Are All E-Commerce Negotiations Auctions?

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Abstract. The difference between auction and negotiation mechanisms has blurred with the arrival of the Internet and electronic commerce. The new media provide new opportunities and mechanisms to cooperate or to compete, taking advantage of computer power, the communication possibilities of the network, and the fact that millions of people and businesses are online simultaneously. We discuss the characteristics of different types of auctions and negotiations. We extend the discussion to combinations and hybrids of auctions and negotiations and their possible roles in e-commerce.

1. Introduction

Electronic auctions have rapidly proliferated on the Internet. Most of them focus on a single issue, namely, price, and support simple services (e.g., offer submission, notification and comparison). They are also usually one sided: a single seller (or buyer) considers bids from many buyers (sellers). The popularity of auctions and the requirements of e-business have led to growing interest in the development of complex trading models. An example of a two-issue double-auction is OptiMark [1], an electronic stock exchange developed for institutional traders—the issues are price and quantity. Multidimensional auctions in which bidding involves many issues [2-4] as well as double auctions [5] that permit bidding by many buyers and sellers have been proposed.

The presence of two and more issues begins to blur the difference between auctions and negotiations. This raises the possibility of using utility as a measure of offers and other mechanisms that have been traditionally used in negotiations (logrolling, simultaneous improvements, efficiency analysis, etc.). Negotiation is a subject that has for years been thoroughly studied in the behavioural sciences. The literature concerned with negotiations does not mention auctions as a particular type of negotiations. Indeed, some economists [6] view bargaining as precisely the opposite of the idealized "perfect competition" that is presumed to form the basis of market models, recognizing the importance of persuasion and other human factors in determining the nature of the process and the outcomes.

In response to a recently posted question "Are auctions negotiations?" on an Internet discussion group (http://clubs.yahoo.com/clubs/negotiations) all answers were that auctions are not negotiations because, for example, there is no logrolling in auctions. This seems too narrow a perspective as multi-issue and combinatorial auctions allow for trade-offs and logrolling [7, 8]. On the other hand, the computer science community involved in e-commerce transactions, including negotiations, appears to have perhaps an even narrower perspective, that "negotiations are auctions". Sandholm [7] makes an opening statement saying that "Negotiation is a key component of e-commerce" in an article that is entirely devoted to auctions. Similarly, other authors who write about electronic business negotiations discuss

solely auctions [9, 10]. Segev and Beam [11] succinctly summarize this trend by saying that:

> "… we present a new market-based negotiating paradigm, designed for the capabilities of electronic software agents on the Internet. We propose replacing negotiating skill with market forces. This is a direction which has already gained some momentum with the use of online auctions, and we believe it will continue to gain in popularity."

There are few exceptions to this equating of negotiations with auctions. Maes and her associates proposed several software agents that are engaged in multiple bilateral negotiations [12-14]. These agents are—according to their developers—capable of conducting integrative negotiations. This implies that there is an interest in negotiations other than auctions (see, for example, http://www.frictionless.com/). Since businesses activities in e-commerce in many respects mirror their traditional activities (e.g., contract negotiations, acquisitions, mergers) there is a strong demand for mechanisms that allow for different types of negotiations. The questions that, we think, need to be addressed are how to frame the different types, what their characteristics are, and how they can be modelled.

This paper is based on the premise that although negotiation is an important business activity, it has not been studied extensively either in traditional business or in e-commerce, and—with the exception of simple auction formats—adequate tools are not available. While we believe that electronic auctions provide an important vehicle for the conduct of business transactions, new developments are needed to increase their usability for complex interactions. We argue that while auctions can be viewed as negotiations, there is more to negotiation than can be addressed within auction frameworks. We also argue that despite claims to the contrary, existing negotiation software agents conduct only distributive (`win-lose') negotiations.

We discuss different types of negotiations in Section 2 and auctions in Section 3. The possibilities and requirements for the use of integrative negotiation mechanisms in e-commerce are discussed in Section 4. Section 5 presents different possibilities for integration of auctions and negotiations mechanisms. Section 6 concludes the paper.

2. Negotiations

Walton and McKersie proposed classification of negotiations into the *integrative* and *distributive* [15] types. Distributive negotiation predicts that one party can only gain at the other party's expense. The parties are competitive and they claim value. They are interested in achieving more of what is on the table. Their interest in the other party is only insofar as the other party affects the achievement of their own objectives. They are engaged in a fairly simple process of exchanging offers and counter-offers.

