THE VALIDITY AND LIMITATIONS OF SOFTWARE AGENTS IN CONTRACT FORMATION

A brief discussion under the Electronic Transactions Act in Australia

This paper discusses the legal position of software agents under the recent changes to the Electronic Transactions Act which changes are designed to put into effect the obligations detailed in the UN Convention on the Use of Electronic Communications in International Contracts

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The Validity and Limitations of Electronic Agents in Contract Formation.

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Section 1: Introduction

In 1999, the US National Conference of Commissioners on Uniform State Laws settled the then proposed "Uniform Electronic Transactions Act (1999)" (UETA). The UETA model has now been adopted by 48 of the 50 US states[2]. One of the novel aspects of the UETA model was that it was the first legislative regime to enshrine in legislation the concept of contracts being established without any human intervention. It did this by acknowledging the use of electronic agents[3] and recognising that the contracts can be formed through use of such electronic agents[4]. Now, such contracts had been created by commerce for some time. For example, contracts created via Electronic Data Interchange (EDI) had been enforced by commerce since the early 1970s.

The difference between what was being recognised under the UETA and EDI contracts was that under an EDI arrangement the contracting parties had pre-negotiated and settled on a trading partner's agreement, which detailed their respective obligations arising out of the interchange of certain data. Thus, the resulting contractual terms arising out of the exchange of data had been settled even before the parties had exchanged data via the EDI system. The UETA provision envisioned the prospect of a new contract being established without any prior human involvement or negotiation.

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[1] Ph.D., LL.B. (Hons), B. App. Sc. (Computing)

[2] Notification by the National Conference of State Legislators
http://www.ncsl.org/issues-research/telecom/uniform-electronic-transactions-acts.aspx

[3] Section 2 defines an electronic agent as follows:

> "**Electronic Agent**" means a computer program or an electronic or other automated means used independently to initiate an action or respond to electronic records or performances in whole or in part, without review or action by an individual.

[4] See **section 14 UETA**:

SECTION 14. AUTOMATED TRANSACTION.

In an automated transaction, the following rules apply:

(1) 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.

(2) 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.

(3) The terms of the contract are determined by the substantive law applicable to it.

The United Nations in the "UN convention on the Use of Electronic Communications in International Contracts 2005" (the Convention) accepted this concept but instead of looking at the formation of a contract in a positive manner, the framers of the Convention approached the contract formation from a negative position. That is, the framers expressed the concept by stating that a contract is not invalidated simply through the use of automated message systems.   This approach is expressed in *Article 12* of the Convention as follows:

> *Article 12.   Use of automated message systems for contract formation*
>
> *A contract formed by the interaction of an* **automated message system** *and a natural person, or by the interaction of* **automated message systems**, *shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the* **automated message systems** *or the resulting contract. [emphasis added]*

An **automated message system** is defined under the Convention as follows:

> *"Automated message system" means a computer program or an electronic or other automated means used to initiate an action or respond to data messages or performances in whole or in part, without review or intervention by a natural person each time an action is initiated or a response is generated by the system;*

This definition anticipates some communication pathway, which may not necessarily be how an electronic agent operates or is deployed. The definition is focused of the transmission of data messages which could bring into play the issue of jurisdiction where the parties/electronic agents/automated message systems are located in separate jurisdictions. The issue of instantaneous communications involving offer and acceptance then comes into play under the *Entores Ltd v. Miles Far Eastern Corporation*[5] position. But what happens if there is no communication pathway involved. This may arise through the utilisation of mobile software agents combined with an anchor software agent. (This is discussed more fully below.)

 As a result of Australia agreeing to accede to the Convention, various Parliaments in Australia (Federal, State and Territory) have amended their respective Electronic Transaction Acts (as at the date of this paper only Queensland has failed to enact the relevant provision to comply with the Convention) to ensure that the Convention is adhered to. That is, the principal legislative position in Australian is to ensure that the utilisation of an automated message system will not itself invalidate the resulting contract. Now there may be other reasons that could impact the formation of a contract. All that has been enacted by the various parliaments in Australia is that invalidity will not arise solely if an automated massage system was involved in the formation of a contract. Another interesting aspect of the Australian enactments is that even though the Convention appears to be directed at international contracts the enactments in Australia are not so restricted. That is, any

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[5] [1955] 2 QB 327

contracts whether international or domestic will not be invalid solely if an automated message system (s) is involved.

This paper will first briefly examine in section 2 the formation of contracts via human agents. The paper will then proceed to examine in section 3 from a technical perspective what an electronic agent is and how they are developed and deployed. Section 4 will examine in greater detail the legislative approaches and finally section 5 what difficulties remain.

