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On the evolution of on-line contracts.

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This paper discusses the evolution of on-line contracts and how a trusted third party service for these contracts might be designed. The purpose is to show that contracts can be re-thought in the perspective of evolving information and communication technology. Two metaphors of contract are introduced and discussed. Then the future of contracts, as intelligent, fragmentarised condition clusters is discussed in brief.

Background

The contract is a deeply entrenched legal and cultural icon. The fateful signing on the dotted line is a vivid image of being bound and committed to a cause or a course of action. As a cultural sign the contract conveys serious and far-reaching connotations. But what is a contract? In essence? Without claiming to give a strict and exhaustive definition (should there be one, which I seriously doubt) we can settle for the following:[1]

A contract is a formalisation of a relationship in a legally binding way.

This is where we started out in the Swedish part of the ChamberSign project when we wanted to discuss and research our opportunities to develop a trusted third party service pertaining to the formation and management of *digital* contracts. The next step was to ask what followed, in terms of what form a contract should have, from our definition. We were of the opinion that the resultant design space was very large, and that there are several different designs consistent with the informal definition above.

Drawing upon the definition it is hard to see that the notion of a contract as a physical document made of paper and signed with ink is a necessary consequence. There ought to be several different and new ways to render a contract. Especially when it comes to the use of new technologies and the construction of digital contracts.[2]

We have started to experiment with digital contracts and have also found ourselves forced into thinking long and hard about what these contracts are, and what they can be. This work has resulted in a prototype that will be tested during summer/autumn in a small-scale project. That prototype will be described at the end of this paper.

This paper is organised around the main themes in the work with designing this service. Firstly we discuss the nature of the contract as such and its relation to trust. Secondly we discuss the metaphors we usually use to structure our understanding of contracts. In conclusion we describe some probable future developments and our prototype project.

Trust and contracts - the three phases

Contracts are artifacts of trust. Their relation to trust is however not totally uncomplicated. A contract could - in many ways - be thought of as a paradox. One way of describing the paradox would be to state that:

A contract is a sign of trust that eliminates the need for that very trust it embodies by offering alternative ways of recovering the value for which it stands.

Trust, in other words, where no trust is needed.

This paradox highlights the peculiar nature of the trust involved in contract negotiation. There seems to be different kinds of trust that apply to different stages of the process and even within these forms there seem to be a certain variance. It should be noted that even though we use one and the same word "trust" in many various settings the connotations of the word in different language games might very well vary.

We can speak of three different phases of trust in the contracting process:

1) Pre-signing phase. This is the phase where negotiations take place. Trust here is a volatile thing. Promises, suggestions and statements are plagued by the necessary vagueness of negotiation. Trust might be backed up by letters of intent and non-disclosure agreements during this phase.

2) Signing phase. This is the phase where the contract has been drawn up and is distributed to the parties. The event of signing the contract is the embodiment of the paradox above: the parties must trust each other to sign the contract, to ensure that the need for trust is eliminated.

3) Post-signing phase. This is the phase where the need for trust has been eliminated. Still the relationship between the parties might work flawlessly, and this might not at all be attributed to the fact that they have alternate means to recourse to should a breach of contract occur. They might simply need and trust each other.

These different phases illustrate different needs for trust services as well. In the first phase negotiation services might be needed and utilised.[3] Trusted third parties might be used as mediators or to manage a bidding process.[4] In the first phase we might also imagine a trusted third party that offers templates for contracts and databases of conditions to use in the negotiation process. In the second phase these contracts will have to be signed, and this can be facilitated by a trusted third party that accepts the signings, but only under agreement that the contract will not be valid until both signatures - digital or otherwise - have been deposited with said party. In the post-signing phase there might again need for dispute settlement, negotiation and follow-up. A trusted third party might easily provide the two first services, and the third might also be introduced as some kind of reporting service where the status of the contract is monitored and evaluated.

Throughout the whole process a trusted third party might very well be used to authenticate the parties and perhaps also to anonymise them.[5],[6]

It should be noted here that we have worked here with the factors in the process that might be used to inspire and construct trust rather than also considering environmental factors, such as legal frameworks and self-regulatory initiatives.[7]

Two contract metaphors

Our understanding of contracts depends heavily on the metaphors we use to structure our knowledge of them. One predominant metaphor is that of the document. In trying to design a trusted third party service we, however, found ourselves working with a completely different metaphor: that of the database. In this section we will briefly discuss these two metaphors.

