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LAND ADMINISTRATION IN THE UNECE REGION

Development trends and main principles

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FOREWORD

Over the past 15 years or so, a number of factors have profoundly changed the outlook for political, economic, environmental and social development in the member States of the United Nations Economic Commission for Europe (UNECE): the increasingly widespread acceptance of democratic institutions and market-based economic systems; the liberalization of trade; and rapid technological innovation, in particular in information and communication technologies. In this context, the issue of spatial information infrastructure is recognized as an increasingly important component for achieving sustainable development in all UNECE member States. Economic and social reforms in many UNECE countries have had a dramatic impact on the spatial information environment. These reforms include land privatization, decentralization, cost recovery of the services provided, quality assurance, public/private partnership, etc. The backlog in registration of property rights is a major constraint in the development of land, real estate and housing markets in countries in transition, particular in the urban areas. In view of these developments all countries of the UNECE region are developing and modernizing their cadastre and land registration systems.

Present land administration systems need re-engineering, they must continually evolve to cope with the ongoing developments. To ensure that land administration and management decisions are consistent with sustainable development principles, land information systems must integrate a wider range of data, information and knowledge. The spatial information systems should become increasingly open and public from the highest level of government to the community level, as the societal knowledge bank upon which public and private sectors decisions are made becomes more complex.

In creating an efficient land administration system the *policy issues* should be addressed first. Policies must ensure equal access to real property to all people of both urban and rural society. The process for formalizing and subsequently transferring property rights should be as simple and efficient as possible.

Policy goals can not be achieved unless there is an effective *land administration infrastructure* with modern information technology providing effective citizen access to information. This infrastructure also includes organizations, standards and technological processes, as well as laws and regulations for property rights, valuation and taxation. These regulations should be transparent and meet local requirements and needs.

The present publication is a further contribution of UNECE in the ongoing process of improving land administration systems in the region. It takes into account the developments that have taken place since the publication in 1996 of the *Guidelines on Land Administration*. I hope that this study will lead to a better understanding of the interrelationship between good governance, civil society and land administration for sustainable development.

Brigita Schmögnerova
Executive Secretary

PREFACE

In 1993 the United Nations Economic Commission for Europe (UNECE) launched an initiative to strengthen land administration capabilities, mainly for countries in Eastern and Central Europe. The main purpose was to identify the current needs and problems related to land administration, to share experiences and to assess the opportunities for applying methods, policies and procedures of land administration similar to those that had evolved over a long period of time in the most advanced economies of the UNECE region. In 1996, UNECE published the Guidelines on Land Administration with special reference to countries in transition (ECE/HBP/96) as part of the UNECE contribution to the Habitat II Conference held that year in Istanbul (Turkey).

The present publication takes into account developments that have taken place since 1996. It reflects the lessons learned, many of which are documented in the land administration reviews undertaken in Armenia, Georgia, Lithuania and the Russian Federation by the Working Party on Land Administration of the UNECE Committee on Human Settlements. Many UNECE countries that were once described as being “in transition” have built new land administration systems and, like other UNECE countries, are facing new challenges especially in relation to the sustainability of these systems. Technology has developed, providing opportunities for online access to land-related data and many land administration agencies now operate within a business environment in which the focus is on systems maintenance rather than systems creation.

This has led many UNECE countries towards a unified land cadastre and registration system that either is administered by a single State agency whose activities are regulated by the law, or else is created in virtual reality. A further trend is for the operation of the land cadastre and register system to be partly or fully based on the principle of cost recovery, thus enabling it to generate income for the improvement of its products and services, advance its activities and ensure a better response to customer needs. The use of the Internet to disseminate land and property-related information to the public has also been growing, thus encouraging the development of real property and credit markets.

Despite all the progress made, it is important to look further for ways and methods to improve land (real property) administration systems, taking into account the national and international needs of the public and private sectors, and the citizens they serve. One way forward is through international cooperation between the various European land administration organizations. This has already provided an opportunity for drawing comparisons between various countries and defining the system most suitable to local circumstances.

The present publication is a further contribution in this direction. As with the earlier Guidelines, it defines land administration as the processes of recording and disseminating information about the ownership, value and use of land and its associated resources. It is mainly written for senior governmental staff and politicians engaged in land administration issues. Its aim is to outline the benefit of having a relevant and reliable land administration system in place.

The publication builds on six basic assumptions, namely:

- (i) Access to food and shelter are fundamental human needs;
- (ii) Security of tenure is essential for effective urban development and the implementation of housing policy;
- (iii) Certainty in the legal status of rural land is essential for efficient agricultural production;
- (iv) Investors require a formal structure of land and property rights;

- (v) Sustainable development is dependent on the State having overall responsibility for managing information about the ownership, value and use of land, even though the private sector may be extensively involved;
- (vi) Both land and information about land are resources that must be husbanded in order to achieve economic growth.

This publication identifies the factors that should be taken into account in developing the legislation, organization, databases and maps, as well as the funding mechanisms, required to implement and maintain an effective and sustainable land administration system. Each country needs to build and operate its own system within its own social, economic and cultural environment. The publication suggests alternative ways to meet modern requirements and makes general recommendations on best practice. It does not advocate any unique solution because each country has a different history and experience.

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EXECUTIVE SUMMARY

Part One. OVERVIEW

Land Administration in the UNECE Region: Development Trends and Main Principles builds on the premise that every country should have a formal system of registration for land and property rights in order to facilitate good governance and to provide secure ownership of land, investments and other private and public interests in real estate. Effective systems for recording landownership, land values and land use are the foundation on which the efficient operation of a market economy depends and underpin the sustainable and productive management of land resources. Such systems reduce the risk to mortgage lenders and hence the interest rates that are charged, facilitating greater efficiency and economic growth.

A good land administration system will guarantee ownership and security of tenure; support land and property taxation; provide security for credit; develop and monitor land markets; protect land resources and support environmental monitoring; facilitate the management of State-owned land; reduce land disputes; facilitate rural land reform; improve urban planning and infrastructure development; and provide statistical data in support of good governance. It should be affordable and open to everyone, meeting the needs of all its users, and must be sustainable.

Local traditions and existing infrastructure will give rise to different solutions as to how this may be best achieved, especially in countries where cadastres have been in operation for many decades. This publication identifies a number of good practices and lists these in Part Two of this Executive Summary. In particular, it recommends that:

- The law should define the nature of land, the form and nature of ownership, the legally recognized forms of tenure and the rights, restrictions and obligations that must be registered;
- The land administration system should be run on business lines with a long-term financial model and an appropriate regulatory framework and management system that focuses on meeting customer demands;
- The operations of the land administration system must be transparent, with safe and easy access to the land market and low cost for all participants;
- The efficiency, integrity and transparency of the land administration system must be constantly measured and monitored, through performance indicators relating for example to the time and cost of each transaction, and consumer satisfaction;
- In order to add value to the basic information, records of ownership, value and use of land should be integrated either by having one organization responsible for their maintenance or through linking data from several organizations by electronic means;
- The textual records and graphical data sets should be linked through a common referencing system.

Most UNECE member countries have already computerized their formal land information systems. This has resulted in a broader range of data and documents being handled and moves towards electronic commerce. The key issue is how best to keep land records up to date and of good quality, making full use of the technologies that are available. This may necessitate changes to the organizational structure and financial mechanisms, as well as technical issues. Experiences indicate that issues relating to legislation, organization and funding are frequently more complex to solve than technical matters. The key to good land administration is good management.

The main commodities in a land administration system are the land-related data sets. These should initially be restricted to what are actually required to satisfy high-priority user needs. The adoption of a business-oriented approach should ensure that the processes of land administration are carried out in a cost-effective way and lead to opportunities to generate income that can be used to fund the service and to pay for technology replacements and upgrades.

It is difficult to identify mechanisms whereby the initial creation of a land information system can be financed only through user fees. Countries should regard the building of their system as a long-term public investment in infrastructure, with user fees covering only a portion of the total costs of setting up the system. The costs of maintaining and updating the system constitute only a small part of the economy that it supports. These costs can be fully recovered through fees and taxes charged for land transactions, so long as the charges are not so high as to discourage individuals from participating in the land market.

Land administration often involves partnerships with the private sector. Many countries make use of private lawyers, notaries, valuers and cadastral surveyors, while in some countries private service providers under contract to the relevant public authority operate and maintain information technology systems, including databases, although the data remain in public ownership. More commonly, the maintenance of hardware and software is contracted out while certain one-off activities such as data conversion are often carried out by the private sector. Public-private partnerships need to build on the strengths of each sector.

In all countries, the government is a major owner of land and property within its jurisdiction. It influences the property market not only in its role as a regulator but also as a participant in the market. The State needs to be treated in the same way as any other landowner with regard to the registration of rights in land so that conflicts of interest that may otherwise arise from combining these two roles can be reduced. There must be equal, open and transparent access to land-related information for all land-market participants.

Over the past decade, four key lessons have been learned. The first is that sustainability must be built into the design of any land administration system. Equipment, especially electronic equipment, needs to be upgraded at regular intervals and the digital data continuously updated. Databases will periodically need to be restructured in line with the rapidly changing technology while assuring that digital files held in archives can still be accessed and used. Strategies for cost recovery are essential in order to fund these improvements. Demands from users and opportunities created by the technology and growing volumes of data mean that land administration systems must be dynamic and be continuously reviewed to make sure that they are still fit for modern use.

The second lesson is that systems are moving towards a point where all land-related transactions and record keeping will be handled electronically. Quality controls must be embedded into the design of systems so that the authenticity of those using the system is checked, the integrity of transactions is guaranteed, and there is no opportunity for the parties to deny that they are involved. The security and privacy of personal data must be maintained and this must be balanced against the need for openness. Hence there must be clear guidelines on who can use information under what circumstances and in what ways.

The third lesson is that the successes and failures of land administration reforms are almost entirely attributable to the quality of the management and the calibre of the people who are responsible for the systems. Even in an electronic age it is the human element that determines whether reforms are successful or not. Significant effort and resources must be invested in building and maintaining the capacity of people to manage land administration systems.

The final lesson is that all countries are different and although there is much to learn from the experiences of others, in the end it is a matter of national judgement as to what system is most suitable for any particular country. It is for this reason that this study does not recommend a unique answer to the problem of determining what is best in any individual case. Nevertheless, it is important to recognize international trends and to prepare for wider international cooperation in the global context.

Part Two. GOOD PRACTICES

In this summary the key lessons to be learned from each section are laid out in the form of recommendations for good practice. The issues surrounding them are given in the main body of the text.

I. LAND AND LAND ADMINISTRATION

The initial chapter sets the scene through a general overview of land administration.

A. Land in the framework of sustainable development

Land should be seen within a framework of sustainable development. The work of the land administrator is a means to an end, which is good governance. Good practice will recognize that:

- Good governance, private ownership of land and security of tenure are interrelated and when taken together form a foundation for sustainable social and economic development;
- Land rights extend downwards below the surface of the Earth, upwards into the sky, and relate to all things permanently attached to the soil;
- The ownership, value and use of land are interconnected.

B. Land registers and the cadastre

The cadastre and the land registers provide a framework for sustainable development by acquiring, validating and making available crucial information about the land and its attributes. Good practice will recognize that:

- The function of land title registration is to provide a safe and certain foundation for the acquisition, enjoyment and disposal of rights in land;
- The system must be impartial and those who maintain it must have no conflict of interest;
- The function of the cadastre is to collect and make available graphic and textual information in support of title registration, property valuation and land resource management;
- Compulsory registration of title to land should be encouraged;
- A multi-purpose land cadastre and register system creates new opportunities to add value to and exploit land-related data both nationally and internationally;
- The land registration and cadastral authorities should provide public access to their records and make land-related information widely available;
- Although separate organizations may administer the land books, the cadastre, and the registers of mortgages and encumbrances, an integrated system is desirable either in one organization or through electronic linkages.

C. Land administration and land policy

Land administration must be conducted within a national framework of land policies that determine how land should be used to meet social and economic objectives. Good practice will recognize that:

- Land administration encompasses the recording and dissemination of information about the ownership, value and use of land;
- Ownership relates to the possession of rights in land; value normally relates to market value; use relates to the rights to use and profit from the land:

- Land administration systems should focus on the needs of the users of the data. The information stored within a system should be sufficient to meet the users' needs and must be kept up to date. Non-essential data should be excluded;

- There is no single solution to land administration that is suitable for all countries. Nevertheless, it is important to recognize international trends and to prepare for wider international cooperation in the evolving global land markets.

D. Land management

Land management is the application of land information to land resources. It is a set of processes that involve a variety of disciplines and professions. Good practice will recognize that:

- Land management is the process of putting the physical resources of land to good effect;
- Land administration is part of the infrastructure that supports good land management. It should be treated as a means to an end, not an end in itself;
- Land management decisions may be regulated by different agencies resulting in different land policies. Mechanisms should be put in place to ensure consistency in their implementation.

E. Land reform

Land reform is a term that is interpreted in a variety of ways depending on the context within which it is being applied. From a land administration perspective, it means restoring land rights, creating new rights or redistributing existing rights. Good practice will recognize that:

- Land reforms may take place in urban areas and in rural. Land reform is not exclusively an agricultural activity;
- Land reforms in urban and rural areas are interdependent and each will impact upon the other. Administrators should be aware of urban-rural linkages;
- An understanding of the broader aspects of land management and land reform is essential to proper land administration but is not its essence.

F. The benefits of a good land administration system

There are many benefits that result from the operation of a good land administration system. It is important that politicians and the general public are aware of these benefits since building effective and enduring land administration systems requires long-term investment and continuing support. Good practice will:

- Guarantee ownership and security of tenure; support land and property taxation; provide security for credit; develop and monitor land markets; protect land resources and support environmental monitoring; facilitate the management of State-owned land; reduce land disputes; facilitate rural land reform; improve urban planning and infrastructure development; and produce statistical data;
- Ensure that all citizens are aware of these benefits.

G. Institutional issues

Land administration is more than a technical process and must operate within a social and political environment. Good practice will address institutional issues and recognize that:

- The customers for a land administration service include most government sectors, many professions and all individual landowners. Different customers may need different forms of product or service;

- It is preferable for land administration functions, such as registering and transferring rights in land, to be carried out by agencies that are separate from the courts, leaving the judiciary to resolve outstanding disputes;
- Land administration systems can become financially self-sufficient with many costs of their operation being recovered through registration fees, the sale of land-related data and the provision of services;
- Resources in the private sector can be used to supplement the work of the public sector through public-private partnerships;
- There should be a market-oriented approach to the provision of land-related information goods and services;
- Governments are key players in the land market not only as regulators and providers of land market infrastructures but also as owners of significant amounts of land. In that capacity, they should not enjoy advantages over other land market participants.

H. The e-society

Information technology has led to the growth of the e-society and a demand for electronic access to land-related data. The use of such technologies can improve the delivery of government services and result in more efficient government, greater empowerment of citizens, increased transparency, less corruption, less labour-intensive transactions, increased revenue and lower operating costs. Good practice will recognize that:

- The role of registrars, notaries, solicitors and agents who participate in the land transfer process may change and the procedures for land transfer may need to be modified to take advantage of the new technologies;
- There are risks from the use of new technologies that are at present not well established and hence administration agencies should prepare for e-service developments by taking a step-by-step approach;
- Electronic land transfer systems should be customer-focused.

II. THE LEGAL FRAMEWORK

This chapter explains the principal legal issues that arise in land administration.

A. The legal status of land and real property

Different jurisdictions treat the legal status of land and real property in different ways although there are common underlying principles. Good practice will:

- Define the nature of land, the form and nature of ownership and the legally recognized forms of tenure and rights associated with the land;
- Differentiate between real property (in rem) and personal property (in personam);
- Distinguish between the ownership, possession and use of land and protect the rights of landlords, tenants and third parties, including those of mortgagors and mortgagees;
- Indicate what rights should be registered that are less than full ownership, such as servitudes and mortgages;
- Codify all forms of statutory restriction that may apply to land;
- Define the means and conditions whereby use rights can be changed to ownership rights, for example through the lapse of time;

Establish independent, sustainable institutions for land administration with clear statutory powers and authority, specifying the roles of those responsible for land registration, national mapping, land valuation and the recording of land-use rights.

B. Land tenure

The forms of land tenure that are recognized will influence the rights in land that are recorded in the registers. Good practice will result in laws that:

Define the forms of land tenure that are legal, such as freehold and leasehold;

Specify what land and property rights, restrictions and obligations must be registered;

Recognize that customary rights may exist that are outside the formal legal system but can be recognized at the local level.

C. Deeds registration and title registration

There are two principal methods whereby rights in land are formally recorded: deeds registration and title registration. Good practice will result in laws that:

Create administrative systems for land transfer and mortgage registration that can guarantee the rights that are recorded in the registers;

Provide legal certainty of ownership, prioritizing rights according to their order of registration;

Define the level of guarantees, the mechanisms for securing indemnity and the scale of compensation or rectification of title in case of errors;

Contain a legal definition of real property units, rights and restrictions that mirrors conditions on the ground;

Facilitate land transfer through a system that is simple, direct (so that there is no need to search through a chain of titles), secure and cheap to operate with low transaction costs;

Provide quick and simple ways to create or discharge mortgages;

Require the registers to be kept up to date at all times;

Cover all land, including that held by the State, individual citizens and institutions;

Indicate which use rights should be recorded in the central registers and which may be recorded elsewhere, for instance by the municipal authorities.

D. Adjudication of title to land

When creating a land register or when extending the area that it covers so that new properties are to be entered on the registers, mechanisms must be established whereby the existing owners of the land are formally recognized. Good practice will result in laws on the adjudication of title to land that:

Prescribe rules and procedures for the initial determination of rights in land;

Facilitate the determination of rights to land either sporadically or systematically, encouraging the compulsory registration of such rights in specified circumstances;

Indicate how the ownership of land is to be recorded and made public;

Establish appeals procedures whereby the results of the adjudication can be challenged within a specified period of time (such as 30 days) and disputes resolved in a cost-effective manner;

Permit flexibility in reconciling the possession of land with its ownership.

E. Boundaries and land parcels

The basic features that are recorded in a cadastre are the land parcels and their boundaries. Good practice will result in laws relating to parcels and their boundaries that:

- Provide a legal definition of a land parcel;
- Recognize that boundaries may be vertical (for most surface areas) or horizontal (for strata titles);
- Differentiate between the legal position of a boundary and the physical position of objects such as fences or hedges;
- Define the priority of evidence, such as survey measurements versus monuments, when re-establishing a boundary line, and indicate whether marks on the ground take precedence over measurements recorded in the registers in the re-establishment of boundaries or whether data on the plans must be followed;
- Avoid getting into detail over the precision with which boundaries should be surveyed for the purposes of land titling.

F. Cadastral surveying

The boundaries of land parcels must be identified and recorded to appropriate levels of accuracy in accordance with legal principles. Good practice will be based on cadastral survey regulations that:

- Provide a framework that controls the setting-out of new land parcels, the subdivision of plots of land, and programmes concerned with land consolidation and land reallocation;
- Indicate acceptable survey standards without prescribing the methods whereby these must be achieved;
- Prescribe who may carry out cadastral surveys and the qualifications that must be held by individual surveyors and by commercial companies;
- Include legislation to protect officially emplaced survey monuments from damage and provide rights of access to surveyors;
- Define the extent of legal liability for the accuracy of data.

G. Privacy and rights of access to data

Access to information held in land registers and cadastres is essential for a functioning land market. It must, however, be controlled in order to protect privacy and provide security. Good practice will result in laws that:

- Define the extent of rights of privacy over land and property information, while encouraging the maximum use of data to increase transparency and facilitate the adding of value to them;
- Identify who may use data within the land registers and the cadastre and for what purpose;
- Determine who may ask for and who may authorize alterations to entries in the registers;
- Define the status of electronic data.

III. VALUATION, TAXATION AND THE LAND MARKET

This chapter examines the nature of property values and the ways in which they may be determined and administered in the interests of taxation and the efficient operation of the land market.

A. Value and the valuation of land

The valuation of land is a process that should result in the best available estimate of what real property is worth. Good practice will recognize that:

- There are international standards of valuation the use of which helps international markets and thus facilitates inward investment;
- Valuation entails:
 - The classification of each property in accordance with an agreed set of characteristics relating to its use, size, type of construction and improvements;
 - The collection and analysis of relevant market data including data on sales prices, rents, building maintenance costs, and details of the dates when these applied; and
 - The determination of the value of each real property in accordance with publicized procedures, where possible based on market values and computer-assisted mass valuation systems;
- There is a need to differentiate between the market, use, investment and assessed values of land and to recognize that price is an accomplished fact while value is only an estimate;
- The method of valuation adopted should depend on the purpose for which the value is required;
- A primary requirement for an efficient and effective fiscal cadastre is a set of current property maps that provide an index for compiling and maintaining valuation information;
- Information in the cadastre should be restricted to what is necessary and sufficient to support secure title, market-based valuations and sustainable development.

B. Land and property taxation

Most countries impose taxes in one form or another on real property. Future developments in international property markets may lead to compatible mass valuation practices but at present each country tends to have its own approach. Good practice will recognize that land and property taxation involves:

- The identification and mapping of all properties that are to be taxed;
- The classification and valuation of each property in accordance with agreed procedures;
- The identification of who will be responsible for paying the tax;
- The preparation of the valuation roll;
- The notification of the individual property taxpayer of what has to be paid;
- The collection of the appropriate taxes;
- Appeals procedures for taxpayers who dispute their assessment.

C. Central valuation agencies

In many countries a central valuation agency is responsible for the technical processes of determining the value of real estate. Good practice will recognize that:

- The function of a central valuation agency is to assess the value of land and property. It does not set levels of taxation;
- The agency needs to work closely with the land administration authority either by being within the authority or by exchanging data with it electronically.

D. Land and property markets

Effective and efficient land and property markets are a crucial component of a successful market economy. Good practice will recognize that a well-functioning property market includes:

- A legal basis for all operations so that all dealings are safe and secure;
- Regulating institutions that:
 - Ensure a stable and transparent framework within which transactions take place,
 - Provide easy access to the market for all participants; and
 - Keep the costs of transactions low;
- Participants including landowners, tenants and corporate bodies such as banks and lending institutions, and representatives of those with third-party and minority rights.
- Clearly defined goods and services such as land, buildings and mechanisms whereby these can be offered for sale or lease;
- Mortgage facilities, stable tax regimes and access to credit;
- Clear, consistent and environmentally sustainable land policies;
- Speedy and reliable access by the public to land and property information.

E. Mortgage finance

The mortgaging of real property allows capital to be used for many different forms of investment. Good practice will recognize that:

- Housing finance is a key driver in a market economy, which means that land administration authorities should make the registration of housing a high priority;
- There is a distinction between the creation of mortgages, the holding of mortgages and the administration of payments or foreclosure;
- Land registers must be kept up to date in order to support the mortgage market. It is essential that lenders are not affected by unregistered encumbrances;
- Land administrators need to understand the structure and requirements of the international financial sector in order to encourage foreign investment.

IV. SUSTAINABLE LAND USE

This chapter examines the relationship between land use rights and the processes of land reform.

A. Land-use rights and restrictions

The value of property depends in part on what may be done with it. Land-use rights and restrictions strongly influence the behaviour of the land market and are an important determinant of property values. Good practice will recognize that:

- Information about the use rights and restrictions that relate to a property should be readily available to anyone undertaking a land transaction;
- Land-use rights are becoming increasingly complex as societies become more concerned to protect the environment and reduce the adverse effects of activities such as waste disposal that contaminate the land.

B. The role of land administration in land-use planning

Land-use planning involves the allocation of resources especially land-use rights in ways that should improve the physical environment. Land administration has an impact on land-use planning and vice versa through the identification and recording of use rights. Good practice will recognize that:

- Land administration is concerned with land-use planning in so far as it monitors what is going on and provides appropriate land information. Monitoring may include the recording of building permits within the registers;
- The implementation of land-use plans may necessitate the compulsory acquisition and reallocation of rights in land. There must be legally defined procedures and appeals mechanisms so that the public has confidence in the security of their titles;
- Details of public rights and obligations relating to individual parcels of land should be readily available.

C. Development plans and the cadastre

A development plan is a component part of the planning process in that it provides a framework for the development of real property. Any physical development on the land affects real property prices and the land market. The land administration authority must be notified as and when development takes place. Good practice will recognize that:

- Legislation to control the physical development of land and property should specify how development plans are created, how they are approved and what role the land administration authority has in monitoring their enforcement;
- Many items of geospatial data required for land-use planning are or can be held in the cadastre. The cadastre should, however, maintain only those types of information for which there is an economically justifiable demand;
- The data maintained by the cadastre should be available for use at the regional and local levels;
- The solution to many environmental problems lies in stricter land-use controls either through legal or financial restrictions on rights to use the land. Both forms of restriction impinge on the land market;
- Land-use rights can affect the outcome of any land development project and must therefore be as accessible as ownership rights.

D. Land consolidation and reallocation

Land consolidation and reallocation are processes that bring about more efficient and more equitable use of the land. The land administration authorities need to work closely with those responsible for land consolidation, monitoring changes that affect cadastral mapping, valuation and title data. Good practice will recognize that:

- The land administration authority can be a prime source for information in support of land reform. A basic requirement for both rural and urban development is an accurate cadastral record of the area involved;
- Land restitution should, where appropriate and possible, be accompanied by land consolidation;
- Land consolidation differs from land reallocation in that in consolidation relative farm sizes should remain the same with larger, better-shaped individual parcels and some land being given over to infrastructure such as new roads;

□ When meeting public needs for land for development or conservation, land consolidation should eliminate or at least significantly reduce the possible adverse affects of the development on any existing beneficial forms of land use. The land administration authority should monitor such aspects of the development.

E. Environmental monitoring and geographic information systems (GIS)

GIS is an integrating technology that facilitates the collection, storage, checking, analysis and display of spatially referenced data. GIS allows new information to be discovered by linking data from different sources. Land administration agencies should consider using such a tool to add value to their existing data products and services and recognize that:

- There is a need to structure land administration data in ways that allow them to be exploited using GIS and hence to facilitate the adding of value;
- GIS can be used to analyse cadastral data and to support environmental monitoring and impact assessments;
- The successful use of GIS is largely dependent on the quality of the data that have been recorded and the use of a homogeneous system for spatially referencing the data. Land administration agencies should ensure that such capacity is available to them;
- The same parcel referencing system should be used in the land books, the cadastre, the tax registers and in the municipalities so that real-property-related data can be easily integrated across networks;
- The type of data that are included in the cadastre should be reviewed to meet environmental needs without introducing unnecessary complexity.

V. POLICIES FOR LAND ADMINISTRATION

This chapter discusses institutional rather than technical arrangements that support land administration.

A. Land policy

Land policy is concerned with the allocation of resources, particularly rights to use the land, so as to obtain maximum efficiency consistent with the natural environment and the welfare of the community in the short and longer term. In many countries different ministries are responsible for different aspects of land policy. Good practice will recognize that:

- Land administration operates within an overall framework of national land policies which should be clear and consistent;
- The implementation of land policy requires a multi-disciplinary approach and an effective legal framework within which land administration can operate;
- Coordination among all institutions involved in land policy is critical to success.

B. The role of governments in land administration

Although land administration systems respond to many needs of the land market, it operates within national land policies and leadership comes from central government. Good practice will recognize that:

- There needs to be clarity in the responsibility for creating land administration policy;

- Land administration policies need to be ‘joined-up’ so that they are consistent between ministries. In particular, difficulties may arise when some land policies are administered centrally and some locally;
- The continuing operation and maintenance of a land administration system may be financed through revenues generated by the agencies concerned;
- Systems should be benchmarked against the performance of other organizations. Performance indicators for the delivery and reliability of products and services should be set and monitored both internally and externally.

C. Inter-governmental co-ordination

Land administration may involve different agencies in different ministries. Good practice will recognize that the lead organization for land administration must:

- Meet the needs of all public and private sector users without bias or favour;
- Develop land administration policies and strategies in line with those of the national government and its various ministries;
- Coordinate activities in order to reduce overlaps and increase efficiency;
- Set and monitor technical standards, for instance for data collection, including field survey, data processing and data exchange;
- Provide ‘methodological guidance’ to ensure that all procedures are well understood by other agencies and by the public;
- Improve the efficiency of all land administration processes in the light of changing circumstances and recommend changes to the law if these will improve the service;
- Set policies for archiving data sets that are needed in the long-term national interest;
- Address matters of personal privacy and the confidentiality of data in order to protect the interest of private citizens.

D. The role of the public and private sectors in land administration

The past decade has seen changes in the role of the public and private sectors in land administration. Good practice will recognize that public-private partnerships and cooperation should:

- Allow each side of the partnership to concentrate on its specific part of the shared tasks with, in general, the public sector managing and controlling the activities of public administration and the private sector performing operational activities;
- Avoid undesirable competition between the public and private sectors;
- Strengthen business processes and organizational structures;
- Improve the response to demands of society for better, faster and new services;
- Ensure that sufficient human, physical and financial resources are available;
- Create opportunities for innovation by public and private sector partnerships that combine creativity and flexibility with accountability and credibility.

E. Paying for land administration

There is increasing pressure for land administration agencies to recover their operational costs through the sale of goods and services. Good practice will recognize that a land administration agency should:

- Recover most if not all its operational costs;
- Be allowed to influence its own income through active marketing of its services and be allowed to set its staffing levels accordingly;

- Be allowed to borrow money in the regular market in order to invest in improvements;
- Implement an independent system of accounting;
- Be allowed to fix its own level of staff remuneration, within the broad national interest, and decide on its own internal organization, including where it should establish offices;
- Have a professional management structure and management board;
- Provide management training at senior levels in order to ensure top quality of service.

F. E-commerce

There has been a growth in e-commerce, which, has resulted in a growing demand for rapid access to relevant and correct information as a strategic resource. Good practice will recognize that:

- A land administration system should be customer-focused with users having complete confidence in the system. Customer satisfaction should be monitored;
- The one-stop-shop principle helps consumers; where it is not possible to establish a single point of access, the number of separate enquiries that have to be made should be minimized;
- Clear national policies and strategies for e-commerce must be established;
- Agencies should explore the opportunities created by partnerships with the private sector in order to reach more market segments.