Section 2: Human Agents

The law of agency is sophisticated and complex. The term "agent" is derived from the Latin word "agere", which has various meanings including "acting" or "work".[6] According to the American Law Institute's Restatement of the Law – Agency is defined as:

> *The fiduciary relationship that arises when one person(a 'principal') manifests assent to another person (an 'agent') that the agent shall act on behalf and subject to the principal's control and the agent manifests assent or otherwise consents so to act.[7]*

The main characteristics gleaned from this definition is that the relationship is a fiduciary relationship, by which both parties need to manifest some consent[8] to which one person (the agent) will act on behalf of another person (the principal). It may seem an easy task to identify when an agency relationship arises but as Lord Herschell noted in *Kennedy v. De Trafford*[9]:

> *No word is more commonly and constantly abused than the word "agent". A person may be spoken of as an' agent' and no doubt in the popular sense of the word may properly be said to be an 'agent', although when it is attempted to suggest that he is an 'agent' under such circumstances as create the legal obligations attaching to agency that use of the word is only misleading.*

Whether an agency is established is a question of law. It does not matter what designation the parties may call each other or what they may call their relationship the issue of an agency will always be decided by the law[10]. For example it is clearly understood that a company cannot act in its own person for it has no person. It requires the assistance of some human agent or agents to manifest any and all corporate intent. The highest human agent acting for a company is the Managing Director but there are many other legal examples dealing

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[6] Wettig, S., and Zehender, E., "A Legal Analysis of Human and Electronic Agents", Artificial Intelligence and Law, (2004), 12, 111-135. Springer,

[7] §1.01 Definition of Agency (Agency Defined)

[8] See also Garnac Grain Co, Inc v. HMF Fauvre and Fairclough Limited [1968] AC 1130 where Lord Pearson stated that:
The relationship of principal and agent can only be established by the consent of the principal and the agent. … the consent must have been given by each of them, either expressly or by implication from their words or conduct.

[9] [1897] A.C. 180

[10] See Potter v. Customs & Excise Commissioners [1985] STC 45 @ p 51 per Sir John Donaldson MR.

with the binding of a company to some contractual obligation. For example, a warehouse manager who has been designated by corporate management with the relevant authority to sign for deliveries acts as an agent for and on behalf of the company to bind the company to the terms and conditions detailed on the accompanying delivery docket. Such binding will arise even if the relevant warehouse person does not even read the delivery terms and condition printed on the invoice/delivery docket[11].

One of the essential elements of agency is that a duly authorised agent cannot generally be sued or sue upon the terms and conditions of the relevant contract.[12] Now if an agent is acting on behalf of an undisclosed principal then the agent will initially be bound until such time as the principal comes forward and discloses him/herself to the other party to the contract. It is the binding of the principal to the contract that creates the liability. As a result of this, an agency relationship affects 3 parties namely; the principal, the agent and the third party (ies) who is/are the other contracting party (ies). Gummow J. of the Australian High Court in *Scott v. Davis*[13] explained this relationship as follows:

> *There is considerable terminological confusion in this area. The term 'agency' is best used, in the words of the joint judgement of this Court in International Harvester Co. of Australia Pty Ltd v. Carrigan's Hazeldene Pastoral Co, 'to connote an authority or capacity in one person to create legal relations between a person occupying the position of principal and third parties'.[14]*

Now, what arises if a person honestly believes that they have the authority to act as an agent for a principal but that belief is mistaken? Now there are three parties disadvantaged in this situation. Some may say that all three parties involved are innocent. The principal does not want to be held accountable for any contractual obligations that he did not either expressly or by implication authorise the mistaken agent from entering into on his/her behalf. The principal has not in these cases exhibited any intent to create legal relations and as such should not be held accountable. Assuming the other contracting party has no idea of the mistake, he/she will be entering into a contract on the basis that it is enforceable against the principal. The mistaken agent though acting under an honest belief does not want to be held accountable and become bound by a contract that he/she did not intend to be bound by. This issue first arose in the case of Collen v. Wright[15], where Willes J., stated as follows:

> *[A] person, who induces another to contract with him as the agent of a third party by an unqualified assertion of his being authorized to act as such agent, is answerable to the person who so contracts for any damages which he may sustain by reason of the assertion of authority being untrue.*
> *...The obligation arising in such a case is well expressed by saying that a person, professing to contract as agent for another, impliedly, if not expressly, undertakes to or promises the person*

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[11] [1934] 2 KB 394, per Scrutton LJ
[12] See Phonogram Limited v. Lane [1982] 3 CMLR 615 per Lord Denning MR.
[13] (2000) 204 CLR 333
[14] Ibid @para 227
[15] (1857) 8 EI BI 647; 120 ER 241

who enters into such contract, upon the faith of the professed agent being duly authorized, that the authority which he professes to have does in point of fact exist.

This position at law has been affirmed many times since its first pronouncement not only in the UK but also in Australia; as recently as in the High Court case of *Black v Smallwood* [16] and in the New South Wales Supreme Court in the case of *Commonwealth Bank of Australia Limited v. Hamilton*[17]. The liability placed upon a person who is incorrectly holding her/himself as an authorised agent is a strict liability. That is, as Buckley L J in *Yonge v. Toynbee*[18] said:

… the liability of the person who professes to act as agent arises (a) if he has been fraudulent, (b) if he has without fraud untruly represented that he had authority when he had not, and (c) also where he innocently misrepresents that he has authority where the fact is either (1.) that he never had authority or (2.) that his original authority has ceased by reason of facts of which he has not knowledge or means of knowledge. Such last-mentioned liability arises from the fact that by professing to act as agent he impliedly contracts that he has authority, and <u>*it is immaterial whether he knew of the defect of his authority or not.*</u> *[**emphasis added**]*

Consequently, the principle under *Collen v. Wright* is a strict liability and it is immaterial whether the alleged agent knew of the defect on his/her authority or not. This position is understandable as there is in the case of a mistaken agency three innocent parties namely; the so called principal who could be bound by an obligation he/she did not authorise, the third party to the alleged resulting contract and the innocent but mistaken person who has falsely claimed to an authorised agent. The onus should from this scenario be placed upon the so called agent to show that they either have expressed authority or implied authority to act as an agent. The so called false agent is the best person to ensure that they have such authority immediately prior to the contract being entered into. Hence a strict liability position arises.

