

Real property transactions

Procedures, transaction costs
and models



Jaap Zevenbergen
Andrew Frank
Erik Stubkjær (eds.)

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Preface

The importance of real estate to the modern economy cannot easily be overrated. Sales of land and buildings, the mortgage sector and the building industry are all part of this. To make these work properly, transactions in real property are needed, and should be safe and efficient. Nevertheless, the actors and procedures involved appear to differ even between countries with comparable economies.

A group of academics from fields like cadastral surveying, information science, economics and law who shared an interest in such procedures came together to study these in more detail. A research design was prepared during 1999 and 2000. Funding for joint activities and travel was sought and found via COST (European Cooperation in the field of Scientific and Technical Research), through Cost as Action G9 'Modelling Real Property Transactions'. The research was carried out from the Summer of 2001 till the end of 2005. For the objectives and an overview of the action please see Chapter 1. Although several results were published during this time, this book can be seen as the main reflection of the knowledge gained during the action.

Thanks go to all that contributed to the action, both to the authors of this book, as to the others who contributed to the knowledge that we generated together during the action. Further thanks go to the COST organisation for supporting the action, especially to the Scientific Officers Mrs. Anna Danti, Mr. Günter Siegel and Mr. David Gronbaek, as well as to the reviewers Prof. Danica Fink-Hafner, Prof. Hans Sevattal and the Domain Committee for Individuals, Societies, Cultures and Health (ISCH) for their positive words on the work accomplished. Thanks go to Dirk Dubbeling and his team of OTB Research Institute for Housing, Urban and Mobility Studies of the Delft University of Technology for changing our manuscripts into the book that you are holding right now. Further thanks go to IOS Press for publishing the book. Final thanks go once more to ESF-COST for their financial contribution to this book.

The book can only show you so much of what we have experienced and felt throughout the action. This certainly includes the amazement when hearing about other country's solutions, the challenges in finding commonalities and the satisfaction of discovering patterns and underlying causality. It also includes the camaraderie that comes with a common field of interest and shared experiences. Research is never finished, and we know that this work only covers some steps of a long staircase. But we hope and expect that we and you can build upon it in the future.

Jaap Zevenbergen
Andrew Frank
Erik Stubkjær

Part 1

1 Modelling real property transactions

An overview

Erik Stubkjær, Andrew Frank & Jaap Zevenbergen

1.1 Introduction

The focus of the research reported in this book is the transfer of ownership and other rights in land and buildings, both of which are of vital importance to society. Ownership rights determine how land is used and by whom it is used, whilst other important property rights are attached to land. Institutional 'real property rights' regulate the function of land in society within the limits of the constitution and statutory laws of each country. Real property markets are influenced by the cost of real property transactions.

Real property transactions transfer real property rights between people, and rules controlling real property transactions determine when and who may transfer which property rights to whom. Because land and buildings are so important, society has constructed safeguards to regulate real property transactions, which require that specific procedures be followed. The presented research project aimed first to provide a comprehensive and comparable description of real property transactions across European countries and, secondly, to assess and compare the costs related to these transactions.

Different legal traditions in different European countries created terminological and semantic difficulties to achieve comparable descriptions. Moreover, land and real property transactions are the object of different scientific disciplines, each overseeing a particular – and often incompatible – aspect: spatial planning, surveying, architecture and economics. The project used a systematic and semi-formal approach to modelling real property transactions, with methods developed by computer scientists, and produced comparable step-by-step descriptions for real property transactions for several European countries.

Transaction costs are the sum of the costs of each procedural step plus fees. Fees are simple to determine and the seller and buyer must pay them to a state agency or consultant he or she hires. However, the steps and organisations involved vary substantially, and restricting one's viewpoint to the parties interested in the transaction does not give the full picture, since notable costs are borne by the public. The comparison of the cost between countries demonstrated significant differences and revealed alternative 'philosophies' for controlling land.

The COST Action G9 'Modelling Real Property Transactions' was launched in 2001 and brought together researchers mostly from the fields of surveying and economics and from twelve European countries. Through a series of meetings and publications, questions were clarified and answers given, leading to further questions. This book presents the findings after four years and is a compilation of contributions from many of the participants, addressing specific questions and presenting the results.

The remainder of this chapter introduces the objectives, then reviews the outcome of the action in three sections, which cover clarification of terminology, real property transaction procedures and the cost of these procedures. In a brief section the participants are listed and details of how the work was carried out are given. The chapter closes with a discussion of open questions for future work.

At the beginning of a research project the researcher often has a certain question, a certain disciplinary focus and a certain methodology in mind. When conducting research in an interdisciplinary field like ‘cadastral studies’ the researcher must be open to reviewing the question and the methodology when some initial answers have been found. The start document for the Cost Action G9 contained a rather detailed description of legal and administrative aspects, as well as of the ontologies for geographic information processing: these were aspects that had been made clear in prior research. In the course of the project we found it necessary to shift our focus to include the framework of New Institutional Economics to model transaction costs in real property, and we had to investigate the position of the real estate sector within National Statistics, two points only very briefly mentioned in the project document.

The project revealed more substantial differences in the objectives that different European countries pursue through the regulation of real property transactions. It becomes evident that a straightforward comparison of the cost of comparable steps in property transactions in different countries is tantamount to comparing apples with oranges and reveals only half the truth. We hope that this research has contributed to an improved understanding of this area and will inspire others to pursue some of the interesting questions we had to leave unanswered.

1.2 The objectives of the COST Action G9 ‘Modelling Real Property Transactions’

In 2001 the objectives (as stated in the Technical Annex, which defines the Cost Action G9) were as follows:

- The main objective of the COST action is to improve the transparency of real property markets and to provide a stronger basis for the reduction of costs of real property transactions by preparing a set of models of real property transactions, which is correct, formalised, and complete according to stated criteria, and then assessing the economic efficiency of these transactions.
 - The detailed information will be presented in such way as to include a formal description of the underlying data. For selected European countries a comparative analysis of the economic efficiency of transactions involved in the transfer of property rights will be presented, supplemented by an exploratory analysis of relations between transaction costs and national
-

practices regarding land management, education, and governance.

- The models of real property transactions must satisfy the criteria of validity from an information modelling, ontological perspective, as well as from a legal perspective. The transactions regard inter-organisational business workflows, which are stating or changing property rights and parcel lots.
- The essential effects, intended and non-intended, of the real property transactions are likely to differ among the countries being investigated. The comparative analysis of the economic efficiency of transactions will include an identification of these effects and an assessment of their impact on the economic efficiency, including an assessment of the value of transaction information for further purposes.
- Statements will be made on the real property transactions, which affect land management, specifically regarding the transition of land use from rural to urban. The statements will identify threats to the transparency that is at stake during the transition process.
- The main benefit of the action is that governments, professions, and holders of property rights get a better basis for reducing the costs of the transactions of the markets of real estates.
- The developed models can be used for drafting new ordinances, and for education. The outcome of the comparative analysis can be used for improving the efficiency of the procedures. The provided description of various effects of property transactions can serve as inspiration for other countries, also by addressing the issue of transparency of real property transactions.

