

Technical Aspects of Electronics Conveyancing

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SUMMARY

A system to support electronic conveyancing of deeds has been developed at the Netherlands Cadastre in close co-operation with the notaries. This system will be operational as soon as the required legislation has been accepted by parliament. The system has been accepted by the notary as a secure system which can replace the paper based system.

In this paper some basic concepts of the Netherlands Cadastre are presented and some technical aspects on the developed system on electronic conveyancing of deeds: electronic signatures, hashing algorithms and the role of a Certification Service Provider are presented in relation to the functionality of the system for electronic conveyancing of deeds.

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1. INTRODUCTION

The land registers and cadastre (Kadaster) in the Netherlands serve a multi purpose aim (Molen, van der, 2003). First of all the Civil Code prescribes 4 requirements for a legal transfer of rights 'in rem', namely right of disposal of the seller, agreement between buyer and seller, obligatory title (notarial deed), and recording in the public registers held by the Agency. The system of delivery is 'causal', which means that right holders have to secure their ownership right ('title') from a theoretical legal point of view in the chain of transfers. Because of the latin notariat, in practice information from the most recent notarial deed suffices and gives substantial evidence of ownership. The registers and cadastral maps therefore guarantee in practice legal land tenure security, and security in the land market. The same is valid for securing loans by mortgages.

Secondly information on taxable persons, taxable objects, and taxable values, are derived from the files of the Agency, and are on a regular basis supplied to the municipalities as main source data for their land taxation.

Furthermore land information from the files of the Agency is used by many government bodies, basically providing source data in order to support the government (all levels) in the interference in private property rights justified by the general interest.

The main concept of the system of land registry and cadastre is the recording of the relationship between men and land, through a formal right. The concept includes the principles of specialty and publicity. The specialty principle results in a proper identification of the right holders through personal identification at the notary office and the recording of ID numbers, or in case of a legal body (e.g. a company) identification of ID number Chamber of Commerce and the legal representatives of the company. Furthermore it impacts on the object of exercise of rights: the land parcel, that should be uniquely identified by parcel number and boundary survey. The right as such should be legally recognised, namely belonging to the closed system of real rights as mentioned in the Civil Code. The right should therefore precisely be identified in the deed.

2. CONTENTS OF THE CADASTRAL SYSTEM

Public registers are registers in which notaries deeds are recorded as they come in. Public registers are comparable with the land registers kept by the courts in other countries. The reason for filing in this order is the importance of the ranking of real rights. The Civil Code (Roman-French law family) assigns two important characteristics to real rights, namely a real right follows the thing, and older real rights have priority over younger real rights. With respect to the latter, the moment of recording can therefore be of crucial importance, e.g. by legal foreclosure and execution. The public registers by consequence are not easy accessible.

The employees of the Agency extract the essential elements from the deed; these form on their turn the input for the cadastral registers and maps, providing registers on name, parcel (both administration and cartography), and street address. In essence the cadastral registers and maps are auxiliary registers to provide access to the public registers. The public registers are kept in digital format. The same is valid for both cadastral registers and cadastral maps, those databases are 100 % in digital format.

In addition to the basic relationship men-right-parcel there are many attributes: land use, purchase prices, various legal essentialia, parcel surface area etc.

The contents of the cadastral map are based on terrestrial surveys. Observations made in the field are drawn on field sketches. This part of the system is still paper based.

3. CURRENT PROCESS

The recording of the relationship men-right-land is based on the recording of notaries deeds. Acceptance of a submitted deed, by the land registrar, does not imply investigation and review of the legal validity of the transfer. The check is done on some precisely described formal requirements only. Unlike a title registration system, the system in the Netherlands does not provide state guaranteed proof of title. The publicity principle however, results in the compulsory recording of all deeds pertaining to land, which are open for inspection without any restriction, and provide the base for knowledge about the status of tenure. The combination of Latin Notariat and land registers and cadastre provide de facto title security.

A normal procedure of a land transfer is as follows. If a buyer and seller agree on a sale (most likely guided by a real estate agent, a non compulsory party in the land market), a notary public (compulsory) will draw up a notarial deed of transfer, after verifying the right to dispose by the seller and the consensus ad idem and the like. After the signing of the deed by both parties and the notary, the notary public signs a copy as a true copy which is submitted to the Agency. After signing the deed, the notary sends the true copy of the deed to Kadaster, so that the Public Register can be updated. In the 19th century a deed was provided with sealing-wax. Nowadays the official notary paper is used, holding a watermark. For over 150 years, conveyance of real estate takes place on the basis of deeds written or printed on paper. The same story holds for mortgages. The land registrar of Kadaster checks some formal requirements, and records the deed and provides relevant evidence for this to the notary public. As the notary public is also the intermediate for the financial arrangements, the purchase prices is kept by the notary public until the evidence of recording is received, only then the purchase price is paid to the seller. A similar procedure pertains to mortgages, which secure loans on land and buildings.