From the brief discussion above the following can be concluded:

- An agent is a person who acts on behalf of another (the principal) to bind the principal to some obligation (s);
- Both the principal and the agent both need to manifest either expressly or by implication their respective consent to the agency relationship;
- Irrespective of what the parties call their relationship, their relationship will be determined as a question of law. That is, it is a question of law whether an agency relationship exists.

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[16] [1966] HCA 2; (1966) 117 CLR 52 per Windeyer J:
"The principle of *Collen v Wright* is of very general application: *[citations omitted]*, which, whether or not an extension of earlier doctrine...must I respectfully think be taken as correctly stating he law..."
[17] [2012] NSWSC 242, Price J.
[18] [1910] 1 KB 215 which was cited with approval by Price J ibid

- Generally, only the principal will be bound by the agents actions in binding the principal to some contractual obligations;
- The agent and the principal must be entities recognised by law;
- A person who mistakenly claims to be an authorised agent, but is not, will be held accountable for breach of warranty of authority.
- The liability for breach of warranty of authority is a strict liability regime based of contract law.

As noted above the amendment to the various ETAs in Australia have adopted the negative (invalidity) position to contract formation:

> *Section 15C:*
>
> *A contract formed by:*
>
> *(a) the interaction of an automated message system and a natural person; or*
>
> *(b) the interaction of automated message systems;*
>
> *is not invalid, void or unenforceable on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message systems or the resulting contract.*

It then arises as to what is the legal position when it comes to the use of software agents. Taking into account that a software agent is not an entity recognised at law what is the legal position should a software agent escape or be invalidly released and negotiates a contract that the principal later desires to repudiate. Now this could arise, where, due to insufficient security, a hacker somehow activates a software agent that negotiates a contract that the principal did not authorise. Similar to the *Collen v. Wright* the principal and the third party are in effect innocent parties to the transaction. Where should the liability lie? Should the principal be subject to strict liability simply because they have a software agent embedded on the information system or should the liability be couched in the form a duty of care? That is, provided the principal has implemented reasonable security measures then should the principal be able to avoid liability.

Further, being a software agent the rules of communications as detailed in the various Australian Electronic Transactions Act and UETA may apply. But as will be discussed it will entirely depend on how the software agent is actually deployed. That is, from a technical perspective, the type of software agent will impact upon such issues as jurisdiction when it comes to acceptance of an offer.

Section 3: Electronic Agents - Technical characteristics

From a technical perspective the term "software agent" has not a settled definition[19]. The first thing to note is that even though the terms "software agent" / "electronic agent" / "automated message systems" are

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[19] Ahuja, P., and Sharma, V., "A Review on Mobile Agents Security", International Journal of Recent Technology and Engineering (IJRTE), ISSN: 2277-3878, Vol 1, Issue 2, June 2012.

recognised and defined respectively within the UETA, the ETA and the Convention, at no stage as such computer programmes afforded the status of a legal entity recognised by law. That is a software agent/electronic agent/automated message system differs substantially from its human counterpart in that such technical mechanism cannot be sued or commence proceedings in their own "inanimate right"[20].

The reason for this failure of a settled definition of software agent is primarily due to the interdisciplinary research (artificial intelligence, social science, information systems science, computer science, business administration science, economics and law). Software agents are regarded as prime research material because of their utility within these diverse disciplines. Each discipline has taken a slightly different and distinct definitional approach to describing what a software agent is. The scope of the definitions substantially overlap. It is outside the purview of this paper to analyse all of these various approaches. Hence, for the purpose of this paper, the definition adopted will be: "Software/electronic[21] agents are programs that react autonomously to changes in their environment and solve their tasks without human intervention".[22] Franklin & Graesser have developed a taxonomy covering "software agents," which details the characteristics that they believe should be exhibited by a fully functioning software agent. These ideal characteristics are as follows:

- Autonomous - execution without human intervention;
- Social/communicative – ability to interact with other agents;
- Reactive/responsive – ability to understand their environment and react to changes;
- Proactive – ability to take steps to change their environment;
- Adaptive – ability to adjust behaviour over time;
- Goal oriented/intentions – explicit plans to carry out;
- Persistence/continuous – internal state remains constant over time;
- Mobility – ability to migrate over their environment;
- Emotion –ability to express human like emotion. This may not be a characteristic that commercial organisation may desire in their software agent. For example in an auction the benefit of using a software agent is that an agent will not succumb to auction fever[23] and will at all times act objectively and in accordance to its programmed negotiation strategy;
- Intelligence - ability to reason;
- Honesty – truthful in expression.

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[20] The only aspect of law where an inanimate object can be sue is where a ship can be sued. This is a quirk of Admiralty Law which arose historically in the 18th century.

[21] In this paper both terms "software agents" and "electronic agents" may be interposed and as such their use will mean the same.

[22] Op. Cit, note 5

[23] Hayman, J., Orhun, Y., and Ariely, D., "Auction Fever: The effect of Opponents and Quasi-Endowment on Product Valuations", Journal of Interactive Marketing, V. 18, Issue 4, (2004), Wiley Online Library.

