Ensuring the Success of Contract Formation in Agent-Mediated Electronic Commerce

IAN R. KERR   iankerr@uottawa.ca
Faculty of Law, Common Law Section, University of Ottawa, Ottawa, Canada

Abstract

This article examines a number of contractual issues generated by the advent of intelligent agent applications. The aim of the study is to provide legal guidelines for developers of intelligent agent software by addressing the contractual difficulties associated with automated electronic transactions. The author investigates whether the requirements for a legally enforceable contract are satisfied by agent applications that operate independent of human supervision. Given the relative novelty of the technology and the paucity of case law in the area, the author's observations and conclusions are based on an analysis of first principles in contract law. Additionally, the author provides an analysis of whether proposed and enacted electronic commerce legislation in various jurisdictions is sufficient to cure the inherent deficiencies of traditional contract doctrine. Given the trend towards automated electronic commerce, the author concludes by highlighting the legal requirements that must be met in order to ensure the success of agent technology in the formation of online contracts.

Keywords: automated electronic commerce, contract formation, e-commerce legislation

1.   Introduction

The Internet has exceeded most people's expectations in terms of its role as the new forum for communications and commerce. Despite the fact that this pleases most entrepreneurs of the new economy, the exponential growth of online interaction poses a serious threat to the future success of electronic commerce. As the Internet continues to increase in popularity amongst the business sector, it becomes more and more unwieldy. Sorting through the mountains of consumer and corporate information, the inestimable number of product lines and the sea of available services has become rather unmanageable. For example, when shopping on the Internet, conscientious consumers are forced to do a number of things. The list includes: investigating the reliability of new brands, searching for the best available price, appraising product performance, and comparing other product features, such as warranty coverage. Likewise, merchants are required to expend significant time and energy enhancing their products as a consequence of the sheer volume of commercial competition online.

Fortunately, these difficulties have not gone unrecognized. The booming, buzzing confusion generated by the recent surge of business activity online has led to the development of a new kind of software, a new tool in the bid to simplify electronic commerce by automating it. The ability to automate many of these processes, both for consumers and for merchants, eliminates time-consuming activities and reduces transaction costs.

As commercial enterprise migrates further into electronic environments, the demand for automated transactions will increase. An entire industry known as intelligent agent technology capitalizes on the desire of consumers and merchants to automate online transactions (Jennings and Wooldridge, 1998; Russel and Norvig, 1995). Intelligent agent technology has numerous applications in electronic commerce. One very interesting application makes it possible for electronic agents to interact, exchange information and engage in operations that, from all outward appearances, look very much like the negotiation and creation of contractual agreements (Chavez et al., 1997). These interactions can be distinguished from an earlier generation of automated transactions in which computer networks were merely the electronic conduit for human trading. The difference is that intelligent agent technology promises to deliver software that is able to initiate and complete transactions autonomously. What is remarkable about the technology is that it will soon allow some commercial transactions to take place without any need for human traders to review, or even be aware of, particular transactions (Karnow, 1996). Such innovation is revolutionary. It transforms the role of computer hardware and software in electronic commerce from that of a passive pipeline to that of an animated associate.

How the law responds to such innovation will have an important effect on the future evolution and expansion of electronic commerce. In order to fully enjoy the benefits of automation, human and corporate traders need to be confident that the transactions generated by and through their computers are legally enforceable. This need notwithstanding, it is clear that the involvement of autonomous or mobile computer programs in the contract formation process, especially in an online environment, generates considerable doctrinal difficulties insofar as the law of contract is concerned (Allen and Widdison, 1996; Davies, 1997; Karnow, 1996). Although these computer applications are generally referred to as software agents, they are not agents in the traditional legal or commercial sense.

This article will outline the legal problems generated by intelligent agent technology, investigate the proposed legislative solutions to those problems and offer a number of suggestions to the creators of intelligent agent applications. The aim is to facilitate the creators of intelligent agent applications for e-commerce in achieving the successful formation of contracts through automated means.

2.   The future role of contracting agents

Traditionally, the informational transactions required for engaging in commerce have been driven mostly by human interaction. Typical human interactions include: a determination of unmet business or consumer needs (need identification), the retrieval of information about what to purchase in order to fulfil those needs (product brokering), an evaluation of merchant-specific information in order to determine who to buy needed products from (merchant brokering), a method of determining the terms and conditions for the purchase or sale of products (negotiation), the communication of assent to those terms and conditions (offer and acceptance), a method of exchanging legal consideration (payment) and a determination of the perceived level of the quality and service of the products purchased

(customer satisfaction) (Runyon and Stewart, 1987). In the case of electronic commerce, it is unlikely that all of these interactions will continue to be carried out exclusively by humans (Terpsidis et al., 1997). Rather, intelligent agent technology will be employed to assist people in the performance of many of these transactions.

One early example of a promising e-commerce application is the MIT Media Lab's Kasbah (see Kasbah). This system is described as an "online, multi-agent classified ad system":

> A user wanting to buy or sell goods creates an agent, gives it some strategic direction, and sends it off into a centralized agent marketplace. Kasbah agents proactively seek out potential buyers or sellers and negotiate with them on behalf of their owners. Each agent's goal is to complete an acceptable deal, subject to a set of user-specified constraints such as a desired price, a highest (or lowest) acceptable price, and the date by which to complete the transaction. The latest version of Kasbah incorporates a distributed trust and reputation mechanism called the Better Business Bureau. Upon the completion of a transaction, both parties may rate how well the other party managed their half of the deal (e.g., accuracy of product condition, completion of transaction, etc.). Agents can then use these ratings to determine if they should negotiate with agents whose owners fall below a user specified threshold.
>
> Negotiation in Kasbah is straightforward. After buying agents and selling agents are matched, the only valid action in the negotiation protocol is for buying agents to offer a bid to selling agents with no restrictions on time or price. Selling agents respond with either a binding "yes" or "no".
>
> Given this protocol, Kasbah provides buyers with one of three negotiation "strategies": anxious, cool-headed, and frugal—corresponding to a linear, quadratic, or exponential function respectively for increasing its bid for a product over time. The simplicity of these negotiation heuristics makes it intuitive for users to understand what their agents are doing in the marketplace (Guttman, Moukas, and Maes, 1998).