In contrast, integrative negotiation is based on the premise that solutions can be found, during and because of the process, which reconcile the parties' interests. The key characteristics that distinguish integrative negotiations from distributive ones are: creation of value, focus on interests and not positions, openness and exchange of relevant information, learning, and problem restructuring [16-18]. The process is often complex, as it requires discussion about the parties' interests, the possibilities of expanding the 'pie', and new offers.

The two types of negotiations represent two extremes of a spectrum of mixed negotiations that involve a significant element of conflict and a considerable potential for cooperation [15]. Mixed negotiations are more common; negotiators "commit themselves to firm positions (distributive attitude), yet explore options (integrative), make threats (distributive) and yet trust the other negotiator (integrative)" [19]. In order to build systems capable of

conducting and/or supporting mixed negotiations, one needs to understand the requirements for the two extreme types. When viewing auctions as negotiations it is also important to be able to position auctions on the spectrum. In order to do so we introduce several concepts that are required for defining and comparing negotiations.

2.1 Definitions

The concepts and their definitions are derived from the negotiation analysis and multiple-criteria decision-making [20-22].

1. Issue (attribute, dimension) is the topic of discussion in a negotiation (e.g., price, color); i, $(i=1, \ldots, n)$.
2. Option (attribute value) is one of the alternative values that an issue can take (e.g., \$12, \$34); x_i.
3. Offer (decision alternative) is a particular combination of options that has been selected for one or more issues (\$12 and 1 week) $x = [x_i] \in \mathbf{X}$.
4. Objective (interest) is an issue or combination of issues that are of particular interest to the negotiator and allows to evaluate offers (e.g., profit, quality); $f_j(x) = y_j$. $(j = 1, \ldots, m)$; $f(x) = [f_j(x)] = y \in \mathbf{Y}$.
5. Preference indicates the importance of an objective in comparison with another objectives (e.g., profit is twice as important as quality); p_j, $(j = 1, \ldots, m)$.
6. Trade-off (logrolling) is an exchange process in which a negotiator gives up partly on the achievement of one issue so as to gain on another.
7. Utility is a measure that allows for the comparison of offers and/or the achievement of all objectives; $u(y) = u(p, f(x))$.
8. Opposition is the measure of the differences in the parties' evaluation of offers; $o_{a,b} = \nabla u_a(p_a, f_a(x)) \bullet \nabla u_b(p_b, f_b(x))$, where ∇ denotes gradient, and a, b – indicate the negotiating parties.

The above definitions require some explanations. Issues are often, especially in auctions, considered equivalent to objectives. Note, however, that negotiators may introduce and discuss spurious issues in order to achieve preferable options on other issues. In many negotiations objectives are not revealed and are defined over several issues. A business enters purchasing negotiations not to achieve a low price, high quality and short delivery time but to obtain such a combination of the options for each issue that allows the business to increase its market share and increase profit. Trade-offs are measured against objectives, not issues; a common consequence is that an offer intended by one party as a concession is perceived by the opponent as a reverse concession. The concept of opposition allows measuring the distributive character of the negotiation; e.g., if $\forall x \in X \; \nabla u_a(p_a, f_a(x)) \bullet \nabla u_b(p_b, f_b(x)) \leq 0$ (i.e., the gradients at x form an obtuse angle) the parties are in strong opposition and the negotiation is likely to be distributive.

2.2 Distributive negotiations

Negotiations over a single issue x, $(x \in X)$ are often assumed to be distributive [13, 23, 24]. This is indeed true if (1) the issue is equivalent to each party's objective and the opposition is not weak, (2) each party has only one objective and they are strictly opposing, or (3) the parties have several strictly opposing objectives. If one of these conditions is not met then a single-issue negotiation is not distributive because there is a possibility for partial gains and losses. There are several possibilities for such a situation including weak opposition between some objectives of the parties and strong between others, conflicting ob-

jectives of one or both parties, and non-monotonic objectives.

