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# Negotiation Support System Functionality in Business Communication Applications – a Case-Based Evaluation

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## ABSTRACT

In times of E-Business, more and more transactions are conducted electronically. Especially in the context of electronic business negotiations there is a rising need for support provided by the communication medium. This need led to the development of several Negotiation Support Systems (NSSs) within the recent years. However, diffusion of NSSs into practice is scarce. The Negolook prototype developed in the course of our research follows the concept of such NSSs whilst being integrated into traditional business communication systems. It aims to bridge the gap between the uttered need for negotiation support and its actual use in practice. In this paper we present the prototype itself, a theoretical evaluation and, furthermore, we identify future research activities.

## Keywords

negotiation support systems, technology acceptance, electronic mail, decision support, communication support, document management

## 1. INTRODUCTION

Negotiations are part of most business transactions. Today, they are often conducted electronically [5]. To support such electronic negotiations, Negotiation Support Systems (NSSs) have been developed during the past decade that offer different types of support ranging from simple interaction rules to sophisticated communication, decision, and documentation support. Although these sophisticated systems can support business negotiations within every context, the acceptance of such systems is lower than expected. Our approach aims to bridge the gap between research

and practice.

To this end, we present a novel approach to the construction of NSSs. Whilst the prototypes and systems constructed during research activities of recent years mostly applied a stand-alone system in client-server architectures, our idea is to use a client-client approach by integrating negotiation support into communication systems such as Outlook already used in everyday business interactions, thereby enhancing practical acceptance of NSSs.

The paper is structured as follows. Section 2 presents an overview of the research context, explaining what constitutes an NSS. The research goals and the research approach are discussed in section 3. Section 4 introduces the prototype we developed, i.e. a negotiation support Add-In for Microsoft Outlook, which is then evaluated in section 5. We conclude the paper with a summary and a discussion of contributions and future research activities (section 6).

## 2. RESEARCH CONTEXT

### 2.1 Electronic Negotiations

Negotiations are often described as a process of communication and joint decision making where several parties with (more or less) similar goals engage in an iterative exchange of offers. Ideally, a compromise is reached at the end of this process, i.e. an allocation of the negotiated resources or terms both parties find acceptable.[1]. Negotiating is both a process of claiming and creating value, which frequently occurs in business transactions. However, traditional face-to-face negotiation can also be a slow, complex and cumbersome process since the negotiating parties which are possibly distributed all over the globe have to meet causing costs and loss of time. Therefore, many companies tend to conduct negotiations via an electronic medium [5].

Often, the term “electronic negotiations” is used to describe negotiations where electronic media of any kind are used. Stroebel and Weinhardt [2] argue that to describe negotiations as “electronic”, the medium used has to exert regulating influence of any kind on the negotiation process, e.g. via imposition of a

communication protocol or by offering a decision support. Since this narrower definition of electronic negotiations is more applicable for the concept of electronic negotiation support (which is described in the following) it is further used in this paper. Also note that in the following we will reduce the scope of the term “negotiations” to bilateral negotiations (i.e. negotiations with two participating parties).

## 2.2 Negotiation Support Systems (NSSs)

Along with the increasing number of negotiations which are conducted by electronic means, the need for information systems to support these negotiations is growing steadily [3]. Negotiation Support Systems (NSS) aim to satisfy this need. Several research teams have been working in this field for years, developing and evaluating prototypes of NSS (cf. publications in *Group Decision and Negotiation Journal* since 1992). Various models were developed on what exactly a NSS should consist of. One of these models is the threefold structure presented by Schoop et al. [7], which is also the foundation of the NSS Negoisst and in turn of the Negolook prototype presented in Chapter 3. According to the current understanding on what should constitute a NSS, this structure covers all of the important aspects. The resulting NSS Negoisst offers the most powerful support of electronic negotiations among the NSSs available. Figure 1 illustrates the model in a simple way.

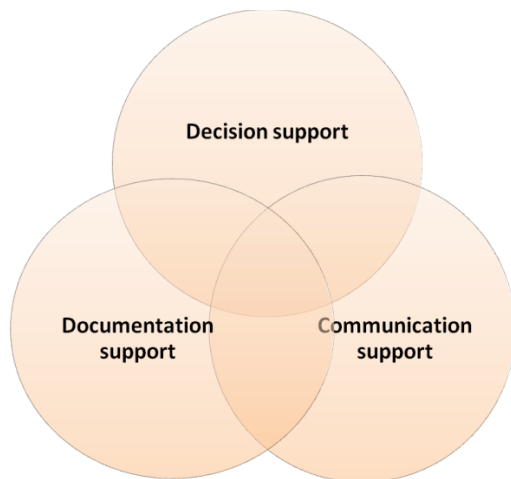


Figure 1: Threefold structure of negotiation support

### 2.2.1 Decision Support

When the paradigm of electronic negotiation support was developed in the mid-eighties, NSSs were basically seen as a kind of decision support systems, and thus mostly consisted of a decision support component for each party. This classical approach can also be found in Negoisst [7] as one part of the offered support. The user is able to specify the agenda the negotiation is about (i.e. the terms that are negotiated) and to explicate his/her preferences. During the negotiation, the component calculates utilities of offers and thus alleviates the user's process of evaluating these. If the decision support system knows both negotiators' preferences it could be used to calculate pareto-efficient allocations which are considered as fair outcomes [8]. Decision support is the most advanced field in NSS research. Challenges in this sector include the measurement, explication and representation of negotiators' preferences.