As indicated in the above passage, Kasbah not only assists human users in the merchant brokering phase of electronic commerce, but in the negotiation process as well. Agent communication is based on a request-response protocol and is strictly agent-to-agent. There is no broadcast of messages and a third party agent cannot eavesdrop on a transaction taking place between two other agents. When an agent (buying or selling) completes a transaction, a notification is sent to the user who created the agent. In a recent real-life experiment held at the MIT Media Lab, the notification messages were delivered to human users by pagers. Of course, other possibilities exist. Once the agent completes the deal, it ceases to negotiate with other agents and automatically asks the marketplace (a closed system) to remove it from the list of "active" agents. Among other things, this ensures that other agents will not be able to send it messages. According to the rules of engagement built into the design of the closed system, it is then up to the human users to "physically consummate" the transaction (Chavez et al., 1997).

Another MIT Media Lab application called Tete-a-Tete (T@T) automates other aspects of e-commerce transactions (see Ecommerce). One feature distinguishing T@T from many of its predecessors is that T@T negotiates in a co-operative, rather than competitive,

style (Guttman and Maes, 1998). T@T can also negotiate across multiple terms of a trans-
action. For example, T@T provides agents with the capability to negotiate specific contrac-
tual terms and conditions, including "warranties, delivery times, service contracts, return
policies, loan options, gift services, and other merchant value-added services." The impli-
cations of agent-mediated negotiations such as these are potentially staggering. Presently,
e-commerce consumers are not generally given the choice to negotiate; the terms of an on-
line offer are usually put forth in a standard form on a take-it-or-leave-it basis. To the extent
that agent technology might allow merchants to tailor the terms and conditions in accord
with individual customer need—*without increasing transaction costs*—the use of agents
in e-commerce could alleviate many of the legal problems associated with standard form
agreements. For example, standard form agreements are often used by merchants to exploit
and abuse their superior bargaining power when contracting with private consumers. The
diminution of standard form agreements through the advent of agent mediated contracts
could have the effect of empowering consumers by increasing their bargaining power in
the marketplace.

It is unclear whether contracting agents will appear in electronic commerce as part of
an evolutionary or revolutionary process. As Hermans and others have pointed out (Her-
mans, 1996), much will depend on the future infrastructure and architecture of the Internet,
including: the chosen agent standards; whether a homogeneous or heterogeneous architec-
ture is adopted; whether interoperability standards will be required; etc. The extent to
which agent technology will require an interoperability standard exemplifies one of the
many difficult choices faced by developers of agent technology. Currently, there is much
debate over the appropriate agent paradigm in electronic commerce. Specifically, should
its negotiation protocol be competitive or co-operative in nature (Rosenschein and Zlotkin,
1994). Guttman et al. have recently rebuffed the use of competitive protocols in retail mar-
kets from economic, game theoretic, and business perspectives (Guttman and Maes, 1998).
Since merchants tend to strive for highly co-operative, long-term relationships with their
customers in order to maximize loyalty, customer satisfaction and reputation, Guttman
et al. recommend more co-operative multi-agent decision analysis tools instead of compet-
itive negotiation protocols such as online auctions. If this approach becomes the norm—
which presently seems to be the case–an interoperability standard will indeed be necessary.

If it turns out that open standards are further developed and adopted, one might expect
that electronic commerce will shift away from its current mode of interaction—a mode
which is in many ways constrained by the fact that transactions take place within a closed
system. Although systems like eBay (see eBay) are currently quite popular, people are
unable to transact without first registering as a member of the system. In the future, there
will likely be a move towards more open, "public" systems. This will require much greater
agent mobility (White, 1997). In the open marketplaces of the future, the specific negotia-
tion protocols will likely not be wholly predetermined. These negotiation protocols would
be left to the predilections of those who design, create and employ the intelligent agents
involved in particular transactions. The future shift towards more open systems will have
a significant impact on the legal treatment of automated electronic commerce. The cur-
rent closed systems have the commercial advantage of clarifying all of the legal rules in
advance. Recall, for example, that the gateway to Kasbah's marketplace requires human

users to adopt certain predetermined rules of engagement, many of which were built directly into the system. In the open systems of the future—where intelligent agents would be free to roam the Internet in search of transaction partners without any pre-existing commitment to the same rules of engagement as those preferred by agents encountered along the way—the threat of commercial uncertainty looms large.

Consider the following as a possible future world. An agent application is designed for an industrial manufacturer that supports a team of intelligent agents, each of which is dispatched to perform a particular task that will be carried out in conjunction with the tasks performed by other agents on the team. After an agent designated to monitor the manufacturer's supply of certain sub-components discovers that the supply is becoming low, it launches into action several merchant brokering agents which are then dispatched to search the Internet for the lowest prices for various sub-components needed to manufacture the ultimate product. Once the appropriate merchant sites have been discovered and evaluated, other agents step in to negotiate the terms and conditions upon which those separate sub-components might be purchased (including product warranties, freight rates, delivery dates, exemption clauses, etc.). Other agents assist with the information and communications pertaining to placing orders and arranging for the shipping and receiving of the sub-components, while a different agent initiates electronic payment schemes. Still other agents deal with the marketing and sales of the ultimate product, once manufactured. Notice that the advent of electronic cash mechanisms (Lelieveldt, 1997; Panurach, 1996)—especially in cases where the goods bought and sold are information products not requiring a physical medium in order to execute the transaction—no longer requires human users to ratify or "physically consummate" agent-made agreements (as was necessarily the case in the original Kasbah experiment). Thus, one ends up in a future world in which agreements are negotiated and entered into without any need for human traders to review or even be aware of particular transactions.