Currently many of these ideals/characteristics are not commercially available in software agent. This science is still in its infancy but the research goal is to develop a software agent that has all or at least most of these characteristics. In the meantime, elementary software agent technology is being deployed.

There are various types of software agents presently being developed. From a broad perspective, software agents can be divided into 2 categories namely; anchor software agents and mobile software agents[24]. An example of a simple mobile software agent is a search engine catalogue spider. A catalogue spider is a program that traverses the WWW and catalogues various web pages into a large database so that web users can later efficiently search the database on a particular topic. An example of an anchor software agent mechanism is EDI. EDI, as mentioned above, really involves two anchor agents that communicate utilising a specific protocol such as EDIFACT. The contracts formed via this type of arrangement do not rely upon the Convention because the parties have, prior to the formation of the first product/service contract being formed, negotiated the terms that will govern their relationship. But the development of software agents is moving from the EDI styled arrangement to the position where the parties have had no prior engagement and yet a contract will be formed utilising some automated technology. This technology is still under development but it is anticipated that within 5 – 10 years sophisticated software agents will be deployed on a regular commercial basis.

A substantial amount of research is currently being undertaken globally to progress the development and deployment of software agents. Despite this uptake in software agent research there are limited examples of flexible negotiation software agents. Vahidov et al, have identified that "*One possible explanation to the scarcity of real life ENS (electronic negotiation systems) and negotiating websites is that negotiations imply relatively high cognitive load, especially if multiple issues are involved (eg. Price, warranty, product attributes, and shipment etc.)*" [25]. As computers become more robust and faster in processing power, there will be continued advancement in this technology. In the meantime software agents can best be described as being in their elementary evolution. Consequently, if the negotiation parameters can narrowed down then there is more likely the possibility for a software agent to be commercially involved. For example, the e-Bay system is a form of software agent involving solely an anchor software agent. That is, for any auction, a participant can set the maximum amount they are willing to pay for an item and then not physically be involved in any further negotiations. If at the closing time of the auction, their maximum price is higher than the previous highest bid then they are determined by the e-bay system as the successful bidder. All negotiations involved are restricted to the price of the item and thus such a system is easier to manage from a cognitive load aspect.
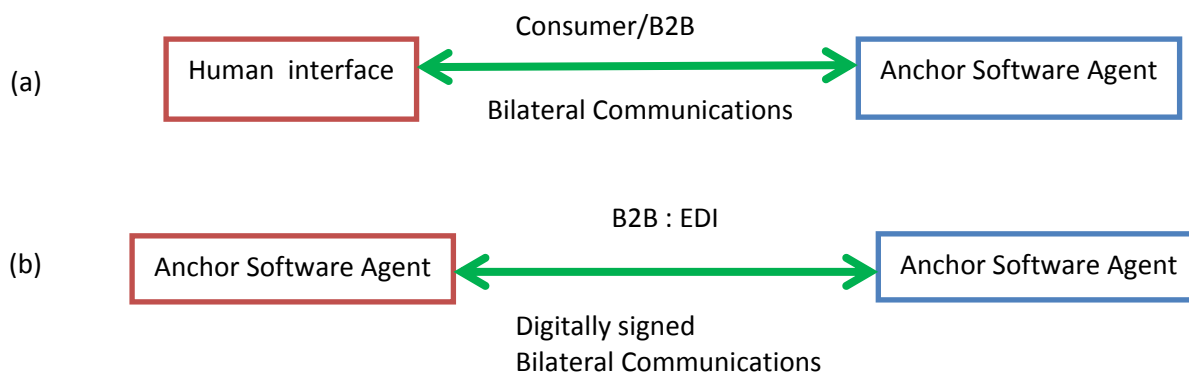
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[24] Cluman, W., Foley, T., Guttman, R., and Kupres, K., "Electronic Commerce with Software Agents" MIT – Sloan, 1997 http://alumni.media.mit.edu/~guttman/research/commerce/papers/commerce.pdf (accessed 24 January 2013)

[25] Vahidov R., and Kersten G., "Design of Software Agents – Populated Electronic Negotiation Systems and Evaluation of Human to Agent Negotiations", InterNeg Research Papers INRo9/12: Design Science Research in IS: Advances in Theory & Practice. Lecture Notes in Computer Science, 7286, 2012, pp411-422.

Further, technically there is no automated message system involved as the participant forwards the relevant parameters (maximum price, auction number, participant identifying details) to the e-bay system (anchor software agent) which then stores the parameters and monitors each bid sequentially. If the bidder's maximum price is higher than all prior bids at the auction closing time then they will be determined to be the winner but not necessarily at the maximum price set by them but at the highest amount as at the close of the auction. All, so called, negotiations occur within the framework of the anchor software agent's environment and the only communication of substance will be a notification to the eventual winner. By the time the participant is notified the contract would have already been formed. The notification really does not form part of the contract formation process. Hence it is arguable that the approach taken by the framers of the Convention may not cover the position of single anchor software agents that process simple parameter data.