### 2.2.2 Communication Support

In recent years, different research groups argued for support not only regarding preference structures but also communication itself (e.g. [9] [10] [11]). In negotiating electronically, the parties are have limited expressivity compared to a face-to-face situation. This holds especially true if the negotiation is only conducted by textual means, such as electronic mail (which is often the case, see [5]). Schoop argues that misunderstandings or ambiguity of messages can be reduced via explication of the illocution of a message [12]. The most well-known system that realises this idea is Negoisst [7] employing both semantic and pragmatic enrichment of exchanged messages. Additionally, a negotiation protocol is used, defining when a negotiator is allowed to send messages and thus further structuring the exchange of messages.

Current research in communication support focuses on challenges such as measurement of communication quality or finding of methods how to improve it in the first place.

### 2.2.3 Documentation Support

The last component which is argued for is the documentation support, also often referred to as document management. Its goal is to ensure traceability and comprehensibility of the course of negotiation. A NSS can realise this via the management of a contract during the negotiation. Each time new offers are sent and received the contract is adjusted according to these offers. This way it is possible to trace the development process of the contract during ongoing negotiations, enabling users to step back to older versions if the negotiation is on the verge of failing. DOC.COM is a framework which shows a possible structure of an NSS applying both communication and documentation support. Moreover, it is argued that the contract created during electronic negotiations via a documentation supporting NSS should lead to a binding commitment, ensuring trust between negotiators [10].

A system that realises this framework and furthermore includes sophisticated decision support means among other modules is Negoisst [7] which is developed at the University of Hohenheim and also acted as a role model for the Negolook prototype which will now be discussed in detail.

## 3 MOTIVATION AND GOALS

### 3.1 NSS acceptance in practice

#### 3.1.1 The discrepancy in NSS acceptance

Currently existing negotiation support systems are still rather seldom used by practitioners (as stated e.g. in [4]). Although potential of such systems is given – [14] even found that 75% of the participants in an experiment with the NSS INSPIRE stated that they would actually use the system in real life negotiations – practical diffusion of NSSs is still scarce.

A large survey among German companies asked for (among other things) usage behaviour of communication media for electronic negotiations [5]. It was shown that the majority of the companies using electronic media utilise plain electronic mail for the core negotiation phase. These results are particularly interesting when seen in comparison to those of [15]. The experiment conducted there showed that electronic mail is unable to compete with negotiation support systems concerning interaction quality and interactivity. Also, message exchange was shown to be more cumbersome, negotiators using electronic mail needed more and longer messages to find an agreement. Negotiators even tended to imitate the behaviour of communication-supporting NSSs,

structuring their messages according to negotiation terms or using the subject field in their electronic mail system in a similar way to the message type concept explained in chapter 4.2.3.

In conclusion there is a discrepancy between the positive attitude of users towards negotiation systems and their actual adoption of NSS in a practical context. Instead, electronic mail, a medium which is perceived as error-prone and which could easily lead to misunderstandings is used.

### 3.1.2 Possible approaches to overcome acceptance problems

In general, we identify two main approaches to solve the acceptance problem described in the preceding section, namely increasing functionality and integration.

The former approach is implicitly followed by most of the researchers on NSS. Newer and better ways to support negotiators are included and more sophisticated systems are developed. Examples are recent developments concerning decompositional methods for preference elicitation [21] or technologies for automated mediation/consultation for negotiators as presented in [22]. In the long run, these improvements will lead to systems with an even more significant increase of utility for negotiators that is recognised by practitioners and thus acceptance (resulting in usage) is reached simply through a huge advantage gain for practitioners that utilise NSS.

An alternative approach is integration. [23] is one of the few studies that propose this idea, though in a slightly different context. It is argued that the utilization of stand-alone systems leads to a loss of work context and is avoided because of issues like the duplication of information. Since we are convinced that the integration approach is highly promising, we decided to follow it in the course of our research. By integrating NSS functionality into business information systems that are already used in regular business context, we hope to achieve higher practical acceptance resulting in increased use of negotiation support systems. Therefore, we developed the Negolook prototype, an Add-In for Microsoft Office Outlook 2007. It applies concepts of current research on Negotiation Support Systems to Outlook, thus enabling users to conduct negotiations via Outlook more effectively and efficiently. The prototype itself was already presented briefly in [17], here we will present a theoretical evaluation and formulate possible future research activities on this topic.

## 3.2 Research methodology

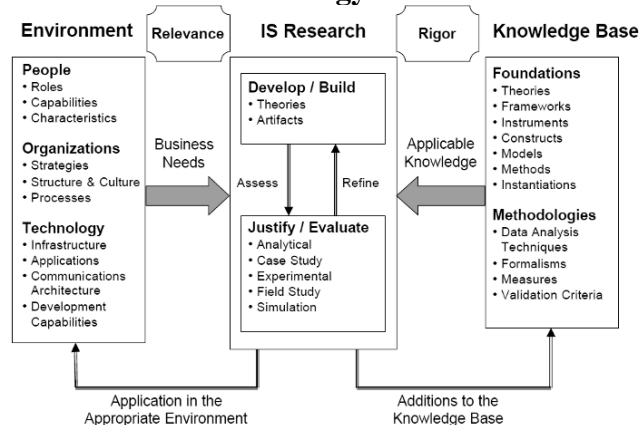


Figure 2: Design Science Approach (Source: [20])

We decided to utilise a Design Science approach as presented in [20]. The main concept of design science is the creation and evaluation of artifacts based on current knowledge ([20] refers to it as the “kernel theories”) and business needs. These artifacts can be used to support the researcher to grasp the scope of the problem (s)he wants to assess.

