INTEGRATING SUSTAINABLE DEVELOPMENT OBJECTIVES INTO ICT ENABLED LAND ADMINISTRATION SYSTEMS IN THE NETHERLANDS

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Key words: land administration, information technology, sustainable development

SUMMARY

The paper analyses the development in the Netherlands in the field of institutional, legislative, administrative and information aspects of land management, and comes to the conclusion that an integrated approach to land administration systems is prominently at stake.
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1. INTRODUCTION

Land as an economic factor is getting less and less important in the Netherlands. In terms of macro economic added value, the agricultural sector decreased from 2.8% in 2000 to 2.3% in 2004, while the financial, business & health service sector in the same period increased from 37.6% to 41.2% (total added value 432 billion euros). The number of farms decreased from 97,000 to 85,000. The amount of agricultural land decreased slowly (30,000 ha), so the average farm size grows.

In a country with 16.3 million inhabitants on 41,528 square km (81% land, 9% inland water, 10% sea) built areas cover 11% which area is growing (351 mln ha in 1996, 367 mln ha in 2000). In 1997 40% of the population lived in urbanized areas, in 2000 this increased to 42% (increase of 549,000 people). This equals the growth of the population as a whole in that period.

The GDP is 466 billion euro in 2004 (+1.2%)

2. POLICY FRAMEWORK FOR LAND MANAGEMENT

Land Policy

Land policy, described as the 'whole complex of soci-economic and legal prescriptions that dictate how the land and the benefits of the land are to be allocated' (UN, 1996), does not exist in the Netherlands in the form of a dedicated policy of the government. A complex set of existing legislation and policy statements constitute what one could indicate as a 'land policy'. There exist an official memo Policy on Land (Nota Grondbeleid 2001), this concerns however the division between stakeholders of the financial aspects of planning, acquisition, development and distribution of land within town developments.

Land tenure

Land tenure, as 'the mode in which rights to land are hold', is regulated in the Civil Code (1992). The Code provides for a closed system of real rights (numerus clausus of rights in rem), including rules for the establishment, transfer and abolishment of these rights. Government is considered as a private owner, and has to behave like any private person, so
there is not a special category of state lands with its own rules. Registration is compulsory to acquire legal ownership. There are currently no policy objectives by the government on land tenure issues.

**Land market**

Through the Civil Code and additional laws and regulations the procedures in the land market are transparent and without debate. There are 4 requirements for legal transfer:
- right to dispose by the seller
- agreement between seller and buyer about the object of sale
- obligatory agreement and notarial deed of transfer
- registration

Transaction costs are about 10% of the value of the transferred property, of which 6% transfer tax. This percentage is from time to time highly under debate because experts consider this tax as an obstacle for a volatile market.

Apart from the right of the government to allocate pre-emptive rights and to apply the expropriation, the government does not interfere directly in the land market.

Purchase power is generated by frequent use by citizens of loans secured by a mortgage (total amount of loans estimated at 557 billion euro, more than the GDP). Apart from the fiscal treatment of mortgage interests, the government does not interfere.

There are currently no policy objectives by the government on land and real estate market issues.

**Land Taxation**

Taxes on economic transactions of real estate and shares form 4% of the total revenue from taxation of the central government in 2003 (4 of 102 billion euro). Lower governments generate 47% of their total tax revenue out of land taxation (2.8 of 6.1 billion euro), waterboards 39% (678 of 1757 million euro).

The policy objective of the government is to diminish the land tax revenue for the municipalities, and replace this by a payment by the central government, which policy is highly opposed.

**Spatial Planning**

There is a tradition of decentralisation of spatial planning competences. However, the growing density of population and economic functions leads to growing tensions between central and local government regarding the incorporation of national interests that are not desired by local authorities (high speed railroads, cargo railroad to Germany, expansion Amsterdam airport, conservation of landscape, all versus local wishes for town development, nimby attitude, agricultural and industrial business development).

Policy objective of the government is to balance between national, regional and local interests.

**Protection of the environment**

This is a major concern of the government. Also here is the policy objective of the
government to balance between economic and environmental requirements. This gives often rise to heavy disputes (e.g. construction of roads and town developments delay because of protection of rare species)

**Conclusion for this chapter**

In a highly populated country as the Netherlands, there is a continuous tension between general interests and private interests. On one hand citizens increasingly make an appeal to the government authorities to regulate society, on the other hand citizens experience the vast amount of regulations and policy measures as a unpleasant burden and they do not fear to contest the government, which is easy because the democratic tradition is materialized through all kinds of appeal procedures. This frustrates the government, which considers possibilities to reduce these possibilities by adaptation of laws.