In case of the transfer of a subdivided land parcel, the land surveyors of the Agency will survey the new boundaries, and assign new parcel identifiers.

Deeds are arriving via the Dutch postal service. Notaries are sending an original deed and a copy on a special form. Special forms, provided by the Kadaster, reserve a special location for our unique identification. It consists of a part and a number. In each part, we put at most 200 pages. Every deed consists of 1 or more pages. At the moment they are on average 12 pages long. Within a part, we are giving number in ascending order until we exceed 200 pages; then we start with a new part. The content of a deed is processed in our database.

Afterwards, we put the deed in our Public Register, that are bindings of about 200 pages. For security, the content is also filmed on 16 mm film. The durability of film is extremely high. KODAK gives a guarantee for hundred years or more.

Kadaster is always sending the notary a proof of receipt by fax. We have automated this process completely, by using a mail-to-fax service offered by a telecommunication company.

In the last year (2002) 410.800 deeds of transfer were recorded and 552.500 deeds of mortgage. Land surveyors surveyed new boundaries for 98.200 land parcels. All cadastral registers and maps are in digital format. Cadastral registers are kept in the system AKR (Automated Cadastral Registers), the maps in LKI (survey and mapping information system): two separated systems with interface connection in order to appropriately coordinate the ongoing updating of the cadastral registers and maps.

For all the services must be paid: the Agency is obliged to fully recover its costs. The total business costs in 2002 were about 207 million €. About 2200 people are employed, 600 in the head office (including the IT departments) and 15 regional offices (1600).

4. ICT RENEWAL: CURRENT INITIATIVES

The main problem of the Agency is the ICT renewal of legacy systems that currently is going on in order to meet the current and future customer requirements on one hand, and to adopt modern ICT opportunities on the other hand. This is a complicated and expensive process, because the renewal should take place within a growing concern environment. Current Initiatives are (Booij, Dijkstra, 2003):

- Recording of all public encumbrances on land. There are about 80 of this kind of public rights to land, of which 20 are indeed recorded yet. Law is currently pending in the Parliament to impose recording of public encumbrances, issued by whatever body of government, either in the registers of the Agency or at the municipalities.
- Law is pending in the Parliament pertaining to electronic submission of deeds. This opens the opportunity for the notary public to submit notarial deeds as a digital file. The concept is that notary public keeps a paper deed in his/her office as the authentic one, sends a certified true copy electronically to the Agency, which records the document in a digital work process. This allows for the creation of digital public registers. As long as the law is not passed, some parts of the system are already operational, backed by the traditional paper workflow.
- Law is pending pertaining to the merger of the Agency with the Topographic Service of the Ministry of Defence, which is the national mapping agency, constituting a 'national land registry and land survey.
- ICT renewal programme is currently running(-> 2010). This concerns reduction of complexity (of different platforms, databases and protocols), centralisation of databases and database management, integration of spatial databases (cadastral map and large scale topographic map) and legal/administrative data) into one database for (on line) information supply purposes, full renewal of cadastral systems, digital public registers,

electronic conveyancing and includes data cleaning (quality improvement, e.g. of subject names) etc

5. ELECTRONIC CONVEYANCING: FUNCTIONALITY

The existing system is somewhat archaic. An intensive review of the existing work-processes as a basis for the introduction of workflow management within the framework of the renewal programme resulted in the proposal to send to Kadaster an electronic copy of the deed by electronic mail. To investigate the impact of this proposal a task force has been established in 1997. This task force was named ELAN, the abbreviation stands for 'Electronic Delivery of Deeds'. In 1998 Kadaster reached an agreement with the group professional notaries (KNB). For the benefit of a more efficient traffic in real estate, it is desired to deliver notarial deeds at the Kadaster in electronic way. To realise this, there must be agreement on protocols, hashing techniques and key management.

Stated agreements are:

- Kadaster will use the intranet of the KNB,
- Until receipt at the Kadaster, the KNB is responsible for integrity of a message,
- After receipt at the Kadaster, the Kadaster is responsible for integrity,
- Integrity and authenticity are reached by use of hashing techniques and digital signatures,
- Digital deeds will still be filmed for durability reasons.