Figure 2 shows how this leads to a cycle of developing and evaluation, enabling the researcher to adjust the theoretical foundation (i.e. the “Knowledge Base”) or to reassess business needs. As [20] states, design science “...addresses important unsolved problems in unique or innovative ways...” which we believe is the case for our integration approach for NSS. Furthermore, seven guidelines for design science were formulated, for which we will now point out how the development of Negolook applies to them.

### Problem relevance

The problem of scarce acceptance of NSS has been stated multiple times in recent years (e.g. [4], [14]). However, not much progress has been made concerning a solution for it. Definitely, it is a crucial problem for the NSS branch in negotiation sciences, since it addresses the relevance of the concept of NSS itself.

### Research rigour

The concepts and ideas Negolook is drawn from are the result of years of studies by the NSS research communities. In chapter 1.2., we presented the threefold structure, Negolook is based on. This structure has been proven to increase effectiveness and efficiency of electronic negotiations by several empirical studies conducted at the University of Hohenheim. (e.g. [15])

### Design as a search process

As it is often the case for research in information systems [20], the context of the problem we want to assess is a highly complex one. Thus we have to rely on what [20] refers to as “search heuristics”. The construction of Negolook can be viewed as a first step in this process, which is continued by evaluating the prototype as described in chapters 5 and 6, and refinement of the prototype based on the knowledge gained from evaluation.

### Design as an artifact

The artifact produced during the research process is the Negolook prototype which is described in the following chapter. It provides an exemplary NSS integrated into a system that is already used to negotiate.

### Design evaluation

A case-based theoretical evaluation of the prototype is presented in this paper. Additionally a possible experimental design is described in chapter 6, contributing to an empirical evaluation of the integration approach in NSS research.

### Research contributions

With the empirical evaluation of the prototype, we hope to contribute an essential new approach on how an NSS can be constructed. We believe that the evaluation will gain us insights on the influence of a familiar system environment on acceptance not only of NSS but also of systems offering previously unused functionalities in general.

### Research communication

A first presentation of Negolook to the negotiation science community has already been done at the GDN 2010 [17], where

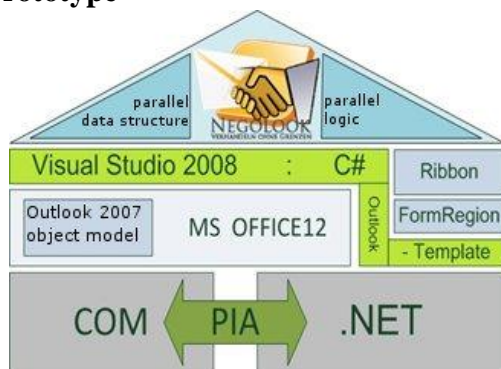
the prototype was presented to an audience with a wide range of backgrounds, both organizational and technology-oriented. However, this paper provides a complete, integrated overview of the prototype, describing its technical and functional properties and thus this paper is targeted at both a technology-oriented and management-oriented audience.

Baskerville and Pries-Heje [28] view the mapping of requirements and components of an artefact as the core of an explanatory design theory. The main requirements for our prototype are those described in section 2.2 (regarding the functionality) and, additionally – as the goal of the prototype is to increase practical acceptance – requirements regarding acceptance criteria. These can be derived from technology acceptance models, e.g. the UTAUT model [6]. Speaking in terms of UTAUT, such criteria are to increase performance expectancy and to increase perceived ease of use, two factors which can be influenced by the character of the system. The components of the prototype that fulfil the functional criteria are described in section 4.2. whilst the fact that the system is integrated into a common business environment aims at fulfilling the acceptance criteria.

#### 4 THE NEGOLOOK PROTOTYPE

The following section describes the technical framework on which the Negolook Add-In is based and the development process is roughly pictured.

#### 5 Technical framework of the Negolook prototype



**Figure 3: Epitome of technical framework**

Our decision to develop the Negolook prototype as an Add-In for Microsoft Office 2007 is basically motivated by two factors. Firstly, as already stated in section 3.1.1, electronic mail is the most common medium for electronic negotiation in a practical context [5] and secondly, Outlook is the most established electronic mail client application in practice [25]. This decision led to the technical fundament which is illustrated in figure 3.

The underlying architecture is based on the .Net Framework 3.5 Service Pack 1 and on the Microsoft Component Object Model (COM).

The structure of Negolook follows a three tier architecture consisting of a presentation layer, a logic layer and an integration layer. The presentation layer contains the classes for the graphical user interface whereas the application logic is located in classes in the logic layer. The integration to Microsoft Outlook 2007 and the data connection are centralised in the integration layer.