1.3 Terminology

Clarification of terminology and strict definitions are crucial for all scientific research (Gottman et al., 2002). In a project investigating real estate, the primary terminology is the terminology of the national law in the national language (or languages). The meaning of terms like ‘real estate’, ‘ownership’ and ‘mortgage’ is defined in the law (Navratil, 2002; Navratil et al., 2003), with semantics that are different in different national legal contexts. This makes comparison across countries difficult, because the same term may be used differently and often there is no exact correspondence between concepts. For example, a *registry of deeds* in the United States and a *Grundbuch* in Germany serve the same overall function, namely listing the owners of land, but the details are different such that a translation of *Grundbuch* as ‘registry of deeds’ is acceptable only in the most superficial of discussions.

National laws select appropriate words from their language to describe legal concepts; these terms have no equivalent even between countries that use the same language. For example, the term *Kataster* is used in Austria to indicate what in Germany is known as the *Liegenschaftsbuch*.

Fortunately, a conceptual agreement in European law does exist; it is based on common roots, namely Roman law as collected in Justinian's Digest. The cadastral law and its practical execution throughout the Habsburg Empire gives a common background to many Central and Eastern European Countries. Many national real property laws (France, Spain and South America, for example) originated with the codification of civil law in the time of Napoleon and have since evolved. Later on, the Prussian development of civil and administrative law spread its influence beyond the German borders. Other countries, in particular the Nordic countries, Russia and Muslim countries, have separate traditions. This makes it increasingly difficult to find corresponding concepts and to fix translations to a single common terminology necessary in a project like this.

The project used English as a working language and used in preference the legal terminology as defined in a well-known law dictionary (Black, 1996), despite the potential dangers of importing part of the conceptual background of a foreign legal system along with the terminology. As far as practical, terms used in a national law were always added to the translated terms, to remind readers of possibly different connotations and to preserve the detailed meaning for more knowledgeable readers.

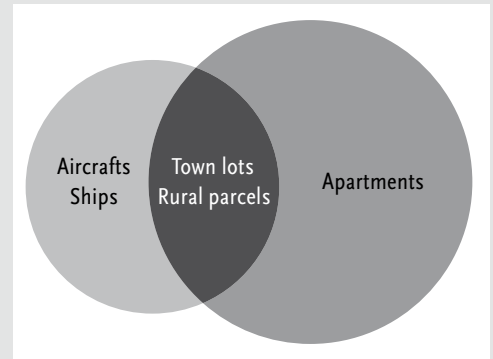
1.4 Definition

The definition of 'real property' in the law dictionary is as follows:

Land and anything growing on, attached to, or erected on it, excluding anything that may be severed without injury to the land; real property can be either corporeal (soil and buildings) or incorporeal (easements). – Also termed realty; real estate. (entry Property, subentry Real Property (Black, 1996)).

This definition of a legal term points both to physical objects and to non-physical objects, which exist only in a legal sense:

- The first part of the definition is a definition of physical land and buildings: the term 'real estate' is prototypically used to describe land parcels, buildings with the land they are sitting on, and also flats in apartment buildings when they are separately owned, etc. It is noteworthy that land parcels must be delimited with recognisable boundaries to form an object in the sense of the law. A land parcel is a physical object in the tiered ontology ((Frank, 2000), see Chapter 10), which 'counts as real property in the context of the law' (Searle, 1995).
 - After the semicolon, the definition expands the applicability of the term 'real property' to other – non-physical – objects related to land, primarily rights, such as easements, securities for debt, etc.
-

Figure 1.1 Examples of real property

Source: Frank, 2005

Most national laws differentiate between movable and immovable goods and require special procedures for the transfer of ownerships and other rights in immovable objects (for example the Swiss Civil Code (Schönenberger, 1976)). Not every object considered by a layperson as real estate is real property in legal terms and, of course, not everything described as real property in legal terminology is seen as real estate by the public; linguists speak of ‘prototype effects’ (Rosch, 1973): land parcels are prototypical, most laypersons can see how ownership of apartments is treated similarly, but it may surprise that many national laws treat aircraft and ships in the same way (see Figure 1.1).

Differences are substantial in terms of what a national law will admit as incorporeal real property. Typically, rights to secure credit (mortgages) and easement (for example a right of way) are construed legally as real property. The mortgagee, enjoying a property right, is in a better position to enforce the right relative to an alternative contractual right, enforceable against a person, cf. Arruñada (2003). For the purposes of this study, we admit as real property everything which can, under national law, be registered as real property. Countries differ mostly in what they exclude: property of apartments in buildings are often construed as real estate, but not always (e.g. Finland); sometimes the ownership of land is separated from the property of the building erected on it (e.g. Latvia, cf. Chapter 3), etc.

The other important concept for this study is ownership, to be understood through the definition of ‘owner’ in the law dictionary:

One who has the right to possess, use, and convey something; a proprietor (entry owner (Black, 1996)).

The concept of ownership seems to be both a factual term and a legal term. The law sometimes separates ownership from possession; possession describes then the direct factual control of a thing, e.g. a pencil, a book, or a car, or even a piece of land. A tenant has possession of the land, but does not necessarily have ownership of that land. Possession includes the right to use, but not the right to convey the object to another owner.

1.5 Procedures

Real property transactions are the procedures that are necessary for owners to dispose legally of their ownership (or related real property rights) and a

new owner to acquire them. National laws prescribe stringent, multi-step procedures that must be followed to achieve a legally valid transfer of ownership. These restrictions are intended first and foremost to protect the parties involved, but also to further other public goals. Other parties, besides the seller and the buyer, may be involved: lawyers, notaries, real estate agents, real estate valuers, and geodetic surveyors. The details of the procedures vary according to whether urban or rural land is conveyed.

In order to achieve comparable detailed descriptions, two important cases, which are similar in all European countries, were selected:

- The acquisition of a single-family dwelling in a small town. This is an important transaction in the lives of many families, and often the most important one in a lifetime.
- The subdivision of a parcel with the intention to build a single-family home.

A very large percentage of real property transactions relate to sales and subdivisions, especially when transactions in apartments are included; a study of these two transaction types should reveal interesting insights into national procedures and provide a valid basis on which to compare transaction costs and how they influence the market.

The procedures for the transfer of ownership in these two cases were collected. Efforts were made to describe in detail a single realistic case and to avoid getting lost in differentiations particular to a single country. Details of the procedures are different in every country and the prescriptions are spread over different types of instructions. Only if a very concrete case is selected are all the details of a procedure fixed, but seldom does a single person know all of them. Using the standardised cases and following the necessary procedures through all professional specialists involved resulted in draft descriptions. It was often found that comparison in discussion with specialists from other countries led to more precise descriptions that were then further refined to reflect the national particulars better.

Based on the experience with the two transaction types selected, it was thought that other transaction types, such as vesting of easements and land consolidation, were likely to be more difficult to compare. These other types of transaction tend to be more complex, aim at a wider range of objectives, and are more influenced by national traditions than sales and subdivisions.

For most of the participating countries – Denmark, England/Wales, Finland, Greece, Hungary, the Netherlands, Slovenia, and Sweden – the transaction processes are described in some detail and, based on these different types, comparisons can be made. The descriptions could be refined, but the benefits of giving more details were not evident. The action objectives mentioned transparency in comparing transactions in order to conduct a comparison of transaction costs and also mentioned the need to educate real prop-

erty specialists. Both goals can be satisfied with the current descriptions. The raw descriptions, which had not yet been made comparable, are available for use in new research.