G. Land information management

A major component of land administration relates to the management of land-related information. Good practice will recognize that when developing land information services:

- Information-related policy issues must be addressed as well as technical standards;
- There should be a focus on interoperability so that the needs of different customers with different operating systems can be accommodated;
- There must be clear customer benefits resulting from the developments;
- There is a growing customer demand for international cooperation, which will pressurize countries into operating compatible land administration systems;
- When working with other national and international bodies, terminology needs careful handling. Projects such as the European Land Information Service (EULIS) help to achieve a common understanding.

VI. MANAGING LAND ADMINISTRATION

This chapter considers land administration from a management perspective.

A. Organizational issues for land administration agencies

Many land administration organizations are now run on business lines and have become market-driven. Good practice will recognize that land administration agencies should:

- Develop a business plan that defines their role and opportunities;
- Re-examine how they deliver services to their customers either through centralized or decentralized distribution of goods and services;
- Find sources for financing their activities so that they can become self-sustaining in line with governmental regulations and policies;
- Undertake focused research into the problems that are identified.

B. Measuring the costs and benefits of land administration

Managers responsible for land administration need to evaluate the costs and benefits of the work undertaken by their agencies. Good practice will recognize that senior managers should:

- Assess the costs and benefits and ‘value for money’ of any new project;
- Undertake a user needs analysis to identify the existing and potential users;
- Document what land-related information is already available and where it is held;
- Identify potential new data sets that should be helpful to land managers, tax collectors, the general public, etc;
- Determine any legal requirements to provide data or that might restrict their use;
- Evaluate each data set in terms of its costs to acquire, to store and to update;
- Evaluate the benefits that should come from each data set.

C. Managing and marketing land registry and cadastral data

Managers must understand the processes of marketing so that they can secure the necessary investment to sustain the new technologies that are available. Good practice will see managers:

- Prepare a business and marketing plan to develop the partnership between government, other land administration agencies, private partners and the public;
- Create a strong corporate identity;
- Assess the market place (e.g. who are the customers and what do they need?);
- Prepare marketing plans to support the development, launch and uptake of new and existing services;
- Monitor and evaluate results, including tracking customers’ views.

In particular in the context of e-commerce and e-government, it will recognize that:

- ‘E-government’ requires appropriate legislation and a well-extended network of information technology covering all of the country;
- The security and privacy of personal data must be guaranteed within an electronic land administration system;
- The policy on the content, quality and availability of public spatial data sets must be developed on a national and on an international level to ensure consistency;
- Electronic signatures can be used to authenticate deeds. When they are used there must be certainty of authorship, guarantees that there has been no change in transit, the signatures cannot be repudiated, and the data remain confidential.

D. Managing human resources

The most important resource available to any organization is its human resource. Good practice will recognize that land administration agencies should:

- Invest in human resource development just as much as in technological development;
- Identify the human factors involved in all operations and ensure that the levels of skill and responsibility are defined for each and every task;
- Consult the staff involved to obtain their confidence and make them aware of what is going on;
- Involve any trade unions that will be affected as their opposition can seriously delay progress;
- Plan for a more rapid turnover of staff;
- Monitor the health and safety of the staff involved;

- Establish a programme of management and specialist training to ensure that high standards are maintained at all levels.

VII. TECHNICAL ISSUES IN SURVEYING AND DATA MANAGEMENT

A substantial amount of the land administration activity is of a technical nature. This chapter reviews a few of the issues that now arise.

A. Spatial data frameworks

A cadastral system must operate within a spatial data framework. Good practice will recognize that:

- The establishment or upgrading of a geodetic control network is necessary to ensure that all land and property-related data can be spatially referenced, preferably in line with international standards such as the European Spatial Reference System;
- A uniform and unique spatial referencing system for the identification of all land parcels and other reale state units facilitates the integration of spatially related data.

B. Cadastral surveying and mapping

Cadastral surveys and cadastral maps need to be fit for the purposes for which they are produced. Good practice will recognize that:

- If cadastral surveys are to be used only for the purposes of land titling and support for the land market, high precision is not necessary provided that there are suitable monuments that identify property boundaries;
- Photogrammetric techniques including the use of orthophotographs are suitable for the compilation of many cadastral maps;
- The methods and quality of survey for recording land parcels and other real property units will depend on local circumstances and should be laid down by the central surveying authority.

C. Electronic data processing for land administration

Land administration agencies are increasingly involved in electronic data processing. Good practice will recognize that the successful implementation of information technologies should:

- Provide easy public access, possibly through linked computer networks, to all data that are important and relate to the ownership, value and use of the land;
- Include metadata that describe land administration data in a clear and precise way (what kind of data are available, their format and how they relate to other data, the quality of the data, etc.). Such metadata should be stored in accordance with international standards;
- Set standards for transferring data from one system to another;
- Incorporate techniques such as the use of electronic signatures, to ensure that transactions cannot be intercepted or changed by third parties.

I. LAND AND LAND ADMINISTRATION

This chapter explains the scope of land administration and identifies the different concepts of land and property. It outlines the benefits and beneficiaries of an efficient land administration system, and notes recent changes as agencies become more business-oriented and move into electronic commerce.

A. Land in the framework of sustainable development

Land is the ultimate resource, for without it life on Earth cannot be sustained. Land fulfils many functions in society. From a physical perspective, it is the space in which we move and create shelter and from which we obtain our food and water. From an ecological perspective, it plays a vital role in the breeding and survival strategies of many living species and all too often is the reason why country fights country and neighbour feuds with neighbour. From an economic point of view, it is a foundation on which wealth is built. From a legal standpoint, it is an abstract set of property rights, while from a social and cultural perspective, it is a taproot through which people draw spiritual sustenance. It is the ultimate resource without which no nation can exist. Good stewardship of the land is therefore essential for present and future generations.

This publication focuses on land as something over which individuals or communities have rights of ownership and use, that can be bought and sold and be subject to tax, and that is the basis of economic production. The text addresses the social, legal, economic and technical frameworks within which land managers and administrators must operate.

All governments are concerned with the administration of land in order to ensure its sustainability and to facilitate economic development. A framework of land and property laws that recognize the rights and duties of the individual and the shared concerns of the wider community is essential if these concerns are to be addressed. No country can maintain stability within its boundaries or sustain economic development unless it has land policies that promote internal confidence among its people and its commercial enterprises. The recognition that land is a source of wealth lies at the heart of good government and effective public administration. Good governance, private ownership of land and secure tenure are a foundation for sustainable social and economic development.

From a legal perspective, land extends downwards below the surface of the Earth and upwards into the sky. From a practical perspective, it may be regarded as the volume of space that encompasses the surface of the Earth, all things that are attached to it, and the rocks and minerals that are just below it. Land includes all permanent buildings and construction erected upon it, all vegetation growing on it, and areas covered by water such as seas and lakes.

Objects that are not permanently attached to the soil, such as motor cars, animals and human beings, are not part of the land, although they will be subject to the rights that control the use of the space that they occupy. 'Air rights,' that is, rights to use space above the land, are in some jurisdictions also treated as being part of the land.

In many countries the term 'real estate' is used to describe land. Some people differentiate between the land and the buildings attached to it, referring to the latter as 'property' or 'immovable property' or 'real property.' In this publication, the term 'land' will be treated as embracing all fixed entities, including crops and trees as well as buildings.

The role of land in the economy of each nation is not always obvious, but is of great significance. Without secure land rights there can be no sustainable development, for there will be little willingness

by local people and by foreigners to make long-term investments. At least 20 per cent of the gross domestic product (GDP) of most nations comes from land, property and construction. In Spain, for example, in 2003, 1.2 million new mortgages were registered and the amount of money circulating in the economy as a result of the mortgage system represented 56 per cent of the Spanish GDP.

Land has many attributes, each of which needs to be carefully managed if development is to be sustainable. To achieve this, each nation must have good land records: of ownership to ensure security of tenure; of value to ensure fairness in land and property taxation and equity in the compulsory acquisition of land for State purposes; and of the use of land to ensure efficient resource management and sustainability.

B. Land registers and the cadastre

A land register is a set of records of rights in land. It is the result of a process known as land registration in which the evidence of ownership of rights to the land is recorded and in many countries guaranteed. A right is something to which some person or group of persons is entitled. The function of land registration is to provide a safe and certain foundation for the acquisition, enjoyment and disposal of rights in land. It creates security for title to land and facilitates and supports the wider land and mortgage markets.

The process of land registration should provide order and stability in society by creating security not only for landowners and their partners but also for national and international investors and moneylenders, for traders and dealers, and for governments. The system must be impartial and those who operate it must be free from any conflict of interest. Although systems of land registration are frequently directed at protecting the interests of individual landowners, they are also instruments of national land policy and mechanisms to support economic development.

A cadastre is a set of records about land that consists of two parts: a series of maps or plans showing the size and location of all land parcels together with text records that describe the attributes of the land. The function of the cadastre is to collect and make available graphic and textual information in support of title registration, property valuation and land resource management. It is distinguished from a land register in that the latter is fundamentally concerned with the ownership and legal rights that are attached to the land, while the cadastre focuses on a wider range of attributes. The maps and surveys produced as part of the cadastre can be used to support a land registration system and indeed in many countries the term ‘cadastral surveying’ is used to describe the survey of land for the purposes of recording ownership rather than value. The process may also be referred to as creating an inventory of lands.

Cadastrals are based either on the proprietary land parcel, which is the area defined by ownership; or on the taxable area of land, which may be different from the extent of what is owned; or on areas defined by land use rather than by landownership. Cadastrals may support either records of property rights, or the taxation of land, or the recording of land use. Alternatively, they may be multi-purpose, providing a variety of land-related information in support of two or more such objectives. In such cases, it is best if they are constructed around the proprietary land parcel, as this is the legal basis for all dealings in land. A multi-purpose land cadastre and register system creates new opportunities to add value to and exploit land-related data both nationally and internationally. Where formal title to land has not yet been established, such multi-purpose records can be built around the land parcel as defined by rights of use.

The land registration and cadastral authorities should provide public access to their records and make land-related information widely available. Both a cadastre and a land register must operate within a strict legal framework. The cadastre should be based on complete coverage of a country; a land register

on the other hand may not record all areas of land since it may not be obligatory to register property rights. Compulsory registration should however be encouraged, for example when dealings are taking place or when introducing or extending the registration of land rights. In this case, selected areas may be given priority and other regions excluded in the meantime in order to maximize the best use of resources. Priority areas may include cities - since they generally have more active land markets and provide the larger share of land and property taxes - and rural areas that are subject to land reform or land consolidation.

In some countries - Finland and Sweden, for example - real property formation, mutation, land consolidation, cadastral mapping, registration of real properties, ownership and legal rights, real property valuation and taxation are all combined within one basic cadastral system. In many parts of Europe, however, the cadastre evolved as a support for land taxation and, therefore, came under the minister of finance, while the legal processes of land registration were dealt with separately by the legal profession and the records entered in land books, such as the German Grundbuch or the Spanish land registers. In general, land books fall under the responsibility of the minister (or ministry) of justice and in some cases of the president of the supreme court (as in Slovenia, where the Ministry of Justice is responsible only for the legislative framework).

Dual systems, with the cadastre operated as a separate entity from the land books, have been reintroduced into some countries as part of the land reform programmes. The physical description of land and property is recorded in the cadastre while data relating to property rights, especially ownership rights, are recorded in the registers of real property. In some cases land-use rights have been recorded in the reformed cadastre, in some they appear in the land books, while often they are recorded only at the municipal level.

Dual systems tend to develop at different speeds and on different technical platforms. The difficulties in regulating the flow of information to and from the cadastre and the register of property rights and the lack of formalized data exchange between systems can result in repetition and additional expense with duplication of effort and more complex processes of land administration than might otherwise arise.

It will be important in the longer term for these separate systems to be integrated either through amalgamation or through the development of formalized data exchange mechanisms between the various registers. In the latter case there will be a virtual centralized set of registers so that from the perspective of the user there is only one system operating.

Almost every country has a slightly different interpretation of the term 'cadastre.' The common understanding is that it is a form of land information system with up-to-date information on the ownership, value and use of land parcels and possibly buildings, together with environmental and socio-economic data. A land information system is not necessarily land-parcel-based and may for example focus on forestry, soils or geology.

Data in a cadastre may include: geometric data (coordinates, maps); property addresses; land use; real property information; the nature and duration of the tenure; details about the construction of buildings and apartments; population; and land taxation values. Data may relate to single plots of land or may cover many properties, as in land-use zoning. The data may support private land transactions, underpin land markets, or assist in the administration of: agriculture; environmental protection; fishery; forestry; housing; land-use management and zoning; public utilities; and transport.

C. Land administration and land policy

The term ‘land administration’ as used in this publication refers to the processes of recording and disseminating information about the ownership, value and use of land and its associated resources. Such processes include the determination (sometimes known as the ‘adjudication’ or ‘formalization’) of property rights and other attributes of the land that relate to its value and use, the survey and graphical description of these, their detailed documentation and the provision of relevant information in support of land markets.

‘Land policy’ is the framework for determining how land should be used and conserved in order to meet social and economic objectives. Land administration provides support for the implementation of land policy and is the basis for good governance. It involves many different sectors of society, including:

- a) National governments: in their administration, policies on taxation, pursuit of economic development, provision of market information, and moves towards European harmonization;
- b) Regional and local governments: in spatial planning, land valuation and the financing of local services, land-use development and control, land management and access to land and property information;
- c) Companies and citizens: in the security of their rights, social stability, access to housing through mortgage finance, market opportunities and potential for investments and development, mobility and property transfer.

Land administration is concerned with three principal and interdependent commodities - the ownership, value and use of the land - within the overall context of land resource management. ‘Ownership’ means the possession of rights in land but does not necessarily imply physical occupation since the absolute owner may, for example, have granted a lease so that the leaseholder becomes the actual occupant. In a market-driven economy, investors must feel confident that the land they are developing has secure ownership and that there is a clear and rigid framework of laws governing their rights to use the land. Insecure property rights detract from land values and discourage the good use of the land.

‘Value’ has several meanings. It may refer to the actual or assessed capital market value, which is the amount of money for which the land has been or can be sold; or it may refer to the rental value, which is the amount for which the land can be hired out. ‘Value’ may also be equated with construction costs, so that the value of a building for insurance purposes will be the cost of rebuilding if it were destroyed by fire or other disaster.

An important determining factor in the value of land is the use to which the land is or may be put. The term ‘land use’ relates to the rights to use the land and the manner in which it is used to generate income or meet social needs. The rights determine what may legally be done with the land, while the use of the land determines the wealth that it generates and hence its economic value. Changes in the permitted use of the land will result in changes in its market value and, ultimately, changes in tax revenue.

In order to create a framework for sustainable development, land policy must be built on relevant information about the ownership, value and use of land. In centrally planned economies, data on a large variety of attributes and categories of land use were recorded. While such data can be used to estimate the potential economic value of property and form a basis for property taxation – Latvia, for example, was able to carry out a rapid and comprehensive mass valuation of all its land using the old cadastral records - the cost of maintaining and updating the data can be high.

It is as important to be able to maintain and sustain a land administration system as it is to design and build one. Comprehensive information at the individual property level is necessary only when it directly affects the individual owner. The European Union, for example, requires certain data in order to calculate and pay subsidies to farmers under its common agricultural policy. A balance needs to be struck so that sufficient information for land management is available and unnecessary data are excluded from the land administration records. Land administration systems should focus on the needs of the users of the data. The information stored within a system should be sufficient to meet the users' needs and must be kept up to date. Non-essential data should be excluded.

There is no single solution to land administration that is suitable for all countries. Nevertheless, it is important to recognize international trends and to prepare for wider international cooperation in the evolving global land markets.

D. Land management

In this publication the term 'land management' is used to describe the processes whereby the physical resources of land are put to good effect regardless of the fact that the land may be owned by the State, a legal entity or a private individual. It covers all activities concerned with the management of these physical resources including farming, mineral extraction, property and estate management, and the physical planning of towns and the countryside. It includes the development and management of utilities and services; the management of land resources such as forestry, soils, or agriculture; the implementation of land-use policies; environmental impact assessment; and monitoring activities that affect good land use.

Land administration is part of the infrastructure that supports good land management. It should be treated as a means to an end, not an end in itself.

Land management involves the implementation of fundamental policy decisions about the nature and extent of investments in the land. It involves routine operational decisions made each day by land administrators such as surveyors, valuers and land registrars. From an institutional perspective, land management is affected by land policy, the legal framework, issues pertaining to resource management, land administration arrangements and land information management. It entails both government and private initiatives.

Many land management decisions affect the use of individual properties but extend over a much wider area and are beyond the control of individual owners. Some decisions on forming new properties or improving existing ones may involve changes in property boundaries, as for instance in land consolidation. These activities need to comply with rules, regulations and procedures set by cadastral authorities and apply to all landowners.

Land management decisions may be regulated by different levels of government, depending on existing administrative structures and traditions inside countries. Consistency between different government agencies in the formulation and implementation of land policy is essential if conflicts are to be avoided. In the transition to a market-driven economy, failure to integrate land policies was all too common.

E. Land reform

Good land resource management helps to promote economic and social development in both urban and rural areas. A number of countries seek to achieve these goals through 'land reform,' a term that has a variety of meanings including the restoration of land rights to previous owners, referred to as land restitution, and redistributing land rights - for example by giving State land to landless people or taking

land from the owners of large estates to redistribute to others. Alternatively, it may involve land consolidation, in which all landowners within an area surrender their land and receive new parcels of comparable value but in a pattern that encourages the more efficient and productive use of land.

Reforms may also involve changes in the tenure of the land, which is the manner in which rights are held. Thus complex traditional and customary rights may be abolished in order that simpler and more streamlined mechanisms of land transfer can be introduced. The impact on the land may be pre-planned - as part of the physical planning process - but it may also result from reforms to the land and property tax system that alter the value of land and in consequence its use.

Land reform programmes normally affect selected areas such as agricultural land or urban centres. In rural areas the programmes may be designed to facilitate changes in the technology of agriculture, the type of crops, the way the land is farmed, the financing of development or the marketing of products. In urban areas land reform may involve major infrastructure development, the taxation of buildings as well as the land upon which they stand, or changes to the manner and use of land and properties. Urban development impacts on the rural environment and rural development on the urban. In recent years the importance of urban-rural linkages has become recognized.

In general, land administration is concerned with such matters as urban development or good agricultural practice only in so far as such activities affect the compilation and maintenance of good land records. This publication is not directly concerned with physical planning, city centre redevelopment, agricultural reform, or improvements to agricultural productivity but instead addresses only the supporting information infrastructure. An understanding of the broader aspects of land management and land reform is essential to proper land administration but is not its essence.

F. The benefits of a good land administration system

Building effective and enduring land administration systems requires long-term investment and continuing support. Although land records are expensive to compile and to keep up to date, a good land administration system produces many benefits. In simple terms, secure title and an efficient land market lead to more credit and investment leading to greater productivity and economic growth and hence to higher incomes and less poverty.¹

The modern cadastre is not primarily concerned with generalized data but rather with detailed spatially referenced information at the individual land parcel level. As such it should service the needs both of the individual and of the community at large. Benefits arise through its application to: asset management; conveyancing; credit security; demographic analysis; development control; emergency planning and management; environmental impact assessment; housing transactions and land market analysis; land and property ownership; land and property taxation; land reform; monitoring statistical data; physical planning; property portfolio management; public communication; site location; site management and protection. In particular, the following benefits arise:

1. Guarantee of ownership and security of tenure

The compilation of land records and the judicial processes that must be gone through in order to bring land information onto the registers should provide formal identification and, in some systems, legal proof of ownership. The public registers should contain all essential juridical information allowing anyone viewing the system to identify third-party rights as well as the name of the landowner.

¹ See UNECE Social and Economic Benefits of Good Land Administration.

2. Support for land and property taxation

Land and property taxes are a potential source of public revenue and are often collected by and used to finance local government. Much of the input data needed for the creation of mass valuation models will be found in the cadastre or land registers. Since the cadastre should provide full cover of the land, all properties can be included and none should be omitted.

3. Provide security for credit

Certainty of ownership and knowledge of all the rights that exist in the land give confidence to banks and financial organizations when they provide funds for landowners to invest in new projects. Mortgaging land is one way to acquire capital for investing in improvements. Landowners can borrow money to construct or improve buildings and infrastructure, improve their methods and management of the land, or develop new industries and businesses. Mortgage banks need up-to-date land and property information in order to be able to guarantee loans.

4. Develop and monitor land markets

Cheap and secure ways of transferring real property rights allow those dealing in land to do so with speed and certainty, while those who do not wish to sell their land can have their rights protected.

5. Protect land resources and support environmental monitoring

The increasing concern to conserve and protect the environment and ensure its sustainability has given rise to increasingly complex environmental regulations. No landowner should have the right to contaminate land as this will contravene third-party rights and damage future generations. Multi-purpose cadastral records can be used to record conservation areas and provide details of archaeological sites and other areas of scientific or cultural interest that may need to be protected. Cadastral data can also be used in the preparation of environmental impact assessments.

6. Facilitate the management of State-owned land

In many countries the land that is held by the State for the benefit of the community is poorly documented. The State needs to manage its property assets and to ensure their efficient use and upkeep every bit as much as does the private citizen. A system of registration of title to land will facilitate this.

7. Reduce land disputes

Often disputes over land and its boundaries give rise to expensive litigation and can lead to a breakdown in law and order. The courts and advisers spend much time in resolving these matters. Many land disputes can be resolved through access to definitive land information.

8. Facilitate rural land reform

The distribution of land to the landless, and the consolidation and redistribution of land for more efficient use all require detailed records of the present ownership and use of the land. Compensation may need to be paid to those who lose out in such a process, or money may be taken from those who make special gains. The design of new spatial patterns of landownership to provide greater productivity from the land can be effective only if the existing pattern is well documented.

9. Improve urban planning and infrastructure development

Urban centres need redevelopment and effective land-use planning and control. A good land administration system should permit the integration of records of landownership, land value and land use with sociological, economic and environmental data in support of urban planning. Up-to-date large-scale cadastral plans provide the basic framework within which development schemes can be designed, assessed and implemented.

10. Produce statistical data

Data obtained by monitoring the ownership, value and use of the land can support resource allocations and be used to measure the performance of development programmes. Both long-term strategic planning and short-term operational management require data in support of decision-making. In the United Kingdom (England and Wales) and many other European countries, data are produced at regular intervals showing the movement of house prices; these are used to monitor the performance of the land market and analyse investments.

Although the benefits are difficult to quantify, they are nonetheless real and citizens should be made aware of their existence.

G. Institutional issues

The success of any broad-ranging land administration system depends on a number of institutional issues being addressed if the benefits identified above are to be realized. In particular, it is essential to focus on the needs of the users of land information. These include:

- a) Government: agriculture and forestry; defence; education; environment; economic affairs; health; highways and transport; housing; internal affairs/police; justice; lands and surveys; local government; natural resources; planning and development; power and electricity; public works; trade and industry; etc.;
- b) Private sector: architects; banks and building societies; construction companies; economists; engineers; environmentalists; farmers and foresters; financial and insurance advisers; investors; land and property owners; lawyers and notaries; marketing specialists; planners; property developers; property managers; real-estate agents; surveyors and valuers; etc.

The products that are needed by each customer will differ, although a common theme is the ownership, value and use of the land, including information on rights, restrictions and obligations that, for example, arise from legislation designed to protect the environment. While detailed land records on soils, water resources, crop types, crop yields, etc. may be useful for some agricultural purposes, there is little evidence that the collection, storing and analysis of these data have been cost-effective or are needed in a modern market economy. The requirements for land information need to be continually reviewed in the light of modern techniques of data gathering and processing and the changing needs of the economy and society. It is essential to set priorities according to the resources available and to create information systems that can be kept up to date at all times.

It is generally accepted that the state must have a dominant role in setting up and operating a cadastre or land registration system. In some countries the responsibility for registering rights in land is given to the courts which are also responsible for hearing appeals. Much time is taken up by the courts in resolving and administering land matters, causing delays in other parts of the judicial system. This led

in 1986 to the European Council of Ministers recommending measures to prevent and reduce the excessive workload in the courts. It is better if a body other than the courts carries out the administrative functions of land title registration, leaving the courts to arbitrate if and when disputes arise.

Experience suggests that governments must subsidize the cost of first registration of title to land and the creation of the base mapping that supports land registration and the cadastre. Subsequently, the operational costs of running a land administration system can and preferably should be fully recovered from the users through registration fees and the sale of land-related data and the provision of services.

Many costs can be recovered through the sale of land-related data, although even in a market economy it may be difficult to determine the right price. In many countries, maps are marketable commodities but have traditionally either been unavailable because the military have considered that they contain matters that affect national security or else have been on sale at unrealistically low prices which have distorted the market.

In many countries there is pressure for land administration agencies to become self-sufficient and recover all their costs of operation, including the upgrading at regular intervals of all their technical equipment. This has forced such agencies to operate as businesses, taking on some of the characteristics of the private sector. This has led in some cases to formal private-public partnerships, although in general the business risk has remained with the government sector. The agencies remain 'not-for-profit' but they are also 'not-for-loss,' setting fees that meet the needs of the service at the lowest possible cost to the users.

Resources in the private sector can be used to supplement the work of the public sector through public-private partnerships. The influence and extent of involvement of the private sector differs between countries. Public-private partnerships occur in different forms throughout the member countries of the United Nations Economic Commission for Europe (UNECE). In some countries government officials carry out all statutory tasks, while in others the work may be done by licensed persons (such as notaries and licensed surveyors). In addition, a number of non-statutory tasks may be undertaken on contract.

In some cases, such as in Sweden and Finland, the State operates a legal process of land management using governmental authorities with little input from the private sector. In many countries, however, private licensed land surveyors survey individual property boundaries, while in some jurisdictions private lawyers are authorized to act as State notaries, checking all relevant documents before they are registered and endorsing land transfer applications to ensure that the persons concerned are the true landowners.

Where work is assigned to non-government persons there need to be regulations that safeguard the quality of the product or service that is being delivered. These regulations should cover professional standards (education, training, ethical behaviour), levels of competencies required, indicators and liability for good performance, and levels of liability for mistakes.

Assuming that a government encourages public-private partnerships then it must put the necessary legislation in place and decide on which tasks can be shared with the private sector. The private sector must have the capacity to deliver, in terms of the necessary skills, the equipment and available capital. Staff within government agencies must be willing to work with the private sector and adopt a monitoring rather than executing role.

Data collected by the State or by other governmental authorities can be made available to the general public for possible commercial exploitation, subject to the protection of individual people's privacy.

Where this happens, the State needs to protect its investment in land information on behalf of the taxpayer just as much as the private sector needs to protect its interests. It is important to ensure that a fair reward goes to those who have incurred costs in collecting data or in creating products. Protection may be provided through pricing policies and laws on intellectual property, especially database protection and copyright. In most countries international treaties on copyright exist, especially as a result of the Berne Convention for the Protection of Literary and Artistic Works.

Most land administration agencies now adopt a market-oriented approach to the provision of land-related information goods and services. When adopting such an approach it is necessary to determine who are the customers for land-related data and what basic information they require. In order to provide a nationwide service, it may be necessary to introduce cross-subsidies in gathering, processing and distributing land-related data so as to ensure full cover of the country. Such support for data management needs to be transparent so that competition with the private sector is not only fair but is also seen to be fair.

Apart from being land market regulators and providers of land market infrastructure, the State also owns and maintains significant amounts of land and property. In some countries land management, land administration and land policy functions are combined within a single agency. While such an arrangement has a number of advantages especially in terms of efficiency in the services that it delivers, it can give the government a competitive advantage over other landowners and create distrust in the land market. As landowners, governments should not enjoy privileges that favour them over other land market participants.

H. The e-society

One of the major changes since the 1990s has been the growth of what is sometimes called the e-society. The term 'e-government' refers to the use by Governments of information technologies (such as wide area networks, the Internet and mobile computing) that can change the way in which government agencies conduct business and relate to their citizens and other agencies. The use of such technologies can improve the delivery of government services and result in more efficient government, greater empowerment of citizens, increased transparency, less corruption, less labour-intensive transactions, increased revenue and lower operating costs.

E-government aims to provide services that are government-to-citizens or government-to-business and inter-agency communications in ways that are friendly, convenient, transparent and inexpensive. The key is not only in the technology but also more importantly in having data available in digital form. Over the past decades many countries have successfully converted their land registration and real property records from large collections of paper documents into a computerized form. Such records then need to be updated in a simple, straightforward manner using computers.

The next step is to make land information available online. Some countries have already converted all their land registration services into a fully computerized system, enabling the electronic retrieval of information so that banks, lawyers, notaries, etc. and members of the public can access land-related information by electronic means. This development has to a large degree involved the computerization of manual routines. To obtain the greatest benefit, the role of registrars, notaries, solicitors and agents who participate in the transfer of land rights may change and the processes of land transfer may need to be modified to take advantage of the new technologies. This can be done in different ways but the two basic computerized systems for transferring land rights are electronic registration (or electronic lodgement) and electronic conveyancing (or electronic land transfer).

Electronic lodgement can be achieved at various levels of complexity, starting with simple electronic applications that add or change entries on the register without the need for a formal deed, for instance when changing the name of an owner following marriage or the entry of a caveat or caution. Electronic registration allows the process of registration to remain a separate activity from the overall process of transferring land rights.

The second system for transferring land rights by electronic means is more comprehensive and effectively links together the whole process of land rights transfer and the creation of other interests in land with the registration process. It is built around an interactive system that is sometimes known as electronic conveyancing or electronic land transfer, terms that mean different things in different jurisdictions.

At least in the initial stages, electronic registration does not necessarily confer great benefits. There is a reduction in the delay caused by manual lodgement through the postal system, and the quality of applications may be higher as the applicant can get access to certain checking facilities as part of the system features. The application, however, still requires a member of the land registry staff to consider the application and approve the appropriate entry or change on the register. It may, however, have some benefit in that it prepares professional applicants such as lawyers or banks to deal with land registries electronically and can be the first step on the path to full electronic land transfer.

It is possible to structure simple applications so that they become interactive. This means that a straightforward application can in fact be used to authorize automatic changes to registers. An example of this is a system that is operated by the United Kingdom (England and Wales) Land Registry for the electronic discharge of mortgages. Lenders who have been authorized to do so can send electronic confirmation to the land registry that a particular mortgage has been repaid; each confirmation contains an instruction to the Land Registry's computer to remove all entries relating to that mortgage from the appropriate register. The application is handled fully automatically and no member of staff has any input into the process.