As the Negolook Add-In is integrated in Outlook 2007, it is a Client-to-Client Architecture. Therefore the client has to meet

some requirements to enable the usage of the Negolook Add-In. These requirements are Microsoft Office 2007, the .Net Framework 3.5 Service Pack 1 and the Microsoft Primary Interop-Assembly (PIA).

As Microsoft Office is based on COM, all objects are handled as COM objects during runtime. The PIA offers type definitions which allow accessing the COM objects from applications based on the .Net framework.

The Negolook Add-In uses some core classes offered by the Outlook 2007 Object model (OOM) [13] of which the most important are described in the following part.

The object tree of OOM is hierarchically structured. The root object is the Application Class. It offers access to all public elements in the application instance of Outlook. -four central access methods are described as examples.

- CreateItem method: used to create MailItems, TaskItems or AppointmentItems representing Emails, tasks and appointments.
- Explorer attribute: used to access the main window of Outlook
- Inspector attribute: used to access secondary windows in Outlook like the window to create an Email
- Session attribute: used to access the folder structure

The Explorer Class represents the main window of Microsoft Outlook displaying the content of folders including an important attribute – ActiveExplorer – which allows the modification of events like the reception of Emails.

As the Negolook Add-In modifies the Email objects, the MailItem Class is relevant as the integration of the additional attributes that are necessary for the application logic of Negolook are included there. To include these attributes a concept offered by the OOM has been used. The ItemProperty Manager is an implementation that is able to write new ItemProperties to the COM objects. Considering the MailItem following ItemProperties have been added:

**Table 1: Additional ItemProperties in MailItem Class**

<u>ItemProperty</u>	<u>Eigenschaft</u>
NegotiationID	GUID of a negotiation
MessageID	GUID of a message
CreationDate	Date of creation
NegotiationStatus	State of a negotiation: Open, CloseWithAccept, CloseWithReject
Message Type	Type of the sent/received message
BestCase	Stores the maximum utility that is possible as an outcome from an attached agenda
WorstCase	Stores the minimum utility that is possible as an outcome from an attached agenda
Utility	Stores the current utility value that is possible as the outcome from an fully specified attached agenda



In order to identify the MailItem objects that are relevant for the Negolook Add-In, the concept of MessageClass is used. With a defined MessageClass it is possible to identify the objects without trying to access the ItemProperties. Three different types of MessageClass were introduced. The first MessageClass defines a negotiation (IPM.Note.Negolook.Negotiation), the second MessageClass defines a message (IPM.Note.Negolook.Message) and the last MessageClass is used to identify the welcome message of a negotiation (IPM.Note.Negolook.WelcomeMessage).

## 5.1 Functionalities of Negolook

In the following section, the supporting elements will be described in detail as they are currently implemented in the prototype.

Basically the structure and the layout of the elements are derived from Negoisst [7], an existing Negotiation Support System that has been already widely evaluated in empirical studies (e.g. [15, [16]).

### 5.1.1 Decision Support

In the Negolook prototype all messages are rated with utility values which are displayed to the user at several locations in Outlook e.g. the message creation dialogue or the negotiation overview.

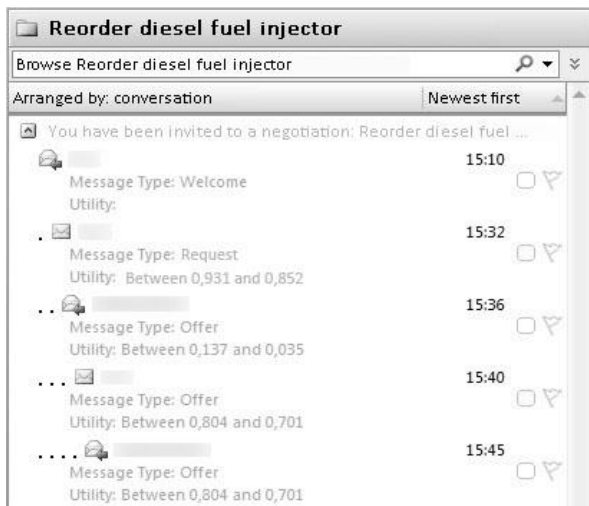


Figure 4: Message tree of an exemplary negotiation

In figure 4, the message tree of a negotiation is displayed. It is ordered as a conversation. The utility values that can be realised with each message are located below the message type. With this prominent location, the negotiator is able to retrace the negotiation process based on his/her preferences. The negotiation agenda is the central point in the decision support module. It stores the attributes which are the centre of the discussion during the negotiation process. The agenda is attached to each message.

Based on the negotiation agenda, a preference model is generated which contains agenda items representing the attributes. At the current development state, the user needs to explicate the preferences. It is possible to weigh the agenda items on a scale from 1 to 100 under the constraint that the sum of all weighted attributes has to result in a value of 100.

The implementation of the preference model editor provides the user with a table view of all agenda items defined in the negotiation agenda. In figure 5, an extract of the preference model

editor view of two agenda items is displayed. The agenda item “Price” is a numerical item where the negotiator spans an interval for acceptable values by defining a worst case and a best case value. The agenda item “Additional parts for installation” is a categorical item which offers the negotiator the choice between several discrete values.