Identifying similarities between countries appears to be more important than finding more details distinguishing procedures in different countries. Two influences resulting in similar procedures are:

- countries that have or do not have notaries;
- the organisation of land surveying:
 - countries with very simple subdivision (FIN, NL, UK), allowing sale of unsurveyed parts of properties;
 - countries with state surveyors;
 - countries with private surveyors (subgroups of surveyors as technical experts or with official authority).

1.6 Modelling

Achieving comparable descriptions, where no common terminology and conceptualisation is available, is a challenge. First, methods and tools to formalise conceptualisations and construct procedural models were investigated. Such methods had been used on previous occasions (Bittner, 2001; Navratil, 2002) to model cadastres in general and national procedures in particular. The Workshop 2001 in Bremen (Stuckenschmidt et al., 2003) revealed that the gap between the very formal approaches and the practical requirements of the project was too large. Instead of the recommended top-down approach, from general concepts to specialised procedures, an approach that worked from the routinised behaviour of the actors (parties and their advisors) ‘upwards’ was deemed more practical.

The suggestion to use the Unified Modelling Language (UML) was made at the start (see Šumrada (2002)). This specification language is often used for the analysis and design of information systems. UML is widely known and has good learning materials and substantial support tools. Over the course of the action for most participating countries the real property transaction processes were depicted in the form of UML activity diagrams (see Chapters 2 and 8).

In parallel, the development of a core cadastral domain model (CCDM) as a UML class diagram was undertaken under the guidance of Chrit Lemmen and Peter van Oosterom, within the framework of FIG (van Oosterom et al., 2002a; van Oosterom et al., 2002b; van Oosterom et al., 2003; van Oosterom et al., 2006). Several COST G9 action partners became involved, which resulted in a joint FIG and COST G9 workshop in Bamberg in December 2004 (van Oosterom et al., 2005).

The UML diagramming technique connects the class oriented analysis with a procedural view. The cadastral domain cannot do without the more data-

(set) oriented way of thinking, represented by the class diagrams; neither can it do without the process approach representing the constant flow of changes in man-land relations that calls for updating those data sets. The core cadastral domain model stresses a more static view and is complemented by the process-oriented activity diagrams produced in the COST action. We believe that neither of these alone will be expressive enough to be truly called a domain model (Zevenbergen, 2002; Stubkjær, 2003b). A domain model must list the most important aspects of the domain, being objects, actors or procedures. A model of this kind is shown in Chapter 6 (and in Stubkjær, 2003a).

The different types of diagram in a domain model each focus on a different aspect. The class diagram is useful in database and software design, whereas activity diagrams help in showing which actors are involved and how they interact. Only the activity diagram revealed the differences in real property transactions and through comparison allowed to identify some of the social goals justifying the differences.

More intelligent modelling languages are being developed by knowledge engineers to support ontological reasoning. Some first steps towards implementing these in order to come to automatic comparison can be found in Chapters 8 and 9.

1.7 Was the analysis of real property transactions revealed?

The primary objective of a real property registry is to identify ownership and related rights to land. To achieve this common primary goal, the same data are needed and therefore class diagrams are quite similar for land registries in different countries. Comparing the activity diagrams, however, reveals differences, as has been shown in the EULIS project (Tiainen, 2005) and the action COST G9 (see Chapters 2 and 8).

The comparison of the activity diagrams revealed differences and allowed us to understand the intended goals of legislators and to identify the contribution made by a real property transaction to other land management processes. The comparison revealed an enormous variety and number of other goals national legislators have linked with the registration procedures. The primary goal almost across the board is that of collecting tax, but there is a diverse list of other goals (see Frank, 2005).

Land taxation

One of the original functions of a cadastre is the equitable taxation of land. Where possible, a comprehensive and national tax base was prepared, based on a detailed map produced by a land surveyor and attributed through uniform assessment methods, all contributing to the goal of equitable taxation.

Slovenia plans to use modern mass appraisal methods to update its land values for taxation; this is novel for most European countries, but is standard practice in the United States. A land tax, which is to be paid regularly, is reflected in the class diagram as the base data (size of parcel, assessed value, etc.) that are necessary to calculate the tax. This might affect transactions, depending on how authorities ensure that the previous owner has paid his taxes before the transfer, but often the burden is passed to the buyer by granting a tax lien (mortgage) for unpaid taxes.

The goal of equitable land taxation requires that the size and value of a newly formed parcel during subdivision is fixed by an expert. In other countries, a certification that all taxes have been paid is required. The seller must provide this certification before a transaction can be completed.

Land sales taxes

Legislators have also found that sale of land, a time at which the seller most likely has cash in their hand, is a good opportunity for taxation. Therefore, land sales taxes are typically based on the value of the contract and taxed separately from ownership.

This tax has several effects: first, the parties are induced to state in the contract a lower price than that which was actually paid. Second, parties are lured into private (unregistered) contracts. Frank has found large numbers of unregistered land transfer contracts in some South American countries, along with the practice of registering sales through adverse possession, whereby the parties swear that the necessary period of undisturbed use has been completed. This form of registration of ownership based on undisturbed adverse possession is not taxed, whereas sales are taxed by different authorities and obtaining the necessary documentation declaring that taxes have been paid is difficult.

Taxation of transfer has negative effects on the performance of the registry but also on the allocation of land; the difference between new use and current use must be large enough to overcome the hurdle of the transaction cost, including tax, for the parties. Countries with land sales taxes typically require that the seller or buyer demonstrates that the tax is paid before a transaction can be completed.

Facilitating acquisition of land by others

When a parcel changes ownership it is the perfect time to allow others to pre-empt the contract and to acquire the property at the same price instead of the negotiated buyer. This firstly reduces the incidence of tax cheating with underreporting of sales prices (because the pre-emptor will pay only the reported price) but is also used to further other goals, e.g. protection of family farming is often furthered by a provision that neighbours can pre-empt a sale. Pre-emption for family members is also often encountered, but pre-emption

rights may also be given to the local jurisdiction (town) (see Chapter 12).

Effective pre-emption rights must give the party which may make use of the pre-emption right a reasonable amount of time to learn about the contract and to make a decision. Pre-emption rights therefore typically add some notification of the intended sale to the parties that could pre-empt and grant a waiting period for them to decide. This period of time is added to the time necessary to complete the transfer and increases its cost by increasing the risk.

Pre-emption rights make land transactions more risky in general, because the parties are never certain that the transfer will occur as planned. The upfront costs to the buyer of investigating the parcel and making a decision may be wasted.

Other goals

When a real property transaction is planned, numerous other public goals may need protection. Legislators tend to add safeguards to the transaction by requiring the interested parties to produce a certification by some authority that the intended transaction does not negatively affect these public goals.

By certification we mean all procedures inducing other parties – mostly public agencies – to make some positive statement that the procedure should go forward. For example, to protect farmland in Austria, ‘subdivision in agricultural land’ certification is required from the ministry of agriculture to ensure that the new parcel maintains the form and access necessary for productive agriculture. In some Scandinavian countries, certification of conformance with planned land use must be issued by the local jurisdiction (municipality). Another type of certification is used in Austria to protect certain classes of sellers and to make it more difficult for them to sell their property (e.g. the Church).

