

# Conflict Resolution Support in Electronic Negotiations

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## ABSTRACT

Negotiation Support Systems offer a sophisticated support of electronic negotiations. During a negotiation process, different types of conflicts can occur. Up to a certain level, they can be constructive, afterwards they become destructive. Such escalating conflicts should be handled and resolved. In this paper, the potential and challenges of conflict resolution support for such type of negotiations are discussed. Based on a state-of-the-art in electronic negotiation support, the application of the concepts of moderation, consultation, and mediation for conflict management and conflict prevention during an asynchronous electronic negotiation process is discussed.

## General Terms

Management, Performance, Economics, Experimentation, Human Factors.

## Keywords

Electronic negotiation, conflict management, negotiation support system, moderation, consultation, mediation

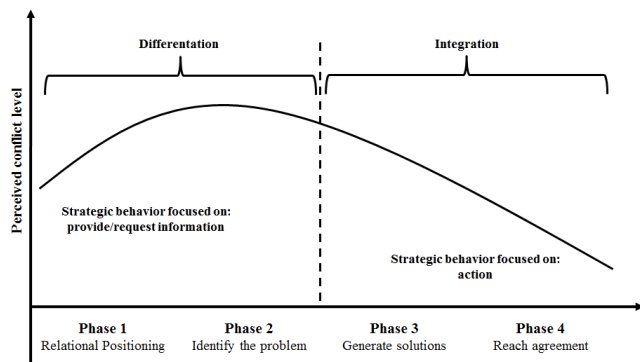
## 1. Introduction

In general, parties negotiate in an iterative communication and decision process. Their motivation is that they want to reach a goal that they cannot achieve alone. During the negotiation process the parties act through exchanging information, offers, and counteroffers to find an agreement [3]. Thus, a conflict is the reason for every negotiation. Electronic negotiations are a specific form of negotiations and their use in a business context has become more and more important during the last years [29]. Compared to face-to-face negotiations, electronic negotiations can offer a multiplicity of advantages which can lead to different economic effects such as cost and time saving [28]. On the other hand, there are several challenges to deal with, e.g. the electronic medium, distributed locations.

During a negotiation, different kinds of conflicts can occur. Whilst parties would not negotiate without the initial conflict, escalating conflicts can lead to a rejection of negotiation which in turn can cause additional costs (e.g. costs of litigation). For example, it has been reported that German companies go to court about 500 times per year with a value of claim of over 500.000€ each leading to more than 1.000.000.000€ costing of litigation [33]. There are several alternative options for dispute solution. Additionally, conflicts are influenced by different factors and can change during a negotiation [17]. In early stages of a conflict, moderation or consultation can help parties to find a joint solution. In later stages, the negotiators can ask a neutral third party called a mediator for assistance. Mediation is a structure process in which a third party with not decision making authority supports the conflict parties to find a new win-win solution [18–20, 23]. Surprisingly, only around 600 mediations between German companies take place every year. 75% of mediations are successful [33]. Comparing the costs, mediation is a real alternative to conflict resolution by a court. Mediators can act much quicker than a judge who must follow standardised processes. As a consequence, those who correctly solve conflicts will save costs and be prepared for success [20].

The conflict behaviour within electronic negotiations is different to that in face-to-face negotiations. Based on the restrictions and potential of the medium, parties focus on some selected aspects. Communication plays a more important role whilst gestures, mimics, and tone of voice which can increase or decrease conflicts are missing. Thus it depends to a certain degree on the conflict behaviour and the negotiation strategy whether the conflict potential in electronic negotiations is higher than in normal face-to-face negotiations [32].

Although there are differences in the conflict behaviour, the conflict process in electronic negotiations is in points similar to that in face-to-face negotiations (cf. figure 1).



**Figure 1: Negotiation behavior over time in a face-to-face setting [32]**

In electronic negotiations, we have a differentiation and an integration phase. In the first phase, the parties focus on providing and collecting information. During the process, they exchange information and start to go into the integrative phase, where the main focus is on action, i.e. on exchanging offers with the objective to generate solutions [32].

In this idealised process, there are different conflict stages. Conflicts develop as the consequence of the negotiators behaviour. During the first period, the perceived level of conflict increases before latent conflicts become stronger and start to manifest. At the end of this period, the participants have, on the one hand, a high level of conflict while, on the other hand, they have created a basis for a mutual understanding based on the exchanged information. They continue with the integration phase, communicate more openly and start to generate solutions. Normally, the level of conflict will decrease with this process and the negotiators will come to an agreement at the end. Taken together, the parties first have a high perceived degree of conflict before they move closer together to find an optimal solution for both sides [32]. Figure 1 shows an approach focusing on the initial conflict - the prime reason for the negotiation - but fails to consider dynamic conflicts occurring during the process. There can be points during the negotiation, where the conflict starts to escalate and as a consequence will lead to a rejection of the negotiation.