Initiatives similar to those in the United Kingdom are under way in other jurisdictions such as Norway and Sweden (where more than 75 per cent of all mortgage certificates are moved between financial institutions in a wholly electronic process). In Spain, on the other hand, fully automatic transfers are not legally acceptable since the registrar must be certain that both the document and the right that is being transferred meet all legal requirements because of the consequences of the registration process. This is also the case in Austria, Switzerland and the northern parts of Italy. No point must be neglected in the registrar's examination, including the legality of the document, the capacity of the parties, issues that affect the validity of the deal, the impact of the right in question on property, and any defects involving the description of the property.

The Spanish approach is based on concerns for data security that arise when an outside organization makes changes to the register. This has implications for the integrity of the system, especially in a jurisdiction where there is a State guarantee of title. Safeguards need to be built in to ensure against fraud or even simple errors.

A more complicated form of e-lodgement relates to the transfer of rights in land. For this to take place it is usually necessary to lodge not only a formal application to change the register, but also to lodge supporting documents. If the process for transferring land rights is still paper-based this will present difficulties, unless the registration authority is prepared to accept scanned copies of the documents, submitted electronically with the electronic application. Often the original documents are seen as the best evidence available to confirm that a particular transaction has taken place: merely seeing a copy of the original document increases, to a limited extent, the risk of fraud.

In certain types of transactions the risk in receiving an electronically scanned copy of the original is in practice not significantly more than arises when receiving an original hard copy, but often the increase in risk far outweighs the benefits of electronic lodgement. In such cases a member of the land registry staff will still need to process the application manually. Some level of automation can, however, increase the benefits and the amount of resource thus saved could easily outweigh the increased chances of fraud.

Some risks remain, hence land administration agencies tend to prepare for e-service developments step by step. What is crucial is that electronic land transfer systems are customer-focused.

II. THE LEGAL FRAMEWORK

This chapter discusses aspects of the law as they affect land administration. In particular, it focuses on the ownership of rights in land, the registration of deeds and title, the definition and survey of real property boundaries - what is sometimes known as real property formation or legal surveys - and the intellectual property rights in the information that is registered.

A. The legal status of land and real property

Every system of social order is based on a framework of laws that reflect the constitution of the country, govern the administrative process and express the rights and obligations of the citizen. The law is a complex set of rules that have evolved within each society to ensure its orderly running and the peaceful behaviour of its members. The law may take different forms, as is the case in Europe today, where there are various legal traditions, based around common law or, more usually, civil law.

Although each country has a different set of civil laws, they share a common approach to problems and have similar ways of defining and conceptualizing these. In broad and simple terms, the civil law tradition employs abstract statements of legal principles. By contrast, common law systems tend to avoid the abstract approach to legal science and are based on written statutes (including subsidiary regulations promulgated by the appropriate law-making body) and judicial systems (sometimes referred to as 'judge-made law'); where the two sources of law are in clear conflict, the former prevails.

The existence of these two distinctive legal traditions has resulted in different concepts with regard to the manner in which rights and interests are defined and the way in which problems are addressed. This is particularly so in the field of property law, although the differences between civil law and common law systems should not be exaggerated. Today the historical factors that contributed to the development of the two legal systems have lost much of their force. Both face similar social and economic problems and regard the law as an instrument to serve and order social aims and objectives.

There are four main areas of the law that particularly affect the land administrator:

- a) The law of 'real' property that affects dealings in land;
- b) The laws on land reform such as the privatization of State-owned land, the restitution of former private land, and land consolidation;
- c) The laws that govern the conduct of land administration such as the regulations that control the operation of the cadastre;
- d) The laws that affect such matters as the ownership of information and ideas, the protection of data and personal privacy.

In addition, other areas of the law, such as those relating to bankruptcy, inheritance and matrimony, also affect real property and thus the work of the land administrator.

The law of property deals with relations between people ('in personam') and of persons to things ('in rem'). It recognizes different types of interest and makes a distinction between the physical object and the abstract rights associated with its use. The law of real property is concerned with land and what may be done with it.

The definitions of 'land' and 'real property' vary between jurisdictions as to whether land includes mines and minerals below the surface, features attached to the surface, such as buildings or parts of

buildings, or natural objects growing in the soil; and whether the definitions relate to the physical things or to abstract concepts such as rights in the land. In what follows, unless otherwise stated, it will be assumed that land extends above and below the ground and includes all things natural and man-made attached to or beneath the surface of the Earth, and rights to air and light.

Land may be owned by one person, in the possession of another and occupied by a third. 'Ownership' means the right to enjoy the use of something, the ability to dispose of it and to benefit from the rights associated with it. With real property this is referred to as the 'title,' which is the highest level of rights in the land. The title is held by the owner, who may not necessarily be in possession of the land.

Possession involves the ability to enjoy the use of the land and in some circumstances to exploit the products on or below its surface. Possession implies the physical power to control an object - a thief who steals a motor car may then be in possession of the car but is not its owner. In this respect, intellectual property is very different since information is unlike material goods - it can legitimately be sold to one person, given to another and retained by its originator all at the same time, something that cannot be done with a physical object such as a motor car. A possessor of land can make use of the land in some way or other. Possession may be legitimate - for example through formal agreements such as leases or rental agreements that protect the rights of the true owner - or illegal.

The term 'illegal' has two different meanings. In some jurisdictions an action that is illegal means that an offence has been committed and the perpetrator may be prosecuted and taken before the courts. Thus driving a motor car on the wrong side of the road would be illegal and a criminal offence. In other jurisdictions 'illegal' can simply mean that the action is outside the law - in effect extralegal. Thus, for example, if there is no law that regulates the use of a geographic information system then operating such a system is 'illegal' even though no one will be prosecuted for doing so. The law in such cases is a facilitator and regulator rather than an instrument that forbids certain action.

Land may be subject to 'adverse possession,' meaning that the occupation is contrary to the interests of the true owner. Adverse possession often takes place where the true owners cannot be traced - they may be absentee landowners, deceased persons, people ignorant of their ownership (as is often the case with State land), or else unwilling to challenge the persons in occupation. As a result, those who are in ownership or legal possession of land may differ from those in occupation.

The term 'squatting' is often used to describe the illegal occupation of land; many landless people are forced to live on other people's land, as they have nowhere else to go. Often this squatting takes place on State land and results in major social and economic problems that are commonly associated with poverty, crime and ill health. It is particularly prevalent in and around cities where there is pressure for more housing. It also occurs where the true ownership is uncertain and there is a weak authority that is unable or unwilling to control development. An effective and efficient land administration system is a prerequisite to the solution of the problems of squatting.

Ownership is a matter of 'right,' while possession and occupation are matters of fact at any one time. Those who use the land and are therefore in possession of it may be tenants rather than owners. The occupation and use of land may provide evidence of ownership but this is not proof. Where there is no evidence of title then, as the maxim goes, possession is nine tenths of the law.

In some countries there is a process whereby the peaceful adverse possession of land can, after a specified period such as 15 or 30 years, lead to the acquisition of full title to the land. Wrongly described by some as land stealing, the prescription of rights through adverse possession is a legal process for bringing security to those unable to prove original ownership. It is based on the idea that

land is a resource that should be used and that society will benefit if squatters are allowed to gain title after an appropriate period.

In the land reform programmes of Eastern Europe in the early 1990s, land was being ‘restituted,’ that is, it was being given back to those who originally owned it. The return of full ownership rights required meticulous scrutiny of old land records and as a result the process was in many cases slow. In order to expedite the change from collective to private enterprise farming, many landowners were allocated use rights so that agricultural production could proceed without waiting for the restoration of full ownership rights. As a temporary measure the practice was successful, even though use rights are less secure than the full title to the land. Financial institutions such as banks are in general not keen to secure loans solely on the basis of use rights.

For land markets to operate, owners of real property need to be able to demonstrate proof of ownership and their power to sell. Buyers need to know the burdens and mortgages that exist on a property that they propose to acquire. Banks must be satisfied as to the clear title of ownership before they can confidently lend money. There must therefore be a basic set of land laws such as a land code that defines the nature of land and property and the rights and obligations that will be recognized by the law. The benefits of private landownership will not materialize unless there is a clear system of title to land that is supported by laws and specific institutions that enforce these laws. Every country needs to establish independent, sustainable institutions for land administration with clear statutory powers and authority, specifying the roles of those responsible for land registration, national mapping, land valuation and the recording of land-use rights.

B. Land tenure

The way in which rights in land are held is called ‘tenure.’ In many countries the absolute owner of all land is the State or head of State but for all normal purposes two common forms of tenure can be identified: freehold and leasehold. Freehold means that the owner can do what he or she likes with the land, for example in the way of disposal, subject to any restrictive covenants and the various planning regulations that are imposed by statute with regard to the use of the land. Freehold is not absolute since the State generally retains the right to acquire land in the public interest, for instance for building new housing or highways. It is indefinite in duration and the highest form of tenure that a citizen can hold.

Leasehold means that the freehold owner, who in some cases may be the State, has relinquished most of the rights in the land for a set period of time such as 99 years during which the leasehold owner has the use of the land or property but at the end of which the title returns to the freehold owner. Many countries operate similar land tenure systems though some do not recognize leasehold and rely on rental agreements to control the short-term use of the land.

In the case of mortgaging there are fundamental differences in mortgage law, different types of mortgages and procedures in each European country and different levels of security for the value of the mortgages. The lack of standardization in mortgage law and procedures creates substantial difficulties for the European housing finance market.

Not all rights are recorded in documents. In some countries the title may be subject to customary laws and overriding interests that are not written down. In general a title is subject to statutory restrictions such as development control regulations that are imposed by the local municipality but which usually do not appear on any certificate of title. In some jurisdictions there are moves to include public-right restrictions and responsibilities although in general it is easier to enforce restrictions than obligations.

C. Deeds registration and title registration

Administrative systems for land transfer and mortgage registration need to guarantee the rights that are recorded and provide legal certainty of ownership, with rights prioritized according to the order in which they are registered. The level of guarantees and the mechanisms for securing compensation or rectification of title in case of errors should be transparent. There should be a clear legal definition of real property units, rights and restrictions that mirrors conditions on the ground and facilitates the transfer of these through a system that is simple, direct, secure and cheap to operate. The transaction costs should be low and there should be quick and simple ways to create or discharge mortgages. Registers must be kept up to date at all times, cover all land, including that held by the State, individual citizens and institutions. Some use rights may be recorded in the central registers, while others may be recorded elsewhere, for instance by the municipal authorities.

There are broadly speaking three systems for recording rights in land: (a) private land transfer; (b) the registration of deeds; and (c) the registration of title.

In private land transfer, also known as private conveyancing, documents agreeing to the transfer of ownership are passed between the seller (vendor) and purchaser (vendee), usually with the guidance of a lawyer. The State merely provides a legal framework within which this process takes place. Private land transfer is generally regarded as inefficient and potentially dangerous since it can be subject to fraud as there is no easy proof that the vendor is the true owner and no direct support for land management.

Under registration of deeds, a copy of the transfer document is deposited in a deeds registry. An entry in the register then provides evidence of the vendor's right to sell and limits the number of titles that must be examined in order to discover who is the true owner. Records of deeds have been used since the 19th century in most of the United States, parts of Canada, France and countries that have a French legal background. They also occur in countries such as Albania, Bulgaria and Romania where there are remnants of the old Turkish 'tapi' system, which is based around records of the names of owners. In parts of the United States of America, there are title insurance companies that underwrite any losses that may arise through defects in the title. The purchaser pays a premium to obtain the necessary guarantee. If fraud takes place and title is invalid, the insurance company will pay compensation. Title insurance does not directly benefit land management.

In countries where there is a national system of deeds registration, the registry is normally under the control of the State. A copy of all agreements that affect the ownership and possession of the land must be registered with the registration authority. If there is a conflict between information in registered documents, priority is given on the basis of the date of recording in the registration authority and not from the date of the contract. This priority rule effectively motivates parties to record for fear of losing title through, for example, a wrongful second sale. If such second sale were recorded first, it would gain priority. Consequently, all relevant evidence on property rights is publicly available by inspecting both the public records and the land itself.

An authorized lawyer will normally check each document and ascertain its validity. As a result, by searching the deeds registry for the most recent document of transfer, any potential purchaser should feel confident that the vendor has the right to sell. The register will show how the vendor obtained the property and the conditions under which it was acquired. This of course provides no proof that the previous transaction was legitimate, hence the transaction before that should be inspected and so on through a sequence of inspections until the purchaser is confident that there is a clear chain of title.

An ideal system should reflect perfectly the legal position on the ground (the mirror principle), draw a curtain over all previous dealings so that only the present entries on the register need be consulted (the curtain principle) and guarantee the accuracy of what is shown on the registers (the insurance principle). It is difficult for a manual deeds registration system to be in conformity with all these principles. On its own, the system gives no guarantee of title; it merely provides access to the history of transfers, some of which may in practice be missing depending on the history of the system; disasters may have occurred, for instance during the Second World War many records were destroyed.

A further objection to deeds registration is that, unless it is fully computerized with documents stored in electronic form being given legal status, it leads to the storage of large quantities of ancient paper documents. Not only is this costly but the retrieval of data can also be difficult and time-consuming, depending on the volumes of documents stored. Technology such as microfilming can be used to make copies of deeds, especially in case of disaster or to facilitate searching through documents, and this can enhance the efficiency and reliability of the service.

With computers it is possible to store and retrieve rapidly large amounts of data and most deeds registries have been or are being computerized. Although the conversion of old documents into digital form is potentially expensive, the costs are much less than in the past. While computerized registries do not necessarily guarantee title, they provide the most important evidence of ownership that can be assumed to be correct unless proved otherwise in the courts. This is the case in the Netherlands, where data can be retrieved electronically on the basis of the known identifier of the parcel or basic property unit, the names and further information about owners (persons, organizations), addresses (postal addresses or other references) and map displays (cadastral or topographic).

An alternative to the registration of documents is the registration of title to land. In this system each land parcel is identified on a map and the rights associated with it are recorded on the register along with the name of the owner. When the whole parcel is subject to transfer, only the name of the owner is changed. When part of the land is transferred, the plans must be amended and new documents issued. Although a copy of the certificate of title to the land is held by the landowner, or by the mortgagee in the case of land that is mortgaged, the definitive record is that held by the titles registry.

Under title registration a person legally acquiring property can rely on the information disclosed in the register. Anyone who is dispossessed of land through the malfunctioning of the registers will be compensated even though the mistake was not made by the registry but rather was a result of fraud. The law must state that, wherever a registration entry and any other document appear to disagree, the terms entered in the registry will prevail over the terms of the document insofar as any third party, acting in good faith, is concerned.

Rights are registered only when the registrar determines that they do not affect any other property right, or the holders of affected rights have consented. Otherwise registration is denied. The process of first registration allows old or invalid rights to be purged from the system and a new clear title to be introduced. Every property then has its own unique property number and entry in the register. Each right is recorded once, incompatible rights are excluded and compatible rights are set out in hierarchical order. The data for each property are held in only one registry, although for safety and security, duplicate copies in case of disaster should be held elsewhere.

There are many similar and effective ways of registering title to land, the most famous of which is known as the Torrens system, which was originally developed in Australia. The system is simple and cheap to operate and ownership can be transferred without lawyers being involved, although in practice many people choose to take professional advice.

Some countries operate dual systems of registration of title and registration of deeds. Both systems evolved to meet the need for an efficient and reliable means of transferring rights in land, giving greater security to the land market. Both grew from a legal rather than a land management perspective. Neither system is concerned directly with land use, though some indication of this may appear in the property description. Furthermore, neither system addresses all of the land rights since many negative rights such as those imposed by municipalities under development control regulations are rarely incorporated.

Similarly, the systems do not necessarily provide definitive information about land values. In many cases, the price paid for properties as declared in transfer documents is used as a basis for charging for the service, and for government-imposed levies such as a land transfer tax or capital gains tax. Sometimes the declared price may differ from the real price so as to reduce or evade paying what may be seen as too high a tax.

In many countries landownership and mortgage data are combined in one register, while in some the data on mortgages or hypothecs are maintained in separate registers, which have to be checked independently when transactions are taking place.

In order to begin compiling a land register, whether it is under a system of deeds or title registration, there must be a legal mechanism for bringing information about land rights onto the registers. In both systems any dealing in the land, such as a sale or mortgage, can act as a trigger, so the current land market provides the mechanism for first registration. Until this happens there is no complete register of who owns every piece of land.

It is a prerequisite in either system that landowners and the general public should understand the process sufficiently to have confidence in it. It is also essential that a land registry should be seen as impartial and free from any conflict of interest. There is often a fear that a government introducing a system may seek to take land away from people rather than confirm the rights that they have. Furthermore, once data are on the registers, the records must at all times be kept up to date. In some countries the system of inheritance makes this difficult, especially where ownership is shared between heirs. The relatives of a deceased landowner may also not record their inheritance, either through ignorance, a misunderstanding of the procedures or a wish to avoid payment of death duties or taxes.

D. Adjudication of title to land

When title to land is recorded in the land register for the first time, a process known as formalization, then a special procedure may need to operate. Known as adjudication, it is the process whereby existing rights in parcels of land are finally and authoritatively determined and is the first stage in introducing registration of title to land. The owners of the land must be identified, the rights that are associated with the land must be determined and the boundaries of each parcel agreed between the adjoining parties.

Formalization of land rights brings many benefits, as discussed in chapter I, section F. In theory, the process neither alters existing rights in land, nor creates new ones; rather it establishes what rights exist, by whom they are exercised and to what limitations, if any, they are subject. As such, it should introduce certainty and finality into the land records. It is a prerequisite for land consolidation and redistribution in order to ensure that each existing owner is identified.

The process may operate sporadically or systematically. The word 'sporadic' in this context means 'here and there' or 'now and then,' the sequence whereby parcels are brought onto the register being piecemeal, haphazard and unpredictable. Sporadic adjudication takes place whenever or wherever there is a reason to determine the precise ownership and limits of individual parcels - for example, when some dealing is about to take place or when an owner requests the land to be registered. It can be

applied voluntarily and can be used selectively to encourage specific categories of landownership. It permits the cost of the whole operation to be passed directly to the beneficiaries, who can be charged an appropriate fee for having their land registered.

The systematic approach implies a methodical and orderly sequence wherein, area by area, all parcels are brought onto the register. It is in the longer term less expensive because of economies of scale, safer because it gives maximum publicity to the determination of who owns what within an area, and more certain because detailed investigations take place on the ground with direct evidence from the owners of adjoining properties. It must however be compulsory since it is necessary to summon everyone who claims to own land within a designated area to give evidence. It must therefore be subsidized by the State in order to ensure the cooperation of the people.

Disputes over land are more difficult and expensive to resolve if the sporadic approach is adopted since economies of scale cannot apply. Furthermore, the unit costs for surveying parcels become significantly higher. Systematic adjudication requires compulsion without which the wrong claimants may come forward or the rightful owners may be unaware that adjudication is taking place. There must be a framework of laws that indicate how the ownership of land is to be determined and recorded, together with appeals procedures that allow citizens to challenge the results of the adjudication within a limited period of time. Experience also shows that without some degree of compulsion in adjudication, registration of title may fail and complete registration of all the important areas of land is unlikely to be achieved. In many countries there are informal settlements on land where the ownership is in dispute or where the enforcement of development control is weak.

E. Boundaries and land parcels

A land parcel is an area of land that is defined by boundaries and has unique ownership with homogeneous real property rights. The definition of a land parcel should be given in the law. The UNECE Working Party on Land Administration has prepared guidelines on the definition of basic property units and how they may be identified. It recognizes five types of real property: the parcel (which is commonly the basis of the cadastre); the basic property unit (which may contain one or more parcels); the proprietary unit (which may also be made up of several parcels); the portfolio of ownership (which is a group of property units); and plot (which is an area that may be plotted on a map). Data relating to each of these five forms of property may be recorded in one entry in the register or be compiled electronically as and when the information needs to be assembled.

In a legal sense, a boundary is a surface that defines where one landowner's property ends and the next one begins. Normally, this surface is vertical and intersects the ground along the legal boundary line; it can, however, be horizontal as in the subdivision of apartments.

In practice, most people mark the limits of their property either with linear features, such as fences or hedges, or with point features, such as wooden pegs, iron bars, concrete markers or special stones. These physical objects may also be referred to as the boundary, though they may not follow the same line in space as the legal limit. In most legal systems, a fence is an item of defence, a guard against intrusion; it is not necessarily a legal property delimiter.

Within a registration system, boundaries are often referred to as either 'fixed' or 'general.' These terms are ambiguous since they have different meanings for different people. To some a fixed boundary (sometimes referred to as a specific boundary) is one that has been accurately surveyed so that any lost corner monument can be replaced precisely from the measurements (as in Austria for example). To others, the term is used to describe a boundary corner point that becomes fixed in space when agreement is reached at the time of alienation of the land. The location of the legal boundary cannot

then be changed without some document of transfer. The surveyor's measurements may provide useful evidence of the boundary's location but the boundary is fixed whether or not there has been a survey. This is the principle that is adopted under the Torrens system.

The crucial question is whether evidence on the ground, for instance the location of existing corner beacons, takes precedence over what is actually shown as the physical dimensions on the title plan. The law should define the priorities that will be used to resolve any conflict in evidence.

An advantage of fixed boundaries is that landowners can have confidence in where their property limits lie since these are formally recognized within the system. Where boundaries cannot be referred to visible and permanent topographic features, such as fences, walls, buildings or ditches, fixed boundaries, which, have been accurately surveyed, can help to prevent future disputes. Very detailed measurements of boundaries (for example to centimetre accuracy) may reduce the amount of additional survey work required at a later stage if and when this is needed for particular projects such as the erection of buildings, expropriations, etc. Such very precise surveys are not normally necessary for the purposes of registering title and their cost can be justified only when the data are also used for purposes other than land titling, such as engineering and construction work.

In the case of general boundaries, the precise line of the legal boundary between adjoining parcels is left undetermined as to whether it is one side of a hedge or fence or the other or down the middle. The ownership of the land can be guaranteed up to the bounding feature, the ownership of which is left uncertain. There is no need for a precise survey, although a reasonably accurate topographic plan is needed. General boundaries are most appropriate where the development of the landscape is mature, for example in urban areas and in rural areas that have been cultivated for a long time so that the pattern of land use is well established, or where boundaries are imprecise such as the line of highest tide along a seashore.

Under the system of general boundaries, the ownership of a plot of land can be registered without the neighbours being consulted and having to agree the precise location of the legal boundary lines. This reduces the number of disputes in the short term but may give rise to problems in the longer term, for example when new development takes place. The approach is often used where adjudication of title is undertaken sporadically with titles being brought onto the register only when dealings take place.

Provided that there are good boundary monuments, for instance in the form of fences or iron stakes driven into the ground, then the parcels define themselves and all that is needed by the registrar of titles is a pointer to ensure that the correct parcel has been referred to in the documents. Inspection on the ground can reveal the precise alignment of the boundaries should that be needed and a surveyed plan is necessary only to identify the parcels.

The advantages of general boundaries lie primarily in the less demanding standards of survey and the manner in which the registrar of titles can ignore small changes in the position of a boundary agreed between two parties, whilst still guaranteeing the title of each. The cadastral records may be held in coordinate form in accordance with the needs of modern technology but they can be compiled more cheaply and maintained within defined limits more accurately. If, for example, a fence between two properties falls down and is re-erected along a slightly different line, there would be no need to alter any cadastral map or filed plan. In the case of strata titles, for example where there is separate ownership of an apartment within a block of flats, the ownership of parts of buildings can be defined and guaranteed without the precise determination of where, within the walls and floors, one set of property rights changes into another.

F. Cadastral surveying

In order to be able to guarantee the accuracy of boundary surveys and to apply quality controls to the work of the cadastral surveyor, it is common for survey regulations to be introduced. These often prescribe the manner in which surveys are to be carried out as well as the standards that must be reached; they provide a framework that controls the setting-out of new land parcels, the subdivision of plots of land, and programmes concerned with land consolidation and land reallocation. They may also prescribe the necessary qualifications for grant of a licence to undertake cadastral surveys.

While in almost all other areas of land surveying, apart from mining surveys where there may be special health and safety requirements, it is not necessary to have a licence, in cadastral surveying it is common to find that before any persons in the private sector can conduct a survey they must be registered as competent to do so. The test of competence may be organized by a professional association of surveyors or by the State, depending on the traditions within any individual country. Regulations governing licensing normally apply to individual cadastral surveyors and not to survey companies.

The methods and precision of a cadastral survey are often prescribed in survey-related laws and regulations although the final standard of the product is not normally defined in laws relating to the registration of title. Ideally, the survey law should interfere as little as possible in the choice of method of survey to be used. It should not go into too much detail on technical matters including the precision of surveys or the level of fees; these matters should be dealt with in regulations that can be easily amended or be matters that are specified within contracts. It should, however, protect officially emplaced survey monuments from damage and provide rights of access to these for authorized surveyors.

From a legal perspective, it is necessary to prescribe the qualifications of those who may conduct cadastral surveys. It is also necessary to establish the legal liability of the surveyor for work undertaken and for the consequences in the short and the long term of any errors in measurement. In many countries the State guarantees and controls the quality of work as far as the general public is concerned but may reserve the right to sue the surveyor in cases of negligence. Sometimes the responsibility remains forever with the surveyor. In either case, the licensed surveyor should hold professional indemnity assurance to protect the ordinary landowner. Clear contractual relationships need to exist between the surveyors and their clients, whether the latter are private citizens or the State.

The definition of legal liability is important, since quality control is more cost-effective when it is undertaken by sampling. Since this implies the risk of failing to identify incorrect data, the level of risk and consequences of mistakes must be clear in order to prevent expensive, unnecessary and time-consuming checking of surveys.

G. Privacy and rights of access to data

Increasingly as registers are computerized and linked into wide area networks, the ownership and protection of the data held electronically within the registers become important. The law therefore needs to lay down rights of access to the data, who is authorized to change entries on the registers and under what circumstances, and who may use the information in ways or for purposes other than those for which it was provided. Many countries have laws on data protection while some have a freedom of information act; in many it is necessary to give the reasons why certain information is needed.

The balance between the rights of the citizen to privacy and the responsibilities of the State to manage land in the best interests of the community can conflict. In Sweden and the Netherlands the amount for

which a property is mortgaged is treated as public information and can be seen by anyone who views the computerized registers. In England such information is regarded as private and is less easily available. The law needs to give a clear lead on who can use information in what way and under what circumstances. In particular it needs to address the differences between digital data and those records held in analogue form.

III. VALUATION, TAXATION AND THE LAND MARKET

This chapter examines the value of land and methods whereby this can be determined in individual cases and through mass valuation. It also considers the role of property taxation and the nature of land and property markets and their importance in the national economy.

A. Value and the valuation of land

Land is a basis from which a nation and its citizens can derive wealth. Individual owners can achieve wealth through the improvement and development of their properties while governments derive wealth through property-based taxation. These two elements are interdependent. An increase in property values can bring about a rise in tax revenue for a government, while a balanced property tax system will stimulate economic growth and the development of land and properties.

The term ‘value’ has several meanings with respect to land and the taxation of land and property. The non-existence of private ownership of land and the absence of land markets in most countries of Central and Eastern Europe in the decades prior to the 1990s resulted in the value of rural land being expressed in terms of soil fertility and its potential to produce crops. In urban settlements, information about land was directed at the needs of centralized urban planning and the construction of free housing. When combined with mechanisms of centrally planned economies, these approaches resulted in very detailed soil-based cadastres or building registers that were very costly to maintain. The introduction of market-oriented reforms has to a large extent put an end to these activities.

Today the cadastres throughout Europe are based mainly on the concept of security of tenure, the maintenance of property rights and support for land-and property-based taxation. The reintroduction of private real property rights in the reformed economies led to property taxation, which, in turn resulted in a reassessment of the details that are no longer required to be registered. It is now recognized that information in the cadastres should be limited to data needed to register rights, value land and property for taxation, facilitate the activities of the land market and support sustainable development.

In Western economies the value of land has always been viewed as an economic concept that is created by the property’s utility or capacity to satisfy and meet the demands of individuals, companies and governments. In this context, value refers to the price most likely to be concluded by well-informed buyers and sellers of a property when it is available for purchase. Value is not a fact but an estimate of the likely price to be paid for land and property at a given time. It depends on the type of market transaction and the motives and interests of the parties involved.

1. Individual and mass valuation of land and property

In a market economy, land and property valuation is commonly divided into two related but different types that are referred to as individual or single property valuation and the mass valuation of properties. Both types of valuation provide an approximation to the market value, which is ‘an estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller ... wherein the parties had each acted knowledgeably, prudently and without compulsion’.² Both are based on the same principles and apply economic analysis.

Individual or single property valuation is commonly performed in support of transactions such as sale, leasing, mortgaging, inheritance, granting, reporting and accounting. An interested party will usually

² International Valuation Standards 2001

hire a valuation professional, who may operate on a licence basis and may be a member of a self-regulating professional association. The valuer will make a market analysis that results in an estimated value of the property in question and inform the client in a valuation report. The value or worth of land declared in such a report will depend on the purposes for which that value has been determined. The value of a building for insurance purposes, for example, may not be the same as the price that it would fetch in an auction or on the open market. The estimation of the value of a property is more an art than a science and depends on many external factors as well as the physical nature of the land or property.

It may be the case that similar valuations of the same property performed by different professionals will arrive at different results. This may be a cause for possible disputes between transacting parties or with authorities that may have an interest in such transactions, for instance when State-owned property is put up for sale or for privatization or there is compulsory acquisition and the various estimates of value differ.

There may also be concern over quality control of the work of valuation professionals. This is partly addressed by the professional valuation community through the development and improvement of international valuation standards and the adoption of professional codes and ethics. Governments need to support such activity and encourage openness and transparency in the valuation process.

While individual valuation is focused on a particular property unit, mass valuation simultaneously covers many groups of similar properties. Mass valuation (also called mass appraisal) is a process of valuing a group of properties on a given date, using common data, standardized methods and statistical testing. Mass valuation models are mathematical expressions of how supply and demand interact in the real-estate market.

