Next Generation Trusted Third Parties – Some Experiences from the Swedish ChamberSign Project.

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Abstract: Trusted Third Parties, or TTP:s, have emerged as an important business model in the information economy. In this paper a study of the evolution of one such TTP, Swedish ChamberSign Sverige AB, is presented. The study spans from 1998 to 2003 and examines the evolution of the TTP business model during that period through examples of actual development projects within ChamberSign Sverige AB. General findings indicate that TTP:s are evolving from simple Certification Authority schemes towards more value added models, but that TTP:s are not developing as independent service providers. Rather, they are developing methods and models that support a *symbiosis model*, where the TTP always relies on a broad set of partners. This is – in part – explained by an examination of the nature of both the TTP-idea and the concept of trust as such.

1. Introduction

1.1 The rise of trusted third parties

Trust has become an important asset in the information society. There are many reasons for this. The increasing anonymity has been pointed out as one reason[1]. Another reason is the ongoing globalization and the great geographic distances encountered in everyday online trade[15].

In this digital environment there is only to be expected that a business role for trust facilitation will emerge. Indeed, some have even called such a role "essential" for the development of the online markets[7].

This paper focuses on one such trusted third party (TTP), Swedish company ChamberSign Sverige AB, and the evolution of business models and strategies employed by ChamberSign under a time of more than five years.[1] The aim is to present both experiences encountered and future scenarios. Some thoughts on the next generation trusted third party services are also presented.

1.2 The ChamberSign project

The ChamberSign-project was originally created by Eurochambres[2], and it started out as a project in which a number of Chambers of Commerce in Europe decided that they should develop a company extending the role of Chambers of Commerce as trusted third parties into the digital economy.

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[1] Observations predating 2000 when I became involved in the project are based on business plans, information from colleagues and other secondary sources.
[2] The European organization for Chambers of Commerce. See http://www.eurochambres.be for more information.

Chambers of Commerce have traditionally had a third party role, accrediting new businesses and acting to provide information on business practices. Chambers of Commerce have also traditionally been associated with arbitration, and other, highly specialized, trusted third party roles developed in other projects within the Eurochambres [2,13]

The ChamberSign project has developed into a number of national implementations. In this paper the Swedish national implementation and the resulting company will be studied in more detail.[3]

1.3 Methodology and material

This study has been performed in close contact with the ChamberSign project in both Sweden and on a European level. From 2000 and onward, I have been involved in the project as a researcher and active participant, and have had the opportunity to both study and change the project.[4] The methodology employed in this study thus most closely resembles action research[12], and the observations also draw upon informal communications, business plans produced during the work with the project, pilot studies, e-mail exchanged and other such informal sources.

In order to reflect critically on the material involved, I have, when opportunity has presented itself, written up research on parts of the project [9,10]. The resulting research and this study are thus qualitative in method and design.

2   Trusted third parties – an evolutionary perspective

2.1 From CA to Trust Integrator

The ChamberSign project and the evolution of that project has clearly shown that the role of the TTP has changed over time. Initially, it was thought that ChamberSign would essentially act as a Certificate Authority, providing little beyond the issuance of actual certificates with a Chamber of Commerce connection. Indeed, in the original business plan this was the only revenue generating activity proposed.

In Sweden there were early tendencies in which the ChamberSign project was seen as little beyond a modernization project for a narrow set of services. In the early years (1998-2000) the project was mostly concerned with offering digital access to certain, very limited, member services such as ATA Carnets and Certificates of Origin.[5]

Over time this perspective changed. It became more obvious that the ChamberSign project was a business model on its own, and in 2000 the project was incorporated as a company by the name ChamberSign Sverige AB. A CEO was hired and a first business plan was proposed. In this business plan the main source of revenue was no longer certificates of identity, but rather certificates of roles and attributes.

The idea of a trusted third party actually offering a number of services developed over time, and then, when the first real projects with partners were launched in the year 2002 it became more and more obvious that the business strategy had changed again. The company had now become a trust integrator – offering to *create trust* in different processes and applications.

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[3] Sometimes ChamberSign is referred to as a project and sometimes as a company. In reality it is both. It has been run as a project within the Chamber of Commerce, but only recently took the final steps towards becoming and acting as a commercial company.
[4] I have been employed as vice president new technologies and as the CEO of the Chamber of e-commerce.
[5] These are customs documents handled by the Chambers of Commerce in Sweden.

One of the more interesting observations about the ChamberSign project has been this development from CA to trust integrator. We have concluded that the development has passed through three generations. These are illustrated in the following table:

Table 1: The evolution of ChamberSign business models and strategies

Generation	Revenue base	Role	Products & services
1 (1998-2000)	Certificates	CA	Certificates
2 (2000-2002)	Role certificates	Trusted Third Role Provider	Roles and attributes
3 (2002-)	Trust components	Trust integrator	Trusted services

The development from CA to trust integrator can be seen in the different services developed in the project over time. Chronologically we see the following evolution in services.