The required functionality of the computerised system for electronic conveyancing has been analysed and agreed. Main functionality can be summarised as follows:

An incoming message from notary at Kadaster can contain four different types of requests, *combinations* are allowed:

- A request for Registration Deed (RRD)
- A request for Registration Correction (RRC)
- A request for Renewed Registration (RRR)
- A request for Cancellation (RCA)

The most common request will be a Request for Registration of a Deed.

In the case the Kadaster has asked the notary for correction, after the check on formal requirements by Kadaster, the notary can send a Request for Registration Correction.

In the situation the Kadaster cannot register a deed because of juridical issues, a notary can send a request for Cancellation. After changing the content of the deed, he must do a new request for registration deed.

In very rare cases, the notaries do not agree with the opinion of the Kadaster on juridical issues. Then we go to court. If the judge thinks the Kadaster is wrong, the notary can send a request for renewed registration.

After reception of a request from the notary Kadaster can reply with one of the following messages:

- Message of Disapproval (MDA)
- Message of Non-mentioned Parts (MNP)
- Proof of Receipt (PREC) for RRD, RRC, RRR and RCA
- Denial of Request for Cancellation (DRCA)

A Message of Disapproval is only sent in case of disapproval of the complete incoming message (request). It has been agreed with the KNB that this case will always be related to a phone call. A Message of Non-mentioned Parts is only sent in case the incoming messages contains too many files; this means files are related to the request which are not mentioned in requests.

A Proof of Receipt will always be sent. These proofs contain already the reserved unique identification or a reason of disapproval. In the seldom case of a Renewed Request, we are sending the Proof of Receipt in analogous form. When the Kadaster disapproves a Request for Cancellation, it sends a denial of it. This is only done when the notary had not sent his request for cancellation within the valid response time.

After reviewing requirements for registration and processing:

- Proof of Registration (PREC)
- Request for Correction (RC)
- Information of Non-Registration (INR)
- Message of Refusal (MR)

A proof of Registration is send after Registration of a Request or Correction.

A Request for Correction is sent when correction is needed. This will always be preceded by a telephone call.

An Information of Non-Registration is sent when the Kadaster could not register the deed or correction because of juridical issues. It will always be preceded by a telephone call.

After information of Non-Registration, the notary has a certain term for reaction (by sending a Request for Cancellation). After exceeding this term, the Kadaster sends a Message of Refusal.

Incoming messages from notary and replies to those messages by Kadaster are composed as follows:

- forms, this means a request for Registration Deed (RRD), a request for Registration Correction (RRC), a request for Renewed Registration (RRR) or a request for Cancellation (RCA). Those forms are in eXtensible Markup Language (XML). Names of annexed files, e.g. file-names of deeds and maps are mentioned in these forms. Furthermore this form contains the name of the local cadastral branch office where the request presented on the form will be processed. XML has as an important advantage above EDI, an earlier format: you have more flexibility in changing the XML definition,

because you don't have to change simultaneously. When using EDI, both sender and receiver had to implement changes at the same time. When using XML, this is no longer the case. See also chapter 6 of this paper.

- deeds, annexes, evidences and maps in Portable Document Format (PDF), this is an important choice The Notaries are using many different text processors, and of course Kadaster is not in the position to change this. This means many different formats have to be managed: e.g.: Wordperfect 4.2; Wordperfect 5.1; Lotus AmiPro; Word 6.0; Word 2000; Notepad; etc. For this reason all files are standardised on PDF, all text processors can convert documents to this standard, even systems like AutoCAD can convert maps to this standard. Another important advantage is that there is a free program, Adobe Acrobat Reader, which can be used to view PDF documents. In some cases maps are annexed to the forms, this is optional. Maps could be send by notary to represent agreements on parcel subdivision or to describe apartments in flat buildings (condominiums). About 1% of incoming deeds contains maps. Big files could be compressed (ZIP)

6. SECURITY ASPECTS

An electronic signature is attached or logically related to an electronic document. Such signature is more sophisticated then a scan of a document with a normal signature. An electronic signature is:

- related in a unique way to the person who signed the document
- allows for the identification of the person who signed the document
- created with tools that can be controlled by the person who signed the document
- related to the data concerned in such way that each modification afterwards in those data can be identified
- based on a qualified certificate
- generated by a secure tool for electronic signatures

Those conditions mean that an electronic signature has the same legal status as a normal signature.

The technology on which the electronic signature is based on two keys which are related and which can not be disconnected: a public and a private key. Those keys are unique for one person. Which key is related to which person is registered by a trusted third party and is documented in a digital certificate.

