electronic negotiation workspace in some predefined communication process.

- The communication processes lead to one or more intermediate and final negotiation *products* in each stage. For example, in the agenda formulation stage, intermediate products can be the set of potential agenda items, while a final product might be the agenda agreed upon by all negotiators.

The negotiation sub-processes are enabled by the *functionalities* of the NSS. The entire system is implemented by a set of either dedicated negotiation *tools* or more generic all-purpose information tools such as mailers or spreadsheets. The functionality enabled by these tools must be matched carefully with the functionality required by the negotiation community, paying attention to both sociability (human interactions) and usability (human-computer interactions) (Preece 2000). Community members should be actively involved in these complex design processes. Which users to involve at what time in system adaptation is defined by communal norms (de Moor and Jeusfeld 2001) and should be reflected in the negotiation protocols for the NSS to remain adequate and current.

The metamodel can be used for several purposes. One application is to serve as a template for NSS analysis, which would allow for the examination of how a tool fits its context of negotiation use. Another use is as a reference model, which allows for best practices to be recorded (van der Rijst and de Moor 1996). Yet another application is to serve as an instrument for comparing different applications by clarifying similarities, differences, and gaps in functionality. In the next section, we show an example of how the metamodel assists in analyzing the usefulness of one particular NSS, the MeMo system, which is used to support contract negotiations in the construction industry.

4. MEdiating & MOnitoring electronic commerce

Electronic Commerce means doing business via electronic networks such as the Internet. Electronic commerce can be seen as the successor of Electronic Data Interchange (EDI), but it goes far beyond EDI in that it aims to support complete external business transactions. Such transactions consist of three stages: the information stage; negotiation stage; and fulfilment stage.

Nowadays, the *information stage* of the transaction process is already supported in several ways. Information about potential business partners can be obtained through specialized databases, chambers of commerce, and more recently on the WWW. The *fulfilment stage* of the transaction is also well served. There exist many systems that support electronic payment, either directly or through some documentary credit facilities. Furthermore, order control can be managed electronically through the use of EDI messages.

However, there is still limited support for the *negotiation stage*. The coordination and execution of this stage thus far has had to be done manually, which has presented a major obstacle for the uptake of electronic commerce by small and medium-sized enterprises (SMEs). Big companies can usually afford to undertake the time and cost of negotiating interchange agreements because they can establish long-term relations with their suppliers (or customers) and they have in-house expertise. For smaller-sized companies, however, the expense and efforts incurred are often prohibitive.

The MeMo (Mediating and Monitoring Electronic Commerce) project was a European initiative in which several research and industrial partners collaborated to design e-commerce support systems for SMEs.⁵ MeMo was dedicated to finding ways for SMEs to negotiate transactions via the Internet and then generate the necessary fulfilment procedures (EDI or more advanced) automatically.

Figure 2 denotes the different stages through which business transactions pass (on a very high level) and the (electronic) support that is offered by MeMo at each level.

Figure 2: Overview of the MeMo system

The main innovation of MeMo is its support of the negotiation stage, which focuses specifically on negotiation communication processes that result in the complex contract negotiation product.

4.1. MeMo requirements

The design of the MeMo system is based on the assumption that to be of practical use in international trade, the support of the electronic commerce process should meet the following three requirements:

- It should be possible to use product and business information from many different sources. It is not realistic to assume that companies are willing to submit their databases to one central database. Indeed, this assumption has been confirmed by MeMo user groups.
- Support for the information and negotiation stage should inspire a level of trust among the partners, such that they are willing to enter the fulfilment stage (payment and delivery) based on the negotiated contract.
- Several different payment and delivery models should be supported in the fulfilment stage to accommodate all the possible contracts and cope with different cultural practices and the many different legal requirements in international trade.

The purpose of the MeMo Project was to obtain knowledge and expertise to construct an open environment to serve as an Electronic Commerce Broker Service (ECBS) for SMEs in order to promote cross-border e-commerce activities. A prototype of the ECBS was delivered in June 2001.

4.2. Main activities in the MeMo project

The MeMo project included the following key activities: the development of partner searching as well as negotiation and contracting mechanisms; business data management; operational and product integration support; and extensive user evaluations.