The negotiation between *a* and *b* is distributive if $\forall \boldsymbol{y}_1, \boldsymbol{y}_2 \in Y$, ($\boldsymbol{y} = [f_j(x)]$, $j=1,\ldots,$ *m*), we have either

$$u_a(\boldsymbol{y}_1) \geq u_a(\boldsymbol{y}_2) \qquad u_b(\boldsymbol{y}_1) \leq u_b(\boldsymbol{y}_2)$$

or

$$u_a(\boldsymbol{y}_1) \leq u_a(\boldsymbol{y}_2) \qquad u_b(\boldsymbol{y}_1) \geq u_b(\boldsymbol{y}_2);$$

that is, a gain for one party is necessarily a loss for the other party.

Distributive negotiation is often, but inappropriately, understood *only* as bargaining over a single issue ([13], p. 4) implying that multiple issue negotiations are integrative. However, multiple issue negotiations may also be distributive. Since $u(\boldsymbol{y}) = u(\boldsymbol{p}, \boldsymbol{f(x)})$ we obtain for multi-issue distributive negotiations the following conditions:

$$u_a(\boldsymbol{p}_a, f_a(\boldsymbol{x}_1)) \geq u_a(\boldsymbol{p}_a, f_a(\boldsymbol{x}_2)) \qquad u_b(\boldsymbol{p}_b, f_b(\boldsymbol{x}_1)) \leq u_b(\boldsymbol{p}_b, f_b(\boldsymbol{x}_2))$$

or

$$u_a(\boldsymbol{p}_a, f_a(\boldsymbol{x}_1)) \leq u_a(\boldsymbol{p}_a, f_a(\boldsymbol{x}_2)) \qquad u_b(\boldsymbol{p}_b, f_b(\boldsymbol{x}_1)) \geq u_b(\boldsymbol{p}_b, f_b(\boldsymbol{x}_2)).$$

Another proposed criterion to distinguish distributive from integrative negotiations is the nature of the parties' preferences [13]; opposing preferences indicate distributive negotiations. Kersten and Noronha [25] give a simple example that shows that when the parties have opposing preferences there still may be a possibility for simultaneous improvements. That is, if the parties agree on an offer that is dominated (inefficient) there are other offers that yield higher utility values for both parties.

In distributive negotiations each party engages in the process in order to achieve the best possible settlement for themselves. They exchange offers and make concessions in order to reduce their differences and determine an acceptable offer. Each party is interested to learn the preference structure of the other because this allows for trade-offs and achievement of a compromise that better meets the party's interests than they could achieve without the knowledge of preferences. The difficulty, in distributive bargaining, is that the parties hide their objectives and preferences and reveal them only indirectly through their offers. The consequence is that unless the parties reveal their utilities explicitly or implicitly through some external mechanism, there is no guarantee that an efficient solution can be negotiated.

One may argue that the negotiating parties should strive for an efficient compromise; rational parties are expected to achieve such a compromise. Negotiation theory suggests a strategy typical of distributive negotiations called hard (positional) bargaining to facilitate the achievement of an efficient compromise (Lax and Sebenius 1986; Fisher, Kopelman et al. 1994; Lewicki, Saunders et al. 1997). Using this strategy the party starts with an offer that maximizes their own utility function. This offer is efficient. Then they make only very small concessions on the least valued issues for this party. These approaches do not assure selection of an efficient compromise because the parties may engage in strategic misrepresentation and gaming. However, if the parties are able to approximate the objectives and preferences of their opponents this strategy often leads to a compromise that is close to the efficient frontier. Negotiation over efficient solutions (on the Pareto frontier) is indicative of distributive negotiations.

2. 3 Integrative negotiations

One of the key differences between distributive and integrative negotiations is in the set of feasible alternatives *X*. In the distributive case *X* is process independent; at best, inefficient alternatives are added. In integrative negotiations new issues and options are in-

vented during, and because of, the negotiation. The set *X* is modified as an integral part of the negotiation process. Its dimensions and/or cardinality change. Walten and MacKersie [15] first proposed this differentiation between integrative and distributive negotiations. Subsequently, leading scholars on negotiations widely discussed and gave many examples of types of negotiations (e.g., [17, 18, 26]). The differences have, however, been confounded in the literature on negotiation analysis [22, 24], and in management science methods and support systems [27].