There is no doubt that a world such as this might create various advantages for human entrepreneurs and would spare human users from having to find, negotiate, and deal with buyers and sellers. A truly intelligent technology applied in this manner would de-personalize the process of negotiation, avoid misunderstandings resulting from language barriers and perhaps even free people to perform other important tasks or pursue more meaningful relationships (Chavez and Maes, 1996). Such systems would also allow more accurate business records to be kept since software agents could build databases that, among other things, keep track of all interactions (whether or not the particular negotiation resulted in the formation of a contract). Some authors believe that the proper integration of the information on such databases would not only reduce transaction costs but would lead to pricing that is closer to optimal (Chavez and Maes, 1996).

3. Doctrinal difficulties associated with automated e-commerce

3.1. *Only legal persons can contract*

In order for electronic commerce to skyrocket in the manner predicted by its enthusiasts, human and corporate traders must be confident that automated transactions are perceived

and understood as contractual in nature. Transactions which are not legally recognized are not worth the disks that they are stored on.

There are several aspects of an automated transaction that make it difficult to perceive and understand the transaction as contractual in nature. Authorities such as Fridman point out,

> Since a contract is an agreement between two or more persons, and involves the idea of *consent*, only those who have the power to give consent can contract (Fridman, 1994, p. 138).

Inextricably tied to the notion of contractual consent is the idea that the *consenting* person has signified an intention to be bound by the terms of the agreement. As Fridman puts it, "[a] contract can only arise if there is the *animus contrahendi* between the parties. Without the expressed or implicit intention that a contract should emerge as a result of the language or conduct of the alleged parties, no contractual obligations can be said to exist and be capable of enforcement. Hence the offer that is made must be an offer to contract involving the creation of legal relations" (Fridman, 1994, p. 26).

Although the law has extended the scope of juristic personality so as to create limited rights and obligations for human artifacts such as corporations, intelligent agents are not legal persons. Since they are not persons, they do not have the legal power to give consent. Nor can it be said in any meaningful legal sense that intelligent agents form the necessary intention to create legal relations. Of course, this does not preclude the possibility that intelligent agents or other electronic devices might play an *instrumental* role in the formation of contracts. For example, an electronic device might be used to offer for sale products ranging from candy bars or soda pop to drivers' licenses and insurance policies. Contracts that arise from such transactions are not generally analyzed as contracts between a machine and the person who plugs in the coins, bills or tokens. Such a contract is understood as a unilateral offer made by the human or corporate owner or operator of that machine. The nature of the offer is the sale of a product at a stipulated price and the offer is thought to be accepted by the conduct of the individual who responds to it by depositing the stipulated *quid pro quo* into the machine. Although it is true that the human or corporate offer or will not oversee or even be aware of particular transactions when utilizing machines of this sort, it is also true that the offer or will always be said to have intended and consented to the precise terms of the contract and the quantity of the product available for sale (subject, of course, to any malfunction or misuse), since machines of this sort are not sufficiently intelligent or autonomous to alter the terms or generate additional products without further human interaction.

What distinguishes the electronic transactions mediated by intelligent agents from purchases made through vending machines is that agent-made agreements will be generated by machines, not merely through them. Thus it is only when agent technology becomes sufficiently *animated* that doctrinal difficulties begin to arise. Though today's agent technology is legally benign, once electronic agents are able to initiate contractual offers autonomously, situations may arise where it is disingenuous and perhaps even conceptually disadvantageous to characterize those transactions as offers made by their human initiators. Once intelligent agents are no longer mere conduits for commercial transactions, it

will become necessary to determine how best to treat them. Although some academics have offered the radical suggestion that future electronic agents be included among the category of legal persons (Karnow, 1996; Solum, 1992), it is clear that intelligent agents do not currently enjoy the status attributed to legal persons. Consequently, absent the enactment of legislation to the contrary, an intelligent agent cannot be a party to a contract.

3.2. *Contractual capacity*

Even if intelligent agents somehow achieved the status of person in law, it is not clear that every such device would be capable of entering into a contract. As stated by Cheshire and Fifoot, "[i]f all of the elements of contract exist between two parties, the agreement may nevertheless lack legal effect if one or both of the parties lack capacity to contract" (Starke, Seddon, and Ellinghaus, 1992, p. 545). In other words, prior to giving legal effect to their agreements, the common law has traditionally required of all persons that they be capable of demonstrating a certain degree of intellectual capacity. To take a typical example, there exists a well established distinction in law between the legal treatment of agreements entered into by persons who are minors and agreements entered into by those said to be of a mature age. This distinction has had the effect of limiting the extent to which minors can enter into contracts. A similar rule exists to limit the contractual capacity for those are said not to be of sound mind. As Fridman puts it, "[o]nce a person has been found by a court to be wanting in intellect, then it would seem to follow that such a person lacks contractual capacity. He or she is not able to consent" (Fridman, 1994, p. 158).

Before a determination can be made as to whether it is possible for an intelligent agent to have the legal capacity to contract, it is important to recognize that the doctrine of contractual capacity serves a function beyond the determination of who is in fact able to consent to an agreement. As Waddams has made clear, one of the central reasons underlying the capacity doctrine is the aim of protecting weaker parties during the bargaining process (Waddams, 1993). According to Waddams, "[f]rom the basic desire to protect minors from exploitation arose a general rule that minors' contracts were voidable at the minor's option" (Waddams, 1993, p. 447). If Waddams is right to link the issue of contractual capacity to the general desire to protect weaker parties when entering into agreements, this adds a wrinkle to the question about whether an electronic agent should be said to have the capacity to contract. The capacity issue, as conceived by Waddams, would become extremely complicated in a world where computers programs are said to have the capacity to contract. Neural net programming, for example, raises the spectre of vast inequalities between the various competing electronic devices. Intelligent agent technology is bound to grow in power and sophistication to the point where the more advanced agents will likely be able to predict the actions and thus take advantage of older, more obsolete versions. It is also likely that only large corporations and wealthy individuals will have access to state of the art agent technology. If the law of contract is to protect weaker parties, it might somehow have to take steps to level the playing field. Should situations such as this be conceived of as analogous to that of sophisticated parties contracting with the infirm? In any

event, even the most intelligent and autonomous of agents currently utilized in electronic commerce seems to lack the capacity to contract.