Partner Searching Mechanism. The partner searching mechanism is a tool that allows companies to quickly and efficiently locate potential business partners and specific products and services. Traditional e-commerce systems offer almost no such facilities other than a searchable catalogue. Although browsing catalogues might be efficient for business-to-consumer electronic commerce, inter-company trade in a rapidly-changing environment requires specialized search support in order to adequately respond to business opportunities. Incorporated within the MeMo electronic commerce brokering service is a range of supported search strategies, ranging from basic keyword searching, via browsable specialized subject gateways, to full-fledged knowledge navigation tools using industry-related concepts.

Negotiation and Contracting Mechanism. The Negotiation Module of MeMo supports business-to-business negotiations and contract building. A precondition for business relations is a sense of trust between all business partners. This trust depends on informal personal contact on the one hand and formal contracts and legislation on the other hand. The MeMo negotiation module does not replace human informal communication, but enables human agents to structure their communication using the Formal Language for Business Communication (Weigand and van den Heuvel 1998). Figure 3 provides an example of how this is implemented on the WWW. Because results of negotiations are typically enumerated in a contract, MeMo also offers a repository of standard contracts and a shared workspace in which a standard document can be adapted by the partners to suit their particular needs. It facilitates different scenarios and provides SMEs with safe "negotiation rooms." Since language is often a large barrier for international trade, especially for small companies in Europe, the Negotiation Module also contains a *multilingual thesaurus* in which key terms in international trade are presented in multiple languages. In this way, it is possible for the human agents to personalize their MeMo interface with their particular language. Using these means, MeMo is one of the first systems that actually facilitates practical business negotiation via the Internet.⁶

Figure 3: MeMo negotiation menu

Business Data Management. A metadata repository that forms the memory of the electronic commerce broker has been developed. The repository provides a common access point for all information that is available in the broker system, including information that is integrated from external heterogeneous information sources, e.g. company profiles from the chambers of commerce and product profiles from the individual companies.

Operational Support and Product Integration. Although fulfilment is not the main focus of the MeMo project, it is important to show SMEs the interaction between new R&D outcomes and traditional standardization schemes, like EDIFACT messaging. EDIFACT is a UN standard that regulates the electronic exchange of business documents and messages⁷. The new initiatives developed in MeMo take into account that there is wide implementation of this standard in the different branches of the market and that it is widely used between SMEs and medium-to-large size companies. For that reason, the MeMo Negotiation System is linked to an EDIFACT-based EDI workflow manager.

During the project, it was found that negotiation support can also be offered during the fulfilment stage. This is because contracts are sometimes negotiated in steps, starting with a general statement and continuing with more levels of detail. Another need for negotiation support arises from dispute resolution. Contracts often have to be renegotiated because one of the parties fails to deliver or because there are important changes in the environment. The document-based negotiation protocol of MeMo seems particularly useful to support dispute resolution. The mere on-line availability of the contracts is nevertheless already helpful to parties when something goes wrong during the fulfilment.

User Evaluation. In order to involve a group of SMEs in the project, MeMo formed an SMEs Round Table in Spain, Germany and the Netherlands. These user group round tables provided a good environment to discuss continually incremental developments and test the EC-Brokering Service (ECBS) with SME-user companies. The most extensive evaluation of the system has taken place in the Dutch construction industry.

One of the results of this evaluation was the finding that traditional non-automated negotiation causes agreements to contain many errors, resulting in high failure costs in the fulfilment stage. An integrated system like MeMo can help reduce errors as less copying is needed from one medium to another and because it can include automatic checks. In other words, the primary business value of an electronic NSS seems to be the potential to improve the quality of communication.

Another result was arriving at the conclusion that negotiation means quite different things for different roles in the value chain, and that a system like MeMo must be tuned to a particular role before it can be used effectively. For example, a wholesaler negotiates with manufacturers about frame contracts on a yearly basis. Wholesalers negotiate with contractors on a project-by-project basis. During and after these negotiations, the wholesaler forwards specific orders (electronically) to the manufacturers within the boundaries of the frame contract. Negotiation and fulfilment are not strictly distinguishable because contracts are modified and updated many times before the final delivery. Contractors negotiate with wholesalers on a project-by-project basis, and do this typically by asking several parties for quotes and then using this information in bargaining. The bargaining is seldom merely about price, but more often about delivery options and extra services. So, for the manufacturer it is important that MeMo supports frame contracts and automatic processing of orders based on these frame contracts. For the wholesaler, it is important that the system supports him in his task as intermediary, which means that he is often simultaneously involved in two related negotiations (and many unrelated). For contractors, MeMo should provide tendering functions, and in general, MeMo should fit in their project management environment.