We follow the negotiation literature and argue that the difference between distributive and integrative negotiations lies not in the number of issues, the existence of inefficient alternatives, or of a process that allows for simultaneous improvements within a given set *X* of alternatives, but in learning and problem restructuring, creation of value, focus on interests and not positions, openness and exchange of relevant information.

To define integrative negotiations we need to refer to distributive negotiations and their possible outcome. Assume that $X^* \subset X$ is the set of possible compromises reachable in distributive negotiations. The negotiation between *a* and *b* is integrative if *a* and *b* search for an alternative $x' \notin X$, such that $\forall\, x \in X^*$

$$u_a(p_a, f_a(x')) \geq u_a(p_a, f_a(x)) \text{ and } u_b(p_b, f_b(x')) \geq u_b(p_b, f_b(x)),$$

In other words, the parties search for an alternative that is not on the table and which dominates all potential compromises available. The introduction of X^* is necessary because there may be alternatives in *X* that are better than *x'* for one party but are unacceptable for the other party.

The above formula describes only one form of integrative negotiations, namely, in which the constraints defining *X* are weakened, but the dimensionality of *X* and *x'* is the same. Other forms involve the change (addition) of the dimensions that necessarily require the modification of preferences and objectives, or only changes in the preferences and/or objectives. In any case the parties attempt to achieve a compromise that yields a higher utility value for both of them than the utilities of compromises available in X^*.

2.4 Simultaneous improvements

Traditionally, the two extreme types of negotiations (integrative and distributive) have been proposed without the consideration of the compromise efficiency. In a distributive negotiation all alternatives are efficient, while in integrative negotiations efficiency does not play as significant a role because the parties attempt to redefine the problem.

A simultaneous improvement implies that there is an offer in *X* which is better for the negotiating parties, i.e., yields higher utility values, than the offer(s) discussed. They are not applicable in a distributive situation when an improvement for one side is necessarily a loss for the other over the whole set of alternatives *X*. The implication is the *X* comprises only efficient alternatives.

Clearly, simultaneous improvements are not indicative of integrative negotiations in which the parties search for offers from outside of *X*. The integrative activities, and especially value creation, are oriented toward improvements but through a redefinition of the negotiated problem and creative search for opportunities.

Negotiations are often complex and involve very large number of offers. There may be thousands of efficient offers and hundreds of thousands of inefficient ones. Lack of information about the parties' interests, lack of trust, gaming, strategic misrepresentation and other characteristics typical for distributive negotiations cause that often the parties are not able to achieve an efficient compromise. They engage in distributive negotiations and achieve a compromise that is inefficient. The parties can *claim value* and yet achieve local

improvements. They can move from inefficient to efficient alternatives while requesting a bigger share of the pie.

Simultaneous improvements are possible both in distributive and integrative negotiations, but in the former it is purely a Pareto movement from inefficient to efficient positions, whereas in the latter it is through the introduction of new alternatives or redefinition of the entire problem. This is central of most of the confusion and claims that simultaneous improvements define integrative negotiations [12-14, 24].

The search for simultaneous improvement though important is difficult and costly. It is an activity where the negotiation software agents and other tools can help in providing negotiators with knowledge about past cases and experts' suggestions.

3. Auctions

There are several well-known auction formats: English (ascending bid), Dutch (descending bid), simultaneous (sealed bid), Vickrey (second price), double auctions, etc. Likewise, there are a large number of well-known intermediaries conducting different flavours of these auctions, e.g., Ebay, Amazon, and OnSale. The most important and appealing features of auctions from a theoretical standpoint are their process efficiency and the ability to simultaneously manage large numbers of bidders. However, from a user's standpoint, the game-like aspects are often the dominant factor [28].

Since auctions are primarily concerned with the establishment of value, most auctions focus on a single issue, price. The auction floors or clearinghouses do not allow for the introduction of, and discussion about, other issues than the one on the table. While the number of options and offers need not be fixed, the participants cannot add offers that are not defined by the issues (outside of the space defined by the auctioneer). Single-issue auctions are based on a fixed pie assumption and are thus distributive. Even if the participants have several objectives these objectives cannot be taken into account. Each participant may (and often does) have different objectives and explicit consideration of these, if possible, would move an auction to a series of bilateral negotiations.