Also the impact of government decisions are not always expected. For example the huge demand for land for construction, development and nature conservation, gives rise to impressive speculation in rural lands, causing a price level for agricultural lands that make farmers face high costs and marginal return on investments (Needham, 2005).

An other example is the policy of the government to privatise telecom-companies, and ton auction network permits. Because of this policy, the country is snowed under with transmitting masts.

Moreover the legislation and additional rules are considered by citizens and the business sector as a major administrative and financial burden (estimated at 3,5% of the GDP), reason why the government launched a program to diminish this burden with 4 billion euro by 2008 (speech Minister of Finance, 25-10-2004).

Policy aspects are increasingly complex. This reflects on the legal framework, the public administration, and the land-information requirements.

**3. INSTITUTIONAL FRAMEWORK FOR LAND MANAGEMENT**

**Transfer of immovable properties**

One of the positive legacies of the French occupation (1794-1813) was the introduction of a cadastre, based on Napoleon Bonaparte’s decision in 1811 to bring the Netherlands (from 1810-1813 annexed by France) under the application the ‘Recueil Méthodique des Lois, Décrets, Règlements, Instructions et Décisions sur le Cadastre de la France’ (Bulletin des Lois no. 397/7340). The work started in 1812. After the defeat of the French, the monarchy was restored and King William I decided to continue the development of a cadastre. In 1832 the cadastre was completed. As the cadastre served fiscal purposes, the system consisted of registers of owners and users as taxable subjects, cadastral parcels as taxable objects, and the rental value of the property as the taxable value. Already in 1825 the cadastre was unified with the so called mortgage register, that was positioned in the Civil Code as what we now would indicate as the 'legal property register'.
As the first post-Napoleonic Civil Code (1825, in power 1838) was a copy of the French 'Code Civil', the characteristics of the land administration system are
- deed registration
- negative system
- causal system of delivery
- unified system of land registry and cadastre (different from France)
- obligatory notarial deed for mortgages (since 1838) and transfers (since 1956)
- transfer of legal ownership requires registration (different from France, since 1838)

These characteristics still remain today, although at various moments discussion in the Parliament took place whether it would not be better to shift to a positive title system. The last discussion took place after World War II during the preparation of a new Civil Code. The Parliament decided to continue the current system, because the Parliament was satisfied by its functioning. The new Civil Code became into force in 1992, providing some new rules to repair some elements in the system that were experienced by the Parliament as undesirable.

Some examples are:
- when the seller is unauthorized to sell, this cannot have effect towards the buyer in good faith, when this incompetence has other causes then a lack of right to dispose (art 3:88)
- when an owner refrains from registration of a certain fact concerning the property, this cannot work against somebody who consulted the registers in good faith (art 3:24)

By consequence the protection of buyers in good faith is quite strong, and this is the reason that the Netherlands’ land administration system today is considered as a de facto semi-positive system.

**Taxation of land and real estate**

Taxation of land and buildings goes back to the middle ages. With the introduction of the cadastre (1832) tax was levied as a state tax. This remained until 1980, after the Parliaments’ decision that taxation of land and buildings was an appropriate tax to fund the budget of Municipalities (Law on Municipalities 1970). Tax was still levied based on the cadastral value. Because of the understanding that taxation based on market values would constitute a more fair taxation, the Parliament decided to give municipalities the exclusive mandate to assess the value of land and real estate based on the market sales comparison method (Law on the Assessment of Real Estate 1992). This law came into effect in 1996. Since then every 4 years all real estate is assessed against market values at a certain reference date (e.g. the value for the period 2005-2009 is fixed on 1-1-2005 and refers to the market value on 1-1-2003). The assessed value must be used by all government bodies for their own activities. The tax is levied for both ownership and use of real estate. As part of political negotiations, the Parliament decided in 2005 to abolish the taxation of the user-part of real estate (tax on ownership remains), which decision is highly critized.

**Urban and Rural Land Use Planning**

Within a whole complex of laws, the Law on Spatial Planning 1965 provides the basic framework for the system of land use planning. Within national and regional plans, the local zoning plan is the plan that is binding for government and citizens. To enforce national interest the Law empowers the central government to compulsory include regional and
national interests in the local zoning plan. This remains however a cumbersome procedure, as local governments often resist these instructions. To avoid long bickering, the Parliament decided on various laws to realise projects of national interests more quickly, like the so-called Track-Law 1993 (called the 'nimby-law').