4.3. *The MeMo Negotiation Model*

To illustrate the use of the Business Negotiation Support Metamodel, we apply it to the MeMo negotiation support system.

MeMo takes a *communication perspective* towards negotiation, as it mainly focuses on the support of the communication processes and does not offer much support for the decision processes at each stage. It also clearly has a strong socio-psychological perspective, given its focus on supporting informal, and often international and intercultural, negotiation processes.

There is a great variety of *norms* in MeMo because of the strong, traditional customs in the construction industry and the various cultural backgrounds of users. Many of these norms are implicit, although a substantial amount has been made explicit in the form of detailed, official construction guidelines and procedures. An example of informal norms is the importance of fair competition (leading to some kind of tender-based protocol). This norm is typically more important in public tenders. Cultural differences between the participants may also be an indicator for a certain type of protocol - for example, one in which implicit steps are made more explicit. In future research, we consider addressing more explicitly cultural reference models used to generate situated protocols (protocols that take into account the cultural background of the participants). Such reference models could be informed by work like the Culture Classification Model mentioned in Section 2.2 and the Ulijn group's research (Ulijn and Campbell 1997; Ulijn and Lincke 2002).

Protocols are prominent in MeMo. One of the design goals of the project is to support different protocols in order to allow for the variation in business contexts and cultural settings. For that reason, MeMo supports the specification of protocols in a declarative language XLBC (Weigand and Hasselbring 2001). XLBC not only allows the designer to specify message types (based on

speech-act theory), but also larger communicative units (transactions, conversations). Although it has been proven hard to generate the operational system completely on the basis of an XLBC protocol specification - especially because the layout and style of the screens are hard to specify on an abstract level - the result has been that MeMo offers a number of protocols and new ones can be added with relatively little effort.

Based on experiences in the Dutch construction industry, three types of negotiation protocols have been distinguished: *quotation-based* (also called norm-based); *tender-based*; and *document-based* (Weigand et al., 2003). The first group of protocols is aimed at bilateral negotiations. These consist of multiple stages, and each stage has a clear result in terms of commitments, for instance, the commitment to prepare a quote. Tender-based protocols are aimed at negotiations with multiple partners. To assure fair competition, it is necessary to make the protocol completely transparent. Therefore, it is usually not possible to start a discussion on some item with only one party. The document-based protocol family is based on the drafting of a document such as a purchase order.

MeMo provides comprehensive support for all *stages* of the negotiation process: information (preparation); negotiation (conduct); and fulfilment (implementation). These stages are interrelated, for example, by the use of integrated business data management facilities.

The *roles* supported by MeMo are still rather primitive. There are buyers and sellers, but little attention is paid to others, such as intermediaries that could fulfill services, like, possibly, tendering, preparing summary reports of new product developments, financial services, etc. Formal roles might be defined in the future for banks, industry associations, and government agencies, so that more tailored support can be provided.

Communication processes are extensively supported. For example, in bilateral negotiations, a distinction is made between a success layer and a discussion layer. The negotiations take place at the success layer. The discussion layer is entered when there is a question or a problem, for example, about the validity of a certain claim, or an exchange of proposals on a certain issue. When such a discussion is finished, the partners can continue from the point at which the success layer was interrupted. The communication process in the document-based process consists of proposals and counter-proposals. It is possible to subdivide the document in parts and assign a specific stage in the negotiation process to each part.

The *decision process* functions of MeMo are limited in comparison to a system like INSPIRE, mentioned above. This is because MeMo was meant mainly to support the communication process. Still, some decision support for the evaluation of tenders is included in the system since this task is directly related to the semantics of the tender protocol. Furthermore, the stance was taken that, in the future, each party is free to add a DSS, intelligent agent, or already available ERP system, to perform tasks such as ranking alternatives or generating a quote. The connection of such systems to MeMo is relatively easy, since MeMo makes use of structured messages based on XML (Extended Markup Language)⁸. XML is a meta-language that allows the structure and meaning of messages and documents to be precisely defined.

MeMo produces a wide range of complex, often related *products*. For example, in tender negotiations, typical intermediate products are calls for tenders and the tenders themselves. The final product is the announcement of the selected party. In a document-based type of negotiation, intermediate products are document parts upon which some level of commitment has been achieved. The final product is an agreed upon contract such as a completed purchase order form.

The final product can also be a contract ready for execution, that is, the configuration of a fulfilment procedure using EDI.