Smith [29] convincingly argues that: "Real auctions—in contrast to theoretical models—are not exclusively or even primarily exchange processes. They are rather processes for managing the ambiguity and uncertainty of value by establishing social meanings and consensus." Auctions focus on *determining the value* of objects of unknown value while negotiations are about co-operating to *create value*. Auctions deal with known and well-defined objects while negotiations may be about defining these objects and collaborating in order to obtain a common definition.

Auctions are solely focused on the outcomes. The communication process is thus oriented on the achievement of an efficient outcome (compromise) through a low-cost process. However, auctions do not assure an efficient (Pareto-optimal) outcome. They are oriented towards increasing competition, with the participants not revealing their objectives and preferences. Since the outcome efficiency is defined with objectives and preferences (utility), it is possible that the result is inefficient. Auctions do not force the participants to reveal any information other than bids. If these bids fully reflect utility of the bidders, then the outcome is efficient. This is the case of single-issue negotiations with the only objective of all the parties being the negotiated issue. Multi-issue auctions cannot assure efficiency unless there are mechanisms that force the participants to reveal their utility.

Single-issue auctions do not provide satisfactory mechanism for most business transactions. Therefore efforts are being made to extend the action formats to multiple issue auctions [2, 3, 30], and combinatorial auctions [1, 31, 32].

Che and Branco discuss multidimensional auctions, mainly from a theoretical basis and the economics perspective [2, 30]. Their work involves the development of a scoring rule for the auction owner, who uses this to evaluate the bids. Teich et al. [3,8] apply a variety of methods to web-based auction environments including the multiple issue auction, the multiple unit auction, and a multiple issue double auction (http://kvstu001.hkkk.fi/nss). They attempt to derive integrative-type benefits from auction environments by using simple preference elicitation schemes and heuristics to suggest offers that are in the neighbourhood of the efficient frontier.

OptiMark is a double auction stock trading system for institutional traders [1]. The two issues involve quantity and price. They attempt to match larger traders in the two issue space in an attempt to avoid "market impact", which is mostly made up of the price jumps once the news leaks that a large trader is re-positioning their holdings. Thus, in an integrative sense, they attempt to find price/quantity combinations that will benefit all parties in the trade as compared to the option of going out to the open market. This integrative capability is one of the main selling points they propose. HHowever, OptiMark's objective in the trading mechanism is to maximize the volume of shares traded, which could, in theory, come at the expense to the traders themselves.

Since the OptiMark system is a "black box", the traders do not know that if they were to logroll to a different (probably lower quantity) price/quantity combination, they would both benefit. OptiMark justifies this seemingly irrational trait by saying that traders actually prefer, overall, higher quantities of shares traded, even though their preferences scores state otherwise. This exemplifies the difficulties with a multiple issue auction system even when the participants reveal their preferences (utilities).

4. Negotiations in e-commerce and beyond

Most, if not all, activities that are typical of distributive negotiations can be implemented in different auction systems, when the number of participants is sufficiently large. Therefore, in this section, we only discuss the integrative activities.

The negotiation literature (which includes analyses of real-life negotiations), unequivocally states that parties should attempt to conduct integrative negotiations [16-18, 26, 34]. Discussions and analyses of real-life negotiations in business and government, high-stake and small stake, inter- and intra-organizational, inter- and intra-cultural negotiations show the importance and benefits of this type of activities. It is now conventional wisdom that opportunities for integrative negotiations are widely available but often go unrecognized and unexploited, consequently, with negative results for the parties. The benefits of integrative negotiations are taught in law and business schools, and in seminars for executives. E-commerce negotiations, particularly those between businesses, are often intercultural and certainly could benefit from integrative activities.

Integrative moves are difficult, sometimes risky, time consuming and often require more resources than distributive ones. Integrative negotiations may require the parties to secure their positions because they, especially in the initial stages, cannot be certain that their counterparts will not resort to distributive tactics endangering their bargaining powers. Time and effort are required to inform and learn about each other's interests, search for commonalities and differences, discuss possible expansions of the issue set, limitations, etc. These discussions require the establishment of an atmosphere of trust, openness and understanding, which may require additional effort.

Web-based systems provide an opportunity in this regard. If the parties trust the underlying computing infrastructure, software systems and agents may help in the establish-

ment of the common basis and provide the parties with additional tools for conflict resolution. An example of this are the services provided by the Web site Cyber$ettle.com to which the parties submit three offers. If any of the offers are within an agreed upon formula (30% of each other), then the case settles immediately for the average of the two amounts. While these services do not promote integrative negotiations, they provide a formula for using the Web in a single-issue negotiation without endangering the parties' bargaining powers.