The advantage of the e-bay anchor software agent is that e-bay the provider of the environment is able to manage, monitor and narrow the negotiation protocol. In effect, the e-bay anchor software agent acts as an intermediary managing all bids that may be submitted by participants. Lomuscio et al[26] identified that all automated negotiation system really involve two basic components namely: the design of the negotiation protocol and the development of negotiation strategies engine[27]. The negotiation protocol specifies the "rules of encounter" between the negotiation participants. The rules of encounter concern the protocol that defines the circumstances under which the interaction between the agents takes place: what deals can be made and what sequences of offers are allowed. An agent's negotiation strategy concerns the specification of the sequences of actions (usually offers or responses) the agents plans to undertake during negotiations.[28]
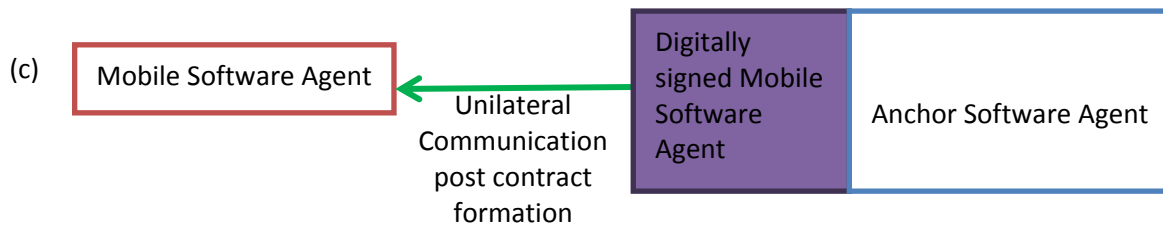
From the above discussion it is possible to describe the deployment of software agent as follows:

(a)

Human interface ⟷ Anchor Software Agent

Consumer/B2B

Bilateral Communications

(b)

Anchor Software Agent ⟷ Anchor Software Agent

B2B : EDI

Digitally signed
Bilateral Communications

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[26] Lomuscio A., Wooldridge M., and Jennings N., "A Classification Scheme for Negotiation in Electronic Commerce". Group Decision and Negotiation, (2003) 12 (1), pp31-56.

[27] Benyoucef, M., Alj, H., and Keller, R., "An Infrastructure for Rule Driven Negotiating Software Agents", Proceedings of the Twelfth International Workshop on Database and Expert Systems Applications (DEXA 2001)

[28] Jazayeriy H., Azmi-Murad M., Sulaiman Md. N., and Udzir N I., "A Review on Soft Computing Techniques in Automated Negotiation", Scientific Research and Essays, Vol.6(24), pp 5100-5106, 23 October 2011 http://www.academicjournals.org/SRE (accessed 25 Jan 2013)

(c) | Mobile Software Agent | ←— Unilateral Communication post contract formation — | Digitally signed Mobile Software Agent | Anchor Software Agent |

An example of (a) is Ebay or even Amazon web sites, which engage anchor software agents and which are designed to interact with human customers. The most common deployment of (b) above is where the contracting parties have deployed EDI technology. In this case, the EDIFACT standard accommodates digitally signed messages so that both anchor software agents are able to authenticate each party to the transactions and thus to each communication arising during the negotiations. The final position is that of (c) which is, from a technology deployment perspective, in its infancy with no current viable commercial deployments, though there are research deployments[29].   The Mobile Software Agent is expected to be a simple payload application which has a sole purpose of delivery certain contract negotiation parameters which could be expressed in XML to the corresponding anchor software agent. Further, to assist in authentication it is expected that the mobile software agent will be digitally and that the digital signature will be used to authenticate the mobile software agent by the anchor software agent. It is anticipated that by digitally signing the mobile software agent it should reduce the effective incidence of rogue mobile software agents from being be deployed by hackers to cause commercial havoc. This is assuming that the hacker has not taken control of the deploying device completed otherwise the hacker could all activate the digital signing technology. Example (c) is expected to be advanced, which within the next 10 years we should see sophisticated commercial mobile software agents being deployed. One of the key aspects will be development of standard mobile software agent negotiation protocols[30]. The interesting aspect of (c) will be that all of the negotiations could occur within the anchor software agents environment which means that there may not be an automated message system effecting the negotiations. That is, all of the negotiations occur within the anchor software agent's environment and the only communication is when the negotiations have been completed (either successfully or unsuccessfully). With negotiations completed the contract has presumable been formed prior to the mobile software agent's environment has any knowledge of such completion. Further, with a mobile software agent their main function is to carry a payload of simple data which will be interpreted by the anchor software agent. The

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[29] Ripper, P., Fontoura M., Neto, A., and Luceno, C., " V-Market: A Framework for Agent eCommerce Systems", Software Engineering Laboratory, University of Rio de Janeiro.
 Journal World Wide Web, Vol 3, Issue 1, 2000 pp 43-52, ACM : Digital Library.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2017783 (accessed 28 January 2013).
[30] Baquero, A., and Taylor, R., "A Multidimensional Evaluation of Integrated E-commerce Architectures". Institute for Software Research, University of California, Irvine. ISR Technical Report #UCI-ISR-12-9, September 2012, www.isr-uci-edu/tech-reports.html (accessed 24 January 2013)

reason for this is that the reasoning power required for even the simplest negotiations will far exceed what a mobile software agent will be capable. Finally, there could occur a security issue if the mobile software agent being an executable is allowed to process and autonomously undertake negotiations on behalf of its owner. It is unlikely that merchants/vendors would permit third parties to use an executable on their platform; especially in light of recent hacker attacks involving such malware as key-stroke monitors as well as others. Consequently, the capability of mobile software agents will be high restricted and controlled within the anchor software agent's environment.