The main objective of this paper is to introduce and discuss a framework for conflict resolution management in electronic negotiations to enable agreements and to prevent parties from breaking off their negotiation process without agreement. To this end, the following questions need to be addressed: Are the conflict resolution methods used in face-to-face conflict situations useable in the virtual world? What are the requirements and consequences for the conflict resolution support of the electronic negotiation process to overcome impasses and to help the parties finding an integrative agreement? The paper will first introduce the concepts relevant in electronic negotiations (section 2) before discussing diagnosis and methods in conflict management (section 3). Section 4 will then present the framework of conflict resolution in electronic negotiations. The paper will be concluded with a summary and a final discussion of the work.

## 2. Electronic Negotiations

### 2.1 Definition and classification

Negotiations that are conducted by means of information technology and that provide rules for communication and/or decision support that are enabled only through the use of information technology are called electronic negotiations [43]. This definition includes different forms of electronic negotiations ranging from fully automated ones conducted by negotiation agents over semi-automated electronic auctions to negotiation support in which the decision are taken by the human negotiator who is supported in the various negotiation processes.

A negotiation support system (NSS) is software which implements models and procedures, has communication and coordination facilities, and is designed to support two or more parties and/or a third party in their negotiation activities [26]. In contrast, for example, to email, the system supports the parties in different ways, namely by means of communication support, decision support and document management [38–41]. The level of involvement an NSS can offer has different levels. Kersten et al. [26] introduced the following three stages, cf. table 1.

**Table 1: Involvement categorisation of NSSs (based on [26])**

Stage	Involvement	Functions
1	Passive	<ul style="list-style-type: none"> <li>- Support of interaction between users located in different places (= Communication Support)</li> <li>- Mathematical and Statistical calculation of utilities (= Decision Support)</li> <li>- Different visualization technologies to represent data</li> </ul>
2	Active	<ul style="list-style-type: none"> <li>- Support in evaluating, formulating and problems solving</li> <li>- Offering concession range and possible new counter-/offers (= Facilitation-Mediation Systems)</li> </ul>
3	Pro-Active	<ul style="list-style-type: none"> <li>- Same functions than active systems, extend with the knowledge of an artificial intelligence. The system supports the negotiator more active, based on a monitoring of the process and the activities. (= Intervention-Mediation System)</li> </ul>

The main differences between active and pro-active NSSs are the role of the user and the knowledge base of the system. In active systems, the negotiator asks for an advice, the system uses the given data, makes an analysis, and visualises it. It thus depends on the activities of the negotiator and its counterpart. Pro-active systems also analyse the process but make inferences and intervene without a request [26].

There already is a conceptual awareness of supporting negotiators in different ways. However, most NSSs do not offer a holistic support. For this reason it is necessary to discuss their components next.

## 2.2 State-of-the-Art in Negotiation Support Systems

Existing systems such as *Negoisst* [39], *SmartSettle* [44], and *Inspire* [24, 25] offer different support features. *Inspire* and *SmartSettle* are firmly rooted in the decision support school. They provide advice limited to a quantitative support to get closer to a Pareto optimal agreement. Support for the other parts of the negotiation process is limited; *Negoisst* is based on a holistic approach offering an integrated sophisticated support for all parts of an electronic negotiation. In particular, *Negoisst* provides decision support, communication support, and document management. For this reason, *Negoisst* is the most sophisticated system and has been used in various negotiation studies [13, 28, 42]. Therefore, *Negoisst* will be in the focus of the following discussions.

Decision Support is the basic for a quantitative analysis. It rates the offers and counteroffers based on the preferences of the user. The used methods can be static and dynamic; preferences can be fixed or fuzzy. If users are not sure about their preferences, they can use indirect preference elicitation methods such as a conjoint analysis or hybrid methods in case of a change of preferences during the process. Based on the preference elicitation, the negotiator will get an individual linear-additive utility function. Additionally, so called utility graphs can visualize the utility history of all offers and counteroffers made up to now [35, 39].

Communication Support offers support on all semiotic levels (i.e., syntactic level, semantic level, pragmatic level). The main objective is to reduce the disadvantages of the electronic medium and to ensure effective and efficient communication. Negotiation protocols structure and coordinate the message exchange on the syntactic level. To create a common understanding of the negotiation issues, the semantic level is relevant. An ontology underlies the communicative exchanges in *Negoisst*. The negotiation issues can be integrated into the natural language text preventing misunderstandings about the concepts under negotiations. All concepts are defined and the definitions can be shown to the negotiation partners if need be. Thus, a common background is created. This approach is called semantic enrichment. The pragmatic level deals with the intentions of negotiation partners. Each message in *Negoisst* is classified by the author using a message type based on the protocol. This shows, e.g. whether a message is meant as an informal enquiry or as a formal request, thereby enabling a clear understanding of how a message is to be interpreted by the recipient. We call this pragmatic enrichment of the messages. *Negoisst* distinguishes between formal (offer, counteroffer, accept and reject) and informal (questions and clarifications) message types. Formal messages are binding and are linked to a contract. Informal messages help to clarify open points which do not belong to the core negotiation [13, 40, 41].