Weighting	Item Name	Choice
35	Price	Best case : 30000 Worst case : 80000
20	Additional parts for installation	Additional equipment include 91 % Additional equipment not incl 16 %

Figure 5: Preference model editor view extract

In order to enable the user to explicate the preferences precisely, the attributes are divided into two classes. First there are the numerical agenda items. They are used to specify a range of numeric values limited by a best case and a worst case, e.g. for an agenda item price this class could be used. The second class consists of the categorical agenda items. They are used to provide the possibility to define a discrete value range for an agenda item, e.g. for an agenda item color the values could be blue, green and red. The user has to define separate weights for each of the values in categorical agenda items.

To calculate the utility value for the messages, the information from the agenda and the preference model are aggregated in a linear-additive utility function [27].

### 5.1.2 Communication Support

The communication support is implemented as pragmatic enrichment for the messages. Based on the language action perspective [12], which has its theoretic fundament on speech act theory of [18] and the theory of communicative action by [19], five message types have been used.

*Request* is the message type that is used to provide the initiator of the negotiation the possibility to ask the partner for an offer that fits to an agenda specified by the initiator similar to a request for quote.

*Offer* is the message type that is used to indicate that the message occurs in a formal conversation and that the sender wants to offer a specific good to the recipient.

*Information* is the message type that is used to indicate that the message is informal conversation. It can be used to clarify questions which need to be clarified for the negotiation to continue.

*Accept* is one of the message types indicating the end of a negotiation. It is used when the negotiators have found an agreement and want to finish the negotiation successfully.

*Reject* is the second message type that is used to terminate the negotiation. Its usage is adequate if the negotiators are unable to find an agreement and the remaining barriers cannot be overcome.

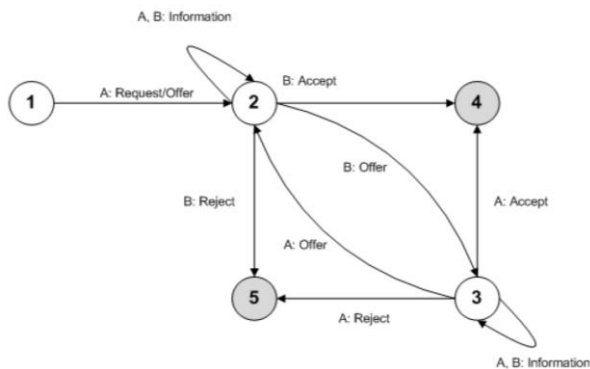
With the usage of the message types, misunderstandings considering the meaning of the message are prevented as the meaning is clearly explicated.

The message types are located in the message tree of the negotiation which is shown in figure 4. Additionally, the message

type is placed in the “write message dialogue” and the “read message dialogue” in order to provide the users with a semantic enrichment every time (s)he accesses the messages contents. Within these dialogues, a dropdown menu is positioned below the subject text field and above the message body. Next to the dropdown menu, the user is given an explanation of the currently chosen message type displayed in figure 6.

**Figure 6: Message header in Negolook write message dialogue**

The second aspect that is used within Negolook considering the communication support is the structuring of the communication process with a protocol pictured in figure 7.



**Figure 7: Negotiation Protocol, adapted from [10]**

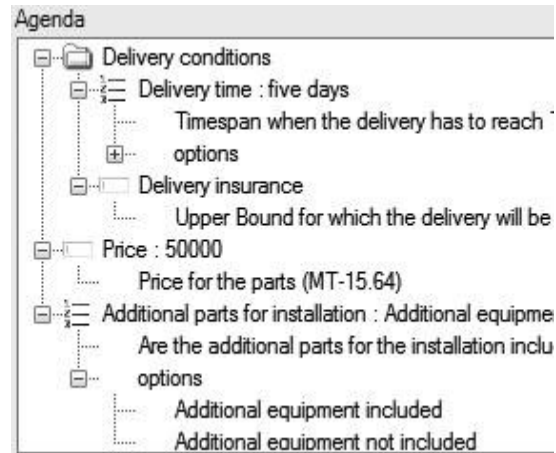
It is a strictly alternating protocol where the negotiators can only write one message a time. This mechanism is useful as it allows the negotiators to identify the message with the latest valid content.

### 5.1.3 Documentation Support

Documentation support offers the users support considering the traceability of the course of messages in the negotiation process. The user has a transparent process where she is able to reproduce the changes that were made to the agenda and to rethink her decision according to the corresponding argumentation verbalised in the body of the message.

Figure 8 shows an extract of an agenda with four agenda items defined, namely “Delivery time”, “Delivery insurance”, “Price” and “Additional parts for installation”. Organising the agenda items in folders such as the “Delivery conditions” folder is a possibility to structure the agenda in a tree structure familiar to many users from file system explorers such as Windows-Explorer.

In this example, the agenda items already specified can be identified by the values behind the titles of the agenda items, e.g. “Price: 50000”. The screenshot is taken from the “write message dialogue” where the user can edit the agenda below the message body. As Outlook 2007 has already clear sorting possibilities for elements in folders, Negolook uses the conversational order of messages to provide an intuitive overview. This overview is also reliable as the course of negotiation is represented in the agenda that is attached to each message, which is changed iteratively during the core negotiation phase.



**Figure 8: Extract of a negotiation agenda**

In contrast to document-based negotiations [9], Negolook does not provide the generation of a final contract after a negotiation has been successfully finished. The agenda that is attached to the messages is in the role of storing the data as it was at the state of the message.