The nature of the Law on Spatial Planning, is that it allows the municipalities to forbid a certain use, not to force the owner to realise planned land use. If owners do not intend to comply, the municipalities have to acquire the land by themselves. If this is not possible through the willing buyer-willing seller concept, the Law on Pre-emptive Rights 1996 provides for the allocation of pre-emptive rights and ultimately the Law on Expropriation 1851 provides for taking by force.

**Land Consolidation**

Land consolidation was first applied under the Law on Land Consolidation 1924, since then many times improved and finally developed into the Law on Rural Development 1985. A main characteristic of this law is the choice it offers between different types of rural land development, depending on the predominant destination of the area concerned. Still the traditional land consolidation by voting is possible, however also land development projects where the government decides. The Law is currently under debate, in order to provide development instruments that can cope with the rapidly changing physical appearance of the country, namely a 'metropolitan landscape'.

**Protection of the environment**

The Law on the Protection of the Environment 1993 constitutes a framework for various laws on water, waste treatment, soil sanitation, noise nuisance etc. With the introduction of this legal framework, the need for coordination and integration with the above mentioned laws became manifest. This integration is mainly established by budget. Development of urban areas is done through a so-called 'integrated budget urban development', and the discussion mentioned on the land consolidation legislation also aims at the development of the rural area through an 'integrated budget rural development'.

**Conclusion for this chapter**

As governance of the described society is getting more and more complex, also the legal framework suffers increasing complexity. As policies require an integrated view, the integration of legislation is a growing issue. Also this impacts on how the public administration is organised. A derivative effect is the demand for integrated (land)-information, that is getting manifest.

**4. PUBLIC ADMINISTRATION AND (LAND)-INFORMATION SUPPLY**

The public administration involved in the administration of the above mentioned public functions is not simple. All three levels of government and moreover waterboards as separate public body (functional decentralisation) and their division into many departments, sets high
requirements for cooperation to achieve integrated policy formulation and implementation. Apart from that, the country exploits in all fields of governance about 500 independent public agencies, which all have a certain independent mandate, although all report to a political responsible minister. Failures in coordination and cooperation become manifest in crisis situations in general, like animal diseases, petty crime, organised crime, fraud, major accidents like airplane crash, and in spatial planning specifically: demand for land for infrastructure, houses, nature and recreation vs agriculture, road construction and town development vs environment, industrial development vs town development, airport developments vs housing, preservation of green belts vs demand for low density houses, port development vs nature etc. The fact that ministries, and departments at regional and local level, feel to represent a certain interest, makes integrated decision making cumbersome. Moreover there is a democratic tradition to discuss issues until everybody agrees (sometimes referred to as dutch ‘polder-model’) which has a compromising effect.

In many cases the result of governance is an interference in private property rights through the establishment of a public interest in land. Today about 100 different public encumbrances are possible on a single land parcel, from which about 80 have power against third parties. With other words, they have power against new buyers of real estate and have the same characteristics as real rights (namely ‘droit de suite’). The government bodies that are mandated to impose such restrictions are many. Apart from this, many government bodies collect information for their own purposes, not necessarily coordinated with other government bodies.

This results in a myriad of suppliers of relevant land-information. Hereafter we mention some examples.

- private rights to land: Land Registry, Cadastre and Mapping Agency
- mortgages: idem
- small scale topography idem
- 20 public rights to land: idem
- 60 public rights to land: 450 municipalities, 12 provinces, 40 waterboards
- taxable land values: 450 municipalities
- land use data: Alterra Institute
- land use planning data: ministry, 12 provinces, 450 municipalities
- environment data: ministry, 12 provinces, 450 municipalities, 40 waterboards
- land consolidation data: Land Registry, Cadastre and Mapping Agency, ministry
- EU agricultural data: ministry
- large scale topography 12 PPP’s, coordinated by a national board

In addition we mention the datasets needed for a transaction in the land market:

- Popular census: 450 municipalities
- Verification Information System: Ministry Economic Affairs
- Guardianship of Minors Register courts
- Tutelage Register courts
Conclusion for this chapter

So, the whole range of policy, legislation, administration, information shows a certain complexity. Unlike Denmark (Enemark at al, 2005) there is not something like a cross reference register, although the cadastral parcel number is used in many registers, and might act as a de facto cross reference. Addresses however, also prominently represented in many registers, are not standardized, and form a source for confusion. The awareness of the need for coordination of government information has now penetrated in political circles, resulting in a strong government program for the restructuring of the government information infrastructure, that started in 2000 (see also chapter 9)

5. POSITIVE ASPECTS OF COUNTRY EXPERIENCE

Within this complex situation, there are certainly positive experiences. We will name three.