Certification is always costly and increases the length of the procedure. The cost may be direct when the parties must acquire the certification themselves from a public agency or an authorised agent. The cost may be borne by the public when certification is obtained by the registry as part of its internal procedure; this cost is then sometimes passed on to the client as part of the fee.

We can see these different procedures linked to the registration of ownership as social burdens, which are linked to the transfer of ownership. They have the same effect as taxes: they make land transactions more costly. It is tempting for the legislator to burden the transfer of ownership in real estate with various other social goals. It seems difficult to achieve an assessment of the benefits and compare them with the cost: they fluctuate according to politics and with the times. Whether or not the costs outweigh the benefits is a political matter.

1.8 Transaction costs

Classical economic theory assumes that transactions have no cost. However, everyday experience tells us that transactions are costly. Everybody has experienced the effort necessary to buy, for example, a new car. One has to obtain information about the cars offered and then to select one, negotiate a price, etc. Similarly, there is an effort on the part of the seller to advertise, to contact prospective buyers, etc. The transaction costs are most vividly experienced when buying a new car and then trying to sell the exact same car a minute later: the price one obtains is much lower than what one paid – this is the cost of the transaction!

Douglass North introduced the concept of ‘institution’ in transaction cost theory and thereby allowed for deeper and empirical analysis of property rights issues. He contributed substantially to the foundation of New Institutional Economics during the 1980s (see, for example, North, 1990) and received the Nobel Prize in 1993. The theory of transaction cost is a precondition for understanding how companies work and how the competitiveness of a country in the international market is influenced substantially by the transaction costs. Hence the need to analyse and compare the transaction cost across Europe.

The terms ‘transaction’ and ‘transaction costs’ are technical terms within New Institutional Economics. The cost of buying commodities includes not only the price paid but also the efforts of searching for the best offer, assessing the quality of the product, protecting the property rights during the transaction with institutionalised paper trails and enforcement measures. Similarly the value of a commodity to a seller is the price the seller receives minus his selling effort. Detailed description of the different steps a buyer and seller must undertake together with assessment of their cost can be found in Chapter 4.

North splits transaction costs very generally into measurement and enforcement costs, and further differentiates search costs and market costs. In a more recent article Quigley (1996) differentiates six different types of costs specific to real property transactions, which may also be applied:

- search cost: the cost of obtaining information about available properties and identifying the one to acquire;
- legal cost: the cost of assistance with legal aspects of the acquisition; assessing the legal status of the property offered and guidance with the process;
- administrative cost: cost of administrative procedures;
- adjustment (or development) cost: cost of adapting the current physical and legal situation to new uses;
- financial cost: the cost of the capital required during the transaction; typically, payment for the new property is expected before the previously owned

property is sold;

- **uncertainty cost:** the cost associated with the risk involved in the transaction.

Our study concentrates on legal and administrative costs but includes some of the other costs. We found that risk is a substantial factor in some countries, especially in the transition countries.

Transaction costs are not only important per se but influence the market and therewith the optimality of allocation of resources. Higher transaction costs result in a smaller market volume: the difference between the value of the utility of the real estate to the current owner and the value to a prospective new owner must be higher to overcome the higher cost incurred in the transaction. Allocation of resources is not optimal compared with the allocation when transaction costs are zero and all land is allocated optimally. This is a loss for the economy as a whole.

This viewpoint is not exclusively in monetary terms and includes external cost, primarily social costs. Low transaction costs for real estate may result in very frequent changes in the environment, which may create external costs. If new constructions are replacing old ones at a rapid pace, faster than society can easily adapt, we face the social costs of adaptation, usually 'paid' by the elder generation or the children. Transaction rates also affect the speed with which social groups mix or separate: Portugali has shown in simulations that low transfer levels – in his case changing family apartments, either by lease or ownership – affects the mixing or separation of different racial groups in a city (Benenson et al., 1995). The influence of transaction costs on the performance on real property markets considers the cost as seen by the buyer and seller. The costs include fees and duties to public services, as well as charges and fees to counsel and consultants. Fees, etc. seem to be fairly easy to record. The costs of fees are more varied and therefore more difficult to establish, because of their complexity and hence the costs of cases. The cost of the parties' own efforts may be accounted for in verbal form, including references to search facilities available and their charges. Selecting typical cases, the costs can be assessed for each country and converted to a common currency (e.g. the euro) and compared, for example Viitanen (2003) for Finland, and Lisec (2004) and Mikkonen (2004) for Finland and Slovenia (see also Chapter 4). The modelling approach chosen implies a comparison of transaction costs across countries, based on procedures. In a series of investigations, Arruñada analysed and compared transaction costs, based on legal concepts and organisational structures (Arruñada, 2002; 2003; Arruñada & Garoupa, 2005). The World Bank reported on the processes and costs of registering property using a comparable methodology (World Bank, 2005), and recently a related study was performed in Germany (BMVBS/BBR, 2006). A comparison of methodologies and outcomes is deferred here.

As our interest is also to understand which procedures are more effective from a national, not an individual, position, then the above assessment of costs to the parties is insufficient: it overestimates the cost of real property transaction to the national economy by including taxes into the cost, and it underestimates the real property transaction cost by not including the cost of running the real property registration system. The provision of governmental services such as land registries, land survey, courts and also the formation and organisation of the related professional services are a substantial cost borne by the public and often only imperfectly passed on to the users as fees for services rendered.

Governmental services in the form of cadastre and land registration make manageable units of real estate from unstructured space and other natural resources. Such units do not physically exist by themselves and do not form legal units automatically, but only through an institutionalised process do they become units with legal status. Land registration, including boundary creation, is a process of capital formation as described by De Soto (2003) (Zaibert et al., 2003). Government charges for such services are difficult to separate into fees for services rendered and tax; occasionally the fees are so low that effectively the public subsidises the formation and registration of land parcels.

Methods that were developed for the standardised System of National Accounts, in particular the so-called 'Satellite Accounts', must be applied to render a comprehensive picture. One would have to define the field of interest, namely the segment of society concerned with changes of rights in real property, which is difficult to separate from the construction sector. Description of the activities with relation to the standard classification NACE (Nomenclature statistique des Activités économiques dans la Communauté Européenne (Statistical classification of economic activities in the European Community)) is necessary to collect the data in a framework comparable to other fields. In Chapter 5 this approach is further developed.

Public bodies are not reflected in any detail in the industrial classification of NACE, which encouraged us to follow a different route to assess the public cost of real property transactions. The yearly reports of the agencies involved in each country show – with varying levels of detail – the cost of running these agencies and the number of transactions handled. From these indications rough estimates for average transaction cost for the national agencies can be computed.

The three different assessments of the cost of real property transactions include different scopes:

- the viewpoint of the parties (buyer and seller) includes taxes as a cost; it is relevant for the functioning of the market;
- the agency viewpoint helps to identify whether transactions are subsidised or taxed;

- the viewpoint of national accounting shows overall benefits and costs, and thus the overall efficiency of real property transactions.

General policy issues like cost recovery for public services and more generally the commercialisation of public sector information are typically focused on the ‘agency viewpoint’ and may lead to decisions which, from a national viewpoint, are short-sighted (Martinez-Asenjo *et al.*, 2002). Currently, data to guide such decisions are scant, but in recent years national statistical services, authorities encouraging competitions and markets, and the European Commission have, in the context of the Lisbon Strategy, paid increased attention to the delivery of professional services, cf. COM (2005).

