

DATA COMMUNICATION: A LIFELINE BETWEEN LAND ADMINISTRATION ORGANIZATIONS AND SOCIETY

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ABSTRACT

Land administration is the process of determining, recording, and disseminating information on ownership, value and use of land when implementing land management, as stated by the UN ECE Guidelines on Land Administration. Focusing on these processes, one observes a growing importance of datacommunication as a supporting tool.

On the determination side of the land administration process (input), strategic objectives such as faster services to the fast moving property market and to the public administration (tax offices, planning authorities) become possible by offering facilities for electronic conveyancing and easy map updating. Electronic conveyancing techniques such as electronic signatures, encryption, hash values, measures against bit-loss, are applied increasingly. Because the law has to provide legitimacy to the transmitting, submitting and registration of electric documents, changes in the (land) law are necessary. Expertise to define the new legal prescriptions concerning the authenticity of electronic documents, the certification authorities who are empowered to issue digital keys, is available now.

As land registers and cadastres play an increasing role in the knowledge regarding the legal status of land according to public law (the so called public encumbrances) as a complement to the status according to private law, the submission and recording of government documents concerning government decisions on land with an effect on third parties, are within reach. This will contribute to the development of e-government.

Modern portable pen computers allow updating of (cadastral) maps during the field session and make geometric quality management possible in the field, so that detected errors can be investigated and rectified right on the spot. Datacommunication facilitates the transmission of work files of maps from the field to the office in order to establish an efficient work process.

The recording process (throughput) will be improved through internal datacommunication offering a better integration between centralized and decentralized processes. Modern workflow management techniques will become applicable, which will have a positive impact on the management of daily fluctuating supply and demand, because an allocation of the workload is possible at the location where the work force is available at that very moment. The integration of work processes allows for combining the benefits of centralized IT services and decentralized information management. This contributes to today's view that land administration operations should take place on a local level in the proximity of citizens, while at the same time maintaining low level

costs through the economies of scale of centralized information processing and storage. Even in the situation that local offices have their own databases, datacommunication makes it possible to have remote access to land information.

On the disseminating side (output) the strategic objective of making land information better, easier and cheaper accessible will be supported by datacommunication. A well-organized front office supported by an efficient back office provides a boost in customer-oriented services. Internet services can be applied here, which require a reflection on opening hours, data quality, liability, data protection and copyright, privacy issues, and pricing policy. Establishing an e-commerce environment will also require decisions on to which extent tailor-made land information products are offered, and how payment will be guaranteed. Land administration will become an important basis of establishing a geospatial data infrastructure.

The author is quite aware that the application of advanced tools as discussed here may flourish in a certain mature institutional environment and when advanced information and communication technology is available. This is not only the case in so-called 'developed' countries. As experiences show (e.g. Central Europe) many countries are making up for lost times as a result of the past, while countries in a luckier situation actually suffer the re-engineering burden of their legacy systems.

1. INTRODUCTION

Land administration is defined by the UN ECE Land Administration Guidelines as 'the process of determining, recording, and disseminating information on the ownership, value and use of land, when implementing land management policies' (UN ECE 1996).

In this paper 'ownership' should be understood as all relationships between humankind and land (statutory, customary, informal) (Fourie 1999)

'Land' should be understood as the surface of the earth, the materials beneath, the air above, and all things fixed to the soil (Dale & MacLaughlin 1999).

The context of 'land administration', as the definition says, is the implementation of land management policies, which we understand as improving security of tenure, land markets, land taxation, urban and rural planning development and maintenance, management of natural resources (GTZ, 1998).

When we refer to 'land administration systems', we consider these systems as a continuum comprising deed recording systems, title registration systems, negative and positive systems regarding their power against third parties, supported by simple or complex geometry.

When we refer to land administration organizations we are aware of the enormous variety that exists when observing organizational structures in different countries, ranging from local organizations without central support to very centralized organizations without any local presence, with a different progress in automation, from rigid separation between public registers and cadastre to so-called unified systems where the legal registers and the cadastre are combined (UN ECE 1998).

Whatever system and organizational structure is present, the paper wants to demonstrate that datacommunication, from closed networks up to public internet, provides many opportunities for improved services to customers, in the private sector as well in the public sector, by giving a boost to the efficiency and the effectiveness of operational processes of input, throughput, and output of land administration systems.