Document Management offers autonomous dynamic contract generation based on each offer/counteroffer. Based on the pragmatic enrichment and the negotiation ontology, the NSS creates a binding contract. The main objective is to create trust between the parties, because each offer/counteroffer can be accepted and has a final contract as consequence. In addition,

contract templates fit the different needs of negotiation contexts. Based on the ontology, an inference machine can simulate the consequences of contract violation [42].

There have been some preliminary discussion about introducing conflict resolution support to sophisticated negotiation support systems [12, 47]. Similar to the focus of decision support in most NSSs, a focus on quantitative analysis and advices is noticeable in these preliminary sketches. However, it is vital to consider also qualitative aspects for conflict resolution. The main challenge is thus to create a holistic concept, including the already established methods of conflict management. The following chapter will give a brief overview over the basic theory of conflict management.

## 3. Conflict Management

Conflicts are an integral part of any cohabitation, but they don't have to be destructive. De Fleur et al. [9] differentiate between constructive and destructive conflicts, Lewicki et al. [30] between functional and dysfunctional conflicts. Since conflicts are often perceived as a battle situation, easily an internal conflict dynamics unfold and a peaceful, constructive and non-violent solution is not longer possible. Not every conflict can be handled in the same way. They can result of different interests, cognitive abilities, norms and values of the society or objectives [5]. Before a conflict can be handled it is necessary to diagnose and classify it.

### 3.1 Aspects of conflict diagnosis

The level of escalation in general can be influenced by 5 aspects [17]:

- 1) The relationship and positions between the parties (including formal and informal positions to each other, character constellations, etc).
- 2) The parties by themselves can be individuals, groups, organizations, etc.
- 3) Their attitude to the conflict (including aspects like: Do they know how to solve conflicts? Does the party itself thinks, that the conflict can be solved? What are their expectations of a solution? Etc).
- 4) The specific conflict points, the so called conflict issues, which are brought into.
- 5) The conflict escalation (= process) by itself, that means: When was the first appearance? How did the intensification proceed? Etc.

All of these aspects are very important for a conflict diagnosis. A holistic diagnosis starts with the recognition of conflicts and its mechanism. The mechanism by itself keeps the level of escalation or pushes it further.

Normally all dimensions have to be put into an overall context to diagnosis the degree of escalation in a conflict. There are several escalation models in the theory. A common used one is the 9-level-escalation developed by Glasl [17]. It divides the escalation in 9 different stages, namely 1) hardening, 2) debate, 3) action instead of words, 4) images and coalition, 5) loss of face, 6) threats, 7) partial destruction, 8) fragmentation and 9) elimination.

In the first stages, there is a polarisation and debate between the parties. During the next stages, the conflict gets more intensive and the parties start to make threats and are afraid of a loss of face. During the first stages, conflicts can be functional. As

discussed, even in successful negotiations there are different positions and opinions. The parties have to exchange information to achieve a mutual understanding. With rising escalation, the conflicts are getting dysfunctional and after stage 5 to 6, they cannot be resolved without the help of a third party any more.

A diagnosis can be of different levels of details. A very detailed diagnosis cannot be guaranteed due to lack of time or missing, distorted, or masked information. On the other hand, it is also not always relevant to include all aspects. In the context of electronic negotiations, the access to interpersonal factors is particularly difficult. The negotiators act in offset locations and communicate over time. For a possible third party, it is far harder to make a complete conflict diagnosis or to influence relevant aspects. In the following, therefore, not all aspects will be considered. Only the conflict escalation (=process), the issues and the relationship are in the focus. Especially the issues play an important role. These are represented in *Negoisst* by specific agenda items and their characteristics and can be quantifiable.

## 3.2 Common Conflict Resolution Methods

After the diagnosis it is possible to intervene and try to deescalate the conflict. Based on the model of Glasl, there are several conflict resolution methods which can help to resolve the dispute.

### 3.2.1 Moderation

On levels 1-3, moderation can be used. A moderator tries to solve problems of interaction and questions to the content and the process immediately. This kind of intervention is very useful for conflicts on the first two levels and for simpler conflicts on the third level. To identify the moment in which a moderator no longer has the necessary effect and a consultant would be better, is very difficult. It is a grey area; the cross-over between both methods is fluent. Characteristic for the first escalation levels is the creation of a common understanding and the clarification of the issues. Misunderstandings can be solved by explaining unclear terms and definitions. A moderator can help to structure polarizing issues and less critical issues. Moderation can force the discussion of less critical issues and create awareness for a joint objective at the heart of the negotiation. Interventions can also be behaviour-oriented or focus on the clarification of tasks, roles and functions. Characteristic for moderation is its passiveness and restriction as an adviser. A moderator can make interventions to a certain point of time, but has no power to force the parties to accept the advice. The effect of moderation is short-term. The current conflict development between parties will be aligned and structured.

### 3.2.2 Consultation

Consultation - on level 3 to 5 in the escalation model - is active, constructive and integral dispute resolution. Active means that the consultant helps the participants to deal with their problems. This does not exclude the consultant helping only one party. The main objective is to support the parties in resolving their conflict alone. First of all the parties need to understand the mechanism of the conflict and that they can influence it (this is meant by "constructive"). The consultation should be perceived as helpful, motivating and not judging. Parties can activate the consultant by asking for an advice.