Despite the limitations in measuring and comparing transaction costs, a few countries – Denmark, Finland, and Slovenia – have quantitatively estimated transaction costs in a comparable way. Two approaches were followed: the first relates to the transaction costs for the users (‘clients’) of the system (see Chapter 4), while the second relates to the money involved within the system as part of the national economy (see Chapter 5 and Gysting, 2005; Lavrac, 2005; Stubkjær, 2005).

1.9 Performance of the COST G9 Action

The action was initiated by a small group of university researchers with research interests in cadastre, geoinformation, and surveying. The COST action made it possible to establish an organised cooperation between 2001 and 2005 and to involve researchers from different backgrounds. These were mostly surveyors, but information specialists, lawyers and economists also participated.

Participants came from the following ten university departments, which focus on land surveying and associated aspects, that are formally related to the project:

- Department of Development and Planning, Aalborg University;
- Department of Geodesy, Delft University of Technology¹;
- Department of Building and Surveying, Napier University, Edinburgh²;
- Institute of Real Estate Studies, Department of Surveying, Helsinki University of Technology;
- Geodetic Department, University of Ljubljana, Slovenia;
- Land Management Research Unit, School of Computing and Technology, University of East London;

¹ Now OTB Research Institute, Delft University of Technology.

² Partner that –due to various reasons– did not participate actively after the early start.

- Professor group of Geodesy and Cartography, Riga Technical University, Latvia;
- Division of Real Estate Planning and Land Law, Royal Institute of Technology, Stockholm;
- Department of Geoinformatics, College of Surveying and Land Management, The University of West Hungary, Székesfehérvár;
- Department of Rural and Surveying Engineering, Aristotle University of Thessaloniki (joined in 2003);
- Department of Geoinformation, Technical University of Vienna.

The following four university departments provided information science and economics input in the project³:

- Centre for Computing Technologies, University of Bremen⁴;
- Department of Computer Science, Aalborg University;
- Department of Industrial Economics and Strategy, Copenhagen Business School;
- Department of Business Administration, Universidad Carlos III de Madrid.

Officially, the project was divided into three working groups:

- WG 1: Law and Models
- WG 2: Cadastral Science
- WG 3: Economy.

but the connections between the topics were so intricate that most participants did not limit themselves to one working group only and meetings usually covered more than one WG. The dependence of one WG on progress made in another further played a part in reducing the differences between the working groups. For example, at least the preliminary findings of WGs 1 and 2 were needed before WG 3 could start work. Important results came from the co-operation between WGs 1 and 2, especially the description of procedures in the form of different types of models (see Chapter 2).

The two working groups 1 and 2 also joined with other groups working in a similar area and jointly organised with Commission 7 of the FIG (International Federation of Surveyors) a conference 'Standardization in the Cadastral Domain' in Bamberg in the autumn of 2004. This conference was attended by 59 researchers from 14 countries and the findings were produced as a conference proceeding (van Oosterom et al., 2005).

In total, eight general meetings were held, at approximately half-year inter-

⁴ Later replaced by the Faculty of Economic and Applied Informatics, Otto-Friederich Universität Bamberg.

³ The departments (Aalborg University, Copenhagen Business School and Universidad Carlos III de Madrid) were later also replaced by the Faculty of Economic and Applied Informatics, Otto-Friederich Universität Bamberg.

vals. These were always followed by the meeting of the Management Committee of the Action (containing one or two representatives from each participating country). Meetings were held in Bremen (D), Vienna-Schewat (A), Delft (NL), Sopron (H), Helsinki (FIN), Riga (LV), Thessaloniki (GR), and Stockholm (S). In the last two years of the Action WG 2 held two meetings in Székesfehérvár (H) and Aalborg (DK), and WG 3 held two in Ljubljana (SLO) and Grange-on-Sands (UK). With the exception of Spain (where a planned meeting had to be cancelled) we met at least once in all participating countries.

During the action most presentations and discussions took place in plenary meetings, although different sessions could be attributed to one of the working groups. In addition to the participants from the network, other people from the host country attended the meetings. These included other university researchers, as well as representatives of organisations involved in real property transactions (in particular cadastral and survey agencies or land developers) in that country. Specialists from disciplines in which additional input was needed, e.g. knowledge engineering, Institutional Economics, and Statistics, were invited to give lectures at some of the meetings. In hindsight, it is evident that these contributions influenced the course of the action substantially.

Short Term Scientific Missions (STSMs) were very important in achieving the comparisons across national boundaries. These STSMs allowed (mostly junior) staff members of participating institutes to travel to another participating institute to take advantage of the research facilities available there. In total, fifteen such missions were undertaken, in particular by PhD students. Some of their findings can be seen in Vitikainen (Chapter 4), Ottens and Stubkjær (Chapter 6), and Hess and Vaskovich (Chapter 8).

The findings of the Action were promoted beyond the group involved: papers giving a broad overview of the Action's objectives and intermediate findings have been presented at other scientific and professional meetings (Stubkjær, 2002; Zevenbergen, 2002; Stubkjær, 2003b; Frank, 2005). More information can also be found on the COST G9 home page: <http://costg9.plan.aau.dk/>.

1.10 Conclusion and further work

As this COST action comes to a close it is useful to review what has been achieved and what can be learned from the COST action both methodologically and substantially for the organisation of real estate registration in general. The findings were as follows:

- A method to describe and compare the procedures used in different countries has been developed. Using this schema, the procedure in another, new country can be quickly captured and compared with the countries we have analysed.

- The procedures for registration of real estate transactions have been systematically described for several countries. These descriptions allow analysis and comparisons.
- Cost of transactions can be deduced from their descriptions; it is also possible to assess the time necessary for a transaction and compare the differences in registration procedures quantitatively across different countries.

This project taught us some important lessons, which are worth reviewing:

- Good science starts with clear terminology (Gottman *et al.*, 2002). Scientific investigation in a field where terminology is confused or not comparable across national boundaries is extremely difficult. Social science is often faced with this problem and this project was no exception. A major result of the project is the method found to compare 'non-comparable' terminology by identifying physical objects which are the same (or similar) across cultural boundaries and basic social processes (use, full economic control, inheritance, security, etc.), which again are comparable across national boundaries. After initially neglecting the need to agree on terminology, we found – the hard way – a way to address terminology issues and start constructing the corresponding ontology.
- Comparison shows that comparable parts of the system of ownership registration and transfer of real estate ownership are similar across national boundaries and differences in efficiency and cost are bound to disappear – provided that taxes and other social burdens are excluded and the focus is on registration only. Countries in transition have difficulties renewing and rebuilding their land registries; educating the necessary personnel and coping with the large number of updates in conjunction with the transition from socialist to market economies at the same time results in backlogs; this seems to be predominately a transitory situation that is soon overcome.
- Legislators are tempted to burden the process of registration of an ownership transfer with various other socially desirable restrictions. Taxes associated with the transfer of ownership are nearly universal but various other goals are furthered by restrictions on the transfer of ownership. These invariably increase the cost of the transaction both financially and by slowing down the transfer. These differences cannot be part of a simple comparison because the benefits the legislator expects to gain from such burdens vary enormously, the benefits mostly depend on supplementary measures, and are hard to quantify; they are, as political goals, not directly related to securing ownership of real estate. The project has contributed to identifying such burdens and motivating further research in this direction. Information to the legislator in terms of social cost-benefit estimates is likely to appear only in medium to long terms. A good scientific project does not only answer questions but poses new ones and refines old ones. The analy-

sis of the functional objectives that real property transactions should fulfil should be extended beyond the simple sale and we found that subdivision transactions could be the next interesting target. Four functional objectives that can be seen in most of the participating countries with regard to subdivision are: (1) reorganising the rights in the plot and its surroundings according to the wishes of the parties, (2) without compromising the rights of passive (and active) holders of rights, (3) in compliance with spatial, environmental and agricultural legislation, etc., and (4) maintaining the clarity and efficiency of registration, by, for example, establishing systematically identified plots of land (cf. Stubkjær, 2002).