From a strategic point of view, one might say that the alignment of business objectives of a land administration organization and the application of ICT (Henderson et al 1992) takes its ultimate form when integrating datacommunication technology and strategic goals.

2. INPUT PROCESSES

2.1 Electronic conveyancing

In every jurisdiction the basic idea of the recording of the rights, interests and responsibilities to land is the submission of a certain document to the land registrar, holding the description of the establishment, transfer or deletion of the relationship men-land (UN ECE 2000). That document might be an agreement between people or legal entities, drawn up by a notary, by solicitors, conveyancers, or just by themselves, depending on the legal prescriptions. The document might also be a deed poll by the government or a judicial sentence. After receiving the document, the land registrar will perform certain actions according to the law resulting in the issuing of an official declaration of recording of the document which means that it fulfills the legal requirements for recording ('deed registration' systems), or a certificate of title which means that the land registrar -after examination of the document- finds the impact of the document legally valid ('title registration' systems). The first system might be called 'land recording', the latter 'land registration'.

Strategic objectives of land administration organizations can be met by focusing on electronic conveyancing:

- coping with a growing amount of digital documents on the land market
- faster procedures for submission and reaction
- perspective of lower costs (procedures, archives etc)
- fast and remote access to digitally stored deeds and title files
- faster clearance for transmission of purchase prices

As the legislation relates to paper documents, 'true copies' on paper, and analogue procedures, the following issues need to be addressed:

- legitimacy of digital documents and digital procedures
- authenticity of digital documents
- integrity and completeness of digital documents

The answer to these questions lies in the interweaving of legal and technical instruments. Electronic conveyancing can be realized through the application of advanced techniques supported by a sound legal prescriptions. One might think of:

- electronic signatures and certification authorities (EU, 1999)
- dual encryption technology
- hashing functions
- closed datacommunication network
- continuous network monitoring
- system of user-licenses

Changing existing analogue land administration processes by the application of these techniques and prescriptions basically leads to a digital process as follows (case: the Netherlands, status: systems ready and law under Parliament): notaries can submit digital documents through closed networks to the land registrar. In order to use this

service, the notary has to apply for an electronic signature at a certified Trusted Third Party which provides security concerning the identity of the applicant coupled with an electronic key, which consists of a private part and a public part. Before transmitting the digital document the hash-value of the document is calculated and encrypted, and mixed up with the notary's private key into a new digital signature. The public key is not secret, however the private key is strictly secret. So access to the network is by authorization and identification. The land registrar also disposes of an electronic signature. After receiving the digital document, the land registrar uses the public key of the notary to decode this mixed code. The land registrar will then be certain of the identity of the sender and the integrity and completeness of the document. For the transmission of the certificate of recording (*mutatis mutandis* a certificate of title) the procedure is similar: the land registrar's message will be hashed and mixed with the registrar's private key, forming the land registrar's digital signature. The receiving notary can decode the message and be sure about the identity of the land registrar and the integrity and completeness of the message. The transmission itself is through fire walls and protected network. If, however, somebody tries to perform illegal operations (hacker), continuous network monitoring will detect the distortion immediately (it takes too much time to decode encryption based on 1024 bits length) and the electronic signature is made invalid. Bit-loss is of course detected by differences in hash values. Similar developments take place in a number of countries (Burdon, 1998).

2.2. Public interests in land

Not only parties on the land market may benefit from electronic conveyancing, but also the government. Many government decisions apply to land nowadays, and many of these have power against third parties including legal successors (new owners). Four aspects are important:

- legitimacy of the government's intervention in private rights to dispose
- to which extent legal power against third parties
- identification of plot of land concerned
- how to access the relevant information

An inventory made in the Netherlands came up to over 60 public encumbrances of this kind. To name a few: decisions on expropriation, pre-emptive rights, housing regulations, historical monuments, nature conservation orders, noise nuisance orders, air pollution orders, soil pollution orders, land use planning regulations, liabilities on maintenance of roads, ditches, canals, dikes etc, orders on unoccupied houses, prohibitions to felling trees. These public encumbrances (charges) are to be considered separately from all sorts of personal rights such as chain-conditions in deeds, conditions of long lease agreements and general conditions in contracts of sale.

The fast recording of governments interest in land will be helpful to the enforcement of government decisions. By consequence, also government organizations are interested in the submission of digital documents by datacommunication.