## 6 THEORETICAL EVALUATION

This chapter sets up a theoretical case in which the two different systems are evaluated against each other based on their major difference: integration vs. an independent system. One System is the earlier mentioned web-based system Negoisst, and the other system is the Outlook-Prototype Negolook. We outline several advantages of one system over the other, depending on the scenario. As the Negolook prototype implements just a small range of functionality of the Negoisst system we assume that both systems are functionally equal in the compared parts.

### 6.1 Comparison Criteria

As the main difference between the two approaches is the environment of the system, we use this as a basis for comparison. Hence we concluded arguments for and respectively against trust issues, security reasons and the embeddedness of the negotiation process. Note that this list of criteria is not comprehensive, the selection is narrowed to the three particular relevant ones which illustrate the main differences between a stand-alone and an integrated approach. In the following we will describe the criteria and name the differences concerning the two systems.

#### 6.1.1 Environment

There is one major difference in the approach of Negoisst and Negolook: the settled environment, e.g. the place of the application.

Negoisst is an independent web-based system which can be accessed by nearly every computer via web browser which makes it independent of any running operating system as it is accessible via simple HTTP-requests.

We now differentiate between a familiar and an unfamiliar environment. The familiar environment is the already in-use personal information management application, e.g. the software that one already uses for reading, writing and managing emails. In our case it is Outlook 2007 which provides additional functionality like calendar, notes and the opportunity to interact with other programs. Thus this involves options to work easily together with other people using a groupware system which will

be discussed later in chapter 5.1.3 (and 5.3.3, respectively). The unfamiliar environment is then the web-based system which opens via a web browser a new application the user is normally unfamiliar with.

### 6.1.2 *Security Reasons*

Besides the different environments there is one issue which concerns both approaches: security. As negotiations, bargaining and making contracts is still one of the problematic and highly secured matters in a B2B-context this is a serious issue both for managers and for people of the IT department, concerning the application of new software systems [11, 26].

Besides this fact there is one difference in handling this matter: the integrated client-to-client system uses a single side technical trust system. That means each side is responsible for the security of the whole negotiation. In fact enterprises can still use their infirm encryption systems when installing Negolook. Additionally Negolook is not able to continue a negotiation if the dedicated data has been altered outside the program. It assumes that someone wanted to change the negotiation without an answer of the other party.

On the other hand, Negoisst as a web-based system is itself a trusted third party (TTP). This means that a trusted third company provides the facilities to use Negoisst. The TTP is responsible for a consistent and traceable negotiation process. This also includes the implementation of a range of functionalities where both parties cannot repudiate any transaction [11, 26].

### 6.1.3 *Embeddedness of the negotiation process*

There are several more points in which those two systems can be compared. One of them is the ability of using advanced techniques that come along with using a personal information management system. Especially using Outlook opens up several opportunities in combination with groupware systems. But the main advantage evolves from the fact that eMails are used as the basis for negotiation messages: forwarding. This is a huge advantage in bigger enterprises where the purchasing department is not the only one who is responsible for a single contract, respectively the negotiation that leads to the creation of the contract. Sure, even Negoisst could provide this functionality but does not per se, whereas Negolook while having plain email as its basis simply inherits this functionality.

## 6.2 Case Setup

As a basis scenario we set up two firms located in the branch of mechanical engineering. Techtatva GmbH is a well known firm based in southern Germany with around 500 employees producing huge printing units for publishing companies. Within this enterprise, Mrs. Martina Scheng works in the purchasing department as procurement officer.

Nine hours west by car, in the Czech Republic, Mr. Peter Novák is head of the sales department in a small sub-supplier called InkPrint Ltd. InkPrint is producing and selling vendor parts for a various range of printing machines. Mrs. Scheng and Mr. Novák are well known to each other, since several contracts between the firms have been closed successfully in the past. These days Mrs. Scheng requests some new vendor parts for a laser-based printing unit (computer-to-plate). For this machine, Techtatva needs about 50 similar pieces of type MT-15.64 for the dry ink duct and several additional parts to install each duct. As both of them already know each other well and Mrs. Scheng has already used Negolook in one other case before, she suggests to Mr. Novák to

use the Outlook-Plugin this time. Despite being familiar with MS Outlook, Mr. Novák has some slight apprehension on security matters and basic usability. He suggests using Negoisst, a web-based negotiation support system a colleague of him got in touch with in some businesses earlier. But as Mrs. Scheng is restricted by her Legal- and IT-Departement only to use validated and already in-use software, Mr. Novák accepts to give Negolook a try.

After setting up the negotiation agenda (containing the negotiated terms, like delivery time, delivery insurance, price, an option on additional equipment, etc.) Mrs. Scheng just sends Mr. Novák an invitation eMail while the negotiation process gets into run.

## 6.3 Theoretical Evaluation

As the case is introduced now, we evaluate the different approaches now along the major differences: the environment, security issues and the embeddedness of the negotiation process, specifically the possibility to connect the system to other systems in use.

### 6.3.1 *Environment*

Since we distinguish between a familiar and unfamiliar environment, in this case, as both agree using Negolook, we assume a familiar environment. The advantage is obvious as Mr. Novák does not need further instruction in using this electronic support in order to avoid any drawback as Mrs. Scheng already used the system before. Based on the UTAUT model [6] it has already been argued for a higher performance and effort expectancy [17] while integrating an NSS into an already in-use and accepted system.