Although these four objectives can be observed in many of the countries, the order in which they are taken into account, and the actor dealing with them, clearly differs. Another group of countries, however, does not include all of these four objectives. Research should produce a methodology to connect the stated or tacitly followed procedures with unstated objectives to identify firstly which objectives in each country are included with subdivision procedures and then to identify the rationale for such decisions.

With a fairly rich array of descriptions and models of real property transactions available, it is time to look once more for formalised terminology and ontology. It was suggested to use the nouns from the activity descriptions as potential candidates for classes in an extended type of 'class diagram' and then to further formalise the activity descriptions (Stubkjær, 2004).

This project has advanced cadastral science as a field of geoinformation science and surveying. Last but not least, one may ask how it influences our perception on what cadastral science is and could be. These questions should be discussed in the new scientific journal (*Nordic Journal of Surveying and Real Estate Research*) which emerged during the life of this project and which was influenced by some of the leaders in this action.

We conclude the action in the uncertainty of how much comparison and unification could and should be achieved. The investigation started with an almost simple goal – comparing the cost of real property transactions across European countries, assuming that the terms used ('real property transaction' and 'transaction cost') were well defined for all the countries involved. The research revealed an increasing host of differences in terminology, concepts, goals and observation methods. We found methods that would provide answers to the 'simple question' posed at the start, but answers must be qualified, and we cannot award a gold medal to the country with the lowest transaction costs: the results are simply not comparable. It appears that differences are justified, while a drive to standardise to one solution is not justified and, fortunately, also not politically feasible.

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Part 2

2 Modelling property transactions

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2.1 Introduction: real property transfers and property formation

If economic development is to prevail in a society, efficient technical and social processes are needed to underpin continuous social change. It is a reasonable proposition that, the faster the pace of economic development, the more flexible the processes of change should be. Technical processes comprise such factors as production technology and logistics, while social processes include such factors as leadership, negotiations, the writing of contracts and bureaucratic routines. Few would deny that the general need for efficient processes also includes various parts of the real property sector.

In countries with private land ownership, methods must exist for transferring ownership from one person to another. Changes of ownership ought to be reasonably smooth and rapid to a greater or lesser extent, but in a changeable society this is not enough. There must be opportunities for changing property structure: it must be possible to create, redistribute and amalgamate properties, thus changing the shape of land parcels in which ownership is exercised. These activities also contribute to methods for producing new properties to be put on the market. Within economics, the theoretical ideal is for each piece of land to be in the hands of the party best able to use it. It is the task of the property market to achieve this. At the same time, land use has external consequences. This being so, changes cannot always be wholly entrusted to individual players. Public control may be needed to safeguard common interests. This control may vary in extent but should not be unwieldy.

Thus we have two processes which ought reasonably to function in market economies based on private ownership of real property, namely processes for changes of ownership and for property formation. If these two processes do not run smoothly, existing structures of ownership, property divisions and land use are liable to impede development instead of supporting it.

The purpose of this article is to expound models for international comparisons of property transfer and property formation. These two phenomena will be jointly referred to as transaction processes. A third process, hinted at above and concerning changes of land use through legally binding plans, permit decisions etc., will not be dealt with except insofar as it affects the two transaction processes under consideration.

Comparisons of property transfer and property formation are a scientific end in themselves. Comparative work can also play an important part in a country's development of more efficient legislation for the processes. But if this work is to be used for achieving more efficient transaction processes, it must be viewed in a wider national context, to avoid the risk of introducing

legal rules that may look good in one jurisdiction but which can have devastating effects in another.¹ Thus understanding of a country's code of rules can be obtained through in-depth studies, but at the same time one risks getting bogged down in details without arriving at any useful comparisons. One way round this is to decide at an early stage what the comparison will entail, i.e. what is judged to be important. The intention is, after all, by using reasonably simplified methods, to identify manageable and comparable conditions in different countries so that the person making the comparison will not need to master the whole body of each country's property law. Comparisons have to be standardised, despite the risks that this entails.

2.2 Systematic approach in general

2.2.1 System concepts used and relations between them

This study is based on a system approach. A system is seen here as an organised complex of related components whose purpose is to accomplish a final result². The components are generally seen as subsystems with specific sub-results³. In the context of this paper the components visually separate the different stages of the process and consist of the according group of actions.

The components (subsystems) consist of elements, which are the smallest parts to be observed. In our case the smallest element is an activity within a process, so in this paper the word 'activity' is used instead of 'element', since we will be using activity diagrams for process descriptions. The activities may end with a decision to investigate further, a product (e.g. a map), a decision (e.g. contract signing), etc. They may be informal, helping the parties to come to formal decisions, or formal, so that the results of the process will be legally valid.

Activities, then, are the smallest elements of our process analyses. When activities are being analysed, in principle they can be broken down infinitesimally, and so the breakdown has to be halted at a reasonable level, in keeping with the purpose defined for the study. This has its problems, because the question is where the breakdown is to be terminated, e.g. which things are to be included and which excluded. Ultimately it is the outcome that decides whether the processes have been successful, even if uncertainties remain and new questions are begged.

¹ Zweigert and Kötz (1998).

² A system study related to land registration and cadastre can be found in Zevenbergen (2002).

³ Components as a modular part of a system are described further in Šumrada (2005).

If, in the end, systems in several countries can be described and analysed in a similar graph, we have our model. As it is the goal of this study to create two transaction models (one for sale and one for subdivision), our use of the model must also be explained. Our model is an applied abstract supplement, which is formed of a graphical and descriptive specification of selected parts (domains) of reality. It represents simplified mapping of activity environments into conceived and interpreted notions. The aim of the models is to help us to understand and shape both the problem and its solution domain. If our modelling approach is successful, it makes the process transparent and comparable between countries.

Actors and objects are also included in the modelling as they influence or guide the process. This includes both actors servicing and actors serviced by the processes. The processes are constructed by and for people with different interests and they have various rights and interests to safeguard.

2.2.2 Limitations and working method

We are dealing here with property transfers and property formation. But there are various forms of property transfer, such as sale, gift, inheritance and exchange. Sale (sale and purchase are used synonymously in the article) will be taken here to represent all transfer transactions. There are also various types of property formation, such as subdivision, amalgamation and reallocation. Subdivision will be dealt with, but to retain the simplicity of presented cases, encumbrances are not included. The main principles of the legislation on purchase and subdivision will be illustrated by means of three typical instances, namely:

- *Instance 1.* Purchase of a detached house with land. It is assumed that an estate agent is involved and that the purchase is to be financed with a bank loan.
- *Instance 2.* Subdivision of undeveloped land for building purposes. It is assumed that the owner will retain both the subdivided property unit and the original property.
- *Instance 3.* Combined purchase and subdivision. It is assumed that a purchase of undeveloped land for building purposes will be co-ordinated with the subdivision of the land.