The contract as document

The most natural image that comes to mind when discussing contracts is the parchment, signed with ink or blood, which binds the owner to a certain set of conditions. This is the contract of Goethes Faust as well as the typical contract of any modern day drama or story.

As we have shown above, however, this form is by no means a necessity. It is easy to imagine and envisage different forms of contracts. The document metaphor offers a number of striking advantages, however:

- It contains, in a single document, the relevant terms and conditions, thereby allowing the signer to overlook the extent of his or hers commitment.

- It has high evidentiary value, and is recognised in the legal community as a means of evidence

- It withstands time with reasonable cost

- It offers the pedagogic moment of signing, which accentuates the moment of will in contracting.[8]

These - and many other factors - have contributed to make the contract one of the singularly most successful information artefacts in the history of man. Still there might be room for improvement. In the next subsection we will investigate another metaphor, and how that might in some cases be even more valuable.

The contract as database

The contract formalises a relationship in a legally binding way, as we stated above. Might we then not understand the contract as a set of conditions that can be accessed by the parties? As a database of conditions? This metaphor has many advantages:

- The re-negotiation costs of a contract where the conditions are available in a database are very low. Simply update the relevant conditions, sign and save and the work is done. This procedure can be automated to a high extent.

- Contracts in this form might be stored in advanced server architectures that render their destruction highly unlikely. Whilst a paper contract might be lost in - say - a fire, a database contract (depending on the storage solution) might be backed up in several different locations with high redundancy.

- The evidentiary value of these contracts should be much higher than ordinary contracts. Signing with digital signatures can be considered a more secure mechanism than signing with a pen.[9]

The database metaphor is also interesting from an effectiveness perspective. If we envisage the contract as a database we might not need to renew the contract as such, we could instead focus on the conditions and the clusters they make up. This - constructing contract clusters - provides us with some interesting problems as we shall discuss later.

A comparison

It is interesting to discuss how the two different metaphors pan out. If we compare them in a more systematic way we might find a table like this useful:[10]

Contract metaphors - a comparison		
	Contracts as Documents	Contracts as Databases

Pedagogic value	High	Medium
Evidentiary value	High	Very high
Non-repudiation value	High	Very high
Re-negotiation cost	High	Moderate
Extensionability	Low	Very high
Coherence	High	Depends
Overview	Good	Medium
Legal entrenchment	Very good	Poor
Time-resistant	Good	Very good
Scalability	Poor	Very Good
Authentication	Good	Very Good
Integrity	Good	Very Good
Usability	Very good	Poor

Without attaching value to the specific components of the comparison - this can of course be done - we see that it is likely to be more advantageous to use the database metaphor. If one should put a high value on pedagogic factors however, it seems that the document metaphor might still be stronger.

There is however always the issue of entrenchment to be taken into account. With *entrenchment* we are mean the fact that an established legal form seems to create a conceptual lock-in effect: the legal framework is inherently highly conservative.

It is therefore not enough to know that a certain metaphor might be more versatile. It also has to have staying power and out-compete the old metaphor. It remains to be seen of the database metaphor will do this or if the two metaphors will co-exist and simply be used in different ways.

Legal developments affecting the evolution of on-line contracts, especially article 9-11, Directive 2000/31/EC "Legal Framework for the development of Electronic Commerce"

It must be noted here that much is being done by legislators to foster an awareness of the new forms of contracts being developed in the information society. However, this development is laden with some important problems. The most interesting initiative today, which we will discuss briefly here to highlight one of the remaining legal problems, is the so-called E-commerce Directive.[11] The, as I think, most important article pertaining to the evolution of on-line contracts states:

"Article 9

1. Member States shall ensure that their legal system allows contracts to be concluded by electronic means. Member States shall in particular ensure that the legal requirements applicable to the contractual process neither create obstacles for the use of electronic contracts nor result in such contracts being deprived of legal effectiveness and validity on account of their having been made by electronic means.

2. Member States may lay down that paragraph 1 shall not apply to all or certain contracts falling into one of the following categories:

a. Contracts that create or transfer rights in real estate, except for rental rights;

b. Contracts requiring by law the involvements of courts, public authorities or professions exercising public authority;

c. Contracts of suretyship granted and on collateral securities furnished by persons acting for purposes outside their trade, business or profession;

d. Contracts governed by family law or the law of succession. [...]"