3.3.   Consensus ad idem

The traditional view of contract includes not only an exchange of promises but also a mutual concordance between the parties as to the nature and scope of the rights and obligations that coincide with that exchange of promises. That is, the parties must be said to have formed an agreement with each other. The metaphor which has taken hold throughout the common law to describe this phenomenon is the idea of a *consensus ad idem*—a meeting of the minds. Historically, this metaphor was based on the paradigm of face-to-face interactions between two human beings. Bearing in mind this historical point, it is not difficult to understand that automated transactions do not easily fit within this conceptual framework. In what sense could it be said that intelligent agents exchange promises, or that two agents reach a meeting of the minds? It is essential to recognize that the notion of a *consensus ad idem* does not merely signify the mutual concordance between two parties. The agreement requirement also underscores the *voluntary* aspect of contract. After all, the traditional understanding of what makes such an exchange of promises special, what makes such an agreement binding both in law and in moral theory, is the underlying idea that the parties to the agreement have each exercised freewill; each person freely chose to make representations about the future that created both trust and reliance in the mind of the other and each person thereby assumed obligations not otherwise existent in law (Fried, 1981; Fuller and Purdue, 1936). Aside from a few fairly radical computer scientists (Minsky, 1994), most of us do not presently conceive of electronic devices as having freewill or as capable of making voluntary undertakings meant to limit future freedom of action in the moral or legal realm.

In sum, when one considers the fact that intelligent agents are not legal persons, that they lack the capacity to contract and that they are incapable of reaching a *consensus ad idem*, it is unclear whether the transactions generated by intelligent agents will be considered binding in law. For this reason and others, law makers in most jurisdictions are proposing legislation aimed at curing these doctrinal defects. Such legislation is thought to be necessary in order to ensure public confidence in the future success of electronic commerce.

4.   Proposed legislative solutions

4.1.   The UNCITRAL Model Law on Electronic Commerce (Model Law, 1997)

Among the first bodies to formulate legislation on electronic commerce was the United Nations Commission on International Trade Law (UNCITRAL). (Strictly speaking, it is incorrect to characterize the code produced by *UNCITRAL* as legislation. Rather, it is a *Model Law* which was drafted to facilitate the development of uniform legislation to be adopted by member States.) This initiative was undertaken partly in response to the fact

that many countries have inadequate or outdated legislation governing the communication and storage of information. More importantly, it was thought that many countries' existing laws actually impede the potential growth of electronic commerce by prescribing rules which impose restrictions on the use of modern media of communication—such as the old requirement that certain kinds of contracts must be evidenced "in writing". The aim of the *Model Law* was not simply to enhance global trading by removing legal barriers of the sort mentioned above, but to achieve a global set of commercial rules that is media neutral. In order to combat the traditional specification of a medium for a particular formal requirement in any given piece of legislation, the strategy adopted by the *Model Law* allows the traditional requirement to be met through the use of modern functional equivalents.

Consider, a traditional rule which requires a signature at the bottom of a document for certain kinds of transactions. In a medium that does not allow for a physical mark to be affixed to the page, its functional equivalent—the clicking of a mouse—is permitted instead. The action of clicking a mouse in response to a particular query provides the functional equivalent of a signature. Namely, it identifies the individual responding to an offer and it signifies assent to the terms of the offer.

When the operations that provide the functional equivalent to a signature are machine generated by an intelligent agent, it becomes necessary to invoke a special rule which attributes those operations to some human or corporate entity. Consequently, the majority of electronic commerce legislation currently proposed in various jurisdictions contain some sort of *attribution rule*. In essence, the effect of an attribution rule is to treat the operations of the automated agent as a mere extension of the actions of the human being who initiated its use. As stated in the "Guide to Enactment" accompanying the UNCITRAL *Model Law*, "[d]ata messages that are generated automatically by computers without human intervention should be regarded as 'originating' from the legal entity on behalf of which the computer is operated" (Model Law, 1997).

The typical justification for this approach is exemplified by comments that were made during a meeting of the Drafting Committee for a subsequent variation on the Model Law adopted in the United States, which underscored "that the key aspect of this term is its function as a tool of a party". The Reporter's Notes state that,

> As a general rule, the employer of a tool is responsible for the results obtained in the use of that tool *since the tool has no independent volition of its own*. … This Act (S.114) provides that a person is responsible for the actions taken and accomplished through electronic agents in the absence of human intervention (UETA, 1999).

According to the annotations accompanying the Canadian counterpart to this legislation, "[t]he use of the term 'electronic agent' is widespread. The law of agency, however, plays no part in this discussion. An electronic agent is a tool, not an agent in law" (UECA, 1999). Similarly, the Reporter's Notes in *the Uniform Commercial Code-2B* (the precursor to the UCITA) states that the electronic agent "is in effect a mere extension of the person utilizing it and its actions constitute the actions of the individual" (UCC2B, 1998). The viewpoints expressed in the above policy statements led to the development of attribution rules in each of the respective proposed statutes.

The attribution rule in UNCITRAL *Model Law* is found in Article 13, which provides that:

> 2) As between the originator and the addressee, a data message is deemed to be that of the originator if it was sent:
> (a) by a person who had the authority to act on behalf of the originator in respect of that data message; or
> (b) by an information system programmed by, or on behalf of, the originator to operate automatically (Model Law, 1997).