The objectives are similar to those in moderation with just one difference: Through conflict management by a third party, negotiators have acquired the knowledge and ability to cope largely independently during future conflicts. Interventions within

the consultation focus on socio-psychological aspects. This mainly means unconscious blockades, attitudes and patterns. Consultation will help the parties to control their emotions, thoughts and intentions and break out of the spiral of escalation. The conflict potential is analysed and the reduction of conflict attitude is aimed for. Interventions should prevent deadlock situations and increase the flexibility of the parties. Further, the parties should reflect their personal identity, self-perception and the images others have of them [17].

It is very important to point out one aspect: A consultant will not start to create a bilateral interaction between both parties at the same time.

### 3.2.3 Mediation

From levels 5 to 7, conflicts cannot be resolved alone; a cooperative conflict resolution is not possible any more. The negotiators just agree on one point, namely to prevent further damage by ending the negotiation. Apart from the multiplicity of definitions, mediation can be simply defined as assisted negotiation through a third party [19, 37]. This definition does not include the procedures, methods or tools of mediation. This abstraction offers the opportunity to investigate all the different perspectives of mediation in combination with the new information technologies. Mediation can be used to assist the parties in their negotiation, not to negotiate with the parties. It is a communicative process between all parties with the objective for the parties to generate a solution themselves. Mediation has the following principles which are essential for a complete process [19]:

- The participation is voluntary; each party (also the mediator) can stop the participation at every point.
- The advice is not binding; the mediator has no decision-making authority.
- There is no relationship between the mediator and the negotiators. The third party is neutral and as a consequence independent.
- There are no secrets between the parties. All information has to be disclosed.
- Everybody knows the whole concept, the objectives and the process. Parties have mediation awareness.

The mediation process is similar to the negotiation and has the same sequences. The focus of mediation is on the negotiation outcome. A negotiation problem should be transferred into a successful and integrative agreement. The aim is not only to stop a fight but also to secure an agreement [27]. The impact of mediation on deep rooted conflict attitudes is a side effect, not the main goal. This is also the difference to consultation which focuses on the conflict awareness and the acquisition of conflict prevention. Parties can find a solution by themselves. Mediation uses similar methods but has the objective of finding an agreement.

Compared to mediation, an arbitrator can help to find a solution on conflict levels 6 to 8. In this case the final advice of the arbitrator is binding. This missing flexibility is a fundamental reason for excluding arbitration from further considerations. Traditionally, alternative dispute resolution (ADR) is an alternative to court cases and as a consequence to a binding advice

[14–16]. Mediation with a trusted neutral party is usually a better solution to impasse than being forced to go to court [33].

In this paper the focus is on the first three methods of conflict resolution, namely moderation, consultation and mediation as arbitration limits the flexibility of the negotiators.

## 4. Conflict Resolution in Electronic Negotiations

To create a concept for conflict resolution support within electronic negotiations, it is necessary to analyse the main challenges and restrictions given by the medium.

To combine conflict resolution methods with an electronic medium is an interdisciplinary task and it is necessary to introduce the definition of a socio-technical system. Electronic conflict resolution is based on two components. The technical system is characterized by software and hardware which enables the communication through technology. The social system includes the relationships between the negotiators, their roles and interaction rules. Both systems influence each other. The way how parties communicate with each other influences their relationship and the interaction rules. As a consequence, it also influences the conflicts between them and vice versa [31]. Last but not least it is obvious that the success of such a support needs a perfect balance between both systems. For further consideration it is necessary to underline the two perspectives.

It is necessary to discuss the fit of technical systems into the different methods and how they can support the conflict resolution process in different ways. Which NSS component supports which method in which way? The other view focuses on the consequences for communication. Fuzzy communication and decision-making can influence the parties in negative ways. Possible tools should not be over-formal or be based on logical models alone. Rather, psychological concepts are also necessary to keep electronic conflict resolution in line.

Apart from the already mentioned considerations, the idea to transfer established conflict resolution methods into an online context is not new. Starting with the growth of the internet, the interest of online dispute resolution has also increased in different ways [1, 2, 21, 36, 37, 45, 46]. In contrast to methods such as moderation and consultation, mediation is already an option of conflict resolution which is popular and has intensively been discussed for more than a decade. Several researchers started to discuss the opportunities and challenges of a so-called online mediation. This research area is wide and can be summarised by three topics: 1) analytical computer support of the (human) mediator, 2) electronic medium for the interaction between mediator and the parties, 3) partial or full replacement of a human mediator by an electronic environment.

Up to now, online mediation is widely discussed, but empirical evidence of its efficiency is rare. One reason could be the missing acceptance within the mediation community [34]. There is no common classification of mediation systems. Many authors focus on discussing the potential of transferring tools and techniques into electronic environment. Most platforms offer a web-based interaction tool enabling parties at different places to come together and to find a solution with the help of a human mediator as third party. These kinds of systems can be synchronous or asynchronous. The degree of computer-support is limited to offering a forum, safe message exchange or several groupware functions [4, 8, 10].