On the other hand, information on existing public interest in land is of major importance for third parties, as these interests will influence the use and value of real estate. So it is a responsibility for the government to speed up the publication of decisions by using digital processes.

One might reasonably expect that in the near future the legal status of land according to public law is as important as that according to private law.

2.3 Map Updating

Although it is expected that in the next-generation land administration systems more legal objects will play a role than parcels only (Kaufmann, 1998), up-to-date information on the geometry of these objects is important to meet the customer's demands. This does not mean - by the way - that all geometry should be at top accuracy level. Standards are to be set after consulting customers although from the government point of view there may be a bottom line. However that may be, update procedures for (cadastral) maps are time consuming, so technology might prove to be helpful in speeding up the actuality of maps. Here the land surveyor will benefit from datacommunication by

- having remote access to map files and field sheets
- processing of field survey on the spot
- results of quality checks on the spot
- results of adjustment to the existing map on the spot
- input for re-measuring mistakes on the spot
- remote updating of map files immediately

An intermediate phase currently applied (e.g. UK) is the use of intelligent pen-computers by the field party. In the future they might be replaced by wireless communication with central systems. Working according to such a process actually means the transfer of office-work towards the field. The impact on organizational processes and structures is therefore substantial.

3. THROUGHPUT PROCESSES

3.1 Local recording, central processing

The trend in the world is to emphasize local governments or structures to perform land-related activities such as land management and land recording/registration (Cobbett, 2000). The communis opinio is that this is contradictory to centralized land registers and cadastre. Datacommunication provides opportunities to combine local activities with efficient data processing and storage. Centralized land registers and cadastre, however, may be operated from a distance: local information management responsibility. There is quite a lot of evidence that centrally managed data processing and storage is more efficient and thus cheaper. Recent investigations in the Netherlands concerning the costs of local cartographic systems compared to a centralized alternative, resulted in the decision to centralize as soon possible. Only concentrating hardware is expected to be 15% cheaper: a further centralization and standardization another 40%. Apart from scale of economy advantages in hard and software, the necessary staffing is much less. The decision taken 15 years ago to install local cartographic systems was not taken on a cost-benefit basis anyway: there were simply no datacommunication options to decide otherwise. It just took too much time to transmit a comprehensive map data file from one place to another. So the development of datacommunication technology can give a boost to effective local operations, which are still efficient.

3.2 Local processing, central distribution

There might be a reason to operate systems locally. The way how tasks and responsibilities are divided within the public administration may determine where the systems are installed. Land registers may be in the local courts having their own computer facilities. Cadastres might be maintained in the municipality, using the municipal IT infrastructure. Access to land information may be hampered then. Datacommunication provides opportunities to continue with local databases, and allowing accessibility from a distance. Recent investigations in the Netherlands show that the regional and local databases (over 70!) which jointly contain the country covering the 'Small Scale Topographic Base Map of the Netherlands' (ready since January 2001), can be accessed for distribution on a national level: a 'single window' for customers who need to go beyond the local or regional data sets only. Contrary to the case in paragraph 3.1, datacommunication here allows local systems to be combined with centralized data distribution.

3.3 Inter-organizational workflow management and infrastructures

The impact of working together, whether simultaneously or on different administrative levels, is the creation of joined work processes where the tasks and responsibilities are transparent. Current methods for data and process modeling are expanded with enterprise modeling: defining common processes and the division of everyone's role and function. Here the concept of spatial data infrastructures emerges, which encompasses the networked geospatial databases and data handling facilities, the complex of institutional, organizational, technological human, and economic resources which interact with one another and underpin the design, implementation, and maintenance of mechanisms facilitating the sharing, access to, and responsible use of geospatial data at an affordable cost, for a specific application domain of enterprise (Groot, 1999). In countries where land registers and cadastral maps cover an administrative unit (municipality, county, nation), it will be a professional challenge for land surveyors and land registrars to play a leading role in the development of an infrastructure at that level, because:

- land administration data covers (in that case) the whole area
- national triangulation normally provides a reference
- parcels are uniquely identified and also provide a reference
- objects are suitable for attachment of other (non spatial) data
- land registers and cadastres maintain a certain topicality
- one cannot expect users to organize a spatial data infrastructure
- data suppliers have to meet the customer demands

Land surveyors who understand their role in data infrastructures will, for example, realize active municipal land information departments and active national land administration organization instead of marginalized land surveying bureaus and cadastres.