Electronic commerce allows consumers and businesses to engage in many individual transactions at any given time. Both have access to information that was previously unavailable; data about consumers' patterns and behaviours can now be obtained very quickly, individual consumers can be targeted, organizations may access new markets and deal with many more suppliers than before. It is impossible for individuals to effectively use the available information and to engage in many transactions despite their potential benefits. One may expect that this is an area where negotiation support systems and negotiation software agents may provide significant benefits and facilitate the conduct of simultaneous negotiations, assess their progress and possible implications. These systems have to provide different interactive and flexible forms of support at the computational and cognitive levels.

Negotiating software agents can be used in e-commerce for both representative and direct negotiations. The possible functions of the agents largely depend on their degree of autonomy, the type of the negotiation, and the specificity of the principal's directives. The functions depend also on the agent's interactions with other systems and agents. The agent may be highly specialized and co-operate with other agents, interact directly with the principal, or it may communicate via a DSS.

We argue that in difficult multiple-issue negotiations with outcomes of significance to the principals, engaging in distributive activities most often leads to a waste of opportunities on one hand, and resources on the other. "There is a frequent criticism that negotiators, particularly Americans, do not engage in adequate preparation." [34]. The use of support tools and agents that cannot facilitate integrative activities can only reinforce this situation. The usual approach to the construction of utility functions based on feasible alternatives defined prior the negotiation, and with disregard for the principals' and their counter-parts' learning, is mechanistic. It is simple and requires little effort but has all the negative results inherent to distributive negotiations. Integrative negotiations impose an additional set of requirements on negotiating software agents. At the same time there is a potential to develop tools that reduces the principals' efforts, helps them to gain confidence, provides constructive suggestions, and facilitates the process. Integrative negotiations are likely to be direct (as opposed to delegated entirely) but with the heavy involvement of agents and use of decision and negotiation support systems.

An intelligent agent is required to provide information and knowledge (e.g., statistics and inferences) about past negotiations and other marketplace activities, search through the negotiation transcripts and other process descriptions, and compare situations, interests and issues of the problems solved in the past against the current problem. Such agents need to collaborate with decision and negotiation support systems that support the principals in the construction of problem representations, their assessment and modifications, suggest new issues, and innovative (for the principal) approaches to cope with conflict. Negotiation records need to be continuously compared and evaluated and effort made to provide the principals with constructive criticism and opportunities for the expansion of the "pie" and the enhancement of the process. Agents may also help in the improvement of the best alternative to the negotiated agreement (BATNA) by searching for alternatives that are not known to the principal.

5. Integration of auction and negotiation mechanisms

A Web-based environment makes more complex, and cooperative auction/market/negotiation mechanisms possible. In traditional auctions and markets, such cognitively complex algorithmically dependent procedures have been impracticable. However they can now be integrated into today's networked computational environments.

5.1 Combinations

Many possibilities exist for combining auctions and markets in a Web-based environment. Auctions may narrow the list of bidders to a small set of winners who are then involved in bilateral negotiations with the auction owner. These negotiations could then take place in real-time, in multiple chat rooms simultaneously, or, they could take place in a more traditional negotiation format occurring sequentially.

Another option is that negotiations may occur first, with a subset of the bidders subsequently following-up into an auction. These initial negotiations may help to establish the set of issues and the initial bids in the auctions. These combinational forms of auctions and markets differ from the "hybrid" forms in the following section because the combinations are still two separate entities, whereas the hybrid forms are a single entity that combines aspects of both auctions and negotiations.

5.2 Hybrid forms

A hybrid auction/negotiation form called a *NegotiAuction* has recently been proposed [33]. Instead of running separate or linked auction/negotiation combinations, Teich suggests running them as a single entity, taking the best aspects of each. He argues that in conducting a hybrid combination, the flexibility of a negotiation with the advantages of the competitiveness of the auction format can be achieved.