Mediation functions can also be more active. The *Negotiator Assistant* of Druckman [11] has the objective to transfer the research-based knowledge on flexibility and to implement it into a diagnostic tool which monitors the process of an active negotiation. The analysis includes all dimensions of the conflict diagnosis. The process based on 3 functions: 1) diagnosis (questionnaire), 2) analysis (graphical grid) and 3) advice (qualitative suggestions for an improvement). Negotiator Assistant shows whether the parties can expect a fair outcome, a conflict on both sides or more on one side, an impasse etc. Whilst the system includes the main functionalities of mediation it depends on the input of the user and does not provide an autonomous diagnosis.

### 4.1 Strategy for conflict resolution support

For conflict resolution support in NSSs, it is necessary to formulate an overall strategy. The acceptance of interventions will depend on the point of time the interventions will occur. The success will be higher when the interventions intensify over time. We follow Glasl [17] who concludes that it does not matter whether an intervention is suitable or not. It is necessary to introduce the principles of conflict resolution to the parties, keep them in line during the intervention and evaluate the results with them. These three steps can be formulated as 1) Preparation, 2) Intervention and 3) Reflection. Preparation has the objective to create acceptance and process understanding at the negotiator. It is indispensable that the parties agree on an intervention and that they are prepared for their own input into the process. Preparation clarifies the roles, rights and responsibilities [17]. As a consequence this means that the parties need detailed briefings of the NSS and especially of the basic components and the additive functions. They have to accept that the system offers multi-level support in the form of interventions. Only if they agree to such an approach can the socio-technical system offer balanced support.

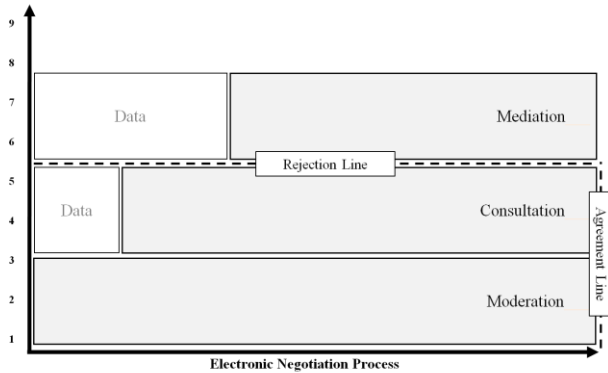
Intervention would include special strategies like moderation, consultation and mediation. Each method would include a different sub-process, but they build up on each other. A typology for intervention and its scope will be given in the next chapter.

Reflection has the objective to consolidate the negotiators and help them to understand the outcome of the whole process. The effect of intervention will be internalised and can be recalled in similar situations. In chapter 3.2.2 it was already mentioned that parties get used to the process and can resolve conflicts in future without the help of a consultant. Reflection as a part of the holistic strategy includes an overview of all interventions and their results.

### 4.2 Typology of interventions

In chapter 3.2, the main methods of conflict resolution have been explained. Based on these considerations, we will formulate a 3-stage intervention typology which fits the theoretical aspects of conflict management (cf. sections 3.1 and 3.2). This approach is user-driven in that the user determines himself/herself at which point which kind of help is required. In addition, we use the nine step escalation model of Glasl [17]. It shows the general intervention methods related to the level of escalation. The reader should bear in mind that we deal with conflict management in *electronic* negotiations. Therefore, some cues are missing such as body language, tone of voice, gestures etc. (as explained in section 1). This can both escalate a conflict (e.g. when a partner assumes a reaction on the partner's side) and deescalate a conflict (e.g. because threatening behaviour is less obvious, a partner can

think before replying etc.). Therefore, it is important that each partner decides on the individual perceived level of conflict.



**Figure 2: Multi-level intervention during the electronic negotiation**

It will now be discussed how the intervention methods of moderation, consultation, and mediation will relate to the different aspects of conflict. Normally these methods would intervene in different intensity on all aspects. We will restrict the intervention on selected points - marked in the following table 2 with an “x”- and categorise them with the considerations discussed in chapter 2.1 (cf. [26]).

**Table 2: Scope of interventions in electronic negotiations**

		Intervention			
		Moderation	Consultation		Mediation
			I	II	
Conflict Aspects	Relationship				x
	Issues		x	x	x
	Parties				
	Behavior			x	x
	Process	x	x	x	x
	Information exchange	No	No	Yes	Yes
	Involvement	Passive	Active		Pro-Active

### Moderation

Moderation has been described as a method that helps the participants to structure the negotiation process. *Negoisst* offers sophisticated communication support. This kind of support already moderates the negotiation, because it constrains the users in several interaction rules. On the first level, a negotiation protocol structures the message exchange. Negotiators know that they can exchange messages in an alternating manner. Thus interruptions as in face-to-face negotiations or chats are prevented. Additionally, one party cannot flood the other party with streams of messages. A moderator also helps the participants to reduce misunderstandings. *Negoisst* offers semantic and pragmatic enrichment of messages with the main objective to reduce misunderstandings. Messages need a type declaration before sending, so the recipient will know whether the message is meant as an offer, request, question, etc. Additionally ontologies

can help to create a mutual understanding. Ontologies are formally ordered representations of a set of concepts and relations between them in a particular subject area [22]. By explaining the concept through the NSS, parties avoid wrong interpretations. So we can confirm that an intervention in form of moderation is already given in *Negoisst*.