Firstly the quality of the above mentioned datasets is good. There is a need for more coordination and cooperation, but the datasets as such are country covering, well maintained, and in digital format. If this would not be the case, a policy of evolutionary integration would not be an easy option. The basic material is thus available for a leap forward.

Secondly, the gaining of the status of independent public agency for the Land Registry, Cadastre and Mapping Agency has resulted in widely used and easy accessible digital datasets, e-conveyancing (amendments Cadastre Act endorsed 2005), quick database search, innovative product development and at a modest costs level, and by consequence low transaction costs for the property and mortgage-market (Abroad, 2005). Independent customer surveys show good customer satisfaction.

Thirdly, practical coordination already has been realised between the Cadastre and the Popular Census, the Cadastre and Registers of Legal Entities of the Chambers of Commerce, and the Cadastral Map and the Large Scale Topographic Map (‘GBKN’).

Conclusion for this chapter

Although a fundamental restructuring of the government information architecture is necessary, the building blocks are readily available.
6. NEGATIVE ASPECTS OF COUNTRY EXPERIENCE

The allocation of mandates to the public administration, the required consultation ‘circus’, the parliamentary procedures make the decision making process remarkably slow compared with the need for a quick response to urgent societal and technological developments. The Law on the Registration of Public Encumbrances 2005, took 6 years to process, even more for the amendments to the Cadastre Act (2005) making electronic lodging of deeds legally possible. Where sometimes IT-projects tend to overrun the planned time (don’t cynics say that IT projects take twice the money and the time?), all technical facilities for accommodating e-lodging were already in place since 2003, while legislation caused serious delay (e-lodging is in place since 25st of October this year). A clever solution however was applied: since 2003: all submitted analogue deeds were scanned, and followed subsequently the new electronic process.

Secondly the attitude of many government bodies still is to prioritize their own interests, and to optimize their own information requirements, with disregard of efficiency of the overall government information infrastructure.

An example is the creation in the ‘90-ties of a countrycovering land-information system under the Ministry of Agriculture of agricultural land-use, as a response to the EU for the Integrated Administration and Control System IACS (EU regulations 1765/92 and 3508/92) where according to Annex E and F one option was to combine this IACS with existing cadastral databases.

Another example is the Law on Assessment of Real Estate 1992 that obliged the municipalities to establish and maintain a municipal land tax administration.

In both examples the cadastral parcel is integrated in the dataset, in the first case a reference of agricultural use-parcels to the cadastral parcel, in the second case a reference of the taxable object to the cadastral parcel.

A new development is the Law on Registration of Public Encumbrances 2005 that obliges all municipalities to establish and maintain a public register of all public restrictions they impose on real estate. Of course this is related to the cadastral parcel as unit for private property.

So already 4 country covering registers are maintained which are based or at least related to the cadastral parcel. One could easily imagine a situation where all these datasets were combined and integrated in the existing cadastral databases. Other countries, like Scotland and Lithuania, are more keen and have paid attention to the efficiency of the information architecture by the creation of ‘centres of registers’, where several registers are maintained by a single agency (Registers of Scotland, State Centre of Registers in Lithuania).

Conclusions for this chapter.

Decision making processes and attitude within the public administration do not always allow for a quick response to the information supply for societal and technological needs.
7. BUILDINGS IN THE CADASTRE

The development of a large scale topographic base map of the Netherlands ('GBKN') (scale 1:1000) is a nice example of a private-public partnership. In the ’70-ties awareness amongst users of large scale topography (municipalities, utilities, waterboards, cadastre) grew that it could be a wise policy to combine efforts in the establishment and maintenance of such a large scale topographic map, in stead of multiple dataacquisition and storage which was the case until then. The map, ready since 2001, is maintained by 12 provincial legal partnerships (foundation), coordinated by a national body. The technical base of the map is aerial photography and restitution. It is estimated that the partners invested about 250 million euro for the creation of the database. The datastructure is spaghetti, discussion are going on about how to upgrade the database to objectmodels.