The problem with this initiative is that it assumes a static contractual process and that the concept of contract will not in the least be changed by the change of medium. In this paper we speak explicitly about the *evolution* of on-line contracts, and of trust services relating to these, and this is intended to reflect a strong belief that concepts do not remain static when they are exposed to technological change.

Thus, trying to regulate the contractual process and the formation of contracts, the European Union may have created here an article that will require large amounts of interpretation. The problem here is that there is a presumed synonymity between "contract" and "electronic contract". The technology however is bound not only to automate, but also to innovate the law.[12]

Will then highly fragmentarised condition clusters be considered as electronic contracts? Or perhaps only document-like digital constructs? This remains to be seen. The provision of article 9 does not say, and the interpretation is not easily determined.

The end result could well be that the European Union here has created a new and wider legal instrument than that of the traditional contract, for better or worse.[13]

On the future evolution of on-line contracts

It is useful to try to predict some of the changes that we will see in the future as well, and to briefly discuss what these will mean.

Fragmentarisation

Technology is changing the world. One of the more interesting changes is that classical forms are being fragmentarised. What do we intend by this? Take a regular pop artists record. Twenty years ago, we spoke about the record, a collection of songs, as the conceptual whole. Today, with mp3 and other formats, we focus more on individual songs. The record has fallen to bits (excuse the pun). This is a widespread tendency. Consider the DVD-movies that are being distributed today. In these movements certain markers lets the user flip between scenes as if leafing through a book. And books: when Stephen King tried his on-line payment scheme, he wrote chapter by chapter of his new book, and the chapters were what people paid for. What was generally thought of as a unity in the analogue world has fallen to bits in the digital world.

This trend possibly has a very simple explanation. What constitutes a conceptual whole is a matter of transaction cost. Coase showed this to be true for the firm: the size and functions of a firm, he held, are due to the transaction cost structure of the market the firm operates in.[14] It is very much the same with concepts. The unity of a conceptual whole is due to the context this concept is situated in. With technology came the ability to sell songs as easily as records, chapters as easily as books. No extra transaction cost. And in these cases things fall to pieces according to popular demand. What is demanded determines the conceptual frame.

In the case of contracts this might mean that we will not see contracts as much as sets of conditions, terms and wordings being used to construct the legal artefact sought after. This fragmentarisation, however, depends on the demand of the context. It might be argued with some fervor that the

conservative outlook of the legal community will preserve the contract-as-document, instead of the messy and highly dynamic condition-oriented framework.

Intelligent contracts

Another prediction is that contracts (or conditions, should the framentarisation process go that far) will be endowed with a modicum of intelligence, and that they will be more like agents than regular contracts.[15] (This, in some degree, highlights the fears voiced above concerning the possible widening of the concept of a contract inherent in the notion of "electronic contracts in European law: will we consider agents as electronic contracts? What degree of intelligence in contracts to we allow and still call the electronic contracts?)

Contracts will be able to re-negotiate themselves and then allow the user/party to approve or disprove of the changes. They might even be launched without there being a party to start with, merely as a sign of a future will to negotiate, and roam the net to investigate possibilities.

Contracts, contract/condition clusters and contractual spaces

Following the fragmentarisation we may also see the development of highly complex referential structures within contracts. Contracts with hyperlinks to other contracts, elucidating or specifying the conditions of the first contract. These referential structures pose interesting problems of notification and the legal validity of changes made several referential steps away.

In the future we might create clusters of contracts that interrelate and draw content from each other.[16] These clusters might then be considered sub-parts of an overall contractspace, which, much like its bigger brother cyberspace, will constitute a legal, consensual hallucination.[17]

Future lawyers' success and prowess might be based on their ability to navigate this space in novel and effective ways.

This might seem like a vision bordering on science fiction, but fact is that much of the work being done in the XML community today seems to include work on referential legal functions in different DTDs. By refering to contract numbers and documents the designers seem to think that they solve the trade-off between having to work with standardisation and an ever-changing legal structure. Instead they introduce new and difficult problems on the legal validity of referencing and using these devices to route the legal issues.[18]

ChamberContract - a TTP service for digital contracts

Within the European ChamberSign project it early seemed that there should be a space for services in this area and that we should be able to work with the trusted third party role in developing new contracts. In trying to explore this option in Sweden we designed a system for managing the contract process, under the working name ChamberContract.