Apart from moderation, the perceived level of conflict can still continue to rise. In this case, as shown in figure 2, there is still some range before the rejection line, where the parties can negotiate without reaching a point where they need the help of a neutral third party.

### Consultation

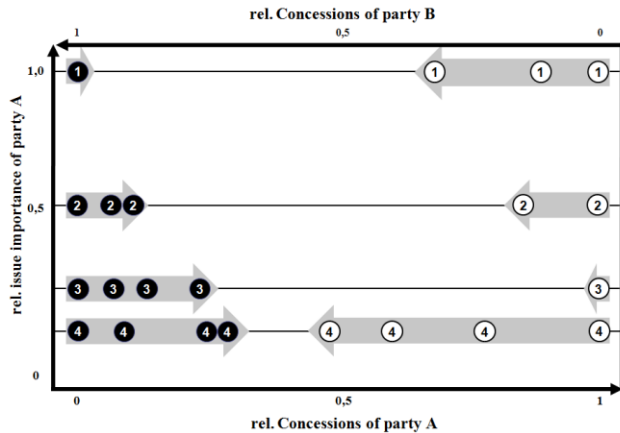
In this case, a possible consulting component can start to support parties. The consultation process can be divided into three steps: 1) Diagnosis, 2) Analysis and 3) Advice. The request for a consultation will be done by the parties themselves. We divide the consultation into two aspects which are very important for further approaches. The first two steps of the consultation approach will focus on the aspect that no exchange of information between the negotiators will occur. This happens in stage 1 and 2:

#### Diagnosis and Analysis

First of all we have to clarify the scope of the consultation: the intervention will focus on the negotiation issues. During an escalation, the flexibility - represented through the issues - decreases. In NSS, the issues are represented through the agenda items. This means, that the main points of negotiation and their characteristics are known by the parties. When they exchange offers/counteroffers they attach specific agenda items which mostly represent their preferences. Based on the preference elicitation, the system generates utility values for each offer/counteroffer. If a party makes few concessions during the negotiation, this can lead to frustration on the other side. This behaviour can be caused of different reasons [17]:

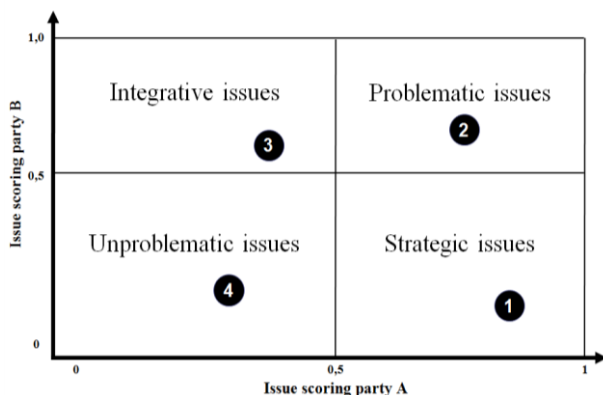
- It can be part of the negotiation strategy
- The other party already cannot make further concessions.
- Issues can be linked with each other
- They have a special (unknown) importance.

All this can lead to a fixed and extreme perception on the issues. In NSSs, the negotiators have two ways to transfer their attitude, opinion and willingness for a successful and integrative agreement: First they exchange offers/counteroffers in form of a specified agenda list (represented through issue values). Secondly they can use written communication to add arguments (represented through words) to their agenda. The objective of a scope on the issues would be to show the participants their own concession history compared to the negotiation history and the concession done by the counterpart. This one sided data analysis offers the opportunity to break up hardenings and increase flexibility – one of the objectives of consultation mentioned in chapter 3.2.2. – based on reflection.



**Figure 3: Relative concession history of party A after 8 messages**

To this point no data has been revealed between the negotiators. Based on the relative concessions and the relative importance, a graphical preparation of the concession history can be given up to now. In this simple example we have static preferences and make a diagnosis after 8 exchanged messages (4 offers/counteroffers on each side). We compare the relative concessions in each issue with the concessions the counterpart made. Figure 3 shows that party A made no concessions for issue 1, while the most concessions can be reported on both sides for issue 4. Compared to that, party B made several concessions for issue 1 (the most important one for party A), but no concessions for issue 3. Based on this development it would be our objective to score the issues automatically to a flexibility degree and estimate the consequences of an issue change for the counterpart. As a consequence we could score the results and transfer it into a portfolio. Figure 4 shows the exemplary portfolio. It offers party A now following interpretation: Issue 1 is a strategic issue. It is from high importance for party A, possible concessions should be done carefully. Issue 3 is integrative, because it seems that issue 3 is of great importance for the counterpart. Cause of their concession history, issue 2 and 4 can be rated as problematic and unproblematic.