In principle, mass valuation is undertaken for the purposes of taxation but, once established, it provides a basis for analysing the performance of the land market, assessing trends in the price indices, supporting strategic decisions at the State and local levels, or assessing the level of compensation in a proposed development project. In Lithuania, for example, several legal acts legalize the use of mass valuation results for alternative needs, such as the sale and lease of State-owned land, provision of social support, estimation of fee for registration of land parcels or property inheritance tax.

The development and use of computer-assisted mass appraisal creates an opportunity to standardize and automate individual valuations and to identify the main valuation criteria and factors that influence value. The processes can be strengthened by integrating computer-assisted mass appraisal with spatial data and the use of geographic information systems.

Mass valuation should be based on policy decisions on property taxation and the introduction of property taxation legislation. It should include: the development of mass valuation models, tools and procedures; education and training of mass valuation experts and government officials involved in mass valuation; the establishment and administering of a countrywide network of valuation offices throughout the jurisdiction; the establishment of a quality control system insuring consistency and uniformity of mass valuation results for similar groups of properties throughout the country; the collection and analysis of land market data as well as other data that are used by mass valuation models; the maintenance and updating of mass valuation database; and the development and introduction of public appeals system.

Mass valuation is carried out in the public interest either directly by government agencies or by private sector professionals operating on government contracts according to the rules and procedures designed and accepted by the government of a country. When land or buildings are subject to taxation, it is important that there is uniformity throughout the country in the methods used.

The scale of mass valuation requires synchronized efforts to be organized and maintained by a government throughout all stages of the operation. Complete coverage of the territory of a country by mass valuation does not on its own guarantee that a country will be in a position to introduce the property tax system that it has envisioned. There must also be formalized and constantly maintained links between valuation agencies, cadastral agencies and registration agencies. This is critical to the introduction of a property tax system. The combination of mass valuation and cadastral data will result in the establishment of taxable values for individual property units.

The combination of information on the taxable value of individual properties with related information on ownership rights provides taxation authorities with information on taxpayers and the amounts of tax due to be collected. This may create technical difficulties for countries that have recently started to develop their property cadastres although these do not normally arise when all land administration functions are combined in one agency.

Central taxation agencies or local authorities are generally the recipients of information provided to them by land administration agencies, which, have responsibility for valuation. The effectiveness of the communication between them depends upon the development of information links between their respective computer systems. A two-directional data exchange between them will help to monitor and improve tax collection and this may be facilitated through geo-referencing each individual land parcel. However, in some countries the open flow of information is hindered by legislation preventing tax authorities from sharing their data in order to protect the privacy of taxpayers.

2. The distinction between price, market, cost and value

When estimating the value of land or property, appraisers make a careful distinction between the terms ‘price,’ ‘market,’ ‘cost’ and ‘value.’. The term ‘price’ usually refers to a sale or transaction price and applies to an exchange: a price is an accomplished fact. A price represents the amount that a particular purchaser agrees to pay and a particular seller agrees to accept under the circumstances surrounding the transaction.

Generally, these circumstances reflect conditions within one or several markets. A ‘market’ is a set of arrangements in which buyers and sellers are brought together through the price mechanism. A market may be defined in terms of geography, products or product features, the number of available buyers and sellers, or some other arrangement of circumstance. A real-estate market is the interaction of individuals who exchange real-property rights for other assets, such as money.

Specific real-estate markets are defined on the basis of property type, location, income-producing potential, typical investor characteristics, typical tenant characteristics, or other attributes recognized by those participating in the exchange of real property. The market for new, single-family residences selling for €100,000 or for older apartment buildings located near the central business district and available for renovation are examples of specific real-estate markets.

Appraisers use the term ‘cost’ in relation to production, not exchange; cost may be either an accomplished fact or a current estimate. Appraisers distinguish among several types of costs: direct costs, indirect costs, construction costs and development costs. Direct costs include expenditure on labour and materials necessary to construct a new improvement. They are also called hard costs. The contractor’s overheads and profit are generally considered to be direct costs.

Indirect costs incurred in construction refer to expenditure on items other than labour and materials. They include administrative costs; expenses incurred by the owner for professional fees, financing, taxes, and interest and insurance during construction; and lease-up costs, which are the net expenses of

operating the project until it reaches a stable occupancy level. Indirect costs are sometimes referred to as soft costs.

Construction costs, or the contractor's bid price, normally include the direct costs of labour and materials plus the contractor's indirect costs. Development costs are the costs involved in creating a property, including the land, and in bringing it to an efficient operating state. They are distinguished from the costs of constructing the improvements. Development costs include the profit of the developer who brings the project into being.

Real-estate-related expenditures are directly linked to the price of goods and services in competitive markets. For example, the costs of roofing materials, masonry, architectural plans and rented scaffolding are determined by the interaction of supply and demand in specific areas, and are subject to the influence of social, economic, governmental and environmental forces.

Price, market and cost relationships also incorporate concepts of value. The term 'value' can have many meanings in real-estate appraisal; the applicable definition depends on the context and usage. In the marketplace, value is commonly perceived as the anticipation of benefits to be obtained in the future. Because value exists at a given moment, an appraisal reflects value at a particular point in time.

Value at a given time represents the monetary worth of property, goods or services to buyers and sellers. To avoid confusion, appraisers do not use the word 'value' on its own; instead they refer to 'market value,' 'use value,' 'investment value,' 'assessed value,' or other specific kinds of value. Market value is the focus of most real-property appraisal assignments and its estimation is the purpose of most appraisals.

3. Methods of valuation

The valuation process is applied to develop a well-supported estimate of the worth of a property, taking into account all pertinent data. Appraisers estimate property value with specific procedures that reflect three distinct methods of data analysis: cost, sales comparison and income capitalization. One or more of these approaches may be used in all estimations of value. The approaches employed depend on the type of property, the use of the appraisal, and the quality and quantity of data available for analysis.

All three approaches are applicable to many appraisal problems, but one or more of the approaches may have greater significance for a specific task. For example, the cost approach may be inappropriate in valuing properties with older improvements that suffer substantial depreciation due to physical deterioration or that have become functionally outdated, all of which are difficult to estimate. The sales comparison approach cannot be applied to very specialized properties, such as refuse disposal plants, because comparable data may not be available. The income capitalization approach is rarely used to value owner-occupied residential properties, although it may be used in conjunction with other data. Income capitalization can be particularly unreliable for the commercial or industrial property market. Wherever possible, appraisers should apply at least two approaches. The different values derived can serve as useful checks on one another.

a) Cost approach

The cost approach is based on the understanding that the buyers and sellers relate value to cost. In this approach the value of a property is derived by adding the estimated value of the land to the current cost of constructing a reproduction or replacement for what is already on the land; from this amount the depreciation, based on the extent of deterioration and obsolescence, is subtracted to give a net value. This approach is particularly useful in valuing new or nearly new improvements and properties that are

not frequently sold in the market. Cost-assessment techniques can also be used to derive information needed in the sales comparison and income capitalization approaches.

The current costs of constructing the improvements can be obtained from specialized cost estimators such as quantity surveyors or construction economists, cost estimating publications, builders and contractors. Depreciation is measured through market research and the application of specific valuation procedures. Land value is estimated separately.

b) Sales comparison approach

The sales comparison approach is most useful when a number of similar properties have recently been sold or are currently up for sale. Using this approach, an appraiser estimates the degree of similarity or difference between the target property and the comparable sales by considering various elements of comparison such as: real property rights conveyed; financing terms; conditions of sale; market conditions; location; physical characteristics; economic characteristics; use; and non-real property components of value. Monetary values or percentage adjustments are then applied to the sales price of each comparable property with consideration for the real property interest involved. Adjustments are made to the sales prices of the comparable properties because the prices of these properties are known, while the value of the subject property is not. Through this comparative procedure, the appraiser estimates the value for a specific date.

In countries where there has been no land market, there may be few or no comparable properties. In such cases a best estimate must be made taking into account such matters as the site location and its characteristics (soils, available utilities, distance to shops, etc.), the building type (size, design and construction, age), etc. Data on many of these features are often recorded either in the cadastre or in separate building registers. Cadastres in Central and Eastern Europe have traditionally maintained data specifying in great detail the physical features of land and buildings. With the introduction of market-based valuation this information has played an important role in reducing valuation costs, provided that it has been kept up to date. Collecting and maintaining these data elsewhere other than through the cadastral agency will increase bureaucratic barriers or create unnecessary duplication of functions.

c) Income capitalization approach

In the income capitalization approach, the present value of the future benefits of property ownership is measured and capitalized into a present, lump-sum value. As with the cost and sales comparison approaches, the estimate of income capitalization requires extensive market research. Research and data analysis for this approach are conducted against a background of supply and demand relationships, which provide information about trends and market anticipation. An investor in an apartment building, for example, anticipates an acceptable return on the investment as well as a return of the invested funds.

The level of return needed to attract investment capital is a function of the risk inherent in the property. Moreover, the level of return required by investors fluctuates with changes in money markets and the returns offered by alternative investments. Appraisers must be alert to the changes in investor requirements indicated by the current market for comparable investment properties and by changes in the more volatile money markets, which may suggest future trends.

4. Land valuation in practice

Valuation entails the classification of each property in accordance with an agreed set of characteristics relating to its use, size, type of construction and improvements; the collection and analysis of relevant market data including data on sales prices, rents and building maintenance costs, and details of the dates when these applied; and the determination of the value of each real property in accordance with publicized procedures, where possible based on market values and computer-assisted mass valuation systems. A primary requirement for an efficient and effective fiscal cadastre is a set of current property maps that provide an index for compiling and maintaining valuation information. Such maps may be an integral part of the tax records or may be derived from data held in the landownership registers. Property maps are necessary to ensure that all parcels are identified and that no parcel is taxed more than once. The approximate size, shape and location of the parcel, as depicted on the map, may be used in the actual valuation process.

Whereas data about the size and shape of parcels may be relatively static, property values are dynamic and change over time. As a result they need to be reassessed at regular intervals. Generally, revaluations should occur at least every five years - in Germany for example the law stipulates a five-year cycle, although in practice this has proved difficult to achieve. It is important that similar types of property are valued simultaneously.

Long intervals between valuations may mean that the workload of those responsible for mass valuation is not distributed evenly throughout the period. The resulting inefficiency can be reduced if each year one particular type of property is scheduled for reassessment.

In fast growing property markets long intervals may mean that taxable values will differ greatly from current market values. In future, wide and intensive use of computer-assisted mass valuation technologies may make it possible to update taxable values annually. This will require the establishment of a special land market data collection, analysis, indexing and management system that can also provide society with accurate and reliable information on the status of the land and property market.

Where the function of valuation is to support taxation, national governments retain the responsibility for ensuring the unity of approach to land and property taxes and guarantee the right of citizens to fair taxation. This can be achieved through the development of valuation models, procedures and manuals that need to be followed nationwide by municipalities, thus allowing controls over the way in which the tax base is established and reported and how the performance of the land and property market is monitored.

B. Land and property taxation

Increasing numbers of countries are pursuing policies to decentralize the provision of public services to the local level of government. In some countries local governments lack sufficient funding to provide support for even basic public services. Raising revenue through the introduction of market-based property taxation is regarded as a fair way to make these decentralization policies achievable. Annual property taxes have been in existence for many centuries and are generally well accepted by the public.

Countries take different approaches to property taxation and the establishment of taxable values. In future the development of international property markets may require the introduction of compatible mass valuation practices by different governments and link with individual valuations of property.

At present, some countries exercise direct property taxes where land, improvements (meaning buildings) or land and improvements combined are treated as taxable objects. Some levy taxes on wealth rather than just land and improvements while others apply both forms of tax. Taxation of land and property has advantages in that it has a broad tax base and is easy to administer and inexpensive to introduce and maintain. The taxes are difficult to evade and, provided that a country maintains good cadastral records, the collection rate can approximate 100%. They provide a stable and predictable source of revenue that is transparent in the way that it is calculated and collected. This encourages efficient use of land and property and discourages land speculation. It recognizes public claims on private property while allowing private property development.

Any system of taxation should serve clearly defined social objectives and raise significant amounts of revenue. It should be exclusively under the control of the government authority and be administered in a way that the public understands and sees as fair. It should be relatively simple and cheap to collect the revenue and be designed in such a way as to make it difficult to avoid making payments. It should distribute the tax burden equitably across the community and encourage the good use of resources.

Property taxes are relatively easy to introduce so long as there is adequate legislation and sufficient educated professional valuers. The procedures to be followed involve the identification and mapping of all properties that are to be taxed; the classification and valuation of each property in accordance with agreed procedures; the identification of who will be responsible for paying the tax; the preparation of the valuation roll; the notification of the individual property taxpayer of what has to be paid; the collection of the taxes; and an appeals procedure for taxpayers who dispute their assessment.

Property taxes are usually based on the estimated market value of property. Taxpayers often confuse this with the sale price for which their property has been purchased. The sale price may be used as the basis of a property transfer tax, sometimes called stamp duty, whereas annual property taxes relate to an assessed value. Stamp duty has traditionally been a document-based tax and hence under an electronic system the tax laws may need to be amended; in the United Kingdom, for instance, it is now a personal tax known as a stamp duty land tax.

To stimulate economic growth the tax can be based on the property's potential rather than the present sale price. For countries in Central and Eastern Europe this has presented a problem because many of the historic occupants of land have properties in what are now prime locations but have not had the ability to pay high property taxes and have not been willing to move out of their dwellings. In the Commonwealth of Independent States the introduction of the highest and best use principle in taxation has triggered the relocation of industrial facilities, which were often historically located in the centres of settlements; indeed, this is often one of the primary objectives for introducing the tax.

A country planning to introduce a market-based property tax system should expect such a project to take at least five to eight years, depending of the status of the land market, the availability of institutions and public acceptance. The tax policy should identify:

(a) The subject of taxation (land as if vacant or both land and improvements): land taxes can be applied to all real property within a country, including land with improvements such as buildings or parts of buildings as well as to vacant land. Taxing vacant land may stimulate investment in real property development and increase construction work. If the unified tax is introduced, the tax value of a unit may be calculated as a single figure or as the value of land and improvements added together;

(b) The techniques that are to be used when valuing property and calculating the tax base: annual property taxation is normally based on the generalized market value of real property on a specific date for the year in which the tax is being assessed. The value is normally derived from mass valuation techniques, especially the cost, sales and income capitalization approaches. Where active land markets exist, the sales comparison approach is generally preferred. Agricultural and forested lands should be taxed according to their production capacity. For certain types of taxable objects mass valuation cannot be applied and individual valuation will need to be used, for instance in the case of buildings of historic interest or special social significance;

(c) The frequency of the revaluation cycle: expediency and the resources available will often determine the frequency of the revaluation cycle, although a regular cycle, such as every five years, is desirable. The values of real estate change over time and although the tax authorities adjust the rate levied, the tax will tend to be seen as unfair and inconsistent with natural justice unless it reflects current property values:

(d) Implementing agency: typically the ministry of finance or the ministry for taxes and revenues takes the lead in introducing a market-based property tax system. A difference needs to be drawn between those responsible for mass valuation and those who collect the taxes. Taxation is a political process while valuation is a technical matter. Combining the two functions under one roof may bring about a conflict of interest. Delegating the tax valuation function to local authorities may also provide grounds for conflict of interest and increase valuation costs nationwide. In many countries land administration agencies are responsible for mass valuation though not for determining the level of tax; nor do they collect annual taxes although they may collect one-off taxes such as those on land transfer;

(e) Beneficiary of land and property tax: annual land and property taxes usually serve as revenue for local authorities. Sometimes tax revenue is divided between local and central government, for example where the latter retains a percentage of the tax to cover the cost of its administration. In general, the public often accepts the taxation of land and improvements as a socially just tax;

(f) Tax rate: local authorities may be given the opportunity to regulate their revenue flow through the establishment of annual tax rates, within limits prescribed by the central government. The tax rates may be fixed or floating depending on national legislation. The level of one-off taxes such as stamp duty on land transfers will be fixed as part of the State budget;

(g) Tax collection procedures: the responsibility for collecting annual property taxes may lie either with central or local government agencies. One-off taxes such as stamp duty may be collected by the land administration agencies as a component of the land transfer fee - for instance in Spain before a right is registered in the land registry there must be a check to make sure that the stamp duty for the purchase has already been paid;

(h) Appeals procedures: it is important that taxpayers are given the opportunity to defend their positions if they do not agree with established tax values. A special system must be put in place that will allow these arguments to be resolved before any court procedures take place. Taxpayers should have the right to receive adequate notice of the valuation on their properties, to review information concerning the basis and methods of valuation, and to contest the valuation and the accuracy of the information and records concerning the property used by the valuation agency to define the property value;

(i) Tax exemptions: property tax relief programmes can be targeted both at individuals as well as at certain types of property. Low-income or disadvantaged groups in the population may not be able to pay full amounts of tax for the properties that they own and selling off such properties may not

be an option. Tax deferral for elderly people and tax credits for the working poor may be considered. Such properties as schools, hospitals, government-owned premises, preserved buildings, historic sites, houses of worship, charitable properties, national parks and reserves, embassies and consulates can also be exempt from property taxes.

The fiscal cadastre is an instrument for administering land tax policy. Although primarily a support for land value and property taxes, the data that are recorded within a fiscal cadastre can be used in the determination of other forms of tax, such as those imposed on personal wealth or on income derived from real estate. The latter include taxes on inheritance or what are sometimes called death duties.

C. Central valuation agencies

In many countries and jurisdictions the land administration agencies are responsible for developing valuation techniques, administering mass valuation procedures and maintaining relevant databases. The fiscal or tax authorities are responsible for calculating taxes on land and property. It is very rare that mass valuation is performed at the local level.

Many countries have a central valuation agency that is responsible for: conducting market research and analysing market price data, determining valuation models and testing mass valuation methodology, estimating real property values for equitable taxation, organizing an administrative valuation review, delivering valuation data connected to real estate to the tax agency for tax billing and collection, conducting public education and programmes to increase public understanding and foster taxpayer confidence, preparing reports and analyses, etc.

A central valuation agency should provide a comprehensive land valuation service both to departments of central government and to local authorities and advise government on matters affecting the value of land. It should have a reference group or advisory board that contains representatives from relevant agencies. It should carry out real-estate valuations, for instance for mass valuation in support of land and property taxation; when calculating compensation to be paid where land is acquired for public purposes either by compulsory purchase or by agreement; and when determining compensation for any adverse consequences of planning decisions. It is preferable, although not always achievable, that a single value of property is used for all these public functions.

In a number of countries, government accounting procedures require notional rent to be paid on all government-occupied properties including those that belong to the State. Fixing the rent on government-owned property is a private function of the government being an owner of the particular property. These rents should be established by government agencies responsible for the management of State-owned properties using information obtained from the valuation agency. Setting a fair level of rent is especially important where agencies are competing with the private sector, for example where cadastral mapping agencies sell maps that could be provided by private companies.

There is advantage in setting up a central valuation agency either within the land administration authority or else in close cooperation with it. This is in order to ensure a uniform application of laws and standards, common software and the avoidance of duplication. In Lithuania, for example, both the land market and the property taxation system benefit from the fact that the cadastre, land registry and valuation functions are all within one self-funded State enterprise known as the State Enterprise Centre of Registers. In Lithuania, objects such as land parcels, apartments and engineering facilities can be registered as separate items in the real property register and be valued accordingly.

Centralization should result in greater economy by reducing the duplication of records, staff and effort. It should also increase the potential for individuals to develop skills in specialized areas such as valuing

plant and machinery, agricultural land or mining sites. The opportunity, especially through computerization, to coordinate large volumes of land sales data should result in a better assessment of individual property values while also facilitating the monitoring of land sales to detect land speculation or to identify social or economic changes that are reflected in the land market data.

D. Land and property markets

Registration of title to land has two main objectives: to provide secure ownership to the land and to support the operations of the land market. Land markets exist in a number of forms, some formal and subject to the procedures laid down by the State, and some informal and unstructured as is often the case in less developed economies. They operate in rural areas, where the main interest is usually in agricultural land or forestry, and in urban areas where industrial, commercial and residential interests predominate. They may be based around the sale of freehold or long-term leasehold (the sales market) or around shorter-term leases (the rental market). They may involve the sale of specific rights in the land such as air rights or the right to take the profits or other benefits that arise from the use of the land.

Land sales markets influence the level of investment in industry and the efficiency of agricultural production since the land can be used to borrow money against the estimated market price that would be paid for the property. In urban areas rental markets create opportunities for people to migrate to where work is currently available, while for rural communities they allow agricultural land to be used more efficiently by farmers renting land that they cannot afford to buy but which they can use productively.

Land is regarded as one of the best forms of collateral. Systems for enabling land to be used for this purpose need to be reliable and efficient, both for the economic development of society as a whole and for the prosperity of individual property owners. Loans based on real property as security constitute a large part of the credit market in many economies, especially in household investment, since the money for purchasing or improving homes often comes through mortgages.

The land market must operate on a legal basis so that all dealings are safe and secure. An efficient market involves regulating institutions that ensure a stable and transparent framework within which transactions take place. It should provide easy access to the market for all participants including landowners, tenants and corporate bodies, such as banks and lending institutions, and representatives of those with third-party and minority rights. There must be clearly defined goods and services, and mechanisms whereby these can be offered for sale or lease; mortgage facilities; stable tax regimes; access to credit; and a framework of clear, consistent and environmentally sustainable land policies. Understanding the land market involves understanding not only the participants but also the processes such as planning and construction on which economic decisions depend.

The land market shows many similarities with investments in the stock market and the total sums involved in developed economies are often of the same order. In the former countries in transition stock markets were established quite rapidly, while the land markets lagged far behind, partly because of the lack of available capital to loan and partly because of a lack of transparency. Like the stock market, the land market must be transparent to minimize the opportunities for corruption and allow all participants to be well informed.

In a market economy it is the participants in the market that play the main role. The task of the public administration is to remove market imperfections, redistribute resources, and put in place a framework to regulate the market's behaviour through laws and regulations. These differ in each country so, in the case of land markets, attempts are being made through projects such as the European Land Information Service (EULIS) to establish common procedures for accessing information. The differences arise

because of the different needs to protect the minor participants such as the small-time investor or the family house owner and different attitudes to law and the nature of property.

At present the regulatory processes in each country differ in the extent to which they support the market; how they encourage investment, especially foreign investments, and how quickly they are removing barriers and restrictions, thereby stimulating economic growth; and how much they encourage the development of public/private partnerships and private finance initiatives. The regulatory processes involve rules about annual reporting, insider trading, property formation, mortgaging real property, development permits, purchase of real property, etc.

The division of responsibilities between different participants is an important component in the market. There should be a clear and distinct division of responsibilities between the different 'traders' and the various service functions that are required. In nearly all aspects the stock market has developed further than the land market, perhaps due to the much larger international influence, the existence of very large investors and the relatively large extent of speculation in the market.

The land market needs access to common basic information. This is of the utmost importance. There have been a number of crises in land and property markets that have left people with negative equity, the value of their property having declined so that the amount of mortgage repayment that is due becomes greater than the current market value of their real estate. This has in part arisen because of a lack of good land market information about prices and trends over time. For the market to be successful there needs to be transparency, guarantees to the title to land, and efficient and effective land administration systems that provide speedy and reliable access by the public to land and property information.

E. Mortgage finance

One of the key drivers in a land-market-based economy has been housing finance, allowing house owners to use the capital value of their home to fund other economic activities. Land and property represent a significant proportion of the tangible capital of a country and can be used as collateral to secure large amounts of debt. In the United States, for example, mortgage debt is the largest component of the domestic debt market. In the early stages of the transition from planned economies to market economies the focus tended to be on economic liberalization and privatization. With the reform of these economies and more stable financial institutions, the focus has shifted towards the housing sector and the mortgage market. A well-functioning mortgage market benefits the economy through greater access to capital for development, a more mobile workforce and growth of employment in the construction sector.

There are three principal operations in the mortgage market: the creation of mortgages, comparable to the underwriting function for other capital market securities; the holding of mortgages and hence the risk by institutions such as banks or other investors; and the servicing of the mortgages including the collection of payments from borrowers, ensuring the payment of taxes and the processes of foreclosure in cases of default.

The first of these is normally initiated by the banks, building societies or other financial institutions. In the countries in transition in the 1990s the banks were reluctant to make mortgage loans because of the risks in mortgage lending (including credit, interest rate and liquidity risk) and the lack of available capital. There was and still is in some cases a perception that excess borrowing can overheat the economy and result for instance in negative equity in which property prices fall and are below the level at which the loans were secured. Negative equity means that property owners cannot sell without considerable loss and therefore cannot move to new jobs elsewhere.

In more recent times, primary mortgage markets have grown and secondary markets have appeared. A secondary mortgage market is one in which the process of securing loans (which can still be carried out by banks) is separated from the holding of the mortgages (which can be carried out by capital market investors). In securitization (mortgage backed securities or MBS), the mortgage is sold to a special purpose vehicle (SPV), which, in turn finances the purchase by issuing bonds to the investor, thus reducing the risk to the bank and allowing it to use its resources in other areas of the economy. The asset risk is thus transferred to the capital markets. The necessary legislation to facilitate this must be in place, with land administration procedures providing the necessary support. Where foreclosure becomes necessary, this must be possible quickly and easily.

With mortgage bonds the mortgages remain on the balance sheet of the bank but are used as cover for bonds issued by the bank to finance the mortgages. Today many European countries have legislation that provides for the issuing of covered bonds, which means that the investors have a priority right, in case of the bank's bankruptcy, in the mortgages that cover the bonds. Secondary mortgage markets also exist in Europe (for instance in France), where the central issuing institutions buy mortgage-covered bonds and fund themselves by issuing their own bonds.

Up-to-date public registers are fundamental to the mortgage market especially since investments in secondary mortgage markets or mortgage bond markets may come from international companies. As such, transnational standards (e.g. for securitization) should be adopted. It is important when building or re-engineering a land administration system that there is an understanding of national and international financial structures and requirements.

IV. SUSTAINABLE LAND USE

This chapter examines the role of land administration in the context of land-use rights and land-use planning, placing emphasis on urban and rural development including land consolidation. It also considers the role of geographic information systems in managing land-related information.

A. Land-use rights and restrictions

Rights to land include rights of ownership and rights of use. Land-use rights and restrictions are an important determinant of property value and hence are a factor in the land market. It is important that each landowner and occupier know and understands the rights and restrictions that apply to the use of their land since they determine what can be done with or on any parcel of land. In many societies use rights are under the control of local government, such as the municipalities operating in accordance with national legislation. Information about the use rights and restrictions that relate to a property should be readily available to anyone undertaking a land transaction.

Many land-use rights are in fact restrictions or negative rights that forbid certain activities on the land and do not specifically appear on any certificates of title. In general, rights that are particular to an individual parcel of land such as restrictive covenants may appear on the register but restrictions that apply to groups of properties do not. There are, however, moves in some countries to include public-right restrictions and responsibilities within the land administration system - not just ownership and other private rights. Computerization makes this easier to handle.

In urban areas, properties may lie within planning zones for which there is a designated use such as: residential; commercial; industrial; services such as schools and hospitals; transport including roads, railways and waterways; and recreational areas such as parks and open spaces. Unless specifically authorized, no property in a residential area may be used for commercial or industrial purposes, although this information is unlikely to appear in the land books or on the land registers. A restriction is in effect a negative right.

In addition to the general category of 'freehold,' the land registers often record public and private rights including: caveats or cautions (the right to be notified of intended dealings); charges on the land (third-party rights); construction rights (e.g. to erect a new building or change an old); easements/servitudes (such as rights of way); long-term leases (for instance for more than 12 years); mortgages (the right of lenders to acquire a property if the debtor defaults); mining rights (the right to extract and profit from oil or minerals); pre-emption rights (the priority right to purchase the land); restrictions on use (for instance restrictive covenants); seizures (where land is taken into legal possession); shares in condominiums (the rights to all or parts of buildings); specific rights (not otherwise identified and applying only to the property); trusts (where land is held by one legal person for the benefit of another); and usufruct (rights to use a particular parcel in a particular way).

Land-use rights are becoming increasingly complex as societies become more concerned to protect the environment and reduce the adverse effects of activities such as waste disposal that contaminate the land. The resulting restrictions on land use may cover many land parcels and may be linked to individual real properties through the use of geographic information systems.

B. The role of land administration in land-use planning

In order to make the best use of national resources, every country implements strategies for land-use planning and development so as to improve the physical infrastructure and create a better environment. Land-use planning is the process of allocating resources, especially rights to use land in particular

ways, in order to achieve maximum efficiency while respecting the nature of the environment and the welfare of the community.

Without formal land-use plans and powers that are used to enforce development controls, unsustainable development will take place creating unregulated settlements and environmental damage. Informal settlements will spring up and land that is designated for future community use will be encroached on, delaying or denying beneficial development programmes. The cost to society and to the environment can be very large.

The manner in which land-use planning is conducted depends on the country's political system and on the division of responsibility between different parts of government. Some responsibilities lie with the central government, while others may be devolved to the local level. The approach to urban development often differs significantly from that in rural areas, leading to social tensions. In reality there are strong linkages between rural and urban areas, each being dependent on the other.

Land-use planning is concerned with a variety of activities including the provision of any necessary infrastructure and the regulation for example through by-laws of the aesthetic and physical quality of building and construction. It involves reviewing and understanding the existing environment and then defining the problems that need to be solved. Much of this work is outside the remit of land administration, although there are close connections between the work of land-use planners and land administrators with regard to land-use rights and the value of land.

Land-use planning often results in the creation of new subdivisions of the land and new patterns of land use that have a significant impact on the land market. In many jurisdictions some of the rights that are allocated in the planning process, such as building permits, are recorded in the land registers and cadastres; it is then the responsibility of the land registration authorities, as in Lithuania for example, to check whether, for instance, proposed subdivisions are in accordance with planning legislation.

If planning authorities seek to create new land-use patterns without integrating their work with the land administration system, then the implementation of development programmes will almost certainly be delayed and may ultimately fail. Studies in the 1980s suggested that, around the world, over half the projects that aimed to provide shelter for low-income communities and failed, did so because of problems over land rights.

Land-use planning has a significant impact on the urban land market since real property values change dramatically when the permitted land use is changed, for example from agriculture or forestry to residential or commercial. Physical improvements to buildings make only small differences to the market price in comparison to changes in the permitted use. Sometimes referred to as betterment, the increase in value brought about by authorizing the change in the designated land use is often proportionally very large and may be subject to specific taxes in order to reduce land speculation. Conversely, there is rarely compensation for a reduction in property values that arise when properties are adversely affected, for instance by a decision to build a motorway or airport nearby.