The MeMo system offers a wide set of *functionalities* in the form of services, using various *information tools*. For example, the multilingual thesaurus discussed earlier provides a basic translation service. A shared workspace gives the participants the opportunity to exchange background documents of any type. Furthermore, a repository of contract templates is available, such as the ICC international sales contract. Originally, MeMo planned to offer some contract verification services as well, based on formal logical representations of the contract, but these services have not yet been implemented.

An interesting question is whether the use of the Internet in general, and an NSS in particular, impacts the negotiation climate (Mastenbroek 1989). The MeMo system has been evaluated in the context of the Dutch construction industry. As part of the evaluation, contractors, manufacturers and wholesalers were asked whether the Internet would change their negotiation behavior. Although the answers varied to some degree depending on the parties' different roles, generally, it was believed that the Internet would make the negotiators more tenacious (less concessive), more dominating, and more evasive (rather than explorative). In other words, the Internet would create a more hostile climate. In a business domain where relationships and mutual trust are considered important, this would not be a positive development. One way to counter-balance this development is to move into hybrid forms: to use the Internet for the first phases of negotiation and to move into face-to-face negotiations with selected parties afterwards. However, there will be consequences for NSS systems like MeMo. One consequence is that these systems should give extra support for the initial selection phases and perhaps the final contracting phase. Most importantly, the system should not assume that all negotiations are conducted only through the system. This would also entail that significant attention be paid to aligning system-generated negotiation products with results from the informal negotiations.

5. Conclusions

Examining the academic literature on business negotiations on the one hand, and the commercially-available systems on the Internet on the other hand, a wide gap looms between theory and practice. In this paper, we have tried to bring theory and practice closer together. We have given an overview of negotiation theory in general and, more particularly, the theory of negotiation support systems. A business negotiation support metamodel was defined that can be used in the analysis of strengths and weaknesses of current systems. Furthermore, we have described the MeMo project in which a complete NSS was built to support European SMEs in business negotiations. Empirical findings from MeMo were analyzed using the metamodel.

As we said, theory and practice still differ widely in their focus. Much of the formal theory is based on decision theory and the search for optimal strategies. In practice, however, the demand is primarily for communication process support, as was demonstrated by the MeMo user evaluations. Theory-based decision and communication tools are valuable, but need to be embedded in business practice and deal with all the related requirements, such as cultural norms, language issues, legal aspects, standard and frame contracts, role assignments, document management, and integration with back-office systems. The challenge to theory is to take all these considerations into account, if it wants to be relevant, and to systematically analyze and compare the findings. Theoretical reflections, in turn, can inspire the design of higher quality practical systems. In this analysis

process, our business negotiation support metamodel could be useful. By doing more case analyses, we hope to extend and refine the model.

In addition, more empirical research is needed to improve the implementation of the currently available systems. Traditionally, empirical research on negotiation has focused mostly on face-to-face settings or, in the last few years, e-mail. With complex and structured NSS for practical use, such as MeMo, becoming available, comparative studies involving several media can be set up to assess the effectiveness of NSS and to gain better knowledge about the media effects. What is important is that this knowledge goes beyond the purely descriptive to address the level of norms that are or should be used in negotiation processes. In this way, it will be possible to translate this knowledge more effectively into design requirements for future NSS.

Notes

¹ One of the most successful examples being eBay: <http://www.ebay.com>.

² <http://www.semper.org>

³ <http://www.dicarta.com>

⁴ <http://www.tradeaccess.com>

⁵ <http://infolab.uvt.nl/prj/past/memo/>

⁶ At the time of finalizing this paper, the Dutch parliament started an investigation of large-scale fraud in tender contract negotiations in the Dutch construction industry. One key problem concerns the lack of competition at the regional level. Internationally operating NSS like MeMo, by increasing the number of potential suppliers, could - to some extent - help increase the fairness of free market operations.