In a hybrid of this type, the auction owner first qualifies the initial set of bidders and reduces the number of bidders to those who are qualified (based on the bidder attributes). The bidders can be placed in three different modes, *automatic*, *manual*, or *pause*. If in *automatic* mode, the bidders are provided with "bid requirements", i.e., a suggested bid price that makes them active in the auction for the quantity they desire. The bids may consist of a price/quantity combination, or perhaps price alone (in a single unit auction), or can be combined with other relevant issues. For example, if a bidder wants to supply 10,000 units of a good, s/he indicates this to the system and the system returns the required bid price which the bidder can/cannot accept. The auction owner also has the option of inserting "bid premiums" which are the increments in which one bidder must beat another bidder to enter the auction as active. These bid premiums could be different for each bidder and are manually input by the auction owner. In addition, the owner has the option to insert underlying constraints regarding the bids and bidders. If in the *manual* mode, the auction owner can respond to bid requests, manually override his own rules and respond with the bid requirement, and send text message with other, more individualised requirements. *Pause* mode temporarily suspends either the auction as a whole, or a subset of the bidders.

This hybrid format may favour the owner rather than bidders. The bidders, however, have the benefit of knowing if their bid is currently active in the auction and they know that they will not be pushed for further concessions in a follow-up negotiation if they win in the *NegotiAuction*. The hybrid format also raises the issue of the impact of premiums

and constraints on the process efficiency. Nonetheless, it is one approach that addresses some of the auctions' limitations.

6. Conclusions

Our answer to the title of this paper is, of course, negative. It is apparent that bilateral trades will continue to be negotiated; it is also evident that multiparty business transactions quickly stretch the limits of existing auction protocols by virtue of the complexity of the items under discussion, the interpersonal dynamics and social factors involved, etc. Auction-like protocols will play a major role in contexts in which the determination of value is the primary concern. However, in business-to-business commerce, the participants are often less concerned with price and more with relationships. Negotiation-like protocols will dominate in these circumstances. This is especially true when the inter-business relationships are viewed as collaborations, and it becomes clear that integrative negotiations should be the focus.

Auctions, which can be viewed as distributive negotiation protocols, appear to be irrelevant in cooperative contexts. They become inapplicable in the face of evolving or emerging issues and changing alternative sets. The need then is for negotiation support systems that enable problem restructuring, and discussions at the level of objectives (interests), not issues or utilities. The current hype about the "new paradigm" of Internet commerce founded on auctions, stems from the fact that the standard auction formats are the low-hanging fruit: they are very easy to implement in software, as demonstrated by the dozens of home-grown systems on the Web today. Once the excitement is over, the reality that strikes is that business relationships and economic models are no simpler today than they were before the Internet, and different business models will need many different kinds of negotiation protocols, some of which will be very complex and rich in human factors.

References

[1]   OptiMark,. 1998. http://www.optimark.com/

[2]   Branco, F., "The Design of Multidimensional Auctions." *Rand Journal of Economics*, 1997. **28**: p. 63-81

[3]   Teich, J., H. Wallenius, and J. Wallenius, "Multiple Issue Auction and Market Algorithms for the World Wide Web." *Decision Support Systems*, 1999. **26**: 49-66

[4]   Reeves, D.M., *et al.*, "Toward a Declarative Language for Negotiating Executable Contracts." 1999, IBM T.J. Watson Center: Yorktown Heights.

[5]   Wurman, P.R., W. Walsh, and M.P. Wellman, "Flexible Double Auctions for Electronic Commerce: Theory and Implementation." *Decision Support Systems*, 1998. **24**(17-27)

[6]   Roth, A.E., "Economic theories of bargaining", in *Social Science Encyclopaedia*, A. Kuper, Editor, Routledge: London, 1995.

[7]   Sandholm, T., "Automated Negotiation. The Best for All Concerned." *Communication of the ACM*, 1999. **42**(3): 84-85

[8]   Teich, J., H. Wallenius, and J. Wallenius, "A Multiple Unit Auction Algorithm: Some Theory and a Web Implementation." *Electronic Markets: International Journal of Electronic Commerce and Business Media*, 1999. **9**: 1-7

[9]   Beam, C., A. Segev, and J.G. Shanthikumar, "Electronic Negotiation through Internet-based Auctions", University of California. 1996. http://haas.berkeley.edu/~citm/WP-1019.PDF

[10] Kumar, M. and S.I. Feldman, "Business Negotiation on the Internet." 1998, IBM Institute for Advanced Commerce: Yorktown Heights, NY.