There must be legally defined procedures for the compulsory acquisition and reallocation of rights in land and appeals mechanisms so that the public has confidence in the security of its titles. There must also be mechanisms whereby compensation can be provided to owners of land whose rights are adversely affected by any project, for instance where there is reallocation or land expropriation. These mechanisms must be consistent with the way that land is valued within the land administration system.

Land administration data can be used to monitor the impact of land-use planning on the environment. Increasingly, environmental restrictions are being recorded on the registers. In Switzerland, for

example, a detailed list of all legislative restrictions that apply to any individual parcel may be noted on the registers, while in the Netherlands the Kadaster is responsible for recording certain aspects of land use under various pieces of legislation including:

- Forest Act: for areas where tree-felling is banned
- Noise Nuisance Act: for noise zones where the amount of noise is restricted
- Urban Renewal Act: for areas subject to special environmental protection
- Spatial Planning Act: various land-use orders
- Provincial Ordinance on Lakes: for building orders and the protection of banks
- Water Board Ordinance: for liability to maintain canals and watercourses
- Soil Protection Act: for soil contamination orders and liability to clean soils

Under an adaptation of the Cadastre Act, the Kadaster will record all ‘public encumbrances with power against third parties’ and any charges against the land that are created by government bodies that are empowered to impose such encumbrances, including the municipalities. A link to the municipalities will guarantee that people asking for information about land will get access to both Kadaster and municipality data. In the Netherlands the recording of public encumbrances is not a constitutional requirement: an encumbrance exists between the municipality and the landowner immediately after it has been signed by the municipality.

In Slovenia, the new Spatial Planning Act from 2002 introduces a strong linkage between data for planning and cadastral data. There will be a ‘legal regimes’ database that will contain current spatial planning and other documents, laying down spatial arrangements, implementation measures and spatial planning restrictions. There will also be an ‘administrative acts’ database containing data relating to the construction and an ‘actual use’ database containing data on the actual use of the physical space and on the public infrastructure networks and facilities. All these databases will be closely linked to the land and building cadastre databases, which are managed by the Surveying and Mapping Authority.

C. Development plans and the cadastre

Changes in land use take place as a result of social and economic pressures that encourage the creation and implementation of new development plans. Such plans may for example be prepared to cope with the expansion of existing urban areas, or to improve the local environmental infrastructure, or to create new towns in accordance with resettlement schemes. Redevelopment occurs where general improvements are needed to the urban environment, for example in order to attract real property investments and thereby create employment opportunities, or to improve local transport systems and traffic flows, or where urban centres need to be rebuilt as a result of major social and political change.

Legislation to control the physical development of land and property should specify how development plans are created, how they are approved and what role the land administration authority has in monitoring their enforcement. Some of the data to support such plans come from the cadastre. In many countries the cadastre has become a multi-purpose tool that provides data for a variety of functions and organizations, not just those responsible for recording property rights. One consequence of this is that administrative procedures for matching cadastral and land registry data with land-use planning data must be established, especially at the local level. Any physical development on the land affects real property prices and the land market. The land administration authority must be notified as and when development takes place. There is a danger that changes in the shape of land parcels may be recorded by the cadastral authorities and reported to the land registry, but not accepted by the latter since the appropriate legal procedures have not been followed.

In particular this can happen in some systems when subdivisions of the land that result from inheritance are legally documented in one way in the land registers while a different pattern of land use is adopted by the heirs. As a result, any cadastral records that are based on land use may be inconsistent with the records of landownership. Furthermore, technical inconsistencies can occur whereby old measurement units and old parcel references appear in legal documents that do not accord with those in the planning and cadastral registers. With the growth of computerized information networks it is important that such inconsistencies are eliminated. The records of permanent changes to the land that are held by both the cadastre and the land registry must be based on the juridical status of the land parcel and must be compatible with each other.

Each country has its own strategy and frameworks for managing the physical development of the landscape. Thus there may be regional plans, district plans, local plans, structure plans, master plans, etc. It should be possible to relate such plans to the terrain through the use either of topographic line maps or, where appropriate, orthophoto maps.

A land-use survey is a prerequisite for the preparation of a development plan and should define the present use of the land and identify changes that are taking place and the rates of these changes, for example in urban expansion. The survey should link land-use data to other physical and social data, and provide an analysis of areas by quantitative means using a variety of statistical measures. It should facilitate the preparation of models of land-use change over time and space, and present the results of the survey in a manner that decision makers and the public at large can understand.

A development plan should encompass the whole area of a community, identifying the way that the land should be used, based on the predicted requirements of the community. It should specify areas to be set aside for building and construction, commercial zones, transport and infrastructure areas, public areas with facilities for hospitals, schools, churches and cemeteries, parks and gardens, etc. It should also show landfill sites and mining areas, agricultural and forest areas, and environmental protection areas, including sites of special scientific interest.

Many of the geospatial data may already be held within the cadastre. Once the outline development plan has been approved, a more detailed plan for each local area can be prepared. As with the outline plan, this local area plan should be legally binding. It will define in greater detail than the outline plan such matters as the type of buildings that may be constructed, their manner of construction and their locations, and the precise boundaries of commercial and industrial estates and areas set aside for community use.

It is often difficult for land-use planning and development control agencies to maintain land-related data up to date at all times, especially at the local level, where there is often a lack of capacity to do so. Many of the data items are needed to support land and property taxation or involve property rights. It is appropriate that the land administration authorities maintain these data and make them available at the regional and local level. The solution to many environmental problems lies in stricter land-use controls either through legal or financial restrictions on rights to use the land. Both forms of restriction impinge on the land market. Data on land-use rights and restrictions should be as readily available as data on landownership.

D. Land consolidation and reallocation

Land-use planning in the rural areas takes a different form and often has different objectives from those in cities and towns. Throughout much of Central and Eastern Europe there has been a legacy of poor infrastructure and fragmented land holdings with, in some regions, farms consisting of up to 15 small fields, some less than a hectare in size, scattered across the countryside. In addition, there is often relatively high unemployment in rural areas and this has resulted in migration by younger people into urban settlements, leaving an ageing population behind. Land consolidation and other rural land reforms need to address a wide range of social and economic issues in order to achieve sustainable development. The land administration authority can be a prime source for information in support of land reform. A basic requirement for both rural and urban development is an accurate cadastral record of the area involved.

Fragmentation is often the result of a system of inheritance in which the land is divided between heirs, resulting either in many scattered parcels of land belonging to one person (multiplicity of parcels) or else many shares being held by different people in one piece of land (multiplicity of owners). The consequence is uneconomic farming that is best addressed through land consolidation. This, in simple terms, involves landowners surrendering all their small parcels or shares in the land before being allocated one or more larger parcels that are approximately equivalent in value to their original holding.

Although primarily a process designed to benefit agriculture where the ownership of the land has become uneconomic due to the small size of the holdings, land consolidation can be an effective instrument for stimulating other forms of development. It may, for example, be used in urban areas for city-centre renewal or to facilitate housing development. In rural areas, even where the pattern of agricultural use may be well structured, there may be strong pressure to respond to changing population densities or to facilitate economic or ecological development. There may, for example, be conflicts over land use caused by road or railway construction, the need for water management and flood protection or the protection of wildlife. All these measures are of public interest and may affect the pattern of farming and the size and shape of fields. Land consolidation should eliminate or at least reduce the adverse effects of such developments.

In general, land consolidation is a set of procedures that can enhance the quality of life and encourage non-agricultural activities as well as improve the efficiency of basic farming. It differs from land reallocation, which is an activity that occurs when the State decides to redevelop an area for the benefit of the wider community. In rural areas, land consolidation will in general result in total farm sizes remaining the same though with larger and better-shaped parcels that allow the farmer to introduce more modern farming techniques. Land reallocation may involve changes in the total area of ownership and the compulsory acquisition of land for which compensation, either in the form of cash or new land elsewhere, should be paid. The process may dispossess some landowners unless the land is owned by the State (for instance, as part of a national land bank or land fund).

It is important to stress that land consolidation is not a form of expropriation; no one should be dispossessed of their land rights although some landowners may choose to sell part of their land, thus releasing capital for investment. In countries that have not yet completed land restitution there is a unique opportunity to carry out land consolidation, thus avoiding allocation and reallocation within a short period.

Where there is reluctance to change the pattern of ownership, the issue of farm size can in part be addressed by leasing. Formal and informal agreements can be struck at the local level between farmers wanting to enlarge their holdings or have shorter distances to travel to their fields - some farmers have land parcels more than 20 kilometres away from their farmstead - and those unable or unwilling to

cultivate their fields. While leasing is beneficial it is, according to the Food and Agriculture Organization of the United Nations, only a partial solution.

Formally structured land consolidation should not only address farm size but also provide better rural infrastructure, such as improvements to roads, drainage and irrigation systems, and the introduction of erosion control measures. It should also support better marketing of produce, resolve land tenure issues, such as the uncertainty of ownership, and provide access to credit.

Whatever the reasons for land consolidation or reallocation, the processes are similar and begin with the project initiation. This will normally be a response to a request from the local community and result in an initial analysis of the proposal and the formation of a local management team to represent the community. The area to be affected must be precisely determined and a team of experts selected to carry out the design and management of the project.

Land consolidation procedures must be in conformity with the law and must be understood by the beneficiaries. All landowners and occupiers who will be involved must be identified and the proposed reforms must be published widely so that all those who may be affected can come forward. Full publicity is essential and all methods that are customarily used for notifying the local community should be employed, including local radio, television and advertisements in the local press.

A basic condition for carrying out both rural and urban redevelopment is accurate land registry and cadastral records of the area. The land registry provides evidence for the ownership rights, while the cadastral plan shows the current spatial distribution of ownership. From these records a document should be prepared showing all the properties within the affected area, including important environmental areas such as sites of scientific interest.

The plan showing the current state of ownership should comprise as a minimum the names of the landowners; the nature of their tenure including lease rights, mortgages, easements and other encumbrances; the boundaries, size, shape and value of each parcel, based on the market price or, if more appropriate, for instance when market prices are low, the productivity potential of the land that results from the soil types, climatic conditions, etc.

Although much of the information on real property rights may already be available in the land registry, not all information will appear of the register; for example, informal arrangements that may be important to members of the local community may not be written down. Investigation on the ground is essential. Having acquired all the basic information and established a dialogue with all those who will be affected, the detailed consolidation plan will then need to be worked out.

Prior to designing the layout of individual land parcels, the local authority will need to set aside areas for: local traffic and highways, roads including pedestrian paths, access road units, squares and other traffic areas; surfaces for parking lots, green surfaces, including playgrounds, and environmental protection facilities. The use of photogrammetric techniques and geographic information systems (GIS) can simplify this procedure, as has been found for example in Germany and Sweden, by making it possible to easily produce and show landowners different possibilities and outcomes.

After land has been allocated to meet the needs of the local authority and the utility infrastructure contractors, the rest can be distributed either according to the value of the land or to the size of the plots. This may well be an iterative process as negotiations take place with the landowners. Several alternative plans may need to be prepared, each showing different road networks, drainage patterns, community facilities, and the environmental impact together with the associated costs and benefits.

Details of the full project must by law be officially available to the local community, but in addition all the participants should be provided with a project extract that relates to their particular rights. There must then be a designated period, for instance 60 days, during which participants can appeal against the proposed plans. Once this period has expired, objections must be considered and resolved before the final proposal can be agreed.

The powers vested in the public authorities under the land consolidation law should permit settlements to be reached in the event of disputes. Resolution may involve payment of compensation so that no owner is worse off after consolidation than before it. Although in theory each landowner should finish up with the same number of hectares as before, in practice some land will need to be given over for improvements to the infrastructure. Furthermore, some land is more valuable (with for example better soils or buildings) than others and small differences will need to be reconciled either through financial compensation or by adjustments in the land allocation.

Having settled all possible complaints, the authorities can then agree that the proposed layout will take legal effect so that construction work can begin. In the course of a development project it may be found that, in some cases, what has actually been constructed is not in conformity with the official cadastral plan of the area. In such cases it may be necessary to redesign the layout, especially in built-up areas, so that new construction can fit in with the position, shape and size of existing buildings. At the same time the cadastral records will have to be brought up to date.

The land consolidation authority should have the prime responsibility for designing the layout for new development areas. The authority may be a component of the cadastral or land registry agencies and in all cases must work closely with them. During the transition period from the old layout to the new, the fact that changes are taking place must be recorded in the land registry and the cadastre. Any changes in ownership rights or in cadastral data must immediately be notified to the land consolidation authority. In Spain, for example, when land consolidation is going to take place in urban or rural areas, the municipality will ask the Land Registry for information on the ownership of the parcels affected; an entry is then made in the sheet of each property giving notice of the operation that is being carried out. If any of the parcels affected are sold, the new owners will then know that land consolidation is taking place.

E. Environmental monitoring and geographic information systems

Multi-purpose cadastral records can contain or be linked to environment-related information. At present, it is rare for many environmental data to be maintained within the cadastre and it is difficult to forecast the precise amount of data that should be held that is necessary and sufficient for environmental protection. A balance has to be struck between what might be needed in support of environmental protection and the constraints imposed by sensible resource management. Some data are best gathered as and when needed, while others have a high probability of being useful sooner or later and should be an integral part of the information system. Any landowner, for example, should be able easily to discover what rights are associated with any particular piece of land.

As part of the European Union's INSPIRE initiative to create a Europe-wide spatial data infrastructure, data within the cadastre should be structured and referenced in such a way as to support a variety of uses, for instance to support environmental impact assessments and facilitate monitoring the consequences of development and construction projects. All environmental data relate to some point or area of the Earth and hence can be given a geographic reference and linked to cadastral and topographic maps using GIS technology.

GIS facilitates the collection, storage, checking, integration, analysis and display of data that are geographically referenced. Using GIS technology, planners should be able to answer such questions as what can be found at a particular point? What can be found within a predefined area? Where can a particular feature be found? Between two events, what has changed? Which is the best route through a network? Is there any particular pattern to a set of events? What will happen if plan A is adopted rather than plan B?

The quality of answers depends on the quality of the data and the quality of the algorithms used in the data processing. Some of these questions require factual answers that can be obtained by retrieving data from the database, provided that the data are fit for the purposes for which they are being used, both in terms of geometric accuracy and textual meaning. Other questions can be answered only if there are models, especially mathematical models, to simulate what is required.

The types of analysis and display that are built into a GIS are known as its functionality. Examples of functionality include the ability of a GIS to display and analyse all data that fall within an area or within a specified number of metres on either side of a proposed road alignment, or to show what area will be flooded and what the landscape will look like if a dam of a certain height were constructed at a specific location. GIS can, for example, be used to analyse and display different designs for land consolidation, showing new proposed layouts and changes in land values and project costs.

A GIS holds data in various layers so that, for example, it becomes possible to extract data from the layer that deals with land use and compare these with data in the layer that relates to soils. Although the integration of such data is a technical process, it may have implications for managing systems since the gathering and updating of each layer of data may be the responsibility of a different organization or agency. GIS is primarily an integrating and mapping tool that allows value to be added to products and services by linking data from different sources. The effectiveness of GIS depends on both technical and institutional issues. For example, GIS may help to turn raw data into information but the solution to many environmental problems lies not so much in knowledge as in applying stricter land-use controls such as legal or financial restrictions on rights to use the land.

Data can be most effectively integrated by using common parcel identification and referencing systems.³ The use of common parcel identifiers is a key element in land and property data exchange across computer networks. Two forms of reference are needed: one that is internal to the working of a computer, while the other is for human use.

From a human perspective, there is no unique solution though most countries tend to follow a hierarchical approach attaching a local reference to the cadastral area and then to the municipality or district. According to the Guidelines on Real Property Identifiers:

- (a) The referencing system should be based on the needs of users and not on the internal requirements of the computerized database management system. It must therefore be simple and easy to understand;
- (b) The data in the register should be compiled on the basis of the land rather than the owner. Data may still be retrieved by the database management system from the name of the property owner, subject to laws governing data protection;
- (c) The same parcel referencing system should be used in the land books, the cadastre, the tax registers and in the municipalities so that real-property-related data can be easily integrated, for example using GIS technology;

³ UNECE Guidelines on Real Property Identifiers

- (d) The reference that identifies a parcel must be unique. Two parcels should not have the same complete reference even when they are located in different administrative districts or municipalities;
- (e) References to basic property units and parcels and buildings should be permanent over time, hence political or administrative areas should not be used as part of the real property identifier, because they may change;
- (f) A national standard for street (postal) addressing should be established;
- (g) Street addresses and apartment numbers should be designed primarily to support the process of finding the relevant feature in the field, for example by supporting the delivery of goods and services at that address. They should be treated as attributes of parcels in the cadastral registers;
- (h) Apartment addresses should have the street address plus the apartment number;
- (i) Geographic and other coordinates of property boundaries and seed-points that represent the middle of a parcel should be recorded as attributes of the parcel;
- (j) The referencing system must be able to be updated.

V. POLICIES FOR LAND ADMINISTRATION

This chapter discusses institutional rather than technical or managerial arrangements that support land administration. It reviews the role of land policy and of government in land administration, highlighting the importance of intergovernmental coordination and the complementary roles of the public and private sectors. It discusses who should pay for the creation and maintenance of a land administration system and how to respond to the emerging world of e-commerce.

A. Land policy

Land policy is concerned with using and conserving land so as to meet social and economic objectives. It works by establishing tangible private and public objectives for example by promoting equal access to property for all people while respecting the sensitivity of local needs and requirements. It is concerned with the allocation of resources, particularly rights to use the land, to obtain maximum efficiency consistent with the natural environment and the welfare of the community, in the short and longer term.

Land policy consists of a combination of socio-economic and legal prescriptions that dictate how the land is to be used and how the benefits from the land are to be shared. It should provide an integrated framework for urban and rural societies, addressing the need for land and other land-related resources such as water, forests and soils. It must strike a balance between the exploitation, use and conservation of the land resource in ways that meet the needs of the present without compromising the ability of future generations to meet their own needs. Its primary objective should be sustainable development.

Land policy influences the ways in which the development of land is regulated, the revenue derived from the land (through sale, lease, taxation, fees, etc.), and how conflicts concerning the ownership and use of the land can be resolved. It concerns both public and private land and impacts upon all aspects of land administration, including land title formalization, land survey and property description, land registration, land valuation, land-use control and management, and infrastructure and utilities management.

Land administration systems define and give legal protection to property rights and transactions. This promotes efficient investments, reduces the risk of expropriation and increases the expectations of returns on capital investment. It reduces the risk for mortgage lenders and consequently the interest rates that are charged on mortgage loans. All these help to make an overall reduction in transaction costs, which in turn facilitates greater efficiency and economic growth.

Such benefits are only possible if there is a sound basis of land policy that is clear and consistent. Governments play a major role in formulating land policy by establishing the legal framework within which land administration systems operate. They influence the land market directly through legislation and taxation and indirectly through their actions as one of the biggest landowners in the country.

The implementation of land policy requires a multidisciplinary approach and an effective legal framework within which land administration can operate. Coordination among all institutions involved in land policy is critical to success.

B. The role of governments in land administration

The structure of most governments includes a cabinet or central decision-making body and a series of ministries. While all land policy ultimately stems from the highest policy-making body in the country, the position in practice is often less clear. Since land policy concerns social, economic and legal

disciplines, several ministries may have an interest in the formation and implementation of land policy. No country has a ministry with full responsibility for all legal, fiscal and environmental land matters and in consequence the decision-making process becomes fragmented. Ministries of finance, justice, agriculture, urban affairs, the environment, etc., all create land policy through their actions and the processes whereby they meet their own objectives.

Some issues, such as the extent of foreign ownership of land, are debated by the highest political decision-making body but many policy issues are resolved within an individual ministry without consultation with other ministries. In several countries this has resulted in inconsistent laws and conflicting decrees. In particular, the distinction between urban and rural land has sometimes been forgotten, resulting in laws that were intended to deal only with rural matters but which have been applied to urban areas.

The problems are compounded at the local level where land-use rights are determined. Local government is of course subservient to central government and must follow the policies laid down at the higher level, even though there may be a serious lack of resources available to implement them. In many countries the ownership rights are controlled centrally whereas the use rights are determined at the local level. Consequently, it is often necessary for the purchaser of land to have to make a series of separate enquiries to establish the nature of what is being transacted.

Ownership rights, use rights and restrictions, tax liabilities, environmental factors, such as the extent of possible contamination of the soil or threats from flooding etc. are all elements that influence the value and suitability of a property for the needs of any would-be purchaser. In a number of countries the data sets in the land registers and in the cadastre are 'joined-up' but links between these and other agencies are less well established, making the collecting together of all relevant land-related information difficult.

'Joined-up' means that information flows horizontally (between all ministries, and out to non-governmental organizations and the public) as well as vertically within any agency to and from lower and higher authorities, including the minister and parliament. Each agency or ministry retains its own identity and activities, but keeps all other authorities informed and where possible uses common data sets, for instance between the cadastre and the land book system. This can lead to greater efficiency, for example when the land registration authority collects land transfer taxes and sends these automatically to the tax office or when information provided by the citizen at one office is used by a different agency without the citizen having to report the same information twice.

Being 'joined-up' affects the policy-making process by enabling all governmental stakeholders to contribute to that policy. The incorporation of too many interested parties in the formulation and implementation of land policy decision-making can however become cumbersome and counterproductive, making it for example more difficult to get new laws passed through the parliament. The trend is nevertheless towards a more open flow of information through electronic means and the provision of some '24/7' services - meaning that they operate 24 hours per day, seven days per week as for example is the case with some services in Sweden. Overall, the trend is also towards the 'e-society' in which most business is done electronically.

Governments affect land administration through their policies and the level of financial support that they provide. In general, the initial creation of a land administration system requires a significant level of central government support, for instance using money provided by international development agencies such as the World Bank or sources within the European Union. Once established, the continuing operation and maintenance of the system can be funded out of revenues generated by the agency concerned.

Governments should set targets for agencies with clearly defined performance indicators, such as the time and cost in handling transactions or the number of appeals that are lodged against decisions made on assessed property values. The performance of each land administration agency should be monitored both internally on a regular basis and externally through, for example, fiveyearly reviews, as is the practice in the United Kingdom.

Monitoring should include benchmarking, which has been defined as “an ongoing, systematic process to search for and introduce international best practice into your own organization, conducted in such a way that all parts of your organization understand and achieve their full potential. The search may be for products, services, or business practices and for processes of competitors or those organizations recognized as leaders in the industry or specific business processes that you have chosen.”⁴ The process of benchmarking benefits from international collaboration as this allows performances to be compared with those expected in the pan-European and global land markets.

C. Intergovernmental coordination

Land administration services strongly relate to the areas of responsibility of many ministries and government organizations such as: real property taxation; environmental protection; agriculture; forestry; urban and housing development. In theory, public agencies are able to combine data from different sources, share spatial information, develop a spatial information market policy for cost recovery, improve cooperation with potential users and the private sector, and develop the ‘e-market’ and related value-added services. In practice, this is not so easy because of poor coordination between public bodies and discontinuities in both the vertical and horizontal flow of information.

The main reasons for the lack of strong cooperation and coordination are common to almost every country. They include the existence of different short-term priorities in each ministry and organization; cultural issues and traditional attitudes of mind; and concerns over copyright and financial matters. There may be technical issues (such as a lack of information technology and deficiencies in the national spatial data infrastructure); uncertainty over legal responsibilities for coordination; or a lack of specialized knowledge and experience. There may also be rivalry and competition between different ministries and organizations, thus preventing a land administration system from working effectively and resulting in much overlap in land administration activities. This leads to inefficient governance and creates additional expense and delays in implementing projects, adversely affecting the land market and inconveniencing customers. It may even result in the failure of some land administration projects.

Land administration should ideally be under the supervision of a single authority that acts as the lead agency. Such an arrangement will guarantee the best possible coordination between the various parts of the whole process and provide the necessary framework for establishing a unified land information system and service. This principle has for example been followed in Romania and in setting up the Hungarian system.

In practice, many Western countries have a tradition of separate governmental institutions with, for example, the cadastre recording property boundaries and data for tax authorities, a separate legal registration system under the control of lawyers or registrars in a ministry of justice, and the local government being responsible for land-use rights. This results in separate inquiries having to be made about rights of ownership and rights of use before any transfer can take place, leading to duplication of effort, inconsistencies and hence inaccuracies in the data, and of course additional costs.

⁴ AusIndustry, 1995.

These diverse administrative arrangements are normally well established politically and historically and hence are difficult to alter. All too often there have been poor channels of communication and limited cooperation between ministries. Rarely do governments have an integrated policy with regard to land or land information management and as a result there is, for example, confusion over the pricing of products or who may have access to government-held data sets. Each ministry often makes up its own rules, while cooperation between authorities depends more on personalities than on policies.

Because of these potential conflicts, evolving national land information systems have often been driven more by the strength of the individual officials involved than by an objective assessment to determine the best institutional arrangements. There is an inherent danger that if one organization is designated as the lead agency it will have its own priorities and give less weight to other interested parties. There is a further danger that the different professions involved will focus on their own areas of interest to the detriment of the broader picture. Historically, in many countries the various professions involved in managing land and its resources have had different visions of what is most important and this has resulted in conflicting priorities and a fragmented approach to land matters.

All too often lawyers have given precedence to the transfer of real property rights and legal issues, while land surveyors have been more concerned with the precision with which property boundaries are surveyed than with cost or delivery times. Tax authorities have been concerned with value more than land-use management, while regional planners have concentrated more on broad trends than individual technical details. Agriculturists have concentrated on matters in rural areas while town planners have focused on the urban environment with little concern for how their recommendations will influence property prices and the land market. Joined-up government requires a multidisciplinary, multiprofessional approach and the different priorities of each profession need to be recognized and reconciled.

Whichever organization is designated as the lead agency it must be neutral and take fair and balanced account of the interest of all other parties, both in the public and in the private sectors. It is a matter of political judgement as to which ministry or institution can best fulfil the lead function. Although land registration is inevitably influenced by the legal profession, this does not necessarily mean that all land administration activities should fall within the ministry of justice. In order to speed up the judicial system, the number of non-judicial tasks that are entrusted to judges should be reduced and such tasks should be assigned to other persons and bodies. Almost all day-to-day aspects of land administration can be handled by non-judicial persons, leaving the courts to deal with cases of serious dispute or matters in relation to the interpretation of the law. In the United Kingdom, for instance, trained and experienced members of staff with no formal legal qualifications approve titles and deal ably with the great majority of issues on adjudication and dispute resolution.

Where the responsibility for registering title is passed to registrars rather than the courts, the registrar must painstakingly examine the evidence of title to ensure that all legal requirements are met before any entry is made in the registers. The law must vest registrars with similar guarantees of freedom from political interference as it gives to judges and justices so that the work of registrars is, and is seen to be, totally impartial.

One way to ensure closer cooperation between government bodies is to establish a high-level land administration coordination board. Such a board can help to coordinate the administration of land and the environment and can develop policies for handling land-related data that are in line with those of the national government and its various ministries. It can help to reduce overlaps between ministries, increase efficiency, and provide a forum in which improvements to land administration services can be discussed in the light of changing circumstances and any consequent need to amend the law. It can also recommend policies for archiving data that may be needed in the long-term national interest. It can also

address matters of personal privacy and the confidentiality of data in order to protect the interests of private citizens.

Because of the relationship between information and power, the land administration coordination board should have a strong position within the government and should ensure that the designated lead agency cooperates with all interested parties. The coordination board should also consult with representatives of the quasi-governmental bodies, such as the public utilities, with local governmental bodies and with the private sector.

The coordination board may establish a technical support group to provide technical assistance for the coordination of spatial information. Such a group would, for example, prepare technical standards for data collection, including field surveys, data processing and data exchange. It should be multidisciplinary, drawing on surveyors, computer scientists, planners, environmentalists and others in the private sector as well as public officials, and should provide 'methodological guidance' to ensure that all procedures are well understood by other agencies and by the public.

In cases where there is no consensus on the lead agency, a high-level coordination board set up by the government can improve the cooperation between different authorities. In Slovenia, for example, the Programme Council for the real-estate recording modernization programme was established in 1999 with responsibility for the efficient and interlinked cooperation between ministries, the supreme court and other State bodies that are involved in the processes of real-estate recording. It directs all the important strategic and operational decisions and monitors their success. The Programme Council is chaired by the Minister for Environment and Spatial Planning (of which the cadastral agency is part) and its members are ministers and director-generals from the fields of cadastre, land registry, justice, agriculture, finance, taxation, informatics and statistics.

Coordination is important when systems become decentralized. One role of the public sector is to offer its customers a full and consistent service across the whole country, covering the entire land administration process from boundary survey through adjudication and valuation to final registration. Depending on the size of the country and extent of computerization, it may be more effective though more expensive to have regional cadastral authorities in separate administrative units rather than carry out the day-to-day work centrally. In such cases there must be strong central control in order to ensure that consistent standards are adopted.

Centralization can lead to economies in administrative procedures, standardization in documentation and the exchange of information between users, and economies of scale in which large and powerful systems can be used with mass production techniques. This proved to be the case in the Netherlands when in 1994 the Cadastre and Land Registry Service, a department in the Ministry of Environment, Housing and Spatial Planning, was reorganized into an independent cadastre and land registry agency (the Kadaster). The National Users Council was created as a forum for regular meetings between the Executive Board of the Kadaster and umbrella organizations of notaries, real-estate agencies, municipalities, banks, etc. By law, governmental bodies must use information from the Kadaster when implementing government policies and tasks, such as land taxation, spatial planning, land consolidation or environmental protection. The National Users Council is one way in which the Kadaster is made accountable.

From a political perspective, decentralization brings government closer to the people, especially in countries where distances are great or travel is inconvenient. From a practical point of view, in countries where the information technology or social attitudes do not yet allow ordinary citizens to have full and open electronic access, placing land administration offices at the district or local government level tends to ensure greater accuracy and effectiveness. If these offices are located a long

way from the land for which they hold records, landowners may not visit them. Transfers would then be more likely to take place without notification to the land administration authorities and the registers would no longer reflect the reality on the ground. This has happened in a number of countries where informal settlement has taken place and the authorities have had great difficulty in trying to regularize the consequent development.