Article 13 contemplates the fact that many contractual offers are transacted by intermediaries. Where the intermediary is another person, subsection 2(a) provides that the offer made by that person is attributed to the originator on the basis of the common law notion of *authority*. Authority can be understood as a special kind of legal power held by another, a power to perform some act which will affect the originator's legal relations. In cases where that power is voluntarily conferred by the originator, the other person is said to be "authorized" or to "have the authority" to act on the originator's behalf (Reynolds, 1996). The paradigmatic mechanism by which authority is conferred to another is by consent. In essence, the agency relationship is created by the originator's unilateral manifestation of a willingness to have his legal position changed by the other person.

Subsection 2(b) attributes the operations of an 'information system' to its originator. According to the definition set out in Article 2, an 'information system' means "a system for generating, sending, receiving, storing or otherwise processing data messages" (Model Law, 1997). Clearly, this definition will include intelligent agent technology. The legal effect of subsection 2(b) is that each operation of an intelligent agent employed as an intermediary in an electronic transaction will be attributed to the person who originated its use. Though subsection 2(b) does not make intelligent agents the subject of rights and obligations, such agents are treated in precisely the same manner as persons who have been given the authority to act on the originator's behalf. That is, they have the power to bind the originator.

Still, the *Model Law* does not include intelligent agents within the statutory definition of 'intermediary' in electronic commerce. An 'intermediary' is defined in Article 2(e) as "a person who, on behalf of another person, sends, receives or stores that data message or provides other services with respect to that data message" (Model Law, 1997). Thus, even though the *Model Law* contemplates the use of intermediaries in electronic commerce, it distinguishes between transactions carried out by persons from those carried out by automated means. The important difference is that the scope of attribution for human intermediaries is limited by the common law principle of authority, whereas the attribution rule for automated intermediaries is founded on the basis of absolute liability. In other words, in the case of an automated transaction, the *Model Law* precludes a court from inquiring whether the originator consented to the transaction in question. Consequently, the *Model Law's* attribution rule for intelligent agents could lead to unjust results in situations where a transaction generated by the intelligent agent is unintended, unforeseen or unauthorized by its human originator.

4.2. *The proposed Uniform Electronic Transactions Act (UETA, 1999)*

The *UETA*, which was recently adopted by the National Conference of Commissioners on Uniform State Laws, deals with electronic devices in a more sophisticated manner than the *Model Law* by expressly recognizing that such devices can operate independent of any human review.

> S.14. In an automated transaction, the following rules apply:
> (3) A contract may be formed by the interaction of electronic agents of the parties, even if no individual was aware of or reviewed the electronic agents' actions or the resulting terms and agreements.
> (4) A contract may be formed by the interaction of an electronic agent and an individual, acting on the individual's own behalf or for another person, including by an interaction in which the individual performs actions that the individual is free to refuse to perform and which the individual knows or has reason to know will cause the electronic agent to complete the transaction or performance.
> (5) The terms of the contract are determined by the substantive law applicable to it.

Section 14 permits a contract to be formed by the interaction of electronic agents or the interaction of an electronic agent and an individual. In addition to enabling electronic agents to contract, the section provides a mechanism for click-through transactions. Part of its effect is to validate online transactions where a consumer effects a purchase by interacting with an electronic agent on a commercial Web site. It may also affect other informational transactions, such as agreements in which one party enables another to use information contained on a Web site for personal purposes in exchange for a promise to agree to the Web site owner's terms and conditions, for example, a promise not to use the information for certain prohibited purposes.

Two other provisions in the *UETA* are involved in its attribution process. Section 9(a) has the effect of attributing an electronic record or electronic signature to a person when that record or signature resulted from the operations of his or her electronic agent. This section is a more elegant version of Article 13 of the *Model Law*. In addition to attributing the operations of electronic agents to the persons utilizing them, section 9(a) highlights the important role of security procedures (attribution procedures) in the electronic environment. It allows the act of a person to be shown in any manner, "including a showing of the efficacy of any security procedure applied to determine the person to which the electronic record or electronic signature was attributable" (UETA, 1999). It is not surprising that reliable authentication mechanisms will become necessary as electronic agents are used more and more to create electronic records and electronic signatures.

The final relevant provision in *UETA* is section 10. Although this section deals primarily with the legal effect of changes or errors in an electronic record, subsection (2) contains a special provision for mistakes that occur in the contract formation process as between an individual and an electronic agent.

> 10(2) In an *automated transaction* involving an individual, the individual may avoid the effect of an electronic record that resulted from an error by the individual made in dealing with the electronic agent of another person *if the electronic agent did not*

provide an opportunity for the prevention or correction of the error and, at the time the individual learns of the error, the individual:

(A) promptly notifies the other person of the error and that the individual did not intend to be bound by the electronic record received by the other person;
(B) takes reasonable steps; including steps that conform to the other person's reasonable instructions, to return to the other person or, if instructed by the other person, to destroy the consideration received, if any, as a result of the erroneous electronic record; and
(C) has not used or received the benefit or value of the consideration, if any, received from the other person (UETA, 1999).

Such a provision is premised on a recognition that the process of automation may generate a number of unexpected results in the form of human mistakes, such as keystroke errors. This provision makes up for the fact that, in an automated transaction, it will not always be possible for an individual to communicate to the electronic agent after the fact that he or she had not meant to enter into the transaction. The section seeks to accomplish these things without otherwise disturbing the law of mistake. In fact, subsection 10(3) specifically refers to the substantive law and indicates that it applies, as always, with the exception of the circumstances contemplated in subsections (1) and (2). The section also seeks to provide an incentive for the implementation of error correction mechanisms.