1. 1998-2000. In the first phase the project devoted time to setting up a traditional Certificate Authority. The original business strategy was to simply issue certificates, that then could be developed and used by other market partners in different applications. The value of these certificates was thought to be more than enough to sustain the business model.

2. 2000-2002. In the second phase it became more and more obvious that the role of CA would be much too burdensome, at least for the Swedish ChamberSign project. The first signs that the certificate market would become commoditized helped to accelerate a move into other segments of the value chain, ensuring that Chambers of Commerce added value where their own value was best utilised. The new business strategy became to offer attribute or role certificates stating not identity but rather different legal capacities, formulated thus: "Given that X is X (established by CA other than ChamberSign) he or she has this set of legal powers $(p_1...p_n)$". In this phase ChamberSign also attempted to set up independent services based only on its position as a trusted third party.

3. 2002-. The third phase was not initiated by a major revision of business strategies, but rather emerged as the resulting model from a number of smaller projects. In these different pilot projects (one of which we will discuss in detail below) it quickly became obvious that there was a role for ChamberSign not as a separate actor or player, but rather as a complementing factor in existing business processes. This meant taking greater part in and understanding the business processes at hand, and also acting more as a service provider than as a product or certificate provider.

These different phases are, in a sense, simplifications. There are still elements in ChamberSign's development that are more CA-like, for example, but overall the illustrated development correctly represents a shift in the focus of trusted third party business model employed in ChamberSign Sverige AB from certificates to trust components of different kinds.

3 The Swedish ChamberSign project – some example subprojects

3.1 ChamberSign development methodology

In ChamberSign's evolution subprojects have developed according to different opportunities that have presented themselves. The design has not been top-down and governed by a set of limited strategic imperatives. The development method is rather an example of the unstructured development that Claudio Ciborra calls *bricolage*. [4]

This has not necessarily been a disadvantage.[6] On the contrary the services and projects developed have helped define, recursively, the business strategy of ChamberSign, and shown probable and promising development paths.

If anything, this has in fact emerged as a business strategy: to seek out partners and co-develop products and services with them on a small scale and with great flexibility. This also reflects the new role of the trusted third party as dependent on the design of other services. ChamberSign now consciously applies a *symbiosis methodology* as opposed to the earlier stand-alone development strategy.

In this chapter we will examine three different development projects, from the three different generations sketched above. The aim is to show how the projects represent and illustrate the different perceptions of what a TTP is in the different generations.

Table 2: Development methodology

Period	Development Method	Example project	ChamberSign role	ChamberSign goal
1998-2000	Consultant adaptation of existing services	ATA – Carnets	Passive	Certificate enabling old services
2000-2002	Consultant development of new services	Digital Evidence	Active and independent	Designing new services that did not depend on certificates, but on trust
2002-	Co-development for symbiosis projects	E-procurement notary services	Partner co-developer	Integrating trust services with existing needs

In the following sections we will describe these projects in some detail, in order to be able to show the development of the trusted third party role through concrete and existing projects.

3.2 ATA Carnets

Chambers of Commerce in Sweden administer something called the ATA – carnet system. Without going into great detail this system can be described as an exemption from paying customs fees on items that are only temporarily being brought into another country for the purpose of, for example, a trade show.[14]

The Stockholm Chamber of Commerce issues these documents following an application for an ATA-carnet by an individual company. These applications have up until recently been paper-based, as has the entire process.

It was decided early on in the ChamberSign project that digitizing these services would be a prioritized area. One of the first subprojects for ChamberSign was thus to establish a digital application for ATA-carnets. This subproject was initiated in 1999 and finished early in the year 2000.

The technical architecture was simple, and consisted of a word document issued by a service that could authenticate the user and then send in the digital application. The only step in the process actually digitized was the application. Due to format reasons (the application forms and the ATA carnet document conform to no document format standards)

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[6] And indeed, Ciborra specifically notes that bricolage should not be seen as a problem, but rather an opportunity.

the application then had to be printed out and handled separately. The actual utility of this system was questionable, but the project had important simplifying benefits for the customers of the chambers, and thus was continued.

ChamberSigns role in this project was simply to digitize and certificate-enable an existing service. Nowhere in the process did the idea of changing the process or collaborating with other parties occur. The entire project was also handled not by the ChamberSign project (which at the time consisted only of two project members, employed full time elsewhere in the Chamber), but by a consultancy and the result was more or less a made-to-order package that had no strategic role in the development of ChamberSign as a concept or business model. It later fell out of use due to the lack of upgrades and obsolescence of the technology involved.