The landowners should feel that the land office is there to serve them rather than to serve government bureaucrats in distant offices. Decentralization should allow the overall land administration process to proceed more quickly and should permit the system to respond more effectively to local community needs. However, small offices can be inefficient and vulnerable, hence the greater the degree of decentralization, the greater is the need for good communications between the local offices and headquarters and for strong control from the centre. Decentralization means that local offices have some degree of independence to allow them to be closer to their customers, but they must remain within the control of central management and operate under national guidelines.

In general, the trend is towards centralization because of information technology (IT) services. Electronic lodgement of deeds leads to one central public register, instead of one per regional office. Where the information infrastructure is weak, decentralization has many merits, but with the growth of computerized networked systems, central control becomes important. If there is a single central office, care must be taken to accommodate the needs of landowners in outlying areas by providing them with appropriate searching and registration services by mail, over the Web, or by telephone. Where computerized records are centralized but accessible remotely, local enquiry and information services should be provided. This meets the need to benefit from computerization while enabling the citizen to retain local access to information, for example using Internet services.

D. The role of the public and private sectors in land administration

There are different ways of organizing the administration of land and establishing the legal status of the offices responsible for the implementation and maintenance of registers. Throughout Europe, registration offices are in general under central or federal government control. In many cases, countries that maintain separate land registers organize these within the local or regional courts. Where a cadastre is set up separately from the land register, the cadastral organization is usually either a part of the national mapping and surveying authority, or is organized as a special agency.

In several European countries the technical, organizational and legal integration of registers has been an issue that has affected the status of the organizations involved. Several countries have given their cadastral and land registration organizations a less constrained position within the government. This development has transformed some organizations from being an authority, run as a government department, to being an agency run partly as an independent business. The terms 'agency' and 'authority' have, however, different meanings under different national legislation. An agency normally has a professional management structure that is freer to do business than an authority.

The government's guarantees and liability for the content of the registers is however not affected by the status of the organization, unless this is prescribed in the legislation. An agency can take advantage of the potential for developing value-added services on top of its statutory land administration obligations, for example by selling data to investors, developers, banks, etc. It may be difficult to maintain a neutral and objective role as a governmental agency or authority if it is much involved in competing with the private sector. It is, therefore, important that governments define the rules under which such organizations operate and determine which activities should belong to the agency and which should be handled by the private sector.

While the ultimate responsibility for the cadastral system must lie with the government, the private sector may have a significant role to play in land policy implementation. In many countries there is insufficient capacity in the public sector for government staff to offer a complete cadastral service, while in some it is the official policy to encourage greater private sector involvement. The initial compilation of the cadastral records may be undertaken under contract by the private sector. Technical work, for example, can be subcontracted, from base mapping and control surveys through to the detailed measurement and recording of property boundaries. In many countries private surveyors undertake subdivision surveys or the re-establishment of old boundaries, while independent lawyers provide services to buyers and sellers involved in the land transfer process. However, where the government guarantees the registered title 'against the world' a government appointed lawyer, registrar or trained non-professional adjudicator will still, on receipt of the registration application, check the quality of the title.

Formal cooperation between the public and private sectors allows each side of the partnership to concentrate on its specific part of the shared tasks with, in general, the public sector managing and controlling the activities of public administration and the private sector performing operational activities. This should help to prevent undesirable competition between the public and private sectors and strengthen business processes and organizational structures. It should improve the response to demands of society for better, faster and new services by ensuring that sufficient human, physical and financial resources are available. Thus it should create opportunities for innovation by combining creativity and flexibility with accountability and credibility.

Cooperation between the public and private sectors takes several forms. In one, the government contracts out work to a contractor, who is then subject to contractual law. In this form of cooperation the risk from the perspective of the general public still lies with the government, while the contractor's liability is limited to his or her own business risk. The approach has been common especially in surveying and mapping and to some extent in the delivery of IT services. Companies have been hired on contract to digitize cadastral maps, while licensed private surveyors often undertake cadastral boundary surveys. In the latter activity the surveyor may take some share of the risk depending on the level of quality controls that have been put in place either by the private sector itself or by the government. In both cases, the procedures to obtain a licence and the parameters within which a licensed operator must work should be laid down in legislation.

Where responsibility for the quality of work remains with the private sector, there must be a strong professional body that will enforce quality standards, supported by professional indemnity assurance so that in the event of error those who are adversely affected will be recompensed. Where government takes over full responsibility for the reliability of the data, checks will have to be applied to the work undertaken by the private sector. Depending on the manner in which this is undertaken, such checks can be expensive, especially if attempts are made to check all aspects of each task. Sample checks and a sensible understanding of risk management can overcome this difficulty.

In another form of cooperation, the government and a private party work together in a partnership in which they share resources, risks and rewards concerning the execution of the public task. In this form of public-private partnership, the government and private sectors cooperate through joint ventures in projects that are of social and economic benefit to the community. Such partnerships may involve some element of financial risk and a commitment to using valuable resources. The shares in the profit should be appropriate to both the level of resource input by each party and the measure of risk of the project.

Investigations by UNECE into public private partnership have indicated that from a public sector perspective:

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- (a) Contracting out work to the private sector normally reduces prices (provided that there is competition for the work);
 - (b) There can be more flexibility in setting performance targets and establishing costs;
 - (c) There should be less risk of cost overruns and project delays;
 - (d) There will be an increase in the capacity necessary to achieve the aims of the land administration agencies;
 - (e) There should be better value for the public in the delivery of services as a result of increased competition;
 - (f) The agencies will have better awareness and understanding of their own processes and products;
 - (g) There will be better exploitation of government assets, data and intellectual property;
 - (h) There will be a reduction in the problems associated with government staff recruitment;
 - (i) There should be an injection of private sector energy and enterprise.

For the private sector, the overall advantage of cooperation with the public sector includes the greater chance of receiving a return on investment in technology and manpower through being able to use proven technological skills and equipment in other markets. This, in turn, provides more incentives for technological innovation and more cost-effective use of resources.

Over the past decade, land administration has become increasingly focused on services to the public and awareness of the customers' needs and expectations. Partnerships between the public and private sectors help to meet these and in so doing fundamentally change the relationship between the government and the private sector for the better, promoting cooperation rather than conflict. The overall aim of public-private partnerships is not only to work faster, better and more efficiently but also to offer more distributed services to customers and to develop the customer-oriented services that are required.

The balance of responsibilities between the public and private sectors ultimately depends upon a country's political objectives with regard to: privatization; the distinction between juridical and technical work; the nature and traditions of the particular jurisdiction; the requirements for restricted access to certain types of data and the need for privacy; and the strengths of the private sector. In all cases there must be a clear definition of the core tasks that should remain within the public sector and those tasks that can be open to collaboration with the private sector.

E. Paying for land administration

Land administration agencies all have to address a fundamental problem, which is how to ensure their sustainability in an age of computerized technology in which the lifespan of most hardware and software is rarely more than four years and is often less. The more an agency becomes capital-intensive, the more it needs to spend on the maintenance of equipment and its replacement, either using government funds or by generating the income through its own activities. Political decisions have to be made as to who pays for 'technology refresh' since this involves the allocation of national resources. In developed economies the land title registry systems are in general self-financing but many mapping agencies are still dependent on financial support from the government rather than the rest of the user community.

There are two cost elements: the building of the system and its maintenance. Building or rebuilding a national land administration system is an expensive process in which the costs for land surveying are much more difficult to recover than the costs of compiling the title registers. Even with economies of

scale, the cost of rebuilding an out-of-date land administration system can be more than € 1 billion depending on the size of the country and the precision of the survey data.

It may take a long time before the number of land transactions reaches a critical mass and there is a revenue stream that can be shown to justify the investment. In due course the economy of a country will benefit from the necessary capital outlay through activities in the land market, the creation of credit and mortgage systems, investment in buildings, factories, etc. A study in the United Kingdom, for example, suggested that the work of the national mapping agency underpinned over € 150000 million of investment. This is not the value of the service, simply the assets in the community that are somehow dependent upon it.

When building or rebuilding a land administration system it is possible to take a step-by-step approach and spread the cost over a period so that the annual expenditure is acceptable. Nevertheless, it is generally accepted that building a system where little or none already exists needs a substantial level of support from the State and possibly from external sources such as the European Union or the World Bank.

Maintaining and improving the system is a different matter but a consensus is emerging that operating a land administration system can become self-sufficient. The options to achieve this include:

- (a) There is no cost recovery and all operations are paid for by the State;
- (b) The users pay for the cost of making the data available but not for the cost of their collection and updating;
- (c) There is partial cost recovery;
- (d) There is full cost recovery;
- (e) There is profit, which is reinvested in the agency.

In the first option (a), there is no cost recovery and all operations are paid for by the State. This places the system at risk since improving the service and replacing equipment depend on funds being allocated by the ministry of finance. It may be valid for supporting a comprehensive cadastre that is used for tax collection but it discourages alternative uses of the data that have been gathered. There is little incentive to create opportunities for income generation and reduce the overall tax burden. The beneficiaries in this approach are primarily those who already own land and are at least notionally rich, since the cost of their transactions is in effect being subsidized by those who are less well off. Furthermore, by not operating on a business basis, the agency becomes more concerned with satisfying the needs of the bureaucracy rather than the needs of other potential users.

In the second option (b), the user pays for the cost of making the data available but not for the cost of their collection and updating. This is known as marginal cost pricing. In theory marginal cost pricing enables users to demand a level of service up to the point where the extra benefits equal the extra cost of providing the service. This point is, however, difficult to determine since there may be additional benefits that are internal to the data supply agency. One consequence is unfair competition when the agency offers a commercial service that is also being offered by the private sector; the obligations and opportunities as a monopoly service provider may result in cross-subsidies that are unavailable to private commercial organizations.

In land administration there are two categories of user: government and non-government. In recovering marginal costs, other government agencies can be charged for the provision of data but it is more usual for costs to be passed on only to non-governmental bodies and individuals. The approach allows data to

be used by those outside the agency that supplies them since there is compensation for the additional work that is necessary to make the data available. The cost of transactions can be kept low, thus allowing poorer people to make use of the service, but there is little incentive to improve service delivery or to look for new markets or provide value-added services. The agency still remains dependent on the central government for funding the maintenance of all aspects of the system as well as investment in new technologies.

In the third option (c), there is at least partial cost recovery in land administration, while in the fourth option (d), there is full cost recovery. Option (c) is becoming the most common with the data or service-providing agency charging not only for the handling of data but also for their collection, storage and maintenance. The proportion of the running costs that is recovered varies but inevitably over time there are pressures to increase this until the full operational costs of the agency are paid for from fees. Some of these fees may come from the central or local government through service level agreements that guarantee that the agency makes certain types of data available and undertakes certain functions for an agreed price. Such an agreement is a contract between the agency and the government that ensures a fixed minimum level of income in return for providing certain goods and services. In general, mapping agencies (including cadastral agencies) find it difficult to raise sufficient money from the general public without such agreements. Land registration agencies find it easier to pass their costs on to the users by charging for each transaction recorded and hence they are more likely to achieve full cost recovery.

There is a danger that the cost of transactions will deter some people from registering property transfers, resulting in an informal land market running in parallel with the formal. The cost of transactions needs to be kept low if people are to be encouraged to use the system. While underpricing may help to encourage the use of the data and generate volumes of transactions sufficient to achieve lower unit costs through economies of scale, there is still a danger that non-users, including the poor, will be subsidizing wealthy landowners.

With both partial and full cost recovery, the money collected by the data and services provider may either be returned to the ministry of finance or else it can be reinvested by the agency responsible for collecting it. In some countries all income must be returned to the ministry of finance, while in others the agencies are allowed to spend surplus income on equipment replacement and staff development. In either case, agencies need to operate along business lines and this, in turn, tends to make them more efficient and more answerable to the users of their goods and services.

The idea that a government agency is a business requires a significant cultural shift that can prove very difficult for those who have been brought up in a central government service-driven environment. In reality a business approach should lead to greater accountability and the better provision of services, based on what people want and need rather than on what those in authority have traditionally thought of as being good for the general public.

The downside is that there is a danger that the financial incentives that benefit individual agencies become incompatible with overarching government objectives by discouraging cooperation with other government organizations that are working to different business plans. There should be a common approach throughout government towards the cost of providing information and hence cost recovery must take place within a common national information framework. There have been cases where the same information could be obtained either on payment of a fee from one government office or for free from another.

Many cost recovery arrangements have been ad hoc, lacking transparency and having poor accountability and review mechanisms. Some have been inconsistent with sound economic principles

and have tended to distort the allocation of resources, which can ultimately result in a reduction in living standards. Cost recovery must operate within a policy that is consistent within government and is transparent to the users and competitors in the private sector.

The information policy framework should conform to international norms. Within the European Union, there is, for example, Directive 2003/98/EC on the reuse of public sector information. This seeks to encourage public sector bodies to make information more generally accessible. It does not contain an obligation to allow the reuse of documents; rather it leaves the decision whether or not to authorize reuse with the member States. Basic information such as legislation and regulations should be available for free, whereas reasonable charges can be made for other information. Where charges are made, the total income should not exceed the total costs of collecting, producing, reproducing and disseminating documents, together with a reasonable return on investment, having due regard to the self-financing requirements of the public sector body concerned. The cost of producing documents includes the cost of their creation and collation, while the cost of dissemination may also include user support.

Land book and cadastral data are public sector information but issues of privacy arise because many of the data items are of a personal nature. Revealing the number of transactions handled by a land administration agency each year clearly falls under the Directive, but whether the details of the private ownership of land belonging to an individual should be revealed depends on how member States interpret the Directive. There is a parallel with the health service, where statistics about the number of operations carried out or the length of time that people wait for an operation are in the public domain, but details about an individual's health are confidential.

In summary, cost recovery can provide an important means of improving the efficiency with which information is produced and services provided. Its adoption should be consistent with policy objectives and care should be taken to ensure that it does not stifle competition or unduly impact upon the legitimate role of the private sector. It is not appropriate for all information products and services, but where it is, it can ensure that those asking for information pay the costs.

When this approach is adopted, the agency concerned should be allowed to influence its own income through active marketing of its services and be allowed to set its staffing levels accordingly. It should be allowed to borrow money in the regular market in order to invest in improvements and must implement an independent system of accounting. For preference it should be allowed to fix its own level of staff remuneration, within the broad national interest, and decide on its own internal organization, including where it should establish offices. What is crucial is that it should have a professional management structure and management board and provide management training at senior levels in order to ensure top quality of service.

F. E-commerce

There is today a growing demand for rapid access to relevant and correct information as a strategic resource for development and business. The computerized multi-purpose cadastre is one tool for the efficient handling of land and property-related data that has potential to provide many benefits across all sections of the community by adding value through the combining of data sets and making these widely available. It is important that these benefits are widely promoted both to the leaders of government who are responsible for the allocation of resources and to the users of land and property-related information. The computerized multi-purpose cadastre has much to offer the world of e-commerce.

E-government can be successful only if it is properly designed and accepted by citizens, companies and administrations. In Austria, the e-government strategy was developed in cooperation with all relevant

institutional players at national, regional and local levels, including the private sector. This resulted in the E-Government Law of 2004, which, creates a dual approach in which citizens can choose between electronic services or paper-based transactions although citizens are encouraged to use electronic services.

In the Austrian system there are standardized processes and concepts guaranteeing security and privacy with open standards and freely available interface specifications. There is multichannel access to public online services with a technologically neutral design to allow citizens the choice of their preferred technology. The administrative processes are transparent and oriented towards the future so as to allow the integration of new developments. Overall the system is based on the 'one-stop-shop' concept.

The experience in several countries suggests that it is essential for land administration organizations to have a customer focus so that the needs of users of the service can be met and be seen to be met. Customer demand is tending towards integrated data sets and the one-stop-shop principle. If this is to be introduced and land administration data are to be integrated and used efficiently, then suitable techniques and organizational arrangements for data exchange must be put in place and there must be good management and quality control.

There also needs to be a 'marketplace' where data can be checked for content, quality, price and conditions of delivery, and where it is possible to order data via an effective communications network that is fast and provides easy access to information. This can be achieved via Web-based services. Because information technology is so important it is essential that funds be found from internal or external sources in order to keep the technology used by land administration organizations up to date.

To make customers aware of what is available, all land administration products and services should be proactively marketed. Clear national policies and strategies need to be established to facilitate the integration of land-related data sets. Collaboration with the private sector can help in reaching all market segments and, to achieve this, agencies need to develop appropriate business models. Indeed, close collaboration of all the parties involved - public sector, private sector and relevant professions - is a key factor in bringing land administration products and services successfully to the consumer, especially in the context of e-commerce.

G. Land information management

A major component of land administration relates to land information management. Land-related information is an important and expensive resource that must be managed efficiently in order to maximize its potential benefits. Land information management entails: determining the requirements of the State and of the general public for land-related information; examining how the information is actually used in the decision-making process, how information flows from one producer or user to another, and what constraints there are upon that flow; developing policies for determining priorities, allocating the necessary resources, assigning responsibilities for action, and setting standards of performance and methods for monitoring them; improving existing land information systems or introducing new ones; assessing and designing new tools and techniques; and ensuring that matters of privacy and data security are respected.

The International Federation of Surveyors (FIG) defined a land information system as a tool for legal, administrative and economic decision-making and an aid for planning and development. A land information system consists, on the one hand, of a database containing spatially referenced land-related data for a defined area and, on the other, of procedures and techniques for the systematic collection, updating, processing and distribution of the data. The base of a land information system is a uniform

spatial referencing system. This simplifies the linking of data within the system with other land-related data.

Land information systems, together with appropriate organizing procedures, involve the collection, storage, retrieval, dissemination and use of land-related information. They may focus on environmental, infrastructural, cadastral or socio-economic data. They may be designed to serve one primary function, or they may be multifunctional. They are not necessarily structured around the land parcel although the systems that serve land administration focus on the basic property units.

Land-related data should be collected, stored, maintained and updated economically and efficiently with the information being registered only once, kept up to date, preferably in one place (apart from copies retained in case of disaster) and offered for public use. There should be a focus on interoperability so that the needs of different customers with different operating systems can be accommodated. There must be clear customer benefits resulting from any developments.

Although technical standards are very important in order to achieve this, they are not the only prerequisite for the efficient handling of cadastral data. There are a number of information-related policy issues that need to be addressed that concern data standards, pricing and copyright, and the security and safety of databases, and the legal liability for data. These issues need to be seen within a national and an international context since there is a growing customer demand for international cooperation that will lead to compatible land administration systems.

There should, for example, be a national policy with regard to data exchange that encourages cooperation between each department that is responsible for the supply of land and property-related data. Such a policy will need to be backed by resources funded either by the government or through other strategies for cost recovery. Those who bear the cost of producing data should receive appropriate reward. What constitutes an appropriate rate of return is a matter of political judgement but the general trend is to recover most if not all costs with the aim of making a marginal profit.

Since land information is a valuable commodity, it must be protected like any other resource. If government policy is to distribute land information for free, then agencies will miss the opportunity to recover its costs; if the policy is to charge for the data, then mechanisms must be put in place to control the copyright. All land and property-related information, both in text and in map form, can be subject to copyright and hence communicating land-related data to the public may cause legal or financial difficulties in relation to the enforcement of copyright.

In the case of maps printed on paper, measures of control can be exercised in the same manner as they are with books and other published material. In the case of maps held in digital form, extracts can be made more easily and transferred between systems electronically, for example through networks or over the Web. It is, therefore, much more difficult to enforce the copyright law for digital maps than for paper copies. Where legal action is taken against those who abuse copyright the outcome should be well publicized to discourage other potential criminals.

Information policies will also need to address issues relating to data security and privacy. In some countries, paper maps and aerial photographs carry a security classification and may in consequence be unavailable even to other government departments. Difficulties with the exchange of spatial data exist where the ready availability of certain types of land information such as maps and aerial photographs may have military implications.

There may be implicit or explicit regulations governing the access to government-held land-related data by other State authorities and by the public. Data protection acts may also impose constraints on what

information may be held or divulged. In some countries, the public may have a degree of protection against the divulgence of personal information, while in others there may be no right to privacy. Some countries have a freedom of information act that allows individuals to access much government-held data.

Those seeking illegal access to land administration databases must be prevented from tampering with the system and, for example, changing the name of the registered owner of a property. This applies in particular when data are available online, hence a strong firewall must be in place. In some countries people have a right to know who has made enquiries about a property, hence records of access or attempted access must be retained for a period of time.

Some of the problems are technical and differ more in kind than in principle from what has been the case in the past, although they are more urgent because of the volumes of data that can be interfered with or destroyed; others raise issues of privacy and intellectual property rights. A balance needs to be struck between the right of public access to data and the right of the individual to privacy.

The law needs to clarify who is the data producer? Who owns the data and who may benefit from their sale and use? Who may have access to data sets and for what purpose and who can refuse people access to the data and for what reasons? Who may add value to the data? Who may make changes to the data and who can prevent data from being altered? What amount of copying is permissible and what rights do individuals have to privacy? Who can be held legally liable for the quality of data and should the quality of data be guaranteed? Should data users be licensed?

The answers to such questions must be given in an international context if pan-European and global land markets are to develop. The European Land Information Service (EULIS) is one programme that supports the transmission of land and property data across national boundaries. An alternative approach to the international exchange of spatial data was adopted by the Ordnance Survey (Great Britain), Ordnance Survey Northern Ireland and Ordnance Survey Ireland. All three agencies agreed to work towards common standards. Each agency had different data specifications, data models and data products. In late 1999 the three organizations met to identify common areas that would benefit from closer collaboration.

At the initial stage the aim was to harmonize databases. This work was carried out in four areas: terminology, database comparison product comparison, and identifiers. At the second stage, the three organizations agreed to work towards establishing a common theme structure and feature codes, the creation of harmonized output formats, and the adoption of a common feature identification scheme. The solution was not based on 'one size fits all' but rather on finding common and compatible elements and facilitating the exchange of data between the three separate organizations.

VI. MANAGING LAND ADMINISTRATION

This chapter considers various aspects of land administration from a management perspective. It looks at organizational issues that arise in managing land administration agencies, the assessment of the costs and benefits of land administration systems, the marketing and selling of land-related information and aspects of human resource management.

A. Organizational issues for land administration agencies

Many land administration organizations are now run on business lines and operate in accordance with organizational and financial plans and strategies that anticipate developments at least five years ahead.

1. Developing a business plan

The first requirement in running a land administration agency as a business is to have something equivalent to a business plan. The minister with responsibility for land administration will issue broad guidelines but these may need to be expanded to define more clearly the way in which the service will operate whether as an authority or as an agency. The business plan should include an executive summary that outlines the key objectives, a mission statement that summarizes the work of the agency in a simple sentence, and a statement of its organizational aims and objectives. An ‘aim’ is a vision of what is required while an ‘objective’ is something more tangible that can be measured by performance indicators. An aim might be to provide services that meet the needs of the local community, while an objective might be to register the transfer of ownership within one week of receiving an application from a notary.

The business plan should contain a work plan providing more detail as to how the agency will operate and how it will achieve its aims and objectives and on what timescale. The plan should also contain a financial analysis showing how and when operations within the agency are to be funded, and a market analysis identifying the needs of users and how different organizations such as other government agencies and the private sector may be addressing these. It should also contain an organizational analysis showing how the agency will operate internally and within the national structure.

In operating as a business it is important to understand the competition and develop competitive strategies. Such strategies may include the development of public-private partnerships or creating agreements that certain activities will be left to the private sector. It may also include clarification of the different roles and responsibilities of other government agencies and ministries. Competition should not result in work being taken from private companies but rather in rationalizing the delivery of goods and services that are cost-effective from the user’s perception and sustainable from the agency’s.

One function of the land administration coordination board referred to in the previous chapter should be to identify and thereby prevent the duplication that otherwise can arise, especially between government departments, as this can result in inefficiencies and extra costs. Another is to help to identify new markets where value can be added to land administration data.

In preparing a business case it is important to understand the nature of the business, to establish who the users are and in what ways they will use the data and information that the agency can offer. The tangible and intangible costs and benefits need to be identified so that priorities can be determined; some services may be in the category of ‘nice to have’ or ‘may possibly be useful in the future’ rather than ‘necessary to have.’ Given the changing needs of society, some data that were collected in previous eras are no longer needed while new types of data may now be required.

The aim should be to operate simple procedures that are capable of delivering top quality in all areas. To achieve this it is necessary to benchmark each agency's performance by comparing this with international norms and then setting and monitoring the way that it functions against a set of indicators. There should be a continual search for improvements. This should be one component of the business plan.

2. Centralization and decentralization

When preparing a business plan, part of the analysis will relate to organizational structures and how services should be delivered. Some agencies operate entirely from the centre while others work through regional and district offices. The degree of decentralization may be determined by economic factors or by political considerations, the responsibility for which lies outside the control of the agency concerned. It is important to have a unified system throughout the country but depending on the circumstances there may need to be some regional variations. There may also need to be compromise between the different land administration activities, such as access to the land books or title registration or to cadastral data.

Increased computerization is leading to increased centralization. Experience in the Netherlands and elsewhere suggests that:

- Quality assurance and controls need to come from the head office, although meeting local demands is still a regional or local matter;
- Purchasing of major equipment should be the responsibility of the head office;
- Land registrars can be located at the head office, to ensure consistency between the regions although some work must be done regionally;
- Regional marketing and account managers can operate through the head office;
- Large-scale topographic mapping projects are best located in one office, from where they can control work across the regions. Likewise GIS specialists are best located at one office, although the work they undertake relates to the regions. This could be at the head office or at a separate location;
- Production of value-added products is better controlled from the head office, although sales may still take place at the regional level;
- Telephone calls from customers can be directed to the regional office where there are underused telephone lines. By using regional offices as call centres, local employment can be maintained and employees can be used to help all citizens through the use of IT;
- Access to the centralized database will make it possible for customers to make enquiries and obtain information at a local office.

With full computerization of mapping information the only reason for having regional offices may be because the execution of all the boundary surveys is undertaken by the land administration agency itself (rather than by licensed surveyors). By using its own local agency surveyors there will be a reduction in travel times for field parties while by using private surveyors there may be no need for regional offices. Local land registry offices can however provide a service to customers who want to make enquiries, submit applications or obtain information.

3. Financing and sources of help in re-engineering systems

The business plan needs to identify how the agency will be funded. There are in principle three different ways for financing a land administration system: financing by government out of taxes; financing by fees; financing by commission. Financing by tax means that there is no connection

between the activity from which the tax is drawn and the grant that is given by the government to an agency in order to carry out such an activity.

Financing by fees means that an applicant pays for a service and that there is a connection between the fee and the cost of running the service. The government decides the tariff and the fees can go directly or indirectly to the agency. Financing by commission means that an applicant pays for a service and that the agency that offers the service has the authority to decide about the tariff based on rules set by the government.

These different forms of financing are often used in the same country, but in connection with different activities. This is the case in Sweden, where activities that have a direct applicant are generally subject to a fee or commission, while activities that are more connected to the rule of law or the overall public good are financed by grants. The fees charged are, however, often set at a level so that they contribute, indirectly, to providing the money for the grants.

For countries building new systems it is often necessary to develop the basic organizational and information infrastructure and to prepare new legislation both for cadastral activities and for land registration. This requires money that is in excess of what can be generated by the agencies concerned, hence the various development banks, international aid agencies, etc., are the most frequent sources for funding such activities.

Funding agencies need to see the costs and benefits of any project that they support. The introduction of a proper cadastral system and a reliable way of keeping records of landownership are necessary, but the benefits are not always immediately apparent and are difficult to put into figures. Some indication of the size of the benefits can be seen from the experiences in Sweden and the Netherlands. In 2004, the annual amount of stamp duty paid by applicants to the land register agencies in Sweden was between 5 and 6 billion Swedish kronor (SKr) (€500 - €600 million). The total value of real property units in Sweden that form the base for taxation was calculated at about SKr 3,511 billion (€385 billion). The total amount of real property tax levied was about SKr 23 billion per year (€2.5 billion). The total amount of mortgage certificates issued in Sweden as security was valued at about SKr 2,355 billion (€260 billion).

At the same time in the Netherlands, land administration supported a property market worth €9.3 billion each year, securing mortgages with a total loan sum of €355 billion, and land-based tax revenues of €4.9 billion. The cost of running the cadastral organization, land registration and a land information system was a very small part of the total economy of the sector.

As an alternative to foreign aid contributions, there may be other possibilities of financing the building of a register. There have been examples of commercial companies offering to partly finance new registers in return for part of the future fees. This shows the potential profit that can be generated from the efficient handling and use of land information.

In many cases, the development of an improved land administration system may require assistance from external including foreign experts. Bilateral long-term institutional cooperation with foreign organizations provides opportunities to learn from the experience of others. External consultants can provide technical assistance, advise on appropriate technologies and implement training programmes for local staff, drawing on expertise that is not available 'in-house'. Technical assistance may take the form of providing hardware and software as well as advising on strategic planning and the development of a proper land administration framework. In a similar way, legal consultants can provide assistance and advice on appropriate legislation and other legal matters.

4. Research and development

Research is a form of investment and every land administration agency must decide what percentage of its turnover should be allocated to research and development. All investment carries risk, but failure to undertake research can lead to higher costs. Research is needed into all facets of land management, ranging from the purely technical to legal, social and economic issues. It may be carried out within an agency or by external bodies such as universities or contracted companies.

Some research will focus on local requirements while some will address generic issues that may cross national boundaries. Several national land administration bodies have cooperated in the development of the European Land Information Service (EULIS), while these and others have helped to fund the work of the UNECE Working Party on Land Administration both by supporting national participants and by helping towards the costs of individual projects and reports.

Research in land administration often requires close coordination across the varying professional disciplines. In general it needs to be directed towards affordable and appropriate technological solutions. It is important that agencies or their governments allocate resources to this end.

B. Measuring the costs and benefits of land administration

Cost-benefit analysis is a support tool for making judgements and for setting priorities. Even though the technique cannot provide definitive solutions, it is important to consider the costs and benefits as an analysis of these will help to prevent a waste of resources and be a guide to those who must judge whether an investment should be made. It can be a 'comfort factor' that helps politicians to reach decisions that they may need to defend when they submit proposals to the parliament.