Section 4: Legal position of Electronic Agents

As noted above the UETA was the first legislative regime that recognised the use of software agents in the formation of contracts. This was followed by the incorporation of this concept within the Convention which has been adopted in Australia by the Federal Parliament, all Territory Parliaments and all State Parliaments (except Queensland). There does not appear to be any reason why the Queensland Parliament has failed to incorporate the Convention changes as these changes could be described as being uncontroversial. The following is a brief discussion on the use of software agents within the formation of contracts.

Uniform Electronic Transactions Act

The commentary that accompanies section 14 of the UETA explains that this section was designed to negate any arguments concerning a lack of intent that is required in the formation of a contract. Traditionally, the five basic elements in the formation of contracts at common law are:

1. Offer
2. Acceptance;
3. Consideration;
4. Intention to create legal relations; and
5. Capacity.

It is item (4) that *section 14* of the UETA principally addresses. According to the commentary to the UETA, the requisite intent flows from the programming and use of the machine (software/electronic agent)[31]. By analogy it could be said that example (a) above is similar to the use of vending machines whereby a human engages with a machine to purchase some item[32]. The courts have accepted this type of transaction since the early 1960's. An example of this is the Californian case of *Steven v. The Fidelity and Casualty Company of New York*

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[31] In Australia the rational expressed in the UETA commentary may not apply, due the High Court case of Kennison v. Daire (1986) 160 CLR 129. This case does not deal with contractual intent. Instead it deals with the failure to sheet home to a bank the requisite intent to pass property rights in money when a former customer using his ATM card withdrew a sum a money from an ATM machine at 2 am in the morning that had been programmed to do so. The case is a larceny case.

[32] Hunter, R., Amoroso, H., and Shannon, J., " A managerial Guide to Product Liability: A Primer of the Law in the United States". International Journal of Learning & Development, 2012, Vol. 2. No. 3.

et al.[33] It appears from this case that a contract of insurance could be contracted via a vending machine. The insurance was held accountable for the obligations of insurance even though the contract was formed via a vending machine and no human was involved from the insurance company's perspective at the time the contract was created. This case was decided on other issues which do not concern the argument within this paper.

As noted by Moringello & Reynolds[34], "*The law must be sensible and stable if parties are to have confidence in the security of their arrangements; but contract law also must be able to handle changing social and economic circumstances.*"   An example of the advancement of contract law has also been through the use of so called "click wrap contracts[35]" and "browser wrap contracts"[36]. Further as the Canadian case of *Century 21 Canada Limited Partnership v. Rogers Communications Inc. et al* [37]when dealing with the use of a software agent noted:

> *The ability of the law to adapt is part of its strength. Technological innovation tests that resilience. This case considers that ability as claims for breach of contract, trespass to chattels and copyright infringement meet the Internet. At the root of this lawsuit is the legitimacy of indexing publically accessible websites. (Para 1).*

The definition of "electronic agent" provides that a contract can be formed even though either party may have negotiated the resulting contract through the use of a software program. The framers of the UETA have taken a positive approach by making sure that a contract can be form via the use of a software program that is designed to negotiate contracts. The UETA also provides that the existing substantive law remains unchanged which supposedly results in the retention of the common law rules dealing with invalidity and unenforceability of contractual arrangements.   Further, the UETA only applies to transactions related to business, commercial (including consumer) and governmental matters.   That is, it applies to both domestic and international contracts formed via electronic means.

The Convention

The scope of the Convention is to cover the "*use of electronic communications in connection with the formation or performance of a contract between parties whose places of business are in different States[38]*". Furthermore, the convention specifically provides that it does not apply to contracts "*concluded for personal,*

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[33] 58 Cal.2d 862 (1962)

[34] Moringello, J., and Reynolds, W., "From Lord Coke to Internet Privacy: The Past, Present and Future of the Law of Electronic Contracting", SSRN,
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2017783 (accessed 28 January 2013)

[35] *Hotmail Corp. v. Van$ Money Pie*, No. 98-20064, 1998 WL 388389 (N.D. Cal. Apr. 16, 1998)

[36] *Specht v. Netscape Communications Corp*, 150 F.Supp.2d 585 (S.D.N.Y. 2001), *affirmed*, 306 F.3d 17 (2d. Cir. 2002)

[37] Century 21 Canada Limited Partnership v. Rogers Communications Inc., 2011, BCSC1196.

[38] Chapter 1, Article 1, Clause 1. Of the Convention.

family or domestic purposes". This undoubtedly means that the vast majority of commercial transactions are not intended to be covered by the Convention. For example, the international purchase of a book from Amazon Inc. is not intended to be covered by the Convention.

Chapter II, Article 4, introduces the concept of an "automated message system" as a *"computer program or an electronic or other automated means used to initiate an action or respond to data messages or performances in whole or in part, without review or intervention by a natural person each time an action is initiated or a response is generated by the system"*. The impact of this definition is to cover technology that can undertake automatic negotiations and conclusion of contracts without the involvement of a person, at least on one of the ends of the negotiation chain.[39] This term is primarily invoked in Article 12 "*The use of automated systems in contract formation*". The framers of the Convention have approach the contract formation from an invalidity position. That is "*a contract formed by the interaction of an automated message system and a natural person, or by the interaction of automated message systems, shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message systems or the resulting contract*". The benefit of this approach is that it is clear from its natural language, that there may exist other reasons, which could impact upon the validity of a contract formed via electronic means. What is certain is that validity or invalidity will not arise solely through the use of an automated message system.