There are - of course - ways of signing electronic contracts without the use of a trusted third party. However, the use of a trusted third party can add much value to the process.[19]

Design choices

When thinking through the prototype and its construction we faced a number of design choices that I think are interesting to note. This list of design choices has been compiled over time and is still growing. The ChamberContract system, described below, is still being prototyped and it is quite likely that this process will add to the list.

1) In-house or out-source? This design issue faces most projects, but has a certain special significance in the case of designing TTP-services. The very act of out-sourcing affects the trust image of the project. The choice to in-house the project does as well. The choice here seems to be to have all the control of the in-house project or all the expertise of the out-sourced solution.

2) Provide a set of initial conditions or let the clients do all the negotiation themselves and then deposit the conditions? The provision of conditions to used - template conditions - is a clear risk exposure. We might not be able to guarantee that these conditions are suitable for every possible negotaition and contract that is handled by the system. What then will be the result? The set of conditions, the negotiation space (see below), must be constructed in a way that minimises the risk exposure by the TTP.

3) Another issue pertaining to the negotiation space is if it should be open source. Should all conditions - anonymised - be collected and stored in the database for re-use? What of the copyright of the thos drafting these conditions? The value of an *open source process* would of course be considerable, but is it possible to incorporate such rules in the TTP-platform agreement? Copyright to contracts, conditions and even negotiation sequences must be investigated.[20]

4) COTS or self developed software? If the project chooses to use commercial components this might add something to the robustness of the system, and support might be easy to come by. However, tailoring the system to specific needs might be harder.

5) Privacy or identity? An important choice has to be made concerning the possible anonymity of the partys during the negotiation process. Technology supports such solutions today, but are they legally and socially well thought-through?[21],[22]

6) System redundancy and robustness. How should the system be physically designed to withstand the test of time as well as a paper contract? It should be emphasized that paper contracts are highly cost effective ways of time-proofing an agreement. Computer storage solutions might prove more expensive, lest a reasonable volume is acquired.

There are many other issues, technical, legal and organisational, and in trying to implement this system on a larger scale new issues would also occur (such as jurisdiction, consumer protection, privacy et cetera).

Technical design

The technical design of the ChamberContract-system is comparatively simple today:

The model simply assumes a database of conditions that constitute what we call the available negotiation space. This space might be locked or open depending on whether or not new conditions can be introduced. In the prototype, for simplicity, it is locked. The conditions are the collected and aggregated into a contract, which then is signed by the parties and deposited with the TTP. The whole process is managed on a secure platform, with digital certified identities.

Legal design

There are two different levels of legal design in the prototype. The first considers the platform as such and how this platform should be legally designed. Here issues like when a contract is binding and the secrecy of the negotiation must be solved. The second level is the actual construction of the negotiation space. This is not a simple task, and developing model clauses must be allowed to take considerable time. In the prototype a few simple conditions are used.

Organisational design

The issue of organisational design concerns the introduction of practices and routines within the trusted third party platform. Backing up systems, checking identities, checking that the systems are up and running and handling off-line requests, disputes et cetera in an orderly manner. Much as a certificate authority draws up a certification practice statement (CPS) a TTP needs his own practice statement for organisational issues.

Remaining problems

There are several problems still facing the evolution of on-line contracts. These, here listed, are but a few, but they are the ones I feel are most relevant today.

- The legal standing of on-line contracts is still perceived as uncertain. While there is a considerable difference in-between different judicial systems today. There is still a perceived uncertainty as to the legal quality of on-line contracts. This problem is likely to go away. Especially with the efforts the European Union are now making to equate digital contracts with orthodox document contracts.[23]

- The two metaphors might very well appeal to different parties in the design process. Database contracts might seem very useful to system developers and programmers, who know well how to structure and use knowledge in databases, whilst legal professionals might prefer the entrenched

document metaphor. Should this be the case there will be a dissonance between the system design of future contractual systems and the use. This might prove complicated, and yield sub optimal results, where contracts might, for example be re-negotiated in their entirety in spite of the fact that there only is need to re-negotiate certain clauses.

- The cost/benefit analysis of on-line contracts is still not clear. It is quite possible to argue that the cost of introducing these new forms of contracts (condition clusters, intelligent contracts) might very well exceed the benefit from introducing them. This remains to be worked out. I remain somewhat hopeful here, however, and think that it will prove useful to explore new forms of contracting.