What, then, did this project show about the role of the trusted third party as it was perceived at the time? Firstly, it can be noted that the consensus at the time was that ChamberSign was a product company, producing certificates, and that the use of these certificates was the overall goal of any development project. Secondly, there was little or no faith in the system growing to become autonomous and expansive.

3.2 Digital Evidence

A good example of the second phase projects is the project concerned with what was called "digital evidence". The basic idea with this project was to establish a trusted third party for ensuring the evidentiary value of different forms of digital evidence, in particular web pages, e-mail and faxes.

The conceptual architecture was simple, the aim being to secure evidence of how, for example, a certain web page looked at a certain time. The origin of the concept was that Swedish law employs a *free test of evidence principle* that states that anything can be admitted as evidence in a court of law.

The volume of digital evidence has risen considerably the last few years, and since this category of evidence is so simple to manipulate it was felt that there should be a market need for a trusted third party service that could secure evidence on the behalf of parties involved in any kind of dispute, and thus ensure that the material was not manipulated.

The buyers of such a service would be, for example, lawyers, wanting to ensure that a certain web page was not changed in a way that reduced its evidentiary value.

One typical case would be abuse of intellectual property rights. If a certain web page offered pirated material, it would be important to be able to prove this later in court and to avoid the situation where the pirate simply removes the material and then claims that it was never there during court proceedings.

The secured evidence was fixed in a digital form with time stamps and digitally signed by a Chamber of Commerce representative. The initial revenue model was designed with a minor cost for securing the evidence, and a more substantial cost for demanding copies of the time-stamped evidence for use in court.

The service was tested out on a set of pilot clients, mostly lawyers, but also a company involved in online movie distribution. The latter used the system to habitually deposit the online contracts it formed with its clients, and this revealed a new and non-intended use for the service that fit well with its architectural design.

The technical architecture of this project and its result has been described in further detail elsewhere[10].

Whereas the ATA-Carnet project showed ChamberSign as a very passive trusted third party, this new service launched an active trusted third party that did not rely on the production of certificates, but rather provided a trusted deposit service for qualified and

time-stamped content. The role of the trusted third party in this construction is as an independent service provider, the value added of which is generated by the provision of a new service.

ChamberSign here emerges as an actor on the digital market that provides not only static products (certificates) but also services (securing evidence). This evolution from products to services was not unique for ChamberSign but rather reflected a shift in the trusted third party market, partly due to the emerging realization that the certificate market may well become quickly commoditized.

3.3 E-procurement Notary Services

In the third, and final, example we find ChamberSign as an integrated part of an already established process. In this project ChamberSign enters as a notary service in an e-procurement solution, guaranteeing the integrity of online bids in a public procurement process.

The background for this project was an intense search for roles for ChamberSign that sought already launched projects, but where ChamberSign could add considerable value by offering different kinds of trust services. This search reflected a shift in ChamberSign's business development strategy, in which the Company no longer initiated projects of its own, as in the digital evidence case, but rather offered the trusted third party role as an addition to existing projects.

In its search ChamberSign discovered a legal provision in the Swedish law for public procurement that stated that the Chamber of Commerce could, if any of the parties in a public procurement process so indicated, appoint a special observer to ensure that all bids in procurement were opened and correctly handled by the public authority in question. This little-known and not often used paragraph served as a starting point for re-designing the public procurement process for online use.

This work was performed together with Forum SQL AB, a partner with the technological know-how and basic technologies needed to develop such a solution. This partner also had an ongoing project with a public authority, and could quickly offer and try out the trusted third party additions in a live project.

It was decided that bids would be stored in encrypted form with ChamberSign, and then transmitted and decrypted at the correct time to the public authority, and that the process would be monitored and validated by ChamberSign. The lion's part of the infrastructure is managed by Forum SQL and the public authority in collaboration, but certain components of the infrastructure is provided by ChamberSign, utilising the encryption and deposition services developed together with Forum SQL, and the trust inherent in ChamberSigns third party position.

A close analysis of this business case shows that ChamberSign really does not offer unique technology solutions in this project, but rather a unique role and asset. This role – as a depositary and witness – depends on the accumulated trust assets that Chambers of Commerce have transferred to ChamberSign.

This process of trust transferral is by no means simple. It consists of an advanced design of trademarks, public affirmations of ChamberSign's position as a collaboration platform for Chambers and certain common PR-activities. It has been observed in interviews with Chamber representatives that this is a two way process, in which the digital project of ChamberSign also conveys a certain pressure on Chambers of Commerce to actually succeed in this venture. Trust assets can be quickly consumed.

In this project ChamberSign extends the trusted role that formed the basis of the digital evidence project, and turns this into a component that can be inserted into the public procurement process (or, indeed, any other process). In a sense, then, this third phase seems

as a step back: the independent and service providing trusted third party in the second phase has become a trust component integrator offering trust as a product and acting only in close collaboration with partners and existing needs.