Even though current electronic/software agent technology is not very sophisticated it is expected that in the not too distant future, such technology will be able to act autonomously and be able to conclude fairly complex contracts. The explanatory notes to the Convention (para. 211) contemplates that *"at least in theory it is conceivable that future generations of automated information systems may be created with the ability to act autonomously and not just automatically. That is, through developments in artificial intelligence, a computer may be able to learn through experience, modify the instructions in its own programs and even devise new instructions"*.

In light of this, it is contemplated by the Convention and any legislative implementation of the Convention by member States that the resulting legislative regime will be flexible enough to cover autonomous software agents and their use will not invalidated any contracts so formed.

Electronic Transactions Acts in Australia

The explanatory memorandum to the *Electronic Transactions Amendment Act 2011* (the Amendment) provides that the Amendment is aimed to *"enhance legal certainty and commercial predictability but does not otherwise purport to vary or create contract law"*. Even though the Convention was designed to cover international transactions the Amendment is to cover all electronic transactions. This is, it is submitted, a

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[39] See Para. 103 of explanatory noted to the Convention.

sensible position as commerce is not required to apply two distinct rules; one for domestic electronic transaction and another for international electronic transactions. Another departure from the strict scope of the Convention is that the Amendment applies to all electronic transactions including personal, family and domestic transactions. The rationale behind this departure from the Convention is that consumers are provided adequate protection under the Competition and Consumer Act 2010 (Cth). On the whole the Amendment enacts the articles of the Convention and in particular new Part 2A incorporates new provisions which according to the Explanatory Memorandum will apply in general terms. Consequently new section 15C follows substantially the provisions detailed in Article 12 of the Convention.

Despite the enactment of the Amendment, there remain some outstanding issues which have not been addressed by either the Convention or the Amendment. These issues are discussed in the next section of this paper.

Section 5: Some Outstanding Issues concerning Electronic Agents

The regime dealing with the use of software agents as noted above simply provides that a contract will not be invalid simply because a software agent was used by either of both parties who are bound by the terms and conditions of the contract. The impact of the new regime covering contract negotiated via electronic means is that the law now unequivocally recognises such contract formation. Despite this, there are a number of outstanding issues that require further research. It is not possible in this paper to cover or even mention all of the issues. Consequently, this paper will only deal with two issues, namely:

- Jurisdiction especially where a mobile agent is utilised; and
- Unauthorised software agents.

Some other issues that will not be discussed in this paper though warrant substantial research, are:

1. Determining the trustworthiness of software agents both from a technical perspective and legal perspective
2. Contract restrictions, for example should the law recognise a contract dealing with an interest in land formed via the use of one or more software agents;
3. As the technology matures should any further legal status such as "normative agents" be allocated to software agents[40], remembering that at common law both the agent and the principal must be legal entities. Should such status be afforded to a software agent and if so what flows from such status.
4. The recognition of "acceptance" and "intent" under the principle of Kennison v. Daire[41].

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[40] Demolombe, R., "Relationship between obligations and actions in the context of institutional agents, human agents or software agents"., Artificial Intelligence and Law, (2011), 19, pp99-115, Springer
http://www.irit.fr/page-perso/Robert.Demolombe/publications/2011/AIandLaw11.pdf (accessed 29 Jan 2013)
Lopez, F., Lopez, Y., Luck, M., and d'Inverno, M., "Normative agent reasoning in dynamic Societies", In Proceedings of the Third International Conference on Autonomous Agents and Multi-Agent Systems, IEE Computer Society, 2004.

Jurisdiction – mobile agent utilisation

The issue of jurisdiction can be decided either by law or through the parties' overt agreement. Governing law clauses have been upheld on many occasions especially where the parties have comparable bargaining power. For example, if a vendor makes it clear to all who wish to transact that the vendor will only contract provided the law governing the transaction is subject to a particular jurisdiction then it is arguable that such a clause will be upheld. Such clauses are designed to over-come a battle of the forms scenario[42] and fall within the legal framework of contracts of adhesion[43]. Now, if the contract is formed by a human and an anchor software agent programmed to negotiate on behalf of some legal entity Vendor, then the jurisdiction can be determined through a combination of interpreting the intended Vendor's term and conditions (as it is unlikely that the intended human purchaser will come armed with his/her own terms and conditions), the Electronic Transactions Act dealing with the sending and receiving of electronic communications and the common law dealing with instantaneous communications[44].

As discussed above the utilisation of mobile software agents may not result in any negotiation communications across jurisdictions. That is, all of the negotiations will occur within the anchor software agent's environment which means that the jurisdiction of the contract should be the jurisdiction where the anchor software agent is located. The rational for this position is that all of the so called negotiation will occur within the anchor softwareaAgent's environment and if such negotiations are successful then the contract should be formed prior to any communication to the owner of the mobile software agent occurs. On the other hand a court may take the view that a contract will not be formed until the final communication to the mobile software agent's owner occurs but such a position would not follow the traditions position dealing with acceptance. Acceptance of an offer must be an unequivocal communication of the terms detailed in the offer. The final communication to the owner of the mobile software agent does not fall within this traditional communication because the owner of the mobile software agent is receiving a communication of a concluded negotiation and a not an acceptance communication.