4. OUTPUT PROCESSES

4.1 Making land information easily accessible

The access to land administration data is important because the data has to serve the land market, credit facilities, urban and rural planning and development, land taxation, management of natural resources. A major aim of land administration organizations is to be customer oriented (Magis, 1999). Citizens and organizations need information to take the right decisions. From that point of view the 'single window' policy is developed, aiming for easy access for everyone to government data. The back office behind such a single window has a function to making data from various government agencies available to the public. In fact this is a data infrastructure: networks between distributed databases in a certain institutional framework.

As land administration (UN 1996) refers to

- information on ownership
- information on value
- information on use

the development of data infrastructures makes it irrelevant to store all data concerned in one big database. It gives the opportunity to share data and make them easily accessible for customers.

When providing open access for customers which are not yet known (non-subscribers, like the professional parties in the land market) the use of internet is obvious. There is an increasing creation of internet access to municipalities and other government agencies through the internet. The advantages of the use of the internet (WWW) are

- always available
- many people have access
- the users pays (at least) a part of the datacommunication costs
- through hyperlinks a supplier can be present at many market places
- it brings information close to the user

Disadvantages are

- response time not manageable
- protection of data not so easy
- transaction costs for electronic payment still high
- no relation with customer

A related matter is the openness of the information regarding the low threshold to get access. It still requires some actions for the users (non-subscriber) to obtain some information from the land register and the cadastre, even when open for the public: a telephone call, a letter, an application form, a trip to the office.

In order to understand the feeling of the 'man in the street' the Netherlands Cadastre asked an independent research bureau to conduct a survey among the public.

Over 340 persons (at random) were interviewed by telephone. 59% said that they would use the internet to look at his own cadastral data, 36% to look at data on other people. 58% was supportive of creating an internet access.

Over 440 persons visiting a cadastral office were asked to complete a questionnaire. 72% said that they would use the internet for looking at their own data, and 61% also to look at data on other people. 78% supported the Cadastre in providing internet access.

Over 1300 persons visiting the website of the Cadastre were asked to complete an electronic questionnaire. 83% would look at their own data, also 83% to other people's data. 93% was supportive.

To all the respondents it was clear that their own data would also be easy accessible for others by the internet.

Based on these results the Netherlands Cadastre will facilitate internet access for citizens in the next year, starting with cadastral information concerning the parcel object and the ownership, and providing object based access only (via the parcel number, address, and cadastral map). Perhaps in the next future subject-based access and mortgage information may also be available. Before making a decision, the response of the citizens to the new service will be considered.

4.2 e-commerce

Digital Land Registers and Cadastre cannot provide individual information on ownership only. Query tools make statistical analysis possible, like trends in purchase prices, market shares of mortgage banks, indicators for the activity of the property market: spin off products of land registration and cadastre, with a certain added value. Of course these products have to meet the requirements of national privacy law, which makes sensitive handling necessary. This, by the way, also applies to commercial companies who use this information for further value adding. Important issues concerning side line products are

- privacy requirements
- tailor-made approach (at least: customized)
- well organized back office
- continuously 'in the air'
- easy understandable order forms
- payment mechanism
- pricing (Zevenbergen 1998)
- delivery conditions

The Netherlands Cadastre has exploited an e-commerce site since last year, which only sells to subscribers and 24 hours a day, 4 customized products as follows:

- trends in purchase prices per area
- number and prices of real estate transactions per area
- number cadastral map in rural area
- number and prices transfer of rural land

It was expected that in the year 2000 the number of subscribers would be not exceed 50; however, the reality is over 1,000 at the end of the year. The back office is a copy of the cadastral database which is updated every half year. Subscribers buy on account, with paper invoice, as long as electronic billing is relatively too expensive.

CONCLUSIONS

Datacommunication plays an increasing role in almost all processes in land administration organizations, internally and externally. It facilitates cooperation of local and central land administration functions, with other relevant organizations, and above all with the customers. Information of ownership, value and use of land (all in a broad sense) belongs to the basic data in geo spatial data infrastructures. The trend is

obviously moving from land administration towards land administration infrastructures (Williamson & Grant 1999). Datacommunication is a cornerstone in modern developments like electronic conveyancing, updating maps, distribution of land information and e-commerce.

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