In the context of consumer purchases, subsection 10(2) is an important provision. According to it, an individual will be precluded from avoiding a transaction on the basis of a mistake in cases where the electronic agent has provided an opportunity for the individual to prevent or correct the error. Although this seems fair, it is sure to create a disadvantage for the average consumer who has become accustomed to clicking-through a Web site rapidly and without carefully inspecting its terms and conditions. Such consumers are likely to click "yes" on the "Are you sure?" screen long before giving pause to consider whether they had made any mistakes along the way.

The focus of subsection 10(2) is solely on human errors in automated transactions. However, in addition to situations where an individual transmits an offer or an acceptance by accident, it is also possible that an electronic agent might malfunction or, more likely, function properly though unpredictably to transmit an offer or acceptance that was unintended, unforeseen or unauthorized by the person on whose behalf the electronic agent was operating. Nothing in this provision or in any other section of *UETA* contemplates this possibility. Aside from its potential to yield unjust results, the failure to include electronically generated mistakes in this section might provide a disincentive to merchants in electronic commerce. Merchants would be hesitant to utilize autonomous agent technology if that technology is given an unlimited power to bind them, regardless of the circumstances of the transaction.

4.3. *The proposed Uniform Computer Information Transactions Act (UCITA, 1999)*

The National Conference of Commissioners on Uniform State Laws (NCCUSL) and the American Law Institute have been working for several years on a set of coherent legal

standards to support electronic transactions. Originally, it was thought that the proposed legislation would be incorporated into the *Uniform Commercial Code* as Article 2B. However, on April 7, 1999, it was announced that the NCCUSL would promulgate legal rules regarding computer information transactions as a separate Act entitled *Uniform Computer Information Transactions Act (UCITA)*. Like the *Model Law* and *UETA*, *UCITA* is being created in response to the tremendous growth in the information industry and is intended to address the need for uniformity and clarity in the online environment. The Act purports to deal with three issues of contract law that apply to electronic commerce: (i) the authentication of electronic records, (ii) the manifestation of assent, and (iii) the attribution of electronic messages. The newly proposed draft was presented at the meeting of the NCCUSL in Denver, Colorado, in July 1999. It was adopted in principle and is now is subject to revision by the NCCUSL Committee on Style. *UCITA* has been targeted for enactment in all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

Section 202 contains a general provision on contract formation which validates transactions entered into by electronic agents:

> S.202(a) A contract may be formed in any manner sufficient to show agreement, including offer and acceptance or conduct of both parties or operations of electronic agents which recognize the existence of a contract (UCITA, 1999).

The language here is somewhat different than the language found in the *Model Law* and *UETA*. S.202 (a) implies that a contract will be formed through the operations of electronic agents only if the transaction demonstrates the existence of an agreement between the parties using the electronic agents. This requirement is effective and important. It furthers the objective of creating a media neutral environment while, at the same time, harmonizing electronic commerce with the traditional approach to contract formation.

The attribution rule in *UCITA* subsection 213(a) is perhaps the most insightful and innovative provision in the existing corpus of e-commerce legislation:

> S.213(a) An electronic authentication, display, message, record, or performance is attributed to a person if it was the act of that person or its electronic agent, or if the person is bound by it under agency or other law. The party relying on attribution of an electronic authentication, display, message, record, or performance to another person has the burden of establishing attribution (UCITA, 1999).

The first sentence in subsection 213(a) is generally meant to parallel Article 13 of the *Model Law* and section 9 *UETA*, but it does contain a major addition. The provision attributes the operations of an electronic agent to its originator where he or she is otherwise "bound by it under the law of agency or other law". By including agency law as part of its attribution procedure, the drafters of *UCITA* contemplate that future electronic agents might operate as autonomous commercial intermediaries, i.e., that future electronic agents will have the power to unilaterally alter the legal positions of their originators. In so doing, *UCITA* recognizes that the future sophistication of the technology might make it disingenuous, if not commercially disadvantageous, to treat the operations of an electronic agent as though it were "a mere extension of the person utilizing it" (UCITA, 1999). In essence, UCITA's extension of agency law to intelligent agent technology provides a legal principle

by which the liability of an originator can be limited in circumstances where the automated transaction is unintended, unforeseen or unauthorized by its human originator. Such a provision provides the type of legal safeguard that is necessary for cautious merchants in electronic commerce—who might otherwise hesitate to use agent technology if the attribution rules provide electronic agents with an unlimited power to bind them regardless of the circumstances of the transaction.

Nevertheless, there are several respects in which section 213 is problematic. First, it is not clear that a person would be bound by an *electronic agent* under the traditional law of agency. The doctrinal difficulties enumerated in section 3 above might preclude the possibility of invoking the law of agency without an additional deeming provision that would make it applicable to electronic agents. Section 213 does no such thing. Second, subsection 213(a) fails to articulate the relevant principles of agency to be applied in electronic commerce. What of the agency law rules dealing with the relationship between agent and originator? Are those rules relevant? Can agency law be invoked to the effect that duties are owed to the electronic agent by the person using it or *vice versa*? And what about the possibility of duties owed by an electronic agent to a third party? By referring to the law of agency without articulating which aspects of it are relevant, the above provision confuses the law of electronic commerce, rather than clarifies it.

The remainder of section 213 pertains to the rules surrounding an attribution procedure chosen by the parties themselves. These rules are similar to the *UCITA* attribution procedure outlined above. As will be discussed in Section 5.3 below, it is important for software creators to incorporate such procedures into the terms of software-generated offers.