The first two instances have been chosen to illustrate common situations in the property market. The third is presumably less common, but illustrates the possibility of combining the first two instances in one process.

The three instances will be described as they occur in two countries, Slovenia and Sweden. To this end, basic, standardised activities, together with actors, will be defined to indicate the general system. The activities will be plotted in chronological order with the aid of activity charts, by the time

their purpose is made clear. Knowledge of the constituent activities and of how they are usually combined can be derived from legislation, literature, and interviews with professional practitioners and one's own practical experience.

The country descriptions will be followed by comparisons between the countries, to see whether a common model can be set up which includes basic components (subsystems). Differences of principle appearing between the two countries will then be commented on, as a means of testing the relevance of the model. Is it possible to compare and draw conclusions from the models?

We shall begin by describing the components to be used in the analysis that follows. The actual comparisons begin with a description of normal activities in connection with purchase and subdivision in Slovenia and then in Sweden. After the country descriptions have been completed, the comparison will be made and models constructed. Lastly, the models (including weaknesses) will be investigated and commented on.⁴

2.3 Basic components of purchase

In basic terms, a normal purchase of an existing property can be described as follows. Vendor and buyer search for each other with the aid of an estate agent. At the same time the buyer must investigate the property including legal and other cadastral data and the possibilities of financing the purchase with a bank loan. In certain locations, the sale of a property may be subject to public restrictions. If the purchase can be completed, a contract is signed and the purchase price paid. Legal expertise may be involved. Lastly, the purchase is formally registered at the land registry.

The activities leading to the signing of the contract of sale can be summed up as market-oriented, contract drafting and, where applicable, public control. The drawing up of a contract is a form of decision which changes the legal situation (i.e. ownership is transferred), and registration is a completion measure to make the purchase public. Five basic components of purchase can therefore be more systematically analysed.

- **Land policy control.** There are at least two forms of policy that can affect property acquisition. One of them is concerned with securing a particular land use, the other with who is entitled to own a property. The first form may be seen when a municipality is granted the right of pre-emption for land to be applied to a certain local government purpose. The second form is social, i.e. land policy favours certain groups of the population at the expense of

⁴ UML is used for modelling in this article. See Šumrada (2005). Rambough *et al.* (2005) was the primary reference for UML.

others. For example, a local resident may have first refusal on a property which is coming up for sale. The result of this control is to force market players into a certain kind of behaviour, so that transactions help to underpin the achievement of society's general objectives.

- **Marketing activities.** Marketing activities comprise the activities that take place when seller and buyer are searching for one another in a market. As a result, both vendor and buyer – but also creditor – come into contact with more players in the market, and are thus given the opportunity of maximising the fruits of their endeavours. Activities proceed both in the property market and in the credit market. Ultimately the parties can negotiate on conditions of sale and also judge the possibility of financing the transaction.
- **Pre-contracting.** For various reasons, a preliminary contract of sale is often used as a means of binding the parties as work continues towards a final agreement. This clarifies the terms of contract, including the conditions for a loan. In addition, this presents an opportunity to avoid a situation in which one party incurs expenses because the other party has withdrawn from the proceedings before they are completed.
- **Contracting.** The contract of sale is the final purchase document. The parties are agreed on all conditions and they enter into a binding commitment which includes the conditions of sale and, if needed, financing. The signing of the transaction results in the transition being finally confirmed, so long as the agreement is legally valid. At this point the purchase amount is handed over. Mortgage activities can be seen as a part of this component but may also be treated as a single component. The reason for this could be to analyse the complexity of combining purchase and loan contracts in the same process. The same can be said about rights and encumbrances, such as easements.
- **Registration.** Purchase registration comprises the legal scrutiny and other activities associated with entering the change of ownership in a public register. As a result, the transaction becomes transparent and, in many countries, also protected against third parties.

2.4 Basic functions for property formation

Property formation is described with the aid of subdivision procedures. A new property must somehow be defined. A society's land policy can affect the possibility of doing so. Moreover, it has to be decided that, with effect from a certain point in time, an area of land is to be separated from the original property and constitute a legal entity in its own right. This new property has to be made public by registration. Congruently with the above component description, we have four basic components of property formation. The marketing

activities component can be excluded, because the chosen subdivision case is subject to the property owner retaining both the original property and the subdivided one. Later, of course, he may sell one or both of them, but then we will have a process of sale. When the diagrams for subdivision are developed, the activity diagrams are expanded by introducing actors and roles.

- *Land policy control.* Property formation can be entirely free, but it can also be controlled, directly or indirectly, such that newly formed properties comply with society's land policy. Land policy can be aimed at the formation of properties and at the use to be made of them. The policy may, for example, be aimed at counteracting the formation of properties that are unduly large or small. As a consequence of control, the new property structure will agree with society's land policy.
- *Preparation of case.* Property formation involves the definition of new boundaries. These must be surveyed. In addition, new rights may need to be formed – rights of way, for example – and others may have to be removed. Mortgage loans are another type of encumbrance which can be affected. In connection with property formation, therefore, legal and territorial consequences have to be investigated and taken into account before a decision is made. Rights management, however, need not be a part of the subdivision process but can be dealt with separately, though this latter eventuality does not eliminate the necessity of taking rights into account, one way or another, during the actual subdivision procedure.
- *Cadastral decision.* The formation of an independent legal unit, i.e. the formation of a new property, is an act that needs to gain force of law. Some form of decision thus has to be made whereby a new division into property applies from a certain point in time. As a result, a new, unambiguous and well-defined property is obtained which is separate from the original one. The new property must be capable of carrying rights of its own.
- *Registration.* Properties in the Western world are usually registered, with the result that the extent and legal content of the new property and the original property are known to the market and public authorities, which facilitates both their sale and purchase and the borrowing/lending of money on the security of the property.

2.5 Conceivable but excluded components

The components chosen are to be used to describe subdivision as well as purchase processes in such a way that the activities and decisions included in the processes will be comparable between countries. The components are therefore used to illuminate similarities and differences. Responsible individuals and organisations are also included in the process descriptions, so as to add a further dimension to the inquiry, namely that of how a transaction

proceeds between different people and instances. The mandatory or chosen course of action affects the efficiency of the process.

There are, however, possible additional components that are excluded from the models. Processes for appealing public decisions will not be dealt with, because they are national in the sense that they tie in with a national structure indicating how appeal proceedings are to be conducted in courts and other bodies, rather than being uniquely designed on the basis of purchase and property formation procedures. Payment flows and taxes are briefly described in the text and figure descriptions prepared, but they are not allotted a component of their own. This is because they often form part of one or several of the components described.

It should also be noted that the basic components dealt with in this article are biased, since they emerged as the work progressed and are based on the countries investigated. They have, however, been included by way of introduction, so as to make the subsequent descriptions easier to understand. Certain components may presumably be altogether absent in a third country, while there may be additional components that have not been observed in this study. If, however, a model for comparisons is being developed, it must start with a concept and then be supplemented by means of continued tests and analyses. It should be added that the figures and descriptions presented have been simplified and standardised as far as possible, in an attempt to highlight the basic principles. Much has been omitted, in particular unusual activities not shedding light on the principles of a country's legislation.