1. Investment appraisal and cost-benefit analysis

The implementation of a land administration system requires investment in hardware, software, data and most of all in people. This investment must be maintained over time because keeping the records up to date at all times is an essential element of any land administration system. There are thus both short-term and long-term costs. Similarly, there are short-term and long-term benefits, many of which are difficult to quantify. They are nonetheless real and need to be identified to ensure that financial and human resources are properly targeted.

Investment appraisal is a series of techniques that involves the analysis of all prospective measurable costs and benefits as a means of helping those responsible for deciding on any venture. Cost-benefit analysis, on the other hand, is a particular technique that attempts to assess the economic and social costs of any project and to compare these with all the identifiable financial and social benefits. It extends the processes of investment appraisal into wider considerations such as the creation of a 'better' environment.

Investment, as strictly defined by economists, is expenditure on capital goods. In general, it is taken to include the acquisition of any asset that requires some sacrifice to be made in order to obtain a benefit, including investment in people or training as well as the purchase of hardware or software. Gross investment is expenditure that includes depreciation, which is the cost of replacing worn-out equipment; net investment ignores depreciation.

In some cases it is possible to measure activities in terms of the time that they take and the savings in time that would arise from using the system. It is, however, normal for the costs and benefits to be

expressed in monetary terms, with time being equated with money on the basis of the wages that would be paid.

Because the costs and benefits will be spread over time, it is necessary to adjust any figures to a standard unit of currency. Money available today can be invested to produce interest so that numerically it is worth more tomorrow; on the other hand, a given numerical amount of money tomorrow would be worth less than it is today because of inflation. The future value of money needs to be discounted to that at a given moment such as the date of the proposed start of a project. A factor is applied to all the costs and benefits depending on the date for which they have been calculated in order to standardize the unit of measurement. On the basis of the discounted cash flow, costs and benefits can then be compared and the true profitability of an investment assessed.

The essential difference between investment appraisal and cost-benefit analysis is that the latter incorporates an evaluation of intangible things that may be impossible to express in monetary terms.

2. Assessing costs

It might appear relatively straightforward to estimate the costs of setting up a land administration system. In practice this is often not so. Labour costs are often the most significant component of any organization's budget but staffing levels vary and salaries tend to increase over time. While it may be easy to ascertain the purchase price of new items of equipment, the ongoing cost of their storage, running costs and maintenance may be unclear. Furthermore, every square metre of floor space has an equivalent rental value and every piece of equipment is a capital investment, the value of which depreciates over time.

In order to recover these costs, the time spent on a job by an individual worker must be charged at a rate that is higher than the actual amount paid in salary to that person. At least 25 per cent may need to be added for payments made for national insurance and towards the staff member's pension scheme. In addition, there are the costs of overheads such as the rent on office accommodation, heating, lighting, telephone and mail services, office support staff such as office cleaners, telephone operators and secretarial staff, and even senior management, a proportion of whose costs must be distributed between each project undertaken by the organization. These costs can add 150 per cent to 200 per cent on top of what is paid directly to those who do the work.

The average time that a worker spends productively per year is variously estimated at 1,500 to 1,800 hours. This takes into account holiday time, sickness, absence for social reasons, periods for retraining, etc. Taking the lower figure and a 200 per cent overhead, the annual salary of a staff member needs to be divided by 500 in order to calculate the real cost per hour for his or her services. Thus the hourly costs for someone on an annual salary of €20,000 would be €40, or €320 for an average working day. More highly skilled and highly paid staff would need to be charged at higher rates.

In addition to the cost of labour, equipment costs must be considered. There are commercial rates for hiring equipment and although these rates contain a profit margin for the company undertaking the hiring, they provide a good measure of the notional cost of equipment if it is purchased in-house. The advantage of hiring is that there should be no amortization costs and equipment can be replaced when newer and better items come on the market. If a piece of equipment has only limited use then rather than purchase the item outright, it may be better for a government department to hire it or to put work out to the private sector. As an example, some government organizations only occasionally need to scan or print large maps and may find it cheaper to subcontract work than to buy the necessary equipment.

If equipment is purchased then it must be amortized as an asset and money must be set aside for its maintenance and subsequent replacement. Maintenance contracts can be taken out but are expensive, being between 10 per cent and 25 per cent of the purchase price. A judgement must be made of the financial consequences of any equipment breakdown. If the land registry is providing data online to the public, then there will be need for immediate repair; but if the equipment were a personal computer that could be replaced easily and cheaply then a maintenance contract might not be cost-effective. In the latter case, the data are often more valuable than the hardware.

Frequently, data and equipment may be shared between different parts of an organization, each part having its own cost or budget centre. Cost-sharing arrangements may therefore need to be worked out, but can prove difficult due to local internal politics and available budgets. This can result in duplication and additional expense.

The assessment of intangible costs is even more difficult. These will include worker resistance to new technology, traditional attitudes to job security, changes in work patterns and levels of responsibility within an organization. Some people may receive promotion but others may find their work less creative and more routine. Furthermore, there may be legal restrictions that inhibit the opportunities to exploit change - for example, where data protection legislation inhibits the use of data sets for purposes other than that for which they had been collected. In a full cost-benefit analysis all these factors must be taken into account.

Economists sometimes adopt the 'Pareto' criterion, which states that in order for a change to be justified, at least one person should be better off and no person should be worse off. Thus, where possible losers are identified, action must be taken to ensure that they are compensated. This will add to the costs.

By emphasizing the effects on people, the Pareto criterion can overlook environmental impacts, which are difficult to measure. Also, although it can take into account ethical issues, there is a danger that it will be used as an argument against any form of change.

3. Calculating benefits

Calculating benefits is even more difficult than evaluating costs. A price can be put on some activities such as improved services, quicker and cheaper conveyancing or the more effective collection of taxes thus bringing in more revenue to government. Some of these benefits will be one-off, while others will occur on a continual basis.

Some benefits are not directly measurable in cash, such as a better environment, social stability, or greater security of tenure and the economic growth that flows from that. Some benefits will be relatively immediate in that they represent more cost-effective methods for doing what is already being done; others will be longer-term and may arise only some years after the system has been introduced.

The extent of benefits will depend very much on the type and number of users of the system. The needs of urban communities will, for example, be different from those in rural areas. Thus there is little point in a cadastral system holding records of soils data for city centres; conversely, recording of data on streetlights is of less importance in most country areas, provided the data are held by the electricity supplier. For each category of data there may be a different type of user and hence a different degree of benefit.

It is therefore important to carry out a user-needs analysis, starting with the identification of what land-related information is already available and where it is held. Detailed interviews will then need to be

undertaken in order to establish the nature and extent of what people require and the savings that should be made from the proposed system. The user-needs analysis should also help to identify potential new data sets that could be helpful to land managers, tax gatherers, the general public, etc. In the process it should also be possible to identify any legal requirements to provide data or that might restrict their use.

From all this information it should be possible to evaluate each data set in terms of its costs to acquire, to store and to update, and the potential benefits that should come from its use.

Part of the benefit would then be the difference between the operational costs as at present and the operational costs of using a new system. In some forms of analysis the capital investment costs are ignored and only the running costs are considered. The issue is then whether the new system will be cheaper to operate than the old.

Where the value of benefits is intangible, estimates can be made using the judgement of experts and experienced managers. They are asked to weight the benefits. Scores are then allocated for the importance of specific tasks, for instance with regard to the meeting of specific business goals. Based on these assessments possible savings can be calculated in monetary terms and the potential savings estimated for alternative strategies.

4. Comparing costs and benefits

When all the costs and benefits have been identified and if possible quantified, a balance sheet can be drawn up. The measurable, direct costs and benefits can be set beside a list of intangible, indirect costs and benefits. In the final balance sheet, all forms of cost and benefit should be included. When all the data have been assembled, a judgement must be made as to whether a particular level of investment is justified. Often 90 per cent of the benefits can be obtained for 50 per cent of the cost - increasing accuracy and precision in cadastral mapping may, for example, add significantly to its costs but add only marginal benefits. Ultimately, cost-benefit analysis is a tool to help in decision-making and is not a replacement for human judgement.

C. Managing and marketing land registry and cadastral data

Managers must understand the processes of marketing so that they can persuade their political and financial masters of the need to invest in and sustain the new techniques and technologies that are available. They will need to prepare a business and marketing plan to develop the partnership between government, other land administration agencies, private partners and the public.

1. Moving towards full cost recovery

In recent years, there has been a major shift in the thinking of governments about the costs and benefits of many of the services traditionally subsidized by the taxpayer. Many governments have been seeking ways to reduce the cost of land registration, especially surveying and mapping, and to increase the revenue that can be generated from the products and services that are provided. Greater emphasis is now placed on making the user pay and on reducing general government expenditure. Increased cost recovery can however increase consumer resistance, but there is no doubt that both the individual landowner and the community as a whole benefit from a sound land registration system.

In almost every country, cadastral maps used for land titling and land taxation have been prepared either with large State subsidies or have been totally paid for by the State. Even where the private sector has been involved in surveys for land registration, the full costs of the system have not been

passed on to the landowners. Frequently, the true costs have not even been calculated. Government departments have been run on annual allocations of funds that have rarely been tied to measures of productivity and many have had no accurate way of determining the unit cost of the products and services that they offer.

Today, in an increasing number of countries, policies are in place to encourage maximum efficiency and optimum income generation. The higher the level of cost recovery, the more an organization ought to be able to invest in the development of new products and services and in new technology. If the level of cost recovery is too low then there must be cross-subsidies from other parts of the organization, which in the case of government activities means that the general taxpayer must pay.

Land registries store a wealth of information that can be used for many purposes other than to support conveyancing. Determining the optimum price that can be charged for cadastral data is often difficult, especially where there is no market already established. The value of the information to the user will in part depend on the current state of the land and property market so that higher market activity will result in higher value for land-related information.

Information as a commodity does not behave in the same way as physical products. For instance, someone who possesses information can sell the product to one person, give it to another and still retain it for future use. Those who own a tangible object such as a computer cannot dispose of it and at the same time retain it. Information cannot be divided without significantly changing its nature, unlike, for example, electricity, to which a series of devices can be connected so that the product is divided but still operational. Furthermore, the value of information increases through use, provided that it is kept up to date, while material products in general wear out through use.

The price that should be charged for cadastral information can be established in a number of different ways. One is based on the production costs. In the case of a digital cadastral map, for example, the price can be set on the basis of the costs that were incurred in its production, to which could be added a margin for profit. This would then be divided by the estimated number of maps that would be expected to be sold to give a market price of, for example, €200. However, the technology exists to store 3,000 such maps on one compact disk at marginal additional cost. Such a disk would almost certainly never sell if the price were €600,000.

An alternative way to establish the price is therefore to find out what the market will bear. If the price is too high, the products will not sell. If they sell very rapidly then it may be possible to increase the price.

A further strategy would be to find out what savings could be made through the use of the product in comparison to current practice. Thus if the possession of a paper map saves a motorist €20 per year in fuel through more efficient selection of journey routes, and if the map is likely to last a year before becoming worn-out, then it would be worth the motorist paying €19 for the map but not €21 unless other factors came into play. Such calculations can, of course, become very complicated and presume that it is possible to establish the uses to which any cadastral information will be put. To do so necessitates a user requirements analysis.

In some countries it is not government policy to charge for the collection of data that are an essential part of a government department's work. In such cases a charge may be made for the cost of making the data available, for instance the cost of photocopying or the cost of providing computerized access, but without recovering any of the actual costs of acquiring the data.

A particular characteristic of many land administration systems is that the data are often guaranteed by the State. In some landownership record systems the information is treated as the best evidence available, but is not necessarily definite proof of ownership and is not guaranteed. There is a cost to guaranteeing data and this is often absorbed by the State.

For private sector data, the relationship between the cadastral data provider and the data user should be subject to clear contractual arrangements setting out the extent of liability and guarantees on the quality of data. Protection for the consumer may be provided through indemnity insurance, whereby compensation is paid to the data user if there is loss as a result of mistakes made. This cost must initially be borne by the data provider but will inevitably be passed on to the consumer in due course.

In order to protect the investment of the data provider, all copying of data should be protected through copyright laws. After some initial uncertainties over the status of data stored in electronic form, it is now possible in many legal systems to protect intellectual property rights and investment in data through copyright. The price that is charged for cadastral data must be such as to give the data producer sufficient incentive and protection. Unauthorized copying of data, like stealing from other people, deprives those who have invested time, effort and capital of just reward. Although copyright is in part a moral issue, the primary objective of copyright protection is commercial.

2. Creating a corporate image

From the outside, the business of land administration can appear quite opaque. Citizens usually find themselves customers of land administration agencies through necessity rather than choice, and often business is conducted through an intermediary or professional adviser. The concept of 'service' and 'customers' has taken root over the past decade, so that now there is a much greater recognition of the end-customers, who are the property-owning public, rather than their legal representatives. As a result, many land administration agencies have become more customer-focused. They have assessed what is required in the market place, prepared marketing plans to support the development, launch and uptake of new and existing services, and have monitored the results and kept track of the views of their customers.

The main drivers for this have been: government policies and performance targets; customer expectations and demands; innovations in IT, which open up the possibilities for new revenue streams; and demand from private sector organizations for the supply of bulk data for resale as value-added services.

Many land administration agencies have been given more autonomy by their governments, both financial and administrative, and have adopted business models aimed at business excellence through continuous improvement. They are now more able to respond to these drivers like private sector businesses. This gives them the scope to create and develop new services, and to realize the benefits of the considerable asset of land data that they hold, in the wider interests of the whole community.

Unfortunately, technical solutions for delivering new and/or improved services are not cheap. Agencies have now become publicly accountable and must ensure that the considerable investment in research and development is justified in terms of demand for these services and the successful outcomes of their implementation. To be effective they need to communicate with all their stakeholders to promote a mutual understanding of the underlying importance of their work and greater accessibility of their services and data. This calls for a clear marketing strategy as an integral part of the overall corporate strategy for the organization.

A significant contributor to the success of a marketing campaign is the presentation of a professional image and many agencies have invested considerably in developing their 'corporate identity.' For some this has simply evolved slowly with the gradual move away from central control. Others have undergone a deliberate total review of their image before embarking on a major programme of change.

This idea of creating a 'brand' is much more than just designing a new logo. Internally, it should bring together the people within the organization by consolidating their core values. It should provide a focus in aligning those core values to human resources, operations, internal communication and more. It should promote a shared sense of the mission of the agency. Outwardly, it should represent the public face of the agency and enable new markets and customers to be reached through a variety of channels.

A corporate identity for a modern land administration agency needs to express clearly what the organization does, reflecting its authority and commitment to public service. It should encourage stakeholders to engage with the organization and help to shape and drive the corporate strategy, performing effectively across all media and ensuring consistency between internal and external messages. Overall the identity should help to maintain high communication and design standards.

The creation of a brand image demands careful research and thorough planning. The first stage involves full consultation with staff and stakeholders to ensure that the concept embodies the history and culture of the organization and identifies service and communication requirements. The next stage is to review the existing situation and develop a comprehensive new system, with consistent rules and processes, which will perform across all areas of the business. Once that is achieved the next stage is to launch the new identity in a way that inspires and enthuses staff and stakeholders. Lastly, it is important to protect the new identity by issuing guidance for its use to ensure that it retains its integrity and delivers lasting benefits through close and ongoing monitoring.

The initial costs of a project of this nature may be relatively high, but there is no doubt that, provided it is well conceived and executed, it can be a powerful tool that should galvanize the overall strategy for the organization. It should help to underpin its values, express its vision and help to fulfil the organization's mission.

With careful design and forethought, the corporate identity should be capable of growing with the organization as it evolves and diversifies. Although the investment costs may seem substantial and the benefits are difficult to measure, the latter are real and significant and should far outweigh the costs. These benefits arise from the increased motivation and commitment of staff, the support and confidence of stakeholders, the development of public awareness as to how the system works and what it has to offer, and the considerable savings, over time, in standardization of printed material and other procurement items.

3. Data exchange and e-commerce

In order to provide data in formats that are acceptable to the public a set of data standards must be established. At a technical level, national standards for the exchange of data will almost certainly be needed. These are discussed in chapter VII and should cover the definition of terms used, data transfer formats, data classification and accuracy standards. Although such standards may be directed towards the exchange of data rather than towards internal operational procedures, they inevitably change the way that things are done.

The terms 'e-government' and 'e-citizen' are not yet uniformly agreed and their meaning differs from profession to profession and from country to country. They often include electronic processes and electronic documents, and aim at improving operational efficiency or customer service. As indicated in

chapter V, electronic documents can be divided into two types, the first of which is simply an electronic version of the previous paper document system and is not interactive. When transferring rights in land, the documents are sent electronically to the registration authority, whose staff members then register the transaction manually.

The second type of document is interactive and either the disposition document, or the electronic application, or a combination of both contain a set of information and instructions that lead to automatic changes to the register. One of the benefits of using such a system is that it can include an audit trail to trace the authors and signatories of the documentation and the lodging agent, without the need to follow a 'paper trail.'

The majority of jurisdictions that have made serious progress with electronic land transfer have elected to create a system of electronic lodgement, and in effect this separates the land transfer process from the registration process. The registration authority rarely becomes involved in the land transfer (except, perhaps, to provide land information) until the transaction is completed. This method can lead to difficulties because if an error in the documentation is discovered at the registration stage, either by staff members or through an electronic validation process, and if assistance is required from the seller to correct the problem, there is little incentive to help. As far as the seller is concerned the property has been transferred, the purchase price has been received, and the seller will not want to get involved in a situation where there might be a possibility of incurring extra legal fees. It is partly for this reason that in Spain there is no fully automated system of land transfer; the registrar is involved in all transactions in order to guarantee their integrity.

The solution adopted in the United Kingdom (England and Wales) has been to 'reposition' the land registry so that it plays a pivotal part in the whole land transfer process, not just the registration stage. The process involves the creation of appropriate legislation and defining the steps where the registry can supply electronic services. In the case cited, this includes the establishment of a link between all parties involved in a land transaction, electronic routing of documents and the stepwise, automatic building of a "notional" register viewable only by the parties to the transaction, and upon completion bringing the contract, mortgage document, etc. into effect electronically at the instant when all parties are in agreement.

In some countries, such as Spain, Austria, Switzerland and parts of Italy, the process is not fully automated since the registrar must still check all components in the transaction. The creation of such a fully electronic system is extremely complex and is of course dependent on the structure of the whole process in any given country. It should not be attempted without very careful analysis of the existing system and a clear view of the route ahead.

E-government requires appropriate legislation and a well-extended network of information technology covering all of the country and the cooperation of all those practitioners involved in the process. In particular, the security and privacy of personal data must be guaranteed within any electronic land administration system. In addition, given developments in networking and trends towards globalization, policies on the content, quality and availability of public spatial data sets must be developed on a national and on an international level to ensure consistency.

Electronic land transfer also needs to be accompanied by a fully electronic system for transferring funds, since if registration of a transfer of title to land, or a mortgage thereof, is to be completed instantly, it follows that purchase moneys, mortgage advances, land registration fees and property taxes will need to move at the same speed. It will also be necessary to have a reliable system for digital signatures in place, as is the case under the Austrian E-Government Law of 2004 and in Spain.

Probably the way forward for a jurisdiction beginning to look at electronic land transfer is to start by devising simple electronic lodgement services and then to move slowly towards more complicated, interactive services. Moving slowly but surely forward will help to ensure that progress is made in digestible stages and may well persuade reluctant lawyers and other property professionals to move into the electronic age.

4. Electronic Signatures

Electronic communication occurs both in the public sector (for example, when filing tax returns over the Internet) and in the private sector, where businesses use electronic commerce either with one another or when dealing with consumers, thereby lowering costs and speeding up procedures.

The expansion of information science and worldwide networks has increasingly threatened the veracity of the information available, the integrity of that information and even the storage of that information in computer systems. It is essential that all forms of financial transaction, in terms of both money and property rights, are safe and secure. One of the key elements is the signature, which can range from a scanned image of a signature written by hand on a document, inserted using word processing programs, to more advanced methods, such as numerical signatures in what is termed public-key cryptography. Scanned signatures can of course be easily copied and are open to fraud.

In electronic commerce, the classic paper document is replaced by an electronic document and traditional hand-written signatures are replaced by a variety of 'electronic signatures.' In electronic commerce it is essential that consumers and businesses can trust that their transactions will not be intercepted or changed by anyone, that the buyer and the seller really are who they claim to be, and that obligations committed to in electronic form can be enforced in court and are binding on the parties who subscribe to them.

An electronic signature can be defined, as in Spain under article 3 of its Electronic Signature Act of 2003, as "the set of data, in electronic form, set down together with other data associated therewith, that may be used as a means of identifying the signatory." This definition is technologically neutral and embraces a broad concept that includes any method of signing an electronic document that is capable of identifying its author.

There are many versions of electronic signature available, and many may yet prove too expensive for the ordinary citizen to obtain, thereby making it difficult to introduce electronic documents signed by individuals that are party to a contract. In some jurisdictions, where normally there are persons legally authorized to carry out the land transfer, a way around this problem is for them to have a digital signature that can be used to execute documents on behalf of their clients. However, lawyers may for the most part be reluctant to sign on behalf of their clients, as they have been concerned that the client may deny that he or she has given authority to proceed.

Some jurisdictions have got around this by ensuring that clients give their agents written authority to proceed, but an authority written on paper seems inappropriate in a situation where the aim is to make the process fully electronic. Things are however more complex in an electronic environment since it is easy to copy a signature. There needs to be:

- (a) Authentication (certainty of authorship). This is the security component that ensures the identity of the person sending the message and makes it possible to ensure that a message does indeed come from the person purporting to send it;

- (b) Integrity. This is the aspect of security that guarantees that the message has not been intercepted and altered in transit;
- (c) Non-rejection or non-repudiation. This guarantees that parties to a transaction cannot deny what they have done;
- (d) Confidentiality. This is the protection of the data from revelation or access by unauthorized persons.

In 1999 the European Parliament and Council issued directive 1999/93/EC on a Community framework for electronic signatures. The European Commission had been concerned that the existence of a variety of legislative initiatives by member States posed a danger of fragmenting the internal market. Hence they wished to establish a common process across the whole of the Union to guarantee that electronic signatures could be legally recognized.

Various techniques for creating and verifying digital signatures have been adopted and there is no single definitive solution. Two additional problems can arise: time stamping and the duration of the certificate that is used by legal persons. With regard to the former, a digital signature by itself provides no proof whatsoever of the time of the message (time stamping), although the date and time have important legal consequences since an incorrectly recorded time for a transfer could lead to a miscarriage of justice. This for example is addressed in the Austrian E-Government Law of 2004.

Under Spanish legislation, in addition to the Electronic Signature Act of 2003, there are specific provisions concerning the registration process. Under the Act it is mandatory for registry offices to be equipped so that they can work online. The Act states that notarized public documents, communications, reports, tax returns and self-assessments, applications and certificates can be sent electronically by a notary or by a property or mercantile registrar to another notary or registrar by means of using an electronic signature.

D. Managing human resources

If land administration systems are to be improved then the place to start is by improving the training of those responsible for managing and operating the organization. Agencies must invest in initial and ongoing training if they are to deliver a quality service. Quality is a measure of fitness for purpose and its delivery has been described as a way of life with continually changing objectives in order to meet the changing needs of customers and the market. Quality improvements depend on top management; an estimated 80 per cent of the problems that arise in the control of quality can be blamed on management rather than on the workforce.

Good managers understand the business in which they are operating, create and implement financial structures that allow the organization to invest in new technology and develop new applications, and provide optimum conditions in which each member of staff can develop her or his skills. They identify the human factors involved in running land administration systems and ensure that the necessary levels of skill and responsibility are defined for each and every task. They consult the staff involved to obtain their confidence and awareness of what is going on and involve any trade unions that will be affected as their opposition can seriously delay progress. They recognize that the introduction of new technologies may lead to a more rapid turnover of staff and that health and safety issues will need to be addressed. They therefore establish programmes for management and specialist training to ensure that high standards are maintained at all levels.

1. Training and education

Training and education are required at all levels and in all areas of land administration. In particular in the changing business environment in which land administration now operates it is essential that senior staff have the appropriate business management and communication skills. Management training, especially for top managers, is increasingly common especially in large organizations; no managers however senior can maintain their authority if they do not keep up to date and continually develop their own professional skills.

Management training should be provided for staff at all levels from senior, through middle to junior. All too often in the past people have been promoted to higher positions based on their length of service rather than their knowledge and ability. There has been an underlying assumption that by instinct and observation they can deal competently with their new role. Management training should be an integral part of any organization's culture and strategy.

Government needs to ensure that there is a range of university-level courses for comprehensive professional training with qualified teaching staff that are skilled in the latest land administration and land information management techniques. One way to achieve this is by encouraging the exchange of staff between universities and industry so that academic staff can obtain commercial and industrial experience.

At the more technical and practical levels, managers in land administration agencies should provide resources for in-house training courses that are available to all who need them. They should also provide written information and technical manuals for all levels of operation. All staff should undertake continuing professional development; time and resources should be allocated to this end.

2. Managing people

Not all people have the potential to become good managers but most people can improve their own performance and all can be motivated. The factors that most influence the motivation of staff include job security with career prospects; job clarity with clearly defined objectives; job variety allowing the use of different skills; involvement in decision-making; good status and quality of life; and plenty of interpersonal contacts.

Managers should ensure that all these factors are addressed. They should meet regularly with staff to keep them informed and to listen to their experiences. The outcome of any meeting should be a clear plan of action whose implementation will be monitored. Good communication with staff is essential if the organization is to be sustainable; likewise clients should be kept informed of progress and what is going on. Performance measures need to be established and monitored for all processes and all people involved in the organization so that individuals know what is expected of them and why what they are doing is important. The performance targets that are set must be reasonable and if it appears that they cannot be met they should be revised.

Quality needs to be built into the design of any project from the very start but it is a movable target. Risk management techniques should be applied. This does not mean the total avoidance of risk but rather that if problems arise they are addressed immediately, even to the extent of abandoning a project. If some strategy does not work then it should be changed. The costs should not be allowed to increase if the project is doomed to fail.

The philosophy of risk management is particularly important when introducing new forms of computer technology, as these tend to be a major catalyst for change. The introduction of new technology is more

than a technical matter since it implies changes in the necessary skills and responsibilities within an organization, its organizational structure, the investment strategies, and how it relates to the public that it serves.

Of all the elements that need to be considered, the provision of adequate training and the development of motivation in the staff are by far the most important. At present, in many countries, staff training has been an ad hoc process that is not structured in terms of each individual's career development. The success of any cadastral or land registration system is dependent on the availability of skilled staff at all levels. Education and training are ongoing processes.

3. Working with the private sector

A number of problems will arise when there is collaboration between the public and private sectors, for example where the private sector receives different levels of remuneration for doing the same task as members of the public sector. In Hungary, for example, in the 1990s there was a move out into the private sector, where salaries were seen to be higher but overcapacity developed and salaries dropped so that there was a reverse flow back into the public sector. In good times the private sector can pay more than the government but in bad times there is little job security.

There is also a very different culture in the private sector and it takes time for ordinary employees in government agencies to adjust to a business approach. The private sector takes risks that can be regarded as unacceptable by government employees. Issues surrounding risk management must be addressed before any public-private partnership can be established.

Registration under quality assurance provides one way forward. Quality assurance requires all operational procedures to be documented so that at each stage in the preparation of a product or service, someone can be held responsible for the quality of the work. It is part of the overall process of total quality management that should ensure that what is done is fit for its purpose and meets the needs of all clients.

VII. TECHNICAL ISSUES IN SURVEYING AND DATA MANAGEMENT

This chapter examines aspects of surveying and mapping and of electronic data processing.

A. Spatial data frameworks

Land administration systems deal with information about land parcels. One feature of a land parcel is the location of its boundaries and how these relate to neighbouring properties. Each parcel needs to be surveyed. The classic approach to land surveying and mapping begins with the establishment of a geodetic control framework. Geodetic control measurements make an efficient and effective basis for cadastral surveying and land registration. They also support other surveying and mapping activities including geodesy, cartography, engineering surveying, geophysics and the measurement of tectonic movements, and navigation.

The establishment of a geodetic reference system guarantees the geometrical consistency of all surveying activities within a well-defined coordinate system. Such a geodetic reference frame should consist of both horizontal and vertical control points. For most cadastral purposes a two-dimensional representation of these points is all that is required, although three-dimensional data are becoming more significant. What is important is that there is a uniform and unique spatial referencing system for the identification of all land parcels and other real-estate units and that spatially related data can be integrated.

The establishment of a geodetic framework is generally regarded as the responsibility of a national survey organization. Recommendations and guidelines for the establishment or the updating of an existing national reference frame have been provided by several international geodetic and cartographic organizations such as EuroGeographics, which is the main association of national mapping agencies in Europe. For modern purposes, the local national reference frame should be compatible with the international network. The high accuracy of modern geodetic measurement equipment using electronic distance measuring devices or satellite positioning systems can be lost if measurements are connected to old networks that have not been upgraded.

In order to improve the quality of old survey networks, it may be possible just to recompute the original observations. After the readjustment, unacceptable discrepancies of some decimetres or even metres between the old and the new solutions may appear. It must then be decided whether to recalculate the whole network of control points and whether, in due course, to recompute some or all of the cadastral points. This decision should not be taken without considering the costs and benefits.

There is pressure for solutions of high accuracy, approaching one centimetre, in order to take advantage of new measuring equipment and techniques, and for scientific purposes. From a land titling perspective, high precision is not always necessary depending on the type of boundary monument that is used. If a fence or hedge defines the boundary then decimetre or lower precision will be sufficient. The level of precision in the measurement of position should depend upon the uses to which the data are put and the relative costs in time and money of alternative methods of survey.

In many countries there are moves towards a broader concept of spatial data frameworks promoted under the title of spatial data infrastructures (SDI). These have been described as tools for better policy-making, decisions and services, with the environment and sustainability as two of their main beneficiaries. The development of SDI allows data and information to be shared and exchanged across thematic, administrative and juridical boundaries using interoperable network services. SDI are recognized by a wide range of communities active on a global scale in application domains ranging from natural risk management and biodiversity conservation to monitoring climate change.

A recent initiative backed by the European Commission called INSPIRE, aims to create an infrastructure for spatial information in Europe. This, it is hoped, will help to unlock the value of geographic information across Europe for the benefit of good governance, private business and the citizen.