UCITA section 107 sets out the conditions under which a person will be bound by the operations of an electronic agent. That provision specifically contemplates the possibility of *autonomous* electronic agents by stipulating that "even if no individual was aware of or reviewed the agent's operations or the results of the operations" (UCITA, 1999). It enumerates three uses of electronic agents in electronic commerce. First, electronic agents can be used to authenticate records either by electronically signing documents on a person's behalf or otherwise. Second, an electronic agent can be used to perform certain contractual duties. If the transaction involves an exchange of information, or information in exchange for something else, there are circumstances in which an electronic agent can perform some or all of the obligations undertaken by the person for whom it is operating. For example, a Web-based music provider can employ an electronic agent in conjunction with MP3 technology to fill orders without human oversight or intervention (Rafter et al., 1997). Third, in addition to authenticating records and performing contractual duties, electronic agents can be used to manifest a person's assent. Although it is presently nonsensical to say that an electronic agent has the capacity to consent to contract on its own, it makes perfect sense to say that an electronic agent can be used to manifest the assent of the person originating its use.

UCITA goes further than any of the other proposed legislation by virtue of the fact it defines the contractual notion of a "manifestation of assent" in the context of electronic commerce. Section 112 stipulates that an electronic agent manifests assent on behalf of the person using it if, "after having an opportunity to review" a record or term, the electronic agent authenticates it or "engages in operations that the circumstances indicate constitute

acceptance" (UCITA, 1999). This provision attempts to make it clear that the manifestation of assent requires circumstances that constitute a person's acceptance of an offer. The subsection would be improved if it more clearly indicated that the manifestation of a person's assent is sometimes made *through* an electronic agent, though never *by* an electronic agent. Besides improving the language, that change would allow for contractual liability to be limited to only those instances in which a person intended to manifest assent through the electronic agent. This would justly accommodate situations in which an electronic agent's manifestation of a person's assent is unreliable.

Like *UETA*, *UCITA* also recognizes that electronic commerce is likely to generate errors that will not be immediately detected by electronic agents. It therefore contains a similar attribution procedure for the detection of changes and errors. Unlike section 10 of the *UETA* cited above, *UCITA*'s error provision applies only in the case of consumer transactions. Still, it will not permit a consumer to avoid an automated transaction merely because he has changed his mind. Although the section appears to contemplate "errors created by a consumer using an information processing system", it fails to provide a mechanism that would allow the party using an electronic agent to avoid transactions where a machine generated error has occurred. Fortunately, such a mechanism is contemplated in *UCITA* section 206. This section states that a contract may be formed by the interaction of electronic agents and that the contract's existence is established when performance commences but not if "the operations resulted from fraud, electronic mistake or the like" (UCITA, 1999). A provision that contains a mechanism for limiting contractual liability in the case of computer generated mistakes is extremely important, yet this seems to be the only proposed legislation that addresses the issue. Unfortunately, the term "electronic mistake" is not defined anywhere in the *UCITA*.

5. Ensuring the success of agent technology in the formation of online contracts

Although the creators of software applications for electronic commerce tend to focus on the development of protocols, programming and design architectures, it is clear from the above discussion that successful software applications must include processes that fulfil a number of legal requirements. Unless they do, the merchants and consumers using these applications will be unable to fully enjoy the benefits of automation. Without satisfying the statutory attribution requirements, the contract formation process will be defective, rendering agent-generated transactions legally unenforceable. The following guidelines aim to facilitate the software creators in achieving the successful formation of online contracts through automated means.

5.1. *Ensure that the electronic agent manifests the originator's assent*

In the development of negotiation protocols, software creators should remember that the primary role of an intermediary in a commercial transaction is to manifest the assent of the person on whose behalf the intermediary is operating. In some cases, an intermediary will function as a buyer; in others cases, as a seller. In either case, the intermediary must

indicate in some manner that its originator intends to be bound by the stipulated terms. If the intermediary is putting forth a contractual offer, each term of the offer must be clearly stated. In the context of online agreements, this means that all of the terms and conditions should be in plain view since the courts are unlikely to incorporate inconspicuous terms into an agreement. The offer should also indicate that a reply intimating its acceptance will bind the person on whose behalf acceptance has been communicated. Likewise, if the intermediary is accepting an offer on behalf of its originator, the intermediary must indicate that it accepts the terms *as offered*. A failure to accept the terms as offered is generally understood as a counter-offer and will have the legal effect of extinguishing the original offer. One obvious but important implication of this is that, in addition to knowing what terms are acceptable to its originator, a software intermediary must have the means by which to read and recognize all of the terms put forth in an offer. Without the ability to do so, the contract formation process is jeopardized.

Given the limited 'intelligence' and 'autonomy' exhibited by the current generation of electronic agents, there are few, if any, difficulties pertaining to the manifestation of assent. But as the technology improves along both of these axises, it will become much more difficult to prove that the operations of the agent are a manifestation of the originator's assent. Especially if the technology develops in such a way that intelligent agents are able roam a network in search of transaction partners without any pre-existing commitment to the same rules of engagement as those preferred by their originators or by the agents encountered along the way. The authority principle derived from the law of agency found in *UCITA* subsection 213(a) may be of some assistance. However, it could turn out that other means of restricting the scope of the originator's liability are necessary. Much will depend on the levels of intelligence and autonomy demonstrated by the technology. In any event, software creators working with applications that learn a user's preferences over time (in order to negotiate contracts the terms of which would be unknown to the originator until after they are completed) will want to build into the design of the negotiations a mechanism that makes manifest the fact that the electronic agent has been given a general authority to contract on the originator's behalf.