2.6 Slovenia

2.6.1 Background information

Slovenia belongs to a group of countries having German legal provenance where it is important that all real rights can be acquired on two conditions, namely a promissory legal deal and public announcement through registration in the Land register. In general, the ownership rights gained through the registered transfer process are well-protected and secure. Today in Slovenia the legislation regarding property transactions is regulated by several laws that guard relationships between involved parties and pertain to the purpose and usage of land. The Slovenian cadastral system is a dual one consisting of the following:

- Land registry, and
- Land cadastre and Building cadastre.

Both were established by different organisations and in different historical periods and are maintained by two separate ministries even now. The Land

register is a part of the local courts under the jurisdiction of the Ministry of Justice. The Land and Building cadastre comes under the Ministry of the Environment and Spatial Planning. The Land cadastre was established at the beginning of the 19th century, when Slovenia was part of the Austrian Empire, and cadastre is derived from that origin. With the new legislation (post 2000) the new Building cadastre was established. Data recorded in the Building register includes data on buildings and parts of buildings.

The Slovenian Land register and the Land and Building cadastre are kept in two different digital databases. Both are declared and established as public registers. The role of the modern Land register together with the Land and Building cadastre is to secure property rights, to relate these rights to their holders, and to support different levels of state and municipal administration.

Since 1871 Slovenia has had a land registry system that guarantees the security of real rights (ownership, mortgage, land charge, easement and right of superficies or building right). The rights in the Land register can be acquired, transferred and extinguished upon a proposal (owner) or on official duty (court decision, or final decision of cadastral offices or state bodies). The relevant documents must be enclosed with the inscription proposal presented at the local court. Unregistered rights are not protected against third parties. Although the modern Land register is now digital, not all the data are up to date; there is a large backlog of entries and updates and the quality of data is only steadily improving.

2.6.2 Rights and encumbrances

Encumbrance is a right on the basis of which the owner of an encumbered property is bound to future charges or services. An encumbrance may be established on real property for the benefit of a specific person or of the owner of a specific property. Easement is a right held by one person to make use of the land of another for a limited purpose. Slovenian legislation distinguishes between real and personal easements. Real easements are created mainly to regulate neighbourhood relations. The purpose of real easements is to enable better use or exploitation of land. Most real easements are established for a right of way. A real easement is created:

- by law (electrical power cable easements, water easement, etc.);
- on the basis of a legal transaction, mainly for public utility infrastructure (in these cases, easements seldom enter into the Land register);
- by decision of a state body (e.g. court or administrative body).

Personal easements are established for the benefit of an appointed person until the holder's death (for a legal person the duration may not be longer than thirty years). Personal easements are strictly personal and non-transferable; they are intended for enjoyment (usufruct) and use of the object of a re-

al right or for the right of habitation. Personal easements are usually registered in the Land registry.

Mortgage is the most common method of financing real estate transactions as a lien on real estate. The acquisition of a mortgage on the basis of a legal transaction requires entry in the Land register. A mortgage is established to secure a claim until its final repayment. If a claim is partly repaid, the mortgage is not reduced. If a property encumbered with a mortgage is subdivided, each part of the property is encumbered with the mortgage in full. A mortgage also encompasses the accessories owned by the pledger, even if, for example, a new house was built after the mortgage had been established. If a real property is mortgaged to two or more mortgagees, the order in which they are repaid in full is determined by the time when the mortgage was created. Slovenian legislation distinguishes different type of mortgages, such as joint mortgages, maximum mortgages and super mortgages.

With the Law of Property, land debt was introduced. Slovenian land debt has much in common with the German *Grundschild*, and can be described as the securing of a preferential mortgage. It is similar to mortgage, but is established in a different way. Land debt can be established only on the real property and is an independent claim or charge. The land debt can be established by the property owner or by the mortgagee. Thus, it is independent of the existence of claim. The formation of a land debt is based on the one-sided legal transaction arranged by notary deed, by the entry demand into the Land registry and with the issuing of a land debt letter through the notary to the owner of the property, who can make further dispositions. The land letter is a kind of security that gives the creditor the option of 'direct' execution of repayment for the stated amount of money. The owner of a land letter can transfer (as endorsement) it to others in order to secure this claim or he can forward it as a gift.

The building right is also a new right in Slovenian legislation. It gives a legal or physical person the right to build a structure above or beneath the real property (parcel). Such right is generally established for not more than ninety-nine years.

Leasehold (obligation rights) is entered into the Land register only if the lease period is longer than one year. For the specific use of agricultural land for vineyards, orchards, hop gardens, etc., the minimum period of leasehold is prescribed by law and amounts to 25 years for vineyards and 20 years for orchards and hop gardens.

The pre-emption right is the right by which a beneficiary has an advantage but not an obligation to buy a specific property at a certain price. The pre-emption right is the privilege of being prior to others in claiming property that is subject to pre-emption. Such rights can be defined by law or imposed by a contract. Important for property transactions in urban areas are pre-emption rights on cultural heritage, either by the state or by the municipality, and the

municipal pre-emption rights for the future development of urban areas.

2.6.3 Purchase

The vendor and the buyer initiate the sale case of the selected parcel. They may need expert legal assistance for the purchase process. If the vendor and the buyer require support from an expert (surveyor, technical expert, lawyer, notary, real estate agent, etc.), they hire such assistance. The vendor must be the owner shown in the entry in the Land registry or (if the land registry is not up-to-date) in former purchase contracts (in some cases a whole chain of purchase contracts), which should already be in the process of formal registration. A number of persons may own a parcel jointly. Therefore, both vendor and buyer may be a group of people (physical persons) and/or juridical persons. Before the final contract is signed, a pre-contract may be signed. Pre-contract activities may include one of the following: offer or demand, public auction, tendering, negotiation and letter of intent.

The transfer of ownership of a whole parcel essentially involves the registration of the change of title and is carried out between the vendor, the buyer, the notary and the Land registry. If the vendor wishes to avoid possible conflicts with their neighbours, a surveying service for the settlement of boundaries is an additional option. This entails explicit collateral establishment of definitive boundaries in the field.

Sales concerning agricultural land, forests or waterways are bound by pre-emption rights and are thus different from sales of a parcel for building purposes. The legislation regarding agricultural land, forests or waterways (Act of agricultural land, Act of agriculture, Act of forest land, Water Act) restricts the use of such land according to its nature. The administrative authority for agriculture defines the pre-emptive buyer and gives him the permission to acquire agricultural land, forests or waterways. When the buyer of agricultural land is confirmed, the purchase process is the same as presented above.

The mediation of real estate falls under the special Act on Real Estate Agencies. With the advent of new technology (internet and web) the role of real estate agencies has become more evident. The most important step for a real estate agency is to establish contact between the person placing an order (the vendor) and any third person (potential buyer). The real estate agency also makes further contacts and mediates between the seller and potential buyers. Only persons employed by real estate agencies and holding the licence of the Ministry of Environment and Space may perform real estate activities. Representatives of such agencies participate in all negotiations and prepare the contract (sale, purchase, lease, rent, etc.). A limited fee is also provided for any real estate mediators, and amounts to up to 4% of the contracted purchase value (without VAT).

2.6.4 Purchase procedure

The Slovenian case of ordinary purchