

THE NEED FOR SUPPORTING ELECTRONIC COMMERCE TRANSACTIONS WITH ELECTRONIC CONTRACTING SYSTEMS

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INTRODUCTION

Electronic Commerce is not a new phenomenon. Many projects have been initiated which cover research aspects of electronic product catalogs in the information phase (Keller 1997) and even more projects have been started, which are dealing with aspects of security (Waidner 1997), electronic payment systems (Dietl 1997), (VISA 1997) or logistic services in the settlement phase (Alt/ Cathomen 1995). However, few research initiatives deal with problems in-between the presentation of product information and the settlement of submitted orders. Brokerage or negotiation of terms of trade by means of electronic tools is not being supported. "For example, NASDAQ and SEAQ enables investors to find the best dealer quotes, but do not support any negotiations." (Yen/ Lee/ Bui 1996, 21)

This paper determines the need of supporting Electronic Commerce (EC) by means of Electronic Contracting Systems. This objective will be realized in the following way. First, relevant definition approaches from literature are summarized and combined into a working definition for the term 'electronic contracting'. Studies in the field of electronic contracting and user requirements are identified next (chapter 3). Third, research approaches will be analyzed (chapter 4) in order to identify the status quo in current research work. Finally, the paper closes with a summary and draws conclusions for future research work (chapter 5).

ELECTRONIC CONTRACTING IN LITERATURE

Although the field of electronic contracting is new to information management, few definitions of the term 'electronic contracting' exist. From the legal point of view Electronic Contracting is defined by (Drake 1994, 46) as "a term to describe

the application of advanced information technologies to government contracting." But as the author states later, "... the term narrows the focus on the contracting function". This definition, however, does not observe aspects of real negotiations, such as the negotiation situation.

The authors (Lewis/ Spich 1996, 238) define the negotiation situation in the following way: "A negotiation situation is characterized by the bargaining process which is a complex pattern of singular and joint actions such as requests, exchanges, questioning or challenges that goes through known stages of development." The negotiating or bargaining situation, with a special focus on Electronic Commerce, is also observed by (Beam/ Segev

1997, 3): "We define negotiation in EC as the process by which two or more parties multilaterally bargain resources for mutual intended gain, using the tools and techniques of electronic commerce for software agents." However, this definition narrows negotiations in EC on software agents.

As early as 1991 the authors (Baum/ Perrit 1991, 6) described 'electronic contracting' as something, which "...involves the exchange of messages between buyers and sellers, structured according to a prearranged format so that the contents are machine-processible and automatically give rise to contractual obligations. ... Electronic contracting is a subset of electronic messaging."

The above-summarized definitions of the term 'electronic contracting' mostly observe individual parts of electronic contracting. However, they hardly observe all aspects of electronic contracting, such as the negotiation situation and the signing of contracts.

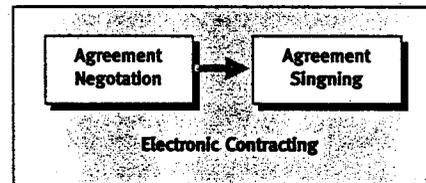


Figure 1
Processes within Electronic Contracting

For the reminder the term 'electronic contracting' is used as a synthesis of the above-summarized definitions and comprises of two major activities. First, 'electronic contracting' involves electronic agreement or contract negotiations. This activity observes the situation of negotiations, the interactive exchange of messages between buyers and sellers.

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Electronic Commerce.

The second activity within 'electronic contracting' is the signing of contracts, which have previously been negotiated or exchanged, electronically. Especially this second activity, which is very essential to Electronic Commerce, has not been considered in above-summarized definitions.

However, defining the term 'electronic contracting' is of no use, if user requirements are not observed correctly and if detailed functions and objects of the negotiation and the signing process are not being analyzed.

USER REQUIREMENTS

In order to analyze user requirements a web survey has been conducted jointly with the EURIDIS Research Institute for Decision and Information Systems, University of Rotterdam. The analysis of returned questionnaires states clearly, that users regard electronic contracting as important (41.09 %) or very important (24.03 %). If the categories 'important' and 'very important' are aggregated, the picture is even more clear: 34.88 % regard electronic contracting as 'unimportant', whereas 65.12 % think of electronic contracting as 'important'.

Analyzing the time-frame, in which negotiations should be carried out, 49.79 % of users stated that they would like to negotiate within the first 15 min. after the product decision by the buyer. According to the survey, this short span of time in which negotiations should take place corresponds to the person or institution which is supposed to carry out the negotiation. More than half of all users (66.88 %) would like to negotiate themselves. Negotiations by computers on behalf of users are welcome by 17.53 %, negotiations through trustworthy third persons are welcome by 12.34 %, and auctions are welcome by 3.25 % of all users.

Summarizing the results of the web survey, it becomes obvious that electronic contracting needs to be observed. The majority of users in the WWW regard electronic contracting as important and would be willing to negotiate all kinds of contract conditions within the first 15 min. by themselves.

To describe future fields of use for electronic contracting tools the model of transaction phases as described by (Schmid, 1993) is best suited to depict potential fields of future use for electronic contracting systems. In analyzing this model electronic contracting systems may be used in all three phases of market transactions.

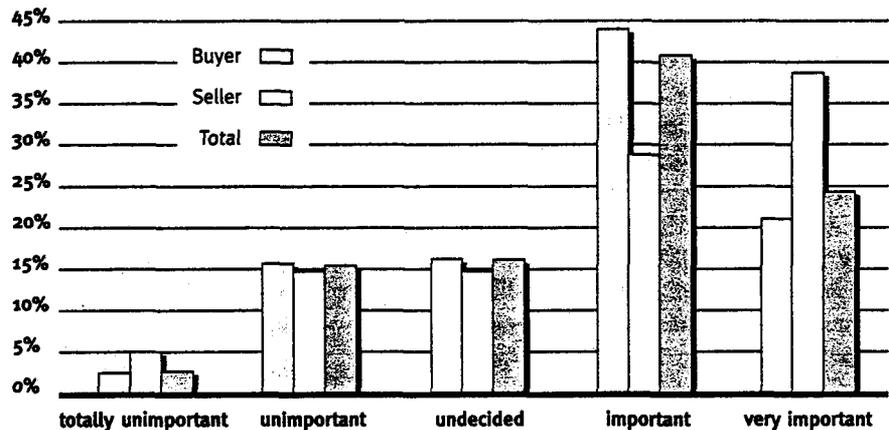


Figure 2 User Requirements for Electronic Contracting

REFERENCES

Alt, R (1997).
"Interorganisationssysteme in der Logistik" Deutscher Universitäts Verlag Gabler Vieweg; Wiesbaden, 1997.

Alt, R./ Cathomen, I. (1995).
"Handbuch Interorganisationssysteme. Anwendungen für die Waren- und Finanzlogistik" Braunschweig/ Wiesbaden, 1995.

Baum, M. S./ Perrit, H. H. (1991).
"Electronic Contracting, Publishing, And EDI Law" John Wiley & Sons, New York; 1991.

Beam, C./ Segev, A. (1997).
"Automated Negotiations: A Survey of the State of the Art" Fisher Center for Information Technology & Management; Walter A. Haas School of Business, University of California, Berkley; <http://haas.berkeley.edu/~citm/nego-proj.html>; October 1997.

Beuthner, A. (1997).
"Sicherheit entscheidet über die Zukunft des E-Commerce" In; Computer Zeitung, No. 28, July 10th, 1997.

Drake, D. J.(1984).
"Basic Concepts of Electronic Contracting". In: Contract Management Magazine, Vol. 34, Issue 6, June 1994, pp. 44-46.

While presenting aggregated product and service information to users, electronic product catalogs could start sub- or secondary transactions and negotiate prices, delivery conditions and other conditions in the background on behalf of users. This scenario could be supported by means of agents. However, negotiations of electronic product catalogs are only appropriate in fast moving markets since background allocations need to be accomplished quickly.

Besides the above-described scenario within fast moving markets, electronic contracting tools could also be used in main transactions. After the identification and allocation of relevant product information through EPCs, contract terms could be negotiated manually or automatically.

The third scenario is a scenario in the field of logistic services. Purchased goods are delivered in most of the cases by the supplier. However, suppliers do not deliver these goods themselves but engage freight forwarders. The process of searching carriers, negotiating and ordering their service represents another sub or secondary transaction. Offers from carrier companies and demands from product-seller companies need to be matched. One very common way to match supply and demand in the field of logistics is by means of transport and shipment intermediaries or brokers (Alt 1997, 196-198).

While describing scenarios for electronic contracting, one needs to keep in mind that primary and secondary market transactions may take place in sequence but may also take place in parallel. Furthermore, different matching criteria (e.g. price and delivery conditions) may be linked closely, for instance delivery conditions (e.g. bad delivery conditions) could influence the price criterion (e.g. lowering price). Therefore, different electronic contracting systems should interact with each other.

This section showed that electronic contracting will be a relevant topic. On the one hand, an analysis of user requirements showed that users would like negotiation situations in Electronic Commerce to be supported. On the other hand, verifiable future scenarios are imaginable, which would be suited best for the use of electronic contracting tools. So far, only a few researchers identified this need for future electronic contracting systems as may be seen in the following section.

ELECTRONIC COMMERCE RESEARCH

Although an increasing number of companies use the Internet for Internet marketing, the number of transactions which are ordered or settled via Internet are low (Beuthner 1997, 32), (Grund-Ludwig 1997, 29).

Reasons are manifold. Lang states in (PW 1997, 39) that one of the reasons for the absence of the expected and predicted growth of Electronic Commerce is a missing transaction system. The presence and ease of use of electronic payment systems is another major success factor. Although many institutions are doing research and design work in the field of electronic payment systems, the availability of electronic payment systems in Electronic Malls is hardly recognizable. However, not only the lack of electronic payment systems is a reason for the slow increase of Electronic Commerce, "Some aspects of secure electronic commerce are not covered ..., or at least not in a suffi-

Gisler, M. (1994).
"Das Zustandekommen und die Erfüllung von Verträgen durch elektronische Kommunikationsmittel"
 Master Thesis, University of St. Gallen,
 September 1994.

Grund-Ludwig, P. (1997).
"Die Firmen stehen in den Startlöchern"
 In: *Computer Zeitung*, No. 28,
 July 10th, 1997.

Dietl, J. (1997).
"W3 Electronic Payments Area";
 World Wide Web Consortium,
[http://www.w3.org/Payments/;](http://www.w3.org/Payments/)
 November 1997.

Keller, A. M. (1997).
"Smart Catalogs and Virtual Catalogs"
 In: Kalakota, R./ Whinston, A. B. (ed.):
"Readings in Electronic Commerce",
 Addison-Wesley, 1997.

Lewis, L. F./ Spich, R. S. (1996).
"Principled Negotiation,
Evolutionary Systems Design, and
Group Support Systems:
A Suggested Integration of Three
Approaches to Improving Negotiations"
 In: *Proceedings of the 29th Annual*
Hawaii International Conference
on Systems Sciences,
Hawaii, January 1996.

Organization for Economic Co-operation
and Development (OECD) (1997).
"Dismantling the Barriers to Global
Electronic Commerce"
<http://www.oecd.org/dsti/sti/it/ec/prod/dismantl.htm>,
 November 1997.

PW (1997). *"Das Internet wird erst durch Transaktionen zum Geschäft";*
 Interview with Ilene Lang, *Altavista*
 In: *Computer Zeitung*, No. 28,
 July 10th, 1997.

cient form." (Waidner 1996, 6). Trust is another important aspect in Electronic Commerce. "Many observers see a lack of confidence in electronic transactions as the main barrier to electronic commerce, because, unlike some other issues, establishing trust depends very much on the user's perceptions." (OECD 1997, 10)

Besides the facts that Electronic Commerce projects are proprietary, closed, mostly US-based, have no standardized APIs and have security problems in general, "multi-party problems (like auctioning) and fairness aspects (like contract signing, certified mail) are not considered yet." (Waidner 1996, 6) Contract signing does, however, not only involve the signing of a contract template, but also involves the bargaining or negotiation of this contract template electronically. Negotiating electronic contracts is very dependent on underlying and applicable law systems, if contracts are to be negotiated between Europe and the United States, for instance.

Theory of political economics as well as practical experience has developed and discussed many methods and ways of matching demand with supply. Very useful approaches to support Electronic Contracting are auctioning systems, which are sometimes carried out automatically with computer agents. Besides auctions and agents, applied research in computer science has led to the development of decision support systems and especially negotiation support systems. Besides these dynamic approaches to handle electronic contracting static approaches are also being developed (International Trade Transaction (ITT) Model). These approaches show, that problems of electronic contracting have been identified and are being studied.

CRITICAL ANALYSIS AND FUTURE OUTLOOK

Above mentioned approaches do not solve all problems. Electronic auctions only match demand and supply via the price criterion. Other criteria such as delivery conditions, payment conditions, and others are not taken into consideration to

be relevant for matching demand and supply. Furthermore, auctions do not pay any respect to potential cross-relationships between several products or between products and services, which are combined into bundles. Product bundles consisting of the core product and additional services such as payment conditions and additional delivery conditions could have cross-relationships.

Although the approach of supporting electronic contracting with software agents is a reasonable approach, some criticism is still to be announced. Agents are capable of searching for offers and are capable of negotiating relevant contract conditions, but agents are not capable of deciding critically and signing reliably on behalf of the user. This is partly due to undefined legal backgrounds. Irrespective of the number of countries which are designing digital signature laws, it is undecided yet if computers may act and sign on behalf of users (Gisler, 1994). However, signing contracts electronically is a major and important aspect of Electronic Commerce.

Not as critical, but still worth mentioning, is the aspect that agents, after eventually solving all electronic contracting problems, do not respect the overall framework of Electronic Commerce. Systems which only support electronic contracting problems while not respecting interfaces towards electronic product catalogs or electronic payment or logistic services are of no use.

Studies of Negotiation Support Systems (NSS) have been mostly done involving organizational decisions and negotiations.

Schmid, B. (1993).

"Elektronische Märkte"

In: *Wirtschaftsinformatik*, pp 465-480, Nr. 5/ 1993.

VISA International (1997).

"Secure Electronic Transaction (SET)";
http://www.visa.com/cgi-bin/vee/nt/ecom/SET/intro.html?2+0; Vers. 1.0;
October 6th, 1997.

Waidner, M. (1996).

"Development of a Secure Electronic Marketplace for Europe"

In: *Proceedings of the ESORICS 96 in Rome; Springer-Verlag, Heidelberg, September 1996.*

Waidner, M. (1997). *"SEMPER - Secure Electronic Marketplace for Europe";*
http://www.semper.org/;
November 1997.

Yen, J./ Lee, H. G./ Bui T. 1996).

"Intelligent Clearinghouse: Electronic Marketplace with Computer-Mediated Negotiation Support"

In: *Proceedings of the 29th Annual Hawaii International Conference on System Science, Hawaii, January 1996.*

However, Negotiation Support Systems need not only be studied in the field of Electronic Commerce, but need to be studied in the field of Electronic Commerce with the assumption of some overall framework, since NSS must be integrated with other systems.

Many questions and problems are still unsolved. Future research questions comprise of the fundamental definition of electronic contracting, its supported actions (simply matching criteria vs. providing real negotiation advice), the analysis and categorization of matching mechanisms and the analysis of efficient scenarios, the analysis of relevant matching criteria, the analysis of applicable products and services for electronic contracting, the analysis of applicable business sectors (business-to-consumer vs. business-to-business), the analysis of underlying legal backgrounds, the design of fundamental Electronic Commerce frameworks and integration questions, and many more.

Future research aspects must not concentrate on fundamental infrastructures and technical problems. Research questions need also to respect business aspects since the use of developed fundamental infrastructures and technical details is determined by business aspects.

ACKNOWLEDGEMENT

This article is based on work carried out in the Competence Center Electronic Markets (CC EM) since 1989 under the leadership of Prof. Dr. B. Schmid. The author also wants to thank the project partners of the CC EM.