In part this reflects market realities: independent trusted third parties are not in demand any more, but there is more to this shift than mere economics. One possible explanation lies in a deeper understanding of the role of trusted third parties, and of trust itself. Trust is a relational and complementary concept of complexity reduction[11]. There is no conceivable need for abstract trust in general. The demand for trust arises in conjunction with the offering of other services. A company taking part in public procurement needs to be certain that the bid he submits is handled correctly for the process to work. Trust enables processes to work more smoothly and lowers transaction costs such as search and evaluation costs.[6]

3. 4 Summary

The ChamberSign project has progressed from a passive production of certificates and the associated digitization of existing services to becoming a trust integrator service in which existing processes utilise trusted third party services and trust components to enhance efficiency and quality.

An intriguing observation is that ChamberSign went through a stage of trusted third party service provision, where the role of ChamberSign was more independent than today. One possible explanation of this is that the integrator role more correctly reflects the realities both of the market and of the concept and value of trust.

In a sense this illustrates a general trend in trusted third party markets, from the pure CA role to a more differentiated service oriented strategy, as illustrated below:
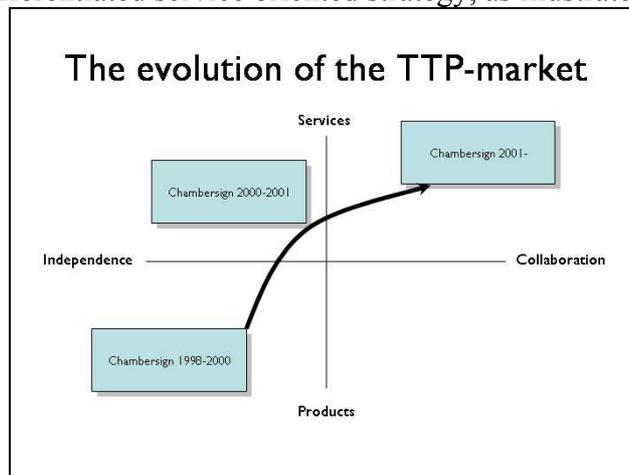

Figure 1: The evolution of the TTP-market from a ChamberSign perspective

The evolution described by these three projects is in a sense idealized. There remains elements of all three business models and strategies in today's ChamberSign, but the essential elements are correct, and can easily be observed by taking part of ChamberSigns ongoing projects[3].

6 Conclusions and future work

As has been shown, the role of the trusted third party is changing. The observations from the ChamberSign project, should they be possible to generalize, show two things.

The first thing is that TTP:s are moving away from the CA-only business model. This is in part due to the fact that the certificate market is quickly becoming commoditized, and partly due to the fact that even if it was possible to construct revenue models based on, for example, revocation lists, these models lack all inherent evolvability and dynamics.

The second thing is that TTP:s must rely on symbiosis models, and explore the nature of trust and trust services closely to be able to find niches in which it is possible to deploy trust components in an optimal way.

What, then, do we know about the next generation trusted third parties? In this paper we have indicated that we have seen three generations so far: CA:s, independent TTP:s and trust integrators. What will the next generation look like?

There are a number of possible alternatives.

1) The first possibility is that we may see a divorce between *trust producers* and *trusted third parties*. ChamberSign today utilises the trust produced by the Chambers of Commerce. Nothing stops them from also channelling and managing trust from other sources, such as the state, religious actors or other trust producers. ChamberSign would then move forward as a trust management and distribution infrastructure.

2) The second possibility is that we see a *rebound to independent services*, in a bid for higher margins. Trust integration is not necessarily a "get rich quickly"-strategy, and if there is a shift in the economy there may be an expansive bid on the part of TTP:s to acquire and build new TTP-markets with independent services. This may also occur on markets where there is a trust deficit of some kind. One example would be export markets where, for example, European companies may feel that they want more security before they trade with companies in south-east Asia or elsewhere. In these markets TTP:s may have an independent role to play as depositaries and service providers.

3) The third possibility is that TTP:s *become obsolete* and that there is no fourth generation at all. This might happen if the architecture of the Internet is changed as to admit only strong identification of all Internet users, or if the current security problems force companies to build separate networks to do business in, so called *splinternets* or *virtual private networks*[5]. In extreme scenarios of this kind trust is ensured not by actors on the market, but by marketplace design [8].

In summary, then, there exist a lot of different possible scenarios for the future, but one thing seems certain, and that is that trust as a social phenomenon is more important than ever in the emerging information society of eEurope.

The future work of this project will consist in following the further development of the TTP-market from a ChamberSign viewpoint, and extending the TTP-concept to the public sector.

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