Unauthorised Software Agents

One important issue that remains unresolved is what is to occur if there is an unauthorised activation of a software agent without the principal's knowledge. The other contracting party (innocent third party) will not be in a position to validate whether the principal's software agent has been released with the consent of the principal. In effect there are two innocent parties, which is similar to the breach of warranty of authority cases but in those case there are three innocent parties.

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[41] Op. Cit. note 31
[42] Butler Machine Tool Co Ltd v. Ex-cell-o Corp (England) Ltd [1979] 1 WLR 401
[43] Hubbert v. Dell Corp., 359 Ill. App. 3d 976 (2005)
[44] Entores Ltd v. Miles Far East Corp [1955] 2 QB 327

As discussed above in a breach of warranty of authority situation if the false human agent honestly believes he/she has the requisite authority the innocent parties are:

- The principal who has no knowledge of the existence of the false agent;
- The third party to whom the false agent is negotiating with to effect a contract;
- The false agent who honestly but mistakenly believes has the authority to undertake and negotiate a contract on behalf the so called principal.

The third party, unless put on notice through some contradictory evidence will not question the agency representation. If some contradictory evidence is discovered then the third party does have an obligation to investigate the authority of the so called agent but in most cases this will not arise. The principal should not be required to be bound by the contract negotiated by the false agent as the principal has exhibited an intention to enter into legal relations. This only leaves the false agent. So from a culpability position, the false agent, even if they honestly believe they have the requisite authority, will be held accountable for breach of warranty of authority. This is a strict liability position based on contract and not on tort. In contrast to the breach of warranty of authority legal principal what should be the position where a software agent is released without the authority or knowledge of its owner (the principal) and negotiates a contract with a third party.

There are three possibilities for this scenario:

1. The principal since he/she has no knowledge of the release, should not be held accountable as there is no intent exhibited on his/her account to enter into a contract;
2. The principal will only be held accountable for negligence if the principal failed to implement reasonable security measures to impede an unauthorised release of the relevant software agent;
3. The principal will be held accountable under a strict liability principle in a similar manner as a false agent is held accountable under the breach of warranty of authority concept.

1 *Lack of intent to enter into legal relations*

It is submitted that the court should not from a policy perspective take this position. The principal wants to take advantage of this technology so as to reduce his/her administrative costs in negotiating future contracts. The issue of intent is of course relevant for the formation of the contract but the liability arising is not dependent upon this intent. The principal should not be in a position to have the advantage of software agent technology without some corresponding responsibility. The innocent third party will usually not be in a position to question the authority of the software agent. This is especially so for digitally signed mobile software agents and for messages digitally signed by anchor software agents. The authentication mechanisms are designed to identify the so called principal and as such the innocent third party will be acting under a honest belief that the relevant software agent has been released with the consent and authority the so called principal. It could be said the newton's

third law of motion should come into play "*for every action there is an equal and opposite reaction*". In this scenario, if a so called principal desires the advantage of utilising software agent technology then a corresponding legal responsibility should be imposed upon him/her.

2   Negligence liability

One valid argument could be that the liability regime imposed upon a so called principal should be based upon negligence. The three elements of negligence, namely:

a.   Duty of care to ones neighbours;

b.   A breach of the duty of care; and

c.   Damage arising from the breach.

It is clear that an unauthorised release of a software agent will cause damage to third parties who are duped into contracting via the unauthorised software agent. For example, let us assume that the so called principal and the innocent third party have had prior commercial dealings. All prior valid contracts have involved the purchase of "X" number of widgets. Now let us further assume that due to some security failure by the so called principal, a hacker is able to breach the computer security implemented by the so called principal and without authority releases the software agent and increases the payload of the software agent to 1.5 times the last order. In response to this new order the innocent third party promptly organises new materials to meet the new order of widgets.

It is arguable that if the so called principal has not taken reasonable steps to secure the software agent then the so called principal should be held accountable in negligence. That is, the so called principal would be required to compensate the innocent third so that they are placed in the position they were in prior to the failed contract was formed.

It is submitted that this position may not be adequate from the innocent third party's position. If the so called principal has implemented reasonable security measures then the liability will solely fall upon the innocent third party.   The alternative is a strict liability regime.

3   Strict Liability

If a person utilises a software agent then it is arguable that they have an absolute obligation to make sure that the software agent will never be released in an unauthorised manner. This is an adoption of the breach of warranty of authority liability regime. That is, even though there are two innocent persons involved the owner of the software agent is more culpable and as such a strict liability regime should follow.

A court may not accept this position as in practical terms there really is no such thing as a secure computer system.   A court may instead observe that provided the owner of the software agent has

implemented reasonable security measure that covers the circumstances then the owner of the software should not be held accountable. This really is a policy position though as with a breach of warranty of authority situation honest belief is no excuse and therefore the mere utilisation of a software agent should give rise to a strict liability regime.

Section 6: Conclusion

The use of software agent has recently been recognised in Australia by legislation through the adoption of the Convention. Despite this there remain a number of outstanding issues. In particular it is arguable that as the development of mobile software agents improves to commercial status it is arguable that no automated messaging system is involved as all negotiations occur within the environment of an anchor software agent.

Further the liability regimes have yet to be properly researched when software agents are being utilised. This is especially so when there has been an unauthorised activation of a software agent. There are three possibilities of which two are equally plausible.

Thank you for your time this afternoon.

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