5.2. *Employ mechanisms that will avoid liability for electronic errors*

There are two sources of error in an electronic transaction. The first source of error is a human generated mistake. For example, it is easy to imagine a person hitting the wrong key or clicking a mouse on the wrong spot on a screen and, by so doing, sending a communication that could carry with it legal consequences. According to provisions contained in each of the proposed electronic commerce statutes discussed above, where an electronic document is mistakenly created or sent in error by a human, the person who sends it can avoid the transaction under certain circumstances. In order to do so, the individual must be able to demonstrate three things. First, that the mistaken individual gave notice of the error as soon as practicable. Second, that the individual responded to the other party's instructions re: the return of the item, etc. Third, that the individual did not obtain a benefit as a result of the mistake. Even if the mistaken person can demonstrate these three things, it is important to note that the proposed legislation provides a mechanism whereby the

merchant using an automated agent can preclude the consumer from asserting the mistake. According to the proposed legislation, so long as the automated agent provides a method of preventing or correcting the error (for example, if it includes a message on a screen saying "You have ordered item X at $Y. Is this correct?"), the consumer who confirms the transaction will be unable to assert the defence of mistake. As a result, the consumer would be bound by the terms of the transaction. This provision extends a measure of security to online merchants against allegations of mistake. But the merchant can take advantage of this security only if the software creator has incorporated an error-prevention mechanism into the design of the transaction. The incorporation of an error prevention mechanism is therefore extremely important since it encourages good business practices and protects the interests of all parties.

The second source of error in an electronic transaction is a machine-generated mistake. To continue the above example, an electronic agent may not be programmed in a manner capable of responding to certain messages sent by a consumer (such as a message sent by a mistaken consumer who replies by typing, "Oops—I didn't mean that"). As discussed, many of the proposed e-commerce statutes contain an error provision that can accommodate such situations. Still, the current versions of most of these statutes do not yet contemplate situations where the machine-generated error is the result of an electronic agent operating autonomously, i.e., entering into a contract on terms not previously contemplated by its originator. The creators of truly autonomous agents must be cautious of such situations. One safeguard, similar to the one suggested at the end of section 5.1, is to include a mechanism that provides the other party to the transaction with reasonable notice of the fact that the electronic agent is operating autonomously and that the transactions entered into are subject to the consent of its originator. The effect of such notice is to shift the onus to the other party, who must now ensure that the originator consents to the transaction. By providing such notice, the software creator makes it unreasonable for the other party to rely on the transaction without first confirming that the originator has consented to its terms.

5.3.   *Devise an express attribution procedure*

The attribution rules discussed above in section 4 should be understood merely as *default rules*. In other words, the parties to a transaction can choose to adopt an attribution procedure of their own in place of the statutory rules set out above. It is only by default, i.e., when the parties fail to adopt their own attribution procedure, that the statutory rules are invoked.

The aim of adopting an express attribution procedure is to provide a mechanism by which the parties are able to verify that an electronic event is attached to a specific person or to detect changes or errors in the information. Such procedures might require the use of algorithms or other codes, an ability to identify words or numbers, the use of encryption, callback or other means of acknowledgement. According to *UCITA* subsection 215(b), if the parties agree to an attribution procedure to verify the person from which an electronic event comes, the record is attributable to the person identified by the procedure, if the party relying on that attribution procedure satisfies the burden of establishing that: (a) the

attribution procedure is commercially reasonable; (b) the party accepted or relied on the electronic event in good faith and in compliance with the attribution procedure and any additional agreement with or separate instructions of the other party; and (c) the attribution procedure indicated that the electronic event was that of the person to which attribution is sought.

Therefore, in order to prevent a party transacting with an electronic agent from disclaiming contractual liability as against its originator, software creators must include a commercially reasonable attribution procedure as part of the terms being offered by its electronic agent. Including a commercially reasonable attribution procedure is the only way that the creators of agent applications can ensure that consumers and merchants using their products are legally entitled to the contractual rights negotiated for on their behalf by those agents.

6.   Conclusion

This article has endeavored to facilitate software creators in achieving the successful formation of contracts through automated means. Although software designers are generally focussed on the technical details of computer and information science, this article aims to demonstrate that the creators of agent applications for electronic commerce must also be cognizant of the legal constraints generated by the requirements of traditional contract doctrine. Despite the fact that legislation has been proposed to solve a number of the traditional difficulties that arise in the context of automated electronic commerce, the proposed legislation also creates a number of new legal requirements that must be taken into account in the design of agent applications, in order to ensure the successful formation of online contracts. It is therefore useful for programmers and software creators who are developing e-commerce applications to take notice of these requirements and to design their applications in accord with the guidelines that have been offered above.

Acknowledgements

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Ian R. Kerr B.Sc. (Alberta), B.A. (Hons., Alberta), M.A. (U.W.O.), LL.B. (U.W.O.) in Ph.D. and philosophy of law (U.W.O.). He is an Associate Professor at Faculty of Law, University of Ottawa.

Prior to his appointment at the University of Ottawa, Ian Kerr was jointly appointed to the Faculty of Law, the Faculty of Information & Media Studies and the Department of Philosophy at the University of Western Ontario. He is a past recipent of the Bank of Nova Scotia Award of Excellence in Undergraduate Teaching, the University of Western Ontario's Faculty of Graduate Studies' Award Teaching Excellence, the Professor of the Year at Western's Faculty of Law, as well as several prestigious fellowships and research grants. Professor Kerr currently teaches in the areas of Internet law, law and technology, contract law, and legal theory.

His primary areas of interest lie at the intersection of media, technology, private law and applied ethics. He has published writings in academic books and journals on ethics and electronic information, Internet regulation, e-commerce, Internet service providers, online defamation, pre-natal injuries, unwanted pregnancies, and the judicial use of legal fictions. His current program of research focuses on electronic commerce and other legal and ethical issues in multi-media, including work on Internet service provider liability, the ethics of automation, the legal ramifications for businesses who use automated software devices, contact formation in cyberspace, and online defamation.

Dr. Kerr is a member of the Law Society of Upper Canada, EPIC (the Ethics and Policy Issues Centre), The Canadian Association of Law Teachers, The Canadian Bar Association, and the Uniform Law Commission of Canada's Special Working Group on Electronic Commerce. He is an Associate Editor of Kluwer's Electronic Commerce Research journal, sits as a member on the Advisory Board for Butterworths' Canadian Internet and E-Commerce Law Newsletter and is co-writing a textbook for Prentice-Hall on the legal aspects of doing business.