The INSPIRE proposal sets down general rules for the establishment of an infrastructure for spatial information that can then be used to support environmental policies or activities that might have a direct or indirect impact on the environment. It anticipates the future use of this infrastructure for other policy areas, such as transport.

INSPIRE will be based on infrastructures for spatial information established and operated by the member States of the European Union. The components of these infrastructures are to include: metadata; spatial data sets (including cadastral parcels, which are described as areas defined by cadastral borders that have specific legal status of ownership); network services and technologies; agreements on sharing, access and use; coordination and monitoring mechanisms; process and procedures.

The six principal objectives of INSPIRE are that:

- Data should be collected once and maintained at the level where this can be done most effectively;
- It should be possible to combine seamlessly spatial information from different sources across Europe and share it between many users and applications;
- It should be possible for information collected at one level to be shared between all the different levels, e.g. detailed for detailed investigations, general for strategic purposes;
- Geographic information needed for good governance at all levels should be abundant and widely available under conditions that do not restrain its extensive use;
- It should be easy to discover which geographic information is available, fits the needs for a particular use and under which conditions it can be acquired and used;
- Geographic data should become easy to understand and interpret because it can be visualized within the appropriate context and selected in a user-friendly way.

An INSPIRE study report⁵ covered some 32 countries and produced information on components that were at various stages of development in almost all of these countries. Several countries are in fact implementing data policy frameworks and business plans for government departments and public sector agencies to resource the needed organizational structures to drive their SDI. They will operate these on a continuous basis, establish spatial data portals and mechanisms for making reference data available, and develop the infrastructure that should enable distributed databases to be linked.

The implementation of INSPIRE can also be seen in the broader context of two other initiatives, Global Monitoring for Environment and Security (GMES) and Group on Earth Observation (GEO). Both emphasize the need for improved data integration and information management in order to monitor the Earth through observations from space and in situ networks.

B. Cadastral surveying and mapping

At their simplest level, cadastral surveys are concerned with setting out and recording the turning points or corners of property boundaries. A variety of techniques may be used, each having its own

⁵ Spatial Data Infrastructures in Europe; State of Play 2003.

inherent advantages, accuracy and cost. The necessary and sufficient accuracy that is needed for any survey depends on the purposes for which that survey is conducted.

If the cadastre is to achieve its aim of being a support for land titling and possibly land taxation, it should be established according to the same general principles throughout the country. This does not, however, mean that all areas must be surveyed to the same precision, since the requirements will be different for example in city centres and in rural areas. In cities a precision of between 0.1 and 0.3 metres may be adequate for land titling, while in rural areas 1 to 3 metres may suffice. For security of title, if the monuments that delimit the boundaries are suitable and relatively permanent, the need for precision in the cadastral survey will be low. In such cases, relative accuracy matters more than absolute accuracy, since it is more important to know where a boundary beacon is in relation to other nearby boundary beacons than it is to know the precise coordinates of points relative to other parts of the country. However, for the purposes of a national multi-purpose cadastre an absolute coordinate system is necessary, while if the data are to be used for purposes other than land administration higher levels of precision may be needed.

Almost all generally known techniques in surveying can be employed for the purpose of cadastral renewal. These include both field survey techniques and air survey methods. Photogrammetric techniques are a powerful set of tools for documenting, interpreting and surveying large areas. The advantage of using such techniques instead of ground surveying is that they save time and money. They have been used to increase the density of control points (although today satellite positioning techniques are more commonly used) as well as to measure property boundaries. When using photogrammetric methods it is essential that whatever is to be recorded can be seen clearly on the aerial photographs.

While it is self-evident that such techniques cannot be used for setting out points on the ground, they can record the physical evidence of what has been set out, for example the lines of hedges and fences or the location of points that have been 'pre-marked,' that is, marked on the ground in such a way as to make them visible from the air. They can also be used to determine land use and to collect topographic data. Photogrammetry should be regarded as just another set of tools in the surveyor's trade. The most appropriate survey technique is that which meets the basic objectives most economically.

The overall quality required for cadastral surveys should be laid down by the central surveying authority, which should determine the rules, standards and basic principles for the examination and evaluation of basic material; how the quality of both text and spatial data is to be improved; and how new data are to be acquired and then reconciled with existing data.

C. Electronic data processing for land administration

One of the major catalysts for change has been and is computerization. This section examines a number of facets of electronic data management.

1. The role of computerization

The use of computers forces standardization in the collection and processing of land information; speeds up the processes of first registration of title; decreases the cost and space required for storing land records; reduces unnecessary duplication; simplifies the preparation of 'disaster' copies of registers; improves access to land-related data and improves their distribution; reduces the time and cost involved in transferring property rights and in processing mortgages; facilitates the monitoring and analysis of market and rental values of land and property; and provides built-in mechanisms for quality control.

The conversion of data into computer-readable form has proved to be an expensive and time-consuming task, which has accounted for up to three quarters of the cost of changing to a computerized system. The quality of the data to be converted may be unreliable or out of date and their conversion into digital form does not necessarily improve this. The introduction of computers is, however, more than a technical matter, since it introduces changes in the skills and responsibilities needed within an organization, its organizational structure and investment strategies.

Most importantly the computerization of land administration data and procedures has involved changes in processes and legislation, for example to accommodate the transfer of land rights by electronic means, accept electronic signatures attached to legal documents, and meet the requirements of data protection.

During recent years many initiatives have been taken in Europe in developing e-government, for example, the European Council launched the “eEurope 2005 Action Plan” to provide modern online public services, a dynamic e-business environment and secure information infrastructure. EU member States, including those that joined in 2004, have been making progress in this area.

As an example of one of the initiatives, Lithuania has adopted key legal documents on the development of e-government, including a long-term public administration development strategy 2010. This will create an integrated system of State registers and electronic signatures. The Information Society Development Commission headed by the Prime Minister of Lithuania has been established for the coordination of e-government activities. The development and improvement of State governance and the provision of online public services are among the main national priorities. The State Enterprise Centre of Registers is one example of introducing advanced information technologies and providing customer-oriented public services to the society and business sector. The Centre is responsible for the development and administration of three base State registers, namely the real property, the legal entities and the address registers.

2. Determining the objectives

In each country, the optimum type and extent of electronic data processing employed will depend upon how the maintenance of land administration data is organized. There will be different solutions depending on whether the objective is to re-engineer an existing system or to create a new one, and whether the cadastre and land book systems are within one organization or whether their data are to be held separately. If the cadastral and land register data share a single database, then the computerized system can provide highly efficient ways of accessing, updating and integrating the data.

In setting up a computerized system it is necessary to determine which conventional records, registers and plans are to be included and how these relate to other applications such as land registration, cadastre, taxation, area planning, community tasks, etc. A crucial issue is where, how and by whom the maintenance of the data will be carried out. It is also necessary to determine what conditions of access will be needed by different users, such as the times when clients can visit the land administration offices, the level of fees, standardized and specific inquiry forms, delivery of data carriers, delivery of update material, opportunities for online access, etc.

Certain legal, organizational and financial limitations may inhibit computerization or there may be technical impediments, for example the lack of a high-speed digital network. These may necessitate the development of the system in a series of stages or phases in order to achieve the defined objectives. It is, however, recommended that the final form of the computerized cadastre should be defined at the start, even though at first only a partial implementation can be achieved.

The common methods that are used for the systematic development of information systems should also be applied when setting up computerized registers. A detailed strategy for electronic data processing should cover: the systems design; how the digital data sets will be created, including metadata and data dictionaries; the methods whereby the data will be kept up to date; the provision of equipment for the data processing centre; data transfer standards; and the forms of user access to the data.

3. Electronic data transfer and systems design

The electronic documents that are handled in the processes of land administration may be electronic versions of what was traditionally done on paper or interactive versions. In the former, documents are sent in digital form to the land administration authority, where they are processed manually in accordance with well-established procedures. In the latter, information and instructions are sent that lead to automatic changes to the records.

The performance of the computerized system and its conceptual realization will be dependent on its design. In practice, not all theoretical solutions will prove to be useful or successful, especially for a cadastre that contains numerical as well as semantic and graphic data. Even with the current state of technology, it will be necessary to compromise between what is desirable and what is practical.

Experience indicates that traditional hierarchic and relational database systems are best for storing and maintaining non-graphic data and for covering large regions that give rise to large data sets. They are particularly useful where there is a need for fast and frequent access and update operations and where there is nationwide direct access.

They are also useful where access to land-related data is to be provided through the Internet. This creates obvious dangers with regard to data security but these matters have already been addressed through the banking community, where direct access to personal accounts is permitted subject to various safeguards. Customers must have confidence in the security of electronic transactions. One way to achieve this is through the use of cryptography and mathematical algorithms that encrypt data and render them unintelligible to anyone who does not possess certain secret information (the keys) needed to decipher the encrypted data.

At first, symmetrical cryptography was used, where the parties used a shared key that they had agreed on in advance. This system has been used in small businesses and in certain internal banking practices. Keys can, as in Spain, be stored on a smart card instead of a personal computer. In the United Kingdom, the Land Registry is testing the public key infrastructure (PKI) system, which provides for the signing of electronic documents by means of a digital signature, based on asymmetric cryptography, with a public and private key pair. The procedure involves an applicant for a digital signature having his or her identity successfully confirmed, and then a certifying authority creating the 'key pair,' comprising a public and a private key.

In future, biometric procedures may even be incorporated to reinforce the system's security, such as identification through fingerprints or iris scans. Because of fears about the ability of authorities to fight crime and terrorism that might affect national security, cryptographic products and technology are subject to export controls. All the countries in the European Union must observe Council Regulation 3381/94 setting up a Community regime for control of export of dual-use goods.

4. The creation of digital data sets

Data conversion is an expensive and time-consuming process because it not only requires the data to be changed into digital form, which mostly can be done automatically, but also to be 'cleaned' so that correct and consistent data are entered into the system. One of the great advantages of the digitizing process is that it can lead to clean data sets. All available conventional records, registers and plans that are to be incorporated into the system need to be identified, many of which may be in mutually incompatible formats. It is important to determine what data the users of the system require and what data may need to be made available for other applications. From the user needs analysis an appropriate data model can be developed.

Given the pace of change of technology, data models should be system-independent. This will help to protect the huge investment especially in the acquisition of geographical data by avoiding the system-specific limitations of individual products. In the 1990s many investments in information technology focused on particular proprietary systems, some of which are now obsolete. Given the present rapid rate of change in technology, investment in hardware and software will have to be renewed every three to five years. Every agency must have a strategy for dealing with such a demand. The acquisition of hardware and software is expensive but the amount is relatively small in comparison with the investment in data. It should not be necessary to reacquire or restructure data every time that hardware and software have to be replaced.

Since many of the data in a land administration system are dynamic, updating of the data is a crucial issue that must be built into the system from the very start. Land-related data should be collected at the local level, while data management and distribution can still be centralized. Large-scale data have a strong link with the local context and therefore can be better updated by local authorities or local surveyors working within the national framework and to national standards.

5. Procurement of hardware and software

At the heart of the computerized land administration system there will be a processing centre that must be equipped to meet the requirements of the systems design in the most efficient way. The range of systems may extend from a single or series of personal computers networked together through to a series of interconnected processors on different systems levels. The hardware, the software, including the database software, and the communication equipment all have to be evaluated and the optimum configuration selected. Furthermore, the procedures to be adopted and the requirements for data security and data protection must be defined.

Various methodologies are used to analyse and implement computer systems design in a structured and orderly way. Given the rate at which technology is changing, it is common to use external consultants to advise on the acquisition and installation of new technologies since often there is insufficient expertise in-house. Even then there is a danger that once decisions have been reached as to what is required and authorization has been received from higher authority to make the necessary investment, the anticipated technology is already obsolete. It is important that when these methodologies are followed, decisions are taken without delay.

The cost of investing in a new computerized land information system and more especially the costs of running the system should not be underestimated. It is important to draw up a cost-benefit comparison before embarking on computerization. Multiple uses of the data - for example for tax purposes and planning development control as well as the proof of ownership rights - will lead to increased benefits. The technology should be used to achieve an optimum benefit through interdisciplinary employment

and the solution of a wide range of problems. That is why geographic information systems have significant potential as forms of integrating technology as well as mapping tools.

6. Access to data

Within existing manual systems, data are maintained in analogue form, usually at administrative offices where there is some degree of public access during office hours. Computerized data processing creates a number of opportunities to improve access to data by providing more convenient times at which to examine the registers and a variety of ways in which to view and download the information, including the provision of services 24 hours per day seven days per week.

Although access to large quantities of data allows different forms of data evaluation and is technically possible, land administration authorities normally restrict the amount of data that can be downloaded at any one time for reasons of privacy and copyright. The forms of access that are provided must be oriented towards existing user requirements. The demand must be met with regard to the type of information that users need as well as the technology (such as transfer medium and data networks).

Glossary of terms

This glossary covers words used in the main text and additional terms used in the administration of real property.

Absolute title: an unconditional title for which no other person has a better right to the land.

Abstract of title: a summary of documents and facts showing the ownership of a piece of land or property.

Adjudication: the process whereby the ownership and rights in land are officially determined.

Adverse possession: the occupation of land inconsistent with the rights of the true owner.

Alienation: the power of an owner to dispose of interest in land or property. In particular land may be alienated from the State and granted to private individuals.

Amalgamation: the unification of two or more basic property units into one unit in the registers.

Appraisal: estimating the market value of real property.

Appraiser: a person who estimates the value of real property.

Assessment: determining the tax level for a property based upon its relative market value.

Assignment: the transfer of property rights from one person to another, for example in a lease or mortgage certificate. In civil law, this is also known as a cession.

Basic property unit (BPU): the extent of land that is recorded in the register as one homogeneous unit.

Beneficial owner: the person who is entitled to the benefit of a property.

Bona fide: in civil law and common law, of good faith.

Boundary: either the physical objects marking the limits of a property or an imaginary line or surface marking the division between two legal estates. Also used to describe the division between features with different administrative, legal, land-use, topographic, etc., characteristics.

Cadastral index map: a map showing the legal property framework of all land within an area, including property boundaries, administrative boundaries, parcel identifiers, sometimes the area of each parcel, road reserves and administrative names.

Cadastral map: an official map showing land parcel boundaries. Cadastral maps may also show forms of land use such as buildings and may be held in digital form as a database.

Cadastral surveying: the surveying and mapping of land parcel boundaries.

Cadastre: a type of land information system that records land parcels as part of a country's land administration, conveyancing or land registration system. The term includes:

- **Juridical cadastre:** a register of ownership of parcels of land;
- **Fiscal cadastre:** a register of properties recording their value;
- **Land-use cadastre:** a register of land use;
- **Multi-purpose cadastre:** a register including many attributes of land parcels.

Caution or caveat: an entry in the registers or court records preventing certain actions being taken without notice to the person registering the caution or caveat.

Charge: an interest in property for example when held as security for a debt.

Civil law: the law laid down by the State regarding the rights of inhabitants. Also known as Roman law.

Collateral: the use of property as a guarantee for a loan.

Commonhold: a piece of land or facility that is shared by several property units.

Common law: the unwritten law based originally on common customs and precedent but now administered by the courts.

Condominium: the co-ownership of property especially in a block of apartments.

Consideration: the price paid or value given by a purchaser for land or a right in land.

Contract: an agreement enforceable by law.

Conveyance: a method whereby rights in land are transferred from one owner to another. The rights may be full ownership or a mortgage, charge or lease, etc.

Co-ownership: a form of tenure in which two or more people own the same property.

Cost: the amount in relation to production, not exchange. Costs may be actual or estimated, direct (such as labour or materials) or indirect (such as administrative costs).

Cost approach: the valuation of property based on estimates of costs.

Covenant: an agreement, either expressed or implied, contained in a deed that creates an obligation between parties. A covenantor gives rights to the covenantee who obtains the benefit.

Customary law: unwritten law established by long usage.

Customary tenure: the holding of land in accordance with customary law.

Data: a raw collection of facts.

Debenture: a special type of loan used by companies.

Deed: a legal document laying out the conditions under which land is transferred when the requirements of the contract are met.

Demarcation: the marking-out of the boundaries of each land parcel on the ground.

Demarcation map: a map prepared to show the parcels of land as determined during the process of adjudication.

Deposit: part payment of purchase price under a contract for sale, lodged by the buyer with the seller's agent at the time of signing the contract for sale. The deposit may be forfeited if the contract is not completed.

Depreciation: the reduction in value of an object by virtue of use, physical wear and tear, effects of time or obsolescence.

Digital mapping (also known as automated cartography, or computer-assisted cartography): the processes of acquiring (capture), transforming and presenting spatial data held in digital form.

Digitizing: the process of converting analogue data such as graphic maps into digital form.

Disaster copy: a copy of the register kept in a secure place in case the main register is damaged, for example by fire.

Discharge: the act of removing a mortgage or other charge.

Easement: a right enjoyed by one landowner (the dominant tenement) over that of another (the servient tenement), for instance a right of access or for the passage of water or electricity. The right is regarded as existing for the benefit of the land itself in favour of which the right has been given and accordingly will not be extinguished if there is a change in ownership.

Eminent domain: the right of the State to take private property for public use upon the payment of just compensation to the property owner. In civil law, eminent domain is not used. The principle is referred to as expropriation and can only be done when warranted by the public interest.

Encroachment: unauthorized intrusion on the land of another.

Encumbrance: a right to or an interest in land that belongs to someone other than the person having the benefit of the right or interest, which represents a burden on the land. The encumbrance will not prevent a transfer of title by the owner of the land, but may reduce its value.

Equitable interest: an interest in land that does not form part of the legal estate, but which is recognized and enforced according to the rules of fairness (in general terms known as the “rules of equity”).

Equity: system of rules based on principles of fairness, formulated and administered by the courts to supplement the rule of law.

Estate: in legal terms, an interest in land. The term is also used to refer to the physical land and property to which that interest relates.

Expropriation: the compulsory depriving of an owner of property in return for compensation.

Fee simple (absolute in possession): a freehold estate in land, absolute and unqualified, representing an unrestricted right in perpetuity of the owner to have possession of land and its use and during his or her lifetime to dispose of it. On the death of the owner, any such interest forming part of the estate will pass to the heirs.

First registration: the completion by entry on the register of an application by a person entitled to be registered as the owner of an unregistered property.

Fiscal value: the value of real-estate property used for taxation purposes.

Fixed boundary: the legal boundary of a property where the precise line has been agreed and recorded.

Foreclosure: proceedings to extinguish all rights, title and interest of a mortgagor in a property, in order that the mortgagee may sell the property so as to satisfy the mortgage secured against it.

Forfeiture: exercise by a landlord of a right to regain possession of leased premise, if the tenant breaches conditions contained in the lease.

Fragmentation: the division of land units too small for rational exploitation, usually as a result of the system of inheritance. The process may lead to a multiplicity of parcels for one owner or a multiplicity of owners of one parcel.

Freehold: a free tenure, distinct from leasehold, in which the owner has the maximum rights permissible within the tenure system for indefinite duration.

General boundary: a boundary for which the precise line on the ground has not been determined.

Geodetic framework or network: a spatial framework of points whose position has been precisely determined on the surface of the Earth.

Geographic information system (GIS): a system for capturing, storing, checking, integrating, analysing and displaying data about the Earth that are spatially referenced. It is normally taken to include a spatially referenced database and appropriate applications software.

Global navigation satellite systems (GNSS): the generic term for fixing positions on the surface of the Earth by measuring signals from satellites orbiting the Earth.

Global positioning system (GPS): an American system of GNSS (see above).

Grant: a general word to describe the transfer of property whereby rights pass from the “grantor” to the “grantee.”

Guaranteed title: a title for which the registration authorities are responsible for paying compensation for any losses incurred as a result of errors found in the title.

Hypothec: a charge on property as a security against a financial loan in which the property remains in the ownership of the person receiving the loan.

Income capitalization: the valuation of property on the basis of its income stream.

Information: data transformed into a form suitable for the user.

Interest in land: a general term to describe rights in respect of land, its use, entitlement to rent and/or income being derived from land and its use, and entitlement to the whole or part of the proceeds of sale of an estate in land.

Land: the surface of the Earth, the materials beneath, the air above and all things fixed to the soil.

Land administration: the processes of determining, recording and disseminating information about the ownership, value and use of land when implementing land management policies.

Land certificate: a certificate issued by the land registration authority to the registered proprietor of a parcel of land, containing details of the land in question and any encumbrances disclosed as affecting that land. It provides primary evidence of the good title to the land that has been registered.

Land consolidation: the process whereby small parcels or shares in the land are exchanged for one or more larger parcels that are approximately equivalent in value to the original holding thereby into creating units of more economic and rational size, shape and location.

Land information management: the managing of information about land.

Land information system (LIS): a system for acquiring, processing, storing and distributing information about land.

Land management: the activities associated with the management of land as a resource from both an environmental and an economic perspective.

Land parcel: an area of land with defined boundaries, under unique ownership and with homogeneous real property rights.

Land policy: the framework for determining how land should be used and conserved in order to meet social and economic objectives.

Land reallocation: the process whereby land rights are acquired by the State and then reallocated to different owners.

Land reform: the various processes involved in altering the pattern of land tenure and land use of a specified area.

Land register: a public register used to record the existence of deeds or title documents, thereby protecting rights in land and facilitating the transfer of those rights.

Land registrar: the officer responsible for keeping the land register at the land registry, appointed by law to be impartial and free from any conflict of interest.

Land registration: the process of recording rights in land either in the form of registration of deeds or else through the registration of title to land so that any person acquiring a property in good faith can trust in the information published by the registry.

Land tenure: the mode of holding rights in land.

Land title: the evidence of a person’s rights to land.

Land transfer: the transfer of rights in land.

Land use: the manner in which land is used, including the nature of the vegetation upon its surface.

Land value: the worth of a property, determined in a variety of ways which give rise to different estimates of the value.

Landlord: a person who permits another to have exclusive occupation of land (commercial, agricultural or residential) for a specified duration under a lease or tenancy, usually in return for receipt of rents and profits.

Leasehold: land held under a lease, which is a contract by which the right of exclusive possession of land is granted by a landlord (the lessor) to a tenant (the lessee) for an agreed amount of money for an agreed period of time.

Lessee: a tenant holding land under leasehold.

Lessor: a landlord.

Lien: a right exercisable against the property of another held as security for the performance of an obligation.

Lot: a land parcel.

Market: a set of arrangements in which buyers and sellers are brought together through the price mechanism.

Market value: the most probable sale price of a real estate property in terms of money, assuming a competitive and open market.

Mass appraisal: the process of valuing a group of real estate properties at a given date, using standard methods.

Metes and bounds: a property description by reference to the bearings and lengths of the boundary lines (metes) together with the names of adjoining properties (bounds).

Mortgage: the conveyance of a property by a debtor (called the mortgagor) to a creditor (called the mortgagee) as security for a financial loan with the provision that the property shall be returned when the loan is paid off by a certain date. In some legal systems there is provision that the mortgagee has the power to sell the property concerned when the interest is not paid in time and the loan is not paid off by a certain date in accordance with the agreed stipulations.

Mutation: the division of land parcels into smaller areas, for instance as a result of inheritance or commercial development.

Negative equity: the result when the value of a property falls below the amount for which a mortgage loan is outstanding.

Occupation: the physical possession of land.

Orthophotograph: a composite aerial photograph from which height and tilt displacements have been removed so that there is uniform scale as in a topographic map.

Orthophotomap: a photomap made from orthophotographs.

Overriding interest: a legal interest in land that has legal force even though not recorded in the land registers.

Ownership: the most comprehensive right a person can have with respect to a thing. Full ownership includes the exclusive right to use and dispose of the thing.

Parcel: see 'land parcel.'

Parcel identifier: a unique reference that identifies a parcel in a cadastre.

Personal property: all property that is not real property, including moveable property, goods, fixtures and fittings which do not form part of land, and leasehold interests.

Photogrammetry: the science and art of taking accurate measurements from photographs.

Plot: an area of land identifiable on a map.

Portfolio of ownership: a selection of basic property units that that have been acquired as an investment.

Pre-emption: a right to be offered a property if the owner decides to sell but which does not impose any obligation to buy.

Prescription: the gaining of a right by reason of a lapse of time.

Price: what a property actually fetches in an open market transaction.

Private conveyancing: the transfer of rights in land without any public record of the transfer.

Property: that which is capable of ownership, either in the form of real property or personal property, tangible (e.g. land) or intangible (e.g. goodwill).

Proprietary unit: an area under single ownership but possibly comprising separate units that have not been assembled into one unit in the register.

Provisional title: a registered title that should in due course become an absolute title provided that no objections are registered within a prescribed period.

Real property: land and any things attached to the land including buildings, apartments and other construction and natural objects such as trees.

Rectification: the legal process whereby errors on a land register may be corrected.

Registered land: land in respect of which title to an interest in it has been registered at a land registry.

Registered proprietor: a person entered on the land register as holder of the registered title to land.

Register unit: a basic property unit registered under a single title or deed in a land register.

Registration of deeds: a system whereby a register of documents is maintained relating to the transfer of rights in land.

Registration of title: a system whereby a register of ownership of land is maintained based upon the parcel rather than the owner or the deeds of transfer.

Registry index map: a map showing all land that has been registered within a given area.

Rent: a periodical payment that a tenant makes to the owner of the land subject to the lease, as compensation to the landlord for the tenant's right to the use and profit from exclusive occupation of the land for a specified period of time.

Rental value: the value of a property in terms of the rent that may be derived from it.

Restitution: the restoration of former rights in land involving the reprivatization of land and property or the creation of new property rights over land formerly taken over by the State.

Restrictive covenant: an agreement whereby one landowner agrees to restrict certain ways in which the land might be used for the benefit of another.

Revaluation cycle: the period of time between which mass appraisals take place.

Root of title: a document dealing with the whole legal and equitable interest in real property that provides certainty in any legal disposition.

Sales comparison: the valuation of property based on estimates of the worth of similar properties.

Satellite positioning systems: the fixing of positions on the surface of the Earth by measuring signals from satellites orbiting the Earth.

Seizure: the legal process of taking possession of property in order to dispose of it and use the proceeds to recover a debt.

Servitude: an easement.

Spatial referencing: the association of an entity with its absolute or relative location.

Sporadic adjudication: the determination of rights in land here and there, now and then.

Stamp duty: a levy charged on the transfer of property.

Statute of limitations: a statute that limits the period during which a claim, for instance for the restoration of rights in land, can be pursued.

Strata title: title to land that is not necessarily divided horizontally, such as in high-rise buildings or for mining rights.

Subdivision: the process of dividing a land parcel into smaller parcels.

Sublease: a lease under which the lessor is the lessee of a prior lease of the same property.

Subservient tenement: land over which there is an easement in favour of the dominant tenement.

Systematic adjudication: the determination of rights in land on a regular and systematic basis, for example within one area at one time.

Tenancy: a lease, usually of a short duration.

Tenant: a person to whom a lease is granted usually in return for payment of rent. The tenant normally agrees to perform specific obligations in respect of the property (e.g. to keep it in good repair to prevent pollution escaping from the land.).

Tenure: the method whereby land rights are held.

Title: the evidence of a person's right to property.

Title deeds: documents giving evidence of title to land.

Title plan: a plan especially drawn to show the boundaries of land parcels.

Topography: the physical features of the Earth's surface.

Transfer: either the act by which title to property is conveyed from one person to another or the document used to pass registered land to the transferee.

Trust: in common law, an arrangement by which legal title to property is held by one person on behalf of and for the benefit of another.

Trustee: a person who holds property on trust for another.

Usufruct: the restricted right by which a person is entitled to use and to enjoy the fruits of a property that is owned by another person.

Valuation: the determination of the value of property.

Valuation role: a list showing the value of property and those responsible for paying taxes on the property.

Value: either: the market value (sales price paid), the rental value (for how much it can be rented out), the use value (the potential of the land for example for agriculture), the investment value (what income it should generate), or: the assessed value (the official value for tax purposes).

Bibliography

AusIndustry (1995). Benchmarking Self Help Manual - Your Organization's Guide to Achieving Best Practice. AusIndustry-Best Practice Program, second edition 1995, Australian Government Publishing Service, Canberra, ISBN 0-644-43110-5.

EULIS : see <http://www.eulis.org/>

European Parliament. Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures. Official Journal L 013, 19/01/2000, p. 0012 – 0020.

Directive 2003/98 EC of the European Parliament and the Council of 17 November 2003 on the re-use of public sector information. Official Journal of the European Union, 31.12.2003, L 345/90 - L 345/96.

Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE). (SEC(2004) 980).

FIG Publications No. 5. Surveyor's contribution to land management. FIG Bureau, Finland, 1991.

Statement on the cadastre. FIG Bureau, Australia, 1995.

Food and Agriculture Organization of the United Nations. Computer applications to the cadastre and land registration in the Near East, Rome, 1993.

Cadastral surveys and records of rights in land. Rome, 1995.

The design of land consolidation pilot projects in Central and Eastern Europe. Rome, 2003.

INSPIRE. Spatial Data Infrastructures in Europe; State of Play 2003. Available from <http://inspire.jrc.it/>

International Association of Assessing Officers (IAAO). Glossary for property appraisal and assessment, Chicago, 1997.

Standard on mass appraisal of real property. Chicago, 2002.

International Valuation Standards Committee. International Valuation Standards, 2003.

United Nations Centre for Human Settlements. Guidelines for the improvement of land-registration and land-information systems in developing countries. Nairobi, 1990.

United Nations Economic Commission for Europe. Guide on the adaptation of real property laws in the countries of Central and Eastern Europe including questions of ownership, valuation, security, restitution, property management and brokerage. Geneva, 1995 (TRADE/WP.5/R.13).

Land Administration Guidelines with Special Reference to Countries in Transition . Geneva, 1996 (ECE/HBP/96).

Principles for the use of public-private partnerships (PPP) within land administration in the UNECE member countries. Geneva, in press.

Guidelines on Real Property Identifiers. Geneva, 2005 (ECE/HBP/135).

Land Administration Review: Armenia. Geneva, 2001 (ECE/HBP/132).

Land Administration Review: Georgia. Geneva, 2001.

Land Administration Review: Lithuania. Geneva, 2004 (ECE/HBP/117).

Land Administration Review: Russian Federation. Geneva, 2003 (ECE/HBP/131).

Social and Economic Benefits of Good Land Administration. Second edition. Geneva, 2005.