⁷ <http://www.unece.org/trade/untdid/>

⁸ <http://www.w3.org/XML>

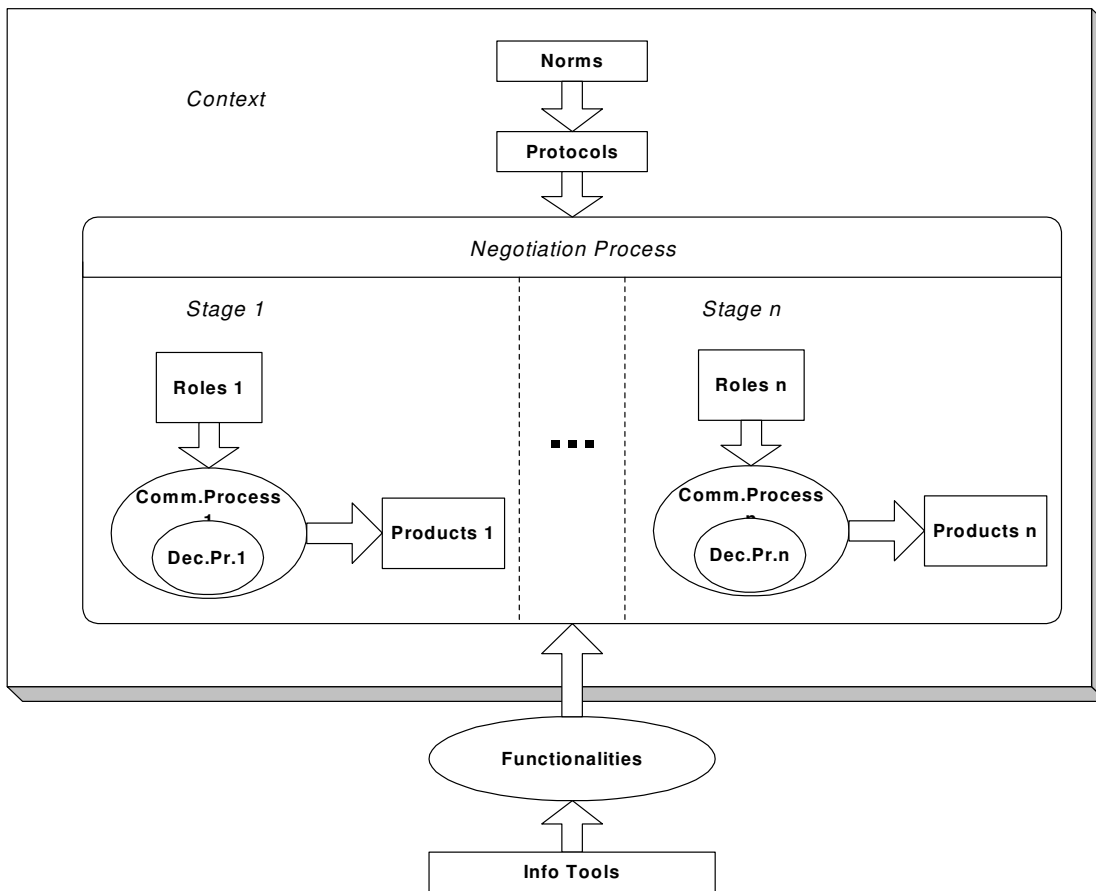
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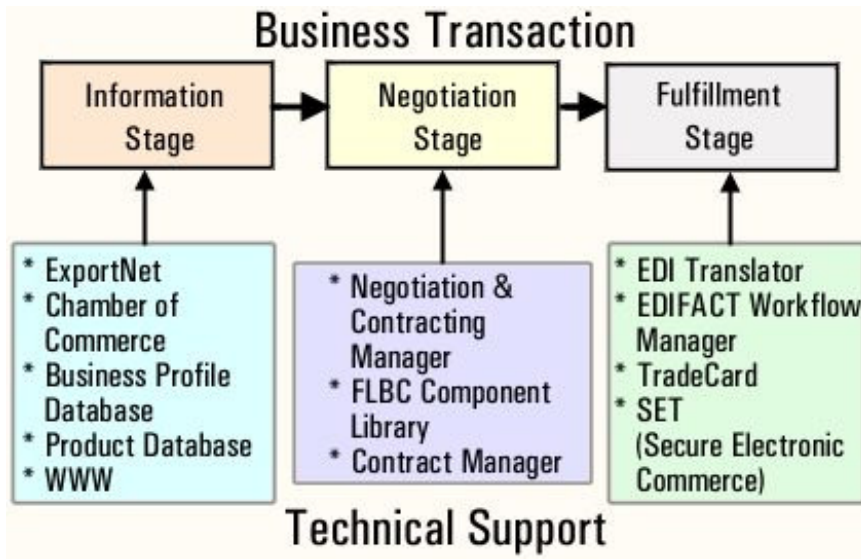
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[Fig.1 The Business Negotiation Support Metamodel]



[Fig.2 Overview of the MeMo System]



[Fig.3 MeMo Negotiation Menu]