- One problem that is really pressing is what we term the consistency problem. When allowing the parties to choose conditions within a predefined negotiation space, or especially when allowing them to define this space themselves, the issue of logical and legal consistency arises. It is quite possible that the conditions themselves are logically consistent (though it is not impossible to imagine a situation where logically inconsistent conditions might be introduced by malice or oversight) but that the resulting contract is logically inconsistent. And even if the conditions and clusters are logically consistent they might end up being legally inconsistent. Both the conditions and the resulting cluster of conditions would then need to be tested for both legal and logical consistency. How do we do this? Is there even a way? Might it not be argued that at least legal consistency is a matter of interpretation, and that a system that performs such checks actually assume the role of the courts? The issue is highly complicated.

It is my belief that these problems are not unsolvable, and that we will see tremendous change in the way contracting is done in the next decade.

Conclusion

Digital contracts are more than contracts. Any attempt to automate also tends to innovate the concept that is under automation. Law is changing with technology. With the evolution of digital contracts, the very nature of the contract changes. We may see highly fragmentarised condition clusters with internal referencing and agent structures that embody what could be called intelligent contracts.

To realize the promises inherent in this vision, and avoid the pitfalls, it seems necessary to work to understand these new forms of contracts. One way of addressing that issue is to examine the metaphors we use to organize our knowledge of contracts. We may in certain situations have to move from thinking of contracts as documents to think of them as databases.

On a whole this is a positive development, but much still remains to be done: technically, socially and last but not least legally.

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[1] This definition is not strict, formal or exhaustive. It is designed to be used as a basis for a design prototype. There are many definitions of contracts in the literature, and these are all designed for a more theoretical discussion.

[2] In this paper digital contracts and on-line contracts will be used interchangeably. Arguably they are, however, different things: on-line contracts being contracts that can be accessed on-line and digital contracts, contracts in digital form. Electronic contracts might be the same thing as digital contracts, we reserve this discussion for later on in this paper in conjunction with the use of the term in an European directive.

[3] The literature on these systems is quite voluminous. See for example, Sandholm 1999, Qui, Tambe and Jung 1999. Often they are integrated in agent systems. See Knapik and Johnson 1997. See also the systems being developed for dispute settlement by SmartSettle.com [http://www.smartsettle.com]

[4] See CyberSettle Inc [http://www.cybersettle.com] for an example of a bidding process facilitator in the insurance industry.

[5] For a discussion of different forms of authentication see for example Ford 1998

[6] That it is possible to do both, to build in privacy, is shown by Brands 2000

[7] There is a short overview of different forms of trust initiatives in Lodder 2000. The three forms suggested by Lodder are legislation, self-regulation and information. These are, in my view, all reactive forms of trust building. A fourth form, construction of support technologies, must also, I think, be included in the set of trust realising technologies. See also Klang 2000.

[8] This moment is quite important in Swedish legal theory. A contract is said to be a manifestation of will. See Ramberg 1999

[9] It is true that this might not always be the perceived case. One must in these circumstances make a difference between percieved evidentiary value and objective evidentiary value. The latter is derived from an analysis of the technologies used and the security of the mechanism, the former from the impression of security the user has.

[10] Many of these functions are derived from the discussion of security in Camp 2000 pp. 65-78

[11] Directive 2000/31/EC "Legal Framework for the Development of Electronic Commerce"

[12] See Susskind p 49

[13] The articles have been extensively commented upon in Lodder 2000. For a wider discussion of model laws on electronic signatures, contracts and other issues see Hultmark 1998

[14] Coase 1990

[15] For a detailed discussion of agent technology see Knapik and Johnson 1997

[16] Stefik 1998 pp 93-95 dicusses this in some detail, but with focus on copyright issues.

[17] The definition of Cyberspace as a consensual hallucination is drawn from the works of Gibson, especially Gibson 1995

[18] See Lundblad 2000

[19] See Molnar 2000

[20] Copyright poses many new problems in the information age. It would take us to far to discuss these here. Excellent discussions are available in, for example, Seipel 2000 and Stefik 1998.

[21] Brands 2000 illustrates the technological possibilities.

[22] Rowland 2000 discusses the issue of whetjer anonymity is a proportionate response to the threats to privacy, and might be applicable here.

[23] See Directive 2000/31/EC "Legal Framework for the Development of Electronic Commerce", especially Article 9.