Hence introducing a new system like Negoisst might cause additional efforts in terms of getting used to it. The threat is to have drawbacks because of an unfamiliar environment in comparison to another person being already familiar with the system and thus gains advantages out of this knowledge.

### 6.3.2 *Security Reasons*

In this chapter, we compare the two systems in matters of a client-to-client approach versus a client-to-server approach where the server acts as a TTP.

Concerning the case, Mrs. Scheng already has some security regulations of her IT department. She is only allowed to use validated software. This means using Negoisst even as it is a web-based approach is not possible. That is why both of them agreed using the already installed system.

It might be easier to validate a web-based approach by the IT department as there is no need to install any new software that could produce additional security leaks. But on the other hand, utilisation of a stand-alone system leads to a loss of control over the system environment, which may not be desired in such a security-sensitive issue as electronic negotiations. Furthermore the enterprises using a third party system are dependent on the uptime and maintenance of this service. Thinking in terms of service level agreements this is technically a valid approach, but negotiating these SLAs might also cause additional effort.

Now the managers need to be convinced that this system is as reliable as the simple mail sending systems used before. This is the advantage of a client-to-client approach where there is no change in the underlying structure. The user does not recognise any effect on his daily business as he just sends and receives eMails as he used to do it before. There is no change on the



security layer and not even a huge change in the working process. If a firm already uses eMail encryption it is able to go on using it as before.

Regarding our negotiation scenario, Mr. Novák might have some interest in not installing new software that he has to maintain by himself as he works for a smaller company. On the other hand, as Techtatva and InkPrint already closed common business before, there already exists a basis for trust on which both can rely on. That in turn is a needed basis for completing negotiation processes successfully [26].

### 6.3.3 Embeddedness of the negotiation process

As described earlier we talked about the inherited functionality of forwarding eMails and the connection to groupware systems. In our case both negotiators got some restrictions by their engineers. This may cause a need for communication during the negotiation between the purchasing respectively sales department and the development department. With the ability to forward negotiation messages concerning engineering details, departments being only indirectly involved in the negotiation process could be directly informed on possible changes or adjustments on the expected outcomes of the negotiation. This would give the engineers the possibility to intervene before the sales department admits tough concessions. This could of course also be true for other departments that are also involved like the legal and financial department.

This would theoretically be applicable to a web-based approach as well, but then again all other departments need to be introduced to the new system. We consider this as a huge advantage of the integrated client-to-client approach because efforts and time to introduce those departments could be saved. Technically there are already similar implementations in this field, like Microsoft's Sharepoint or IBM's Lotus Notes.

## 6.4 Conclusion: Possible areas of application

After evaluating both approaches along the case and the given criteria we conclude that there are two major dimensions in using a web-based versus a client-to-client approach.

Depending on the size of the firm and the duration of relationship we infer the following table. The duration of the relationship is simply divided into long lasting contacts and short term relations. Long lasting contact means that partners already closed successfully some prior common businesses. Short term relations means that the partner barely know each other and hence just started to get in contact. The kind of firm is described in terms of size including criteria as the number of employees, whether or not the company has its own IT department, decision hierarchies etc. The simple differentiation we assume is not exact but sufficient for this comparison.

**Table 2: preferred approach based on size of firm and kind of relation**

Kind of firm Duration of relation	Small firm	Big firm
Long lasting contact	web-based	client-to-client
Short term relations	plain mail	plain mail/client-to-client

The cells contain a suggested preferred approach of the firm mentioned in the column. For example, if a small firm has long lasting contact with another firm, big or small, it is probably more interested in using a web-based system, as it does not want to maintain more software especially in security concerns. It is even not so difficult to change workflows in a small firm as it would be in a bigger enterprise. It is even not that expensive and time consuming to introduce a web-based system to a small group of employees, whereas a client-to-client approach implicates probably higher costs as the software needs to be installed and configured.

Again, the table just displays the suggestion of a *preferred* approach, not the approach that might actually be chosen. This in turn is a matter of discussion and the decisive power of each contract partner. For small firms which just got in contact with each other plain mail respectively face to face negotiations might be a valid approach to create trust for further negotiations with more sophisticated systems.

However, bigger companies may not want to adjust their processes or deal with security issues or put effort into the introduction of a new application. For those companies the integrated client-to-client approach might be promising since it does not involve these efforts and also provides the possibility to be connected to the sophisticated groupware systems and already in-use and well established software.

## 7 FUTURE RESEARCH

### 7.1 Reflection on methodological basis

So far, we have created the artefact based on theoretical foundations of recent research on NSS. Also, a case-oriented theoretical evaluation has been done. Concerning our chosen research methodology we have made the first steps in understanding the problem of NSS acceptance and how our integration approach contributes to solve it. According to the methodology, our next step will be an evaluation of our prototype by empirical means, namely via the conduction of experiments. From the results of these experiments we hope to derive consequences not only to contribute to the knowledge about NSS acceptance itself, but also to refine the artefact we created in the course of our recent research activities.

### 7.2 Further evaluation steps – possible designs

In order to gain reliable and resilient results considering the communication quality and the negotiation results it is necessary to conduct an empirical experiment. In this chapter the setting for the empirical experiment is described along with the variables that are planned to be evaluated.