[11] Segev, A. and C. Beam, "A New Market-based Negotiation Paradigm". 1999. http://haas.berkeley.edu/~citm/nego/newnego.html

[12] Guttman, R.H. and P. Maes. "Agent-mediated Integrative Negotiation for Retail Electronic Commerce." in *Workshop on Agent Mediated Electronic Trading (AMET'98)*. 1998. Minneapolis, MN: (http://ecommerce.media.mit.edu/papers/amet98.pdf)

[13] Guttman, R.H. and P. Maes. "Cooperative vs. Competitive Multi-Agent Negotiations in Retail Electronic Commerce." in *Second International Workshop on Cooperative Information Agents (CIA'98)*. 1998. Paris

[14] Maes, P., R.H. Guttman, and A.G. Moukas, "Agents that Buy and Sell." *Communication of the ACM*, 1999. **42**(3): 81-91

[15] Walton, R.E. and R.B. McKersie, *A Behavioral Theory of Labor Negotiations*. 1965, New York: McGraw-Hill.

[16] Raiffa, H., *Lectures on Negotiation Analysis*. 1996, Cambridge, MA: PON Books.

[17] Fisher, R. and W. Ury, *Getting to Yes Negotiating Agreement Without Giving In*. 1983, New York: Penguin Books.

[18] Fisher, R., E. Kopelman, and A.K. Schneider, *Beyond Machiavelli. Tools for Coping with Conflict*. 1994, Cambridge, MA: Harvard University Press.

[19] Fells, R.E., Overcoming the Dilemmas in Walton and McKersie's Mixed Bargainig Strategy. *Industrial Relations*, 1998. **53**(2). http://www.erudit.org/erudit/ri/v53n02/index.html.

[20] Kersten, G.E. and S.J. Noronha, "Rational Agents, Contract Curves, and Non-Efficient Compromises". *IEEE Systems, Man, and Cybernetics*, 1998. **28**(3): 326-338.

[21] Raiffa, H., *The Art and Science of Negotiation*. 1982, Cambridge, MA: Harvard University Press.

[22] Sebenius, J.K., *Negotiation Analysis: A Characterization and Review*. Management Science, 1992. **38**(1): p. 18-38

[23] Moukas, A., R. Guttman, and P. Maes. "Agent-mediated Electronic Commerce: An MIT Laboratory Perspective". *International Conference on Electronic Commerce*. 1998. Seul, Korea.

[24] Thompson, L., *The Mind and Heart of the Negotiator*. 1998, Upper Saddle River, NJ: Prentice Hall.

[25] Kersten, G.E. and S. Noronha, *Negotiations in Electronic Commerce: Methodological Misconceptions and a Resolution*. 1999, INR02/99, The InterNeg Group: Ottawa. http://interneg.org/interneg/research/.

[26] Lax, D.A. and J. Sebenius, *The Manager as Negotiator*. 1986, New York: The Free Press.

[27] Anson, R.G. and M.T. Jelassi, A Developmental Framework for Computer-Supported Conflict Resolution. *European Journal of Operational Research*, 1990. **46**: 181-199

[28] Corcoran, C.T., *The Auction Economy*. 1999. **69**(August).http://www.redherring.com/mag/issue69/news-auctions.html

[29] Smith, C.W., *The Social Construction of Value*. 1989, Berkeley: University of California Press.

[30] Che, Y.-K., Design Competition through Multidimensional Auctions. *Rand Journal of Economics*, 1992. **24**: 668-679

[31] Rothkopf, M., A. Pekec, and R.M. Harsta, Computationally Manageable Combinational Auctions. *Management Science*, 1998. **44**: 131:148.

[32] Sandholm, T., *eMediator: A Next Generation Electronic Commerce Server*, 1999, AAAI Workshop Technical Report: Orlando, FL.

[33] Teich, J. (1999) "NegotiAuction: A Hybrid, Web-based Auction Procedure Combining Aspects of Negotiations and Auctions", Forthcoming in *Proceedings of the 31st Annual Southwest Decision Sciences Institute Conference*, San Antonio, TX, 2000.

[34] Lewicki, R.J., D.M. Saunders, and J.W. Minton, *Essentials of Negotiations*. 1997, Boston, MA: McGraw-Hill.