The existence of the large scale topographic base map brought about the question of coordination of geometry between the base map and the cadastral map, as both were at the same scale. Overlay showed differences that caused confusion for the public; the citizens were faced with lines on the cadastral map representing the boundary and lines on the base map representing topographic boundaries: what to conclude about the relation between the two? The reason for these differences is on one hand the stochastic nature of geometry, and the difference in source (source for the base map aerial images, source for the cadastral map terrestrial observations cumulated since 1832). To tackle this problem, a reconciliation project was implemented, to adjust all cadastral boundary lines with the topographic lines, and to share the geometry of the buildings. This was a major project, taking 10 years and 50 million euro investment, that was completed in 2004. Since then the cadastral database and the topographic database share the buildings sub-dataset. As the buildings for the base map are updated every three months, the representation of buildings on the cadastral map is better then ever before.

Conclusion for this chapter

The arrangements for geometry of buildings in the cadaster are well established through datasharing with the large scale topographic base map.

8. EU INFLUENCES

Already some aspects of the EU came across in the above chapters. In addition, the EU directives on electronic signatures, privacy, public key information (3/98) influence the legal framework for the cadastre. Questions are asked whether the EU should harmonize the property arrangements, land registration and cadastre of the member states. This would currently be in conflict with the Treaty of Rome (property regimes remain the competence of the member states, art 222 = art 295 since 2002) , although the EU endorsed a directive on time sharing property (directive 94/47), and a judgement of the EU court regarded intellectual property (13 July 1995 C350/92). Free movement of people, capital and goods in the member states is a main objective of the EU. On the long term the matter is whether protection of citizens is in conflict with the existence of various property regimes, and different legal meaning of registration and cadastre (van der Molen, 2002). Moreover the 2nd banking
directive (89/646) aims at improving an easy mortgage service throughout all member states, which is hampered by the various regulation of mortgages (e.g. foreclosure arrangements). Also are relevant the directive on public procurement (93/96), and various projects like Galileo (to be ready 2008) and e-content (EULIS prototype).

**Conclusion for this chapter**

The European Union undoubtly influences the institutional environment, strategy and operations of the Cadastre, Land Registry and Mapping Agency.

### 9. THREE KEY IMPROVEMENTS IN THE NEXT DECADE

At national scale major improvements are expected regarding the restructuring of the government information architecture. The basic idea behind data infrastructures is that it provides for tools giving easy access to distributed databases by people who need those data for their own decision making process. Although data infrastructures have a substantial component of information technology, the most fundamental asset is the data itself, because without data there is nothing to have access to, to be shared of integrated. Last decade it was understood that the development of data infrastructure not only provided easy access to databases elsewhere, but also good opportunities for re-thinking the role of information for the performance of governments. Based on this starting point, the ‘Streamlining Key Data’ Programme of the Netherlands government took the lead in developing and implementing a strategy for restructuring government information in such a way that an electronic government might evolve that:

- inconveniences the public and the business community with request for data only when this is absolutely necessary
- offers them a rapid and good service
- can not be misled
- instills the public and the industrial community with confidence
- is provided at a cost that as not higher than strictly necessary

Jointly with 5 other government registers, the property registers, cadastral and topographic maps of the Dutch Cadastre, Land Registry and Mapping Agency are formally appointed as ‘base registers’ of the governmental information infrastructure. The base-registers will be the core of a system of so-called authentic registers, which might be any register that is maintained by a single government body and used by many others as the authentic source of certain data. If a register is formally designated as an authentic register, all other government organizations are strictly forbidden to collect the same data by themselves. In their budget allocation they will not find any money for data collection at this point.

Secondly, the implementation of the Law on the Registration of Public Encumbrances 2005 provides for registration of all public restrictions on land that are imposed by various government bodies. This regards the set of restrictions that have power against third parties; as such these restrictions have characteristics of a real right (about 80 public rights to land). This should solve the problem, that acquiring knowledge about the complete legal status according to both private and public law is quite an effort for real estate brokers, notaries and citizens. Although the solution offered is complex, technology should make it work. The
A third key improvement is provided by the IT renewal program of the Cadastre, Land Registry and Mapping Agency. This program brings new functionality.

First: improvements are introduced regarding the internet-access to property information. In addition to the existing on line service to the cadastral databases, now also the public register (the files with the paper deeds, stored as they come in) is digitally accessible. Since 2004, deeds and other registered documents from 1999 onwards are accessible online. Older deeds are scanned and sent by e-mail as soon as somebody has a request. This reduces the inquiry time to a few minutes.

Second: relevant selections of the cadastral maps are now available on line in A4 format (A4 is enough to show the property) replacing the e-mail system. This e-mailservice was a reasonably quick service, the new solution offers maps in seconds.