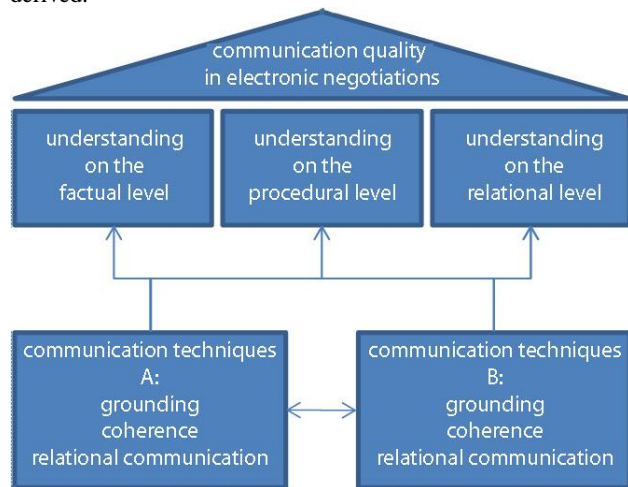
As it is the goal of the current work to show that integration of negotiation support functionality into existing business communication systems conveys the usage in practice, the advantages of the integration have to be proofed. This results in a setting where negotiations should be processed with different systems but the same negotiation case. To be able to show that Negolook enables a better performance than electronic mail, and in further step to compare the performance and usability of existing systems with Negolook, for the experiment design at least three groups have to be set up.

The first group represents the state as the majority of electronic negotiations are conducted recently in practice. The experiment participants will use solely electronic mail for their communication means.

The second group represents the state where a NSS is in usage for the negotiations. In the course of this work it would be ideal to use Negoisst as a representative of an NSS because it implements the threefold structure of NSS. This circumstance allows also better comparison to the third group as the available functionality is very similar.

The third group represents the state of the integrated NSS. The participants of this group will use Outlook with the Negolook Add-In for their communication in the negotiation.

As now the experimental setting is clarified, the next important aspect is what to measure in these experiments. The following section will lay out one up-to-date approach judging the communication quality. The approach proposed in [24] develops a theoretical model for evaluating communication quality in electronic negotiations. From this model a set of variables is derived.



**Figure 7: Theoretic model of communication quality [24], translated**

In figure 5, the model is pictured. Communication quality in electronic negotiation is composed of three layers of agreement, agreement on the factual layer, agreement on the procedural layer and agreement on the relational layer. In order to realise a good negotiation result and high communication quality agreement has to be found on all layers. The layers cannot be seen as strict separate divisions as they are interdependent among each other.

The negotiators have different communicational techniques to gain agreement on the layers. These techniques and their affiliation to the layers will be described in the following section.

Grounding is a process to create common ground between the negotiators. This means a common mental model and common perception. Grounding affiliates to the factual layer.

Coherence is affiliated to the procedural layer. Critical factors for a successful communication are mutual references, the completion of adjacent pairs and a comprehensible message history [24].

Relational communication is affiliated to the relational layer. It is describing the communication that is informal and which aims towards building a stronger relationship between the participants.

With a series of experiments, [24] derived a set of variables that fit to measure the communication quality and the agreement that was reached between the negotiators on the layers. These variables are:

- well-structured argumentation
- elaboration of argumentation
- comprehensibility of argumentation
- Friendliness
- politeness
- adequateness
- professionalism
- interest in messages of negotiation partner

In order to measure these variables a questionnaire has to be composed which the experiment participants will be answering ex post to their negotiation. Until now the integration aspect was not considered at all. It is only possible to compare the systems concerning their ability to facilitate the achievement of good communication quality. This is also an important aspect as the results of the negotiations should not rely on the used media. But as this work also wants to show the difference for the users' subjective opinion on whether and to what extent an integrated system would be used for negotiations compared to a stand-alone system, we also have to include variables into the ex post questionnaire for this aspect. The variables for this problem are taken from the central constructs from UTAUT [6]. It is a compromise between the full amount of items that are used in the root definition of UTAUT and the users' willingness to bother with too many questions. The results of this part of the questionnaire are the most important for this work as it should emphasise whether the Negolook would be useful in practice in comparison to electronic mail or whether the idea of integration does not fit because of security and trust reasons which are invariant to the client-to-client architecture.

### 7.3 Future prospects

In this paper we have sketched the current state of our work and formulated research activities for the nearer future. In the long run it is necessary to show that the approach we follow actually contributes to better acceptance of NSS and thus, application of such systems into practice. Therefore, the prototype needs an evaluation in a practical context. This could be done for example via application of the prototype in a real life scenario or by a qualitative assessment of the prototype from practitioners.

As a result of the evaluation process we hope to draw conclusions on the influencing factors on acceptance of NSS in general and how the integration approach contributes to the creation of practical acceptance. Further steps could also include the extension of the functionalities of the prototype, to further increase effectiveness and efficiency of electronic negotiations. For example the negotiation protocol we utilise could be extended to support multi-party negotiations, or it would be possible to include cryptographic means to cipher negotiation messages and thus providing a further increase in security.

The creation of the Negolook prototype derived from the theoretical foundations marks a first milestone in our research activities. We are aware that this is only the beginning of a longer process leading towards a deeper understanding on the problem sketched in this paper. However, the approach of integrating NSS functionality into business communication systems such as MS Outlook is a highly promising one that definitely needs further research activities.

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