**Figure 4: Issue scoring and visualization from the view of party A.**

The main challenge during the analysis is to animate the negotiators to make an interpretation themselves. The scoring does not include the total utility development! Initially one party

asks for an analysis and the system offers one. The objective of this procedure is that the negotiator can interpret the given data and is not forced to accept a given advice.

#### Advice

Before we discuss the possibilities of giving an advice it is necessary to point out, that we focus again on the issues. Consequently, a quantitative advice in form of suggestions of possible new offers/counteroffers is offered. It is also possible to provide communication advice such as "Have you told your partner that issue xyz is very important to you?" or preference advice such as "Are you sure, that issue n is so important for you?"

Bargaining advices are already part of some NSSs. Software agents monitor and analyses the negotiation process to consider a possible new concession based on the last bargaining step [6, 7].

Vetschera [47] introduces an alternative approach called "Analytical Concession/Advising Technology Model (AC-AT)" which exactly fits the needs of staged and holistic conflict resolution approach: The concept focuses on the entire bargaining process rather than on a single bargaining step of one negotiator [47]. It also assumes that negotiators communicate via offers/counteroffers and that they represent negotiation issues. Based on the issue values it uses an optimization model to predict a negotiation path which is similar to the negotiators concession path. A negotiator can thus preserve the current strategy. Afterwards the approach starts to generate a new offer which is inside of the concession cone. The AC-AT offers the opportunity to choose the degree of "toughness" for the next offer generation. Therefore, the negotiator will get not only an advice but can also choose the cognitive effect of the advice. This suggests more freedom on the negotiator's side which as a result raises the acceptance of the advice and with it the consultation component.

Up to now, the consultation component does not reveal information to the other negotiator. However, the AC-AT needs the utility values of the opponent to generate the advice. This implies, that before such an advice can be given, both parties must agree to unmask their preferences to the consultant (not to the counterpart!). So, as an example, party A's perceived level of conflict continues to rise. Even the analysis of the concessions and the joint reflection does not help to increase the flexibility. Party A will ask now for an advice. The system replies that an advice would be possible but requires publication of the preferences to the consultant. So party A has to wait until party B agrees to the publication. As a consequence, both parties can use the consultant to generate advices. Additionally party B – whose perceived level of conflict is probably not as high as party A's – gets an awareness of the counterpart's frustration. This knowledge might help to review one's own conflict behaviour, another consultation aspect mentioned in table 2.

By definition, the exchange of information (here information about preferences) is also one aspect of mediation. In this case, the private information will only be exchanged on the access level of the consultation component. The counterpart will not see the preferences.

#### Mediation

If consultation does not help to deescalate the conflict and lead to an agreement, one of the parties will reach a point of terminating the negotiation without agreement. At this point, they could ask for active mediation or a pro-active mediation component would



step into the negotiation process before the negotiation reaches such an escalation point. Both options set high requirements for the system, the mediation process. Negotiator Assistant has been combined with *Negoisst* for mediation advice [12]. Empirical experiments (without the considerations to consultation made in this paper) demonstrated that there is a traceable influence of electronic mediation on negotiators behaviour and leads to fewer rejections in negotiations [12]. At the same time, it was shown that the negotiators expect more than a mere self/reflection and general diagnosis from a mediation tool. As mentioned before, mediation is assisted negotiation and as a result a very communicative process. To support negotiators on this level means also to support the communication. When the breaking up of hardenings (lack of flexibility) does not lead to the favoured result, the conflicts between the parties have another source. Aspects such as relationships and conflict behaviour complete the already treated conflict aspects “issues” and “process”. As a consequence, the mediator has to improve the communication quality within the electronic negotiation. To research the transfer of possible mediation functions to electronic negotiations, we suggest a staged research classification of mediation in asynchronous NSS:

#### Stage 1:

Negotiators can request mediation. A human mediator steps into the electronic negotiation and executes the mediation process. *Negoisst* will offer an extended role model, negotiation (=mediation) protocol and new message types to support the whole mediation process by itself. The participants and the mediator have to start at the beginning of the process and complete each stage of it.

#### Stage 2:

The process is almost the same but *Negoisst* automates parts of the mediation process: The closure of mediation contract can be automatically generated by the document management support. An inventory of issues is already provided. The NSS knows the main points of conflicts and can visualize them in a flexibility graph as described. Afterwards, the mediator can start the treatment of issues. The considerations of a consulting advice based on the AC-AT also take in the development and evaluation of alternatives stage effect. A mediator can use these analytical functions to diagnosis and identifying possible solution ranges and integrate them in the interaction. Already given decision support functions can help the participants to evaluate the new options. In a final step, the group designs the solutions and hopefully finds an agreement.

This form of a sophisticated computer-supported mediation should be compared to the results of research in stage 1 with the objective to create on the one hand knowledge about the acceptance and impact of electronic mediation and possible improvements, on the other hand it would be possible to get data – and as a result a knowledge base – of conflict processes and their communicative characteristics.