Third: from September 2005 its (will) be possible to submit a notarial deed through internet to our Agency. Thus submission by mail or delivery at the desk is not necessary anymore. An adaptation of the Cadastre Act making this official is endorsed by the Parliament per 1 February 2005. This brings back the time needed for lodging a deed and receiving the official receipt providing the evidence of a legally valid registration to a few minutes. In the near future it is intended to update the databases automatically, based on these electronically lodged deed. The processing time goes back from a few days to a few minutes.

Fourth: after the deed has been registered at the office, the notary must carry out the post registration check in order to detect any potential change between the execution and the registration of the deed. As the evidence of registration is sent by internet, just after the electronic submission following the execution of the transfer deed, this check can be done immediately, reducing the time to some minutes.

Fifth: the time needed to solve mistakes is minimized through a rigid quality management system for which the ISO 9000:2000 certificate was awarded in 2001. Besides using the computer to check and cross check the consistency and quality of data stored in the databases, each month 5% of processed notarial transfer deeds are monitored on correctness by manual inspection. As an example: the completeness of the public registers should be and is currently 100%, the standards for full-correctness of the databases is 99.6 % while 99% is realized.

Sixth: in order to manage delivery times, a quality charter is published in 2004, to be committed to the customers about what they may expect. The extent to which these standards are met, is published.. For example: in 2004 99,7 % of the registrations were done within 4 days (quite good), 84% of appeals were met within 2-60 days (less), and 97,6 % inquiries were realized with an average of 0,9 second for on line inquiries (the standard is 80% within 2,5 second).

Seventh: the use of GPS for cadastral boundary surveys is getting common, many field parties are now equipped with GPS instruments, and almost 100% use is expected when the European Galileo satellite system is operational, likely in 2008.
Eighth: tailor made products are expanded. The last ten years property market statistics are published, market shares of mortgage banks, idem for notary offices. For the car-navigation industry and distribution- and retail research databases are sold that link addresses to co-ordinates. Recently a national residential housing-value index was introduced, and information service providing the value of selected reference objects for property assessment. Also combination of products with governmental and commercial data suppliers are developed, like fish eye pictures, retail statistics, and topographic information.

Ninth: the organizational structure can not remain untouched while introducing new technologies and new work processes. Through the use of data communication both for input to and output, there is no need for maintaining 15 regional offices any more. Already now workflow management systems direct the submitted deeds for mutation of the databases to the office where the workload is less. Small public desks might be placed in house of townhalls or alike, and field survey parties might work from home. The policy is to shift to 1 office on the long run, via a stepwise approach the next 10 years. Also the internal structure is under drastic review. The number of directors is currently reduced from 14 to 4.

Tenth: all these technological innovation, will require less staff. A reduction of about 20-30% (of 2200 staff currently) is estimated, realizing that re-skilling is necessary for many of us.

Conclusions for this chapter

The next decade will show major improvements in the structure of the government information architecture, in which the developments at organizational level are well embedded.

10. THE INTEGRATED MODEL TO IMPROVE LAND ADMINISTRATION

The above chapters illustrate that the proposed integrated land administration model should be fully supported. Developments in the Netherlands aim at the realisation of such an integrated model. At the same time this report represents my opinion that land administration systems are to be considered as a tool that facilitates the implementation of government activities on land. The land management paradigm (figure 1 in Enemark et al, 2005) could then also be depicted as follows.

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Australia International Science Linkages Program
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It might be that the structure of this diagram shows in a more genuine way the differences between the policy, management and tool level, while at the same time the relationship between the institutional and operational level is better addressed.

11. CONCLUSIONS

Although in the Netherlands land policy and land management exist as a composition of a myriad of laws, policy decisions, and regulations, the overall objective is definitely to govern the country in a sustainable way. The requirements of coordination and cooperation are by consequence high and form a major challenge for the decision making processes and the functioning of the public administration. The supporting information architecture is also complex, and deserves continuous attention. The response to the societal and technological needs demand an integrated governance, it makes that the structure of the government information architecture is also at stake. The development of a system of authentic registers is a step forward, and is promising. The role of land-information within this system is dominant, as the core of 6 datasets consists of 4 geographical datasets, namely cadastre, topography, addresses and buildings. Meanwhile the IT-renewal and organisational re-engineering of the Cadastre, Land Registry and Mapping Agency comply with this approach.

BIOGRAPHICAL NOTES

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