With asymmetric key cryptography, everyone who might possibly want to communicate has such a public key and a private key. These keys are mathematically related, but the private key cannot be discovered from the public key. There is only one public key cryptosystem that is in wide acceptance today: This is called RSA; its named for its inventors Rivest, Shamir and Adelman. The system works quite simple. A key pair is mathematically generated. Messages encrypted with a private key can only be decrypted by the corresponding public key. And messages encrypted with the public key could only be decrypted by using the private key. The private key must be kept secret, the public key can be spread over the world.

The longer the key, the better security. For our system, we are currently using keys of 1024 bits.

Sending documents (deed, etc) can be organised as follows now: Notary A signs an electronic deed with his or her private key. The receiver of this document, this is the Kadaster, can verify with the related public key (which is included in the certificate attached to the document) if this document is unchanged and if it has been send by the holder of the private key. This sounds complex but after installation of the required software this can be done easily.

A Certification Service Provider (CSP) is an independent and reliable third party that generates electronic keys and publishes electronic certificates in which it is declared that an electronic key is related to a person. (X509v3 format is used for this purpose). Of course the holder of the key is obliged to identify him or her self (passport, etc) to the CSP. Every body can check the certificate with the original CSP. For this reason the CSP has to maintain which keys are still valid and which keys have been revoked: the issuer of the key (the CSP) has a certificate revocation list. One CSP in the Netherlands is Diginotar.

The integrity and completeness of the document is checked by a hash value, a number (digit) which is unique for the related document (deed).

SHA-1 hashing algorithms are used for this purpose if a deed is received at Kadaster, but Kadaster performs on more check based on asymmetric cryptography.

Hashing techniques are used to distill the information contained in a file into a single large number, typically between 128 and 256 bits in length. The best techniques combine these mathematical properties:

- Every bit of the message digest function is influenced by every bit of the function's input
- If any given bit of the function's input is changed, every output bit has a 50% chance of changing
- Given an input file and its corresponding message, it should be computationally infeasible to find another file with the same message digest.

MD5 is developed by Ronald Rivest. It produces a 128 bit digest.

SHA-1 is developed by the NSA. It produces a 160 bit digest.

Reasons for using hashing techniques:

- Much faster than traditional symmetric key cryptographic functions
- No patent restrictions on any message digest function currently in use.
- No export restrictions

Message digest functions are the basis of most digital signatures. Instead of signing the entire document, most digital signature standards simply sign a message digest of the document.

Every notary has to sign individually each deed he is sending to the Kadaster. For that reason, his computer is equipped with a smart card reader. He can enter his smartcard to digitally sign the deed.

All those digital deeds are sent to a central point of the Kadaster. The Kadaster is also sending signed messages: proofs of receipt, proofs of registration etc. It should be quite clear that the registrar isn't signing every individual message with a smart card. In stead of this, we are using a cryptoserver. That is some special hardware that signs every message. This hardware is tamper-free, so when someone tries to open it to retrieve the private key kept in the crypto-server, it flushes its own content.

7. IMPLEMENTATION ASPECTS

The availability of electronic deeds allows for the introduction of workflow management in such a way that local offices with too many employees (related to the workload) can take over work from local offices with insufficient employees. This contributes to the improvement of the overall performance of the total organisation.

Working with deed documents on a screen has ergonomic impact, e.g. screen resolution and size, but it also means that an employee has to take rest after 2 hours of working behind the screen. Functionality is included in the system to force the user (more or less) to do so.

Archiving is based on:

- Archive digital (DVD) as well as analogous (film)
- DVD writer
- SAN (Storage Area Network)
- Film produced by third party

As soon as both legislation covering the electronic conveyance of deeds is accepted by the national parliament the system (ELAN) will be operational. In this moment the system developments and a very complete test in interaction with the users (notaries) has been done. According to market research Kadaster expects that about 40% of the deeds will be delivered in electronic way within 6 months after the introduction, 60% after 1 year and 90% after 2 years.

There will be a public register with digital equivalents of the deeds available on microfiche. For this reason the incoming paper deeds have been scanned already for more then one year. This means that after 7 years most of the request for copies of deeds can be supported in an electronic way (average time for a transaction is 8 years).

8. CONCLUSIONS

A system to support electronic conveyancing of deeds has been developed in the Netherlands. This system will be operational as soon as the required legislation has been accepted by

parliament. The system is accepted by the notary as a secure system which can replace the paper based system.

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BIOPGRAPHICAL NOTES

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