#### Stage 3:

In a next step, the human mediator would be replaced and the concept to full computer mediation would be introduced. In this case, a qualitative analysis of communication quality is indispensable. Given concepts of text-mining and natural language perspective already offer the potential to monitor communication processes. In combination with the

communication quality model developed by Duckek [13], it is possible to get a live monitoring of communication quality within electronic negotiations. The opportunities in this case are not only the diagnosis and analysis of written messages; also the qualitative advice given by the system should fit the individual circumstances of a negotiator. There will be no replacement of human mediators and no acceptance of such functions until the final qualitative advice does not exactly fit the cognitive needs. A challenge which even experienced human mediators cannot always cope.

## 5. Summary and Conclusion

It was the objective of this paper to show, that several methods of conflict resolution methods for face-to-face negotiations exist, and that they offer multidimensional advantages (e.g. costs and time saving, better relationships, etc.). Furthermore, we introduced a framework of conflict resolution support in electronic negotiations.

Conflicts occur in any type of negotiation. There are new challenges and new opportunities imposed by the electronic medium when it comes to conflict resolution support in electronic negotiations. We first gave a brief theoretical overview of current Negotiation Support Systems (NSSs) and their classification within electronic negotiations. Following the main characteristics and a description of the components communication support, decision support and document management. The discussion of the current state of the art discloses that already a few years ago different researchers had an idea of more “involvement” by the NSS in the negotiation process. But holistic realisations are still rare due to the difficulties of transferring a very communicative and staged process into an electronic context, which is characterised by several restrictions. To get a better understanding of this “communicative and staged process”, we introduced the basic concepts of conflict management. The last one defines aspects, which influences the level of escalation, such as conflict issues, conflict process, conflict attitude, the parties involved in the conflict and their relationships. Existing escalation models offer the opportunity to intervene at a specific level. In early stages, moderation can be useful to keep the conflict process in line and to reduce misunderstandings. If conflicts continue rising, consultation can be deescalating. It focuses on hardenings and tries to increase the flexibility of negotiators. If this still does not help, the negotiators can ask for the help of a neutral third party. This process is called mediation and can be understand as an assisted negotiation. All this methods have their characteristics and use different methods to deescalate conflicts.

First of all, our considerations focused on a holistic approach. It is not only important to choose the right method, but rather to educate the parties additionally about the process and its possible impact. Only if negotiators accept this type of conflict resolution, the actual intervention can be successful. Last but not least the focus of our considerations was still on the specific intervention methods. Before formulating an approach, we discussed the current state of the art in existing online conflict resolution methods. One finding was that especially the online-mediation already enjoys high popularity within different research areas. Regarding the possible area of application within NSS the implementations get rare.

Based on the idea, that interventions have to build up on each other, we started to formulate and characterize a 3-stage intervention model for NSS, characterized by following aspects:



Scope of intervention, degree of involvement, exchange of information, quantitative and/or qualitative advice. The intervention starts with moderation on low conflict levels, continues with consultation and ends in mediation. Due the discussion we discussed that the basic concept of NSS already matches the requirements of moderation. As a consequence, negotiators using *Negoisst* to negotiate electronically and asynchronously already use several concepts to structure the negotiation and to reduce misunderstandings (negotiation protocol, semantic and pragmatic enrichments, ontology based agenda items ...).

The considerations to a consultation component are characterised by the point of intervention and the possible exchange of information. We assume, that a consultation is requested by the negotiators. The intervention by itself will be structured in diagnosis, analysis and advice. Especially for a possible advice we differentiate between information exchange or no information exchange between the involved parties. In the first two stages the collected data will be analyzed and presented to the users. The objective is to provoke self-reflection and solve hardenings without giving any advice until the user requests one. If this happens, we assume to offer quantitative advice in form of possible bargaining steps without information exchange (TIT-for-TAT strategy) or with information exchange. The last option would base on the AC-AT concept, which offers multiple advantages in the prediction of possible concession in combination with the individual "toughness" of a negotiator. The mutual information exchange (in form of preferences) additional has the effect, that the counterpart gets an awareness of the frustration of his partner.

Last but not least the participants can use the option to go into mediation together. Existing literature shows, that there are no studies of the acceptance and consequences of an online mediation executed through a human mediator. Therefore we suggest first of all integrating a human mediator into the negotiation process and analysis the outcome. Based on this finding it is possible to add (and replace) functions and process steps of the mediation to make it more efficient. Along these two steps it is possible to build up a knowledge base for a full computer-mediated negotiation. As a consequence this kind of support would be pro-active, what means, that the software monitors the ongoing negotiation (text-mining, concession analysis, etc.) and step into the process at a certain point where the perceived conflict level of one or more parties is significant for an intervention.

We have shown that our 3-stage model provides the potential for effective and efficient conflict resolution support in electronic negotiations resulting in more agreements and fewer unsuccessful terminations of negotiation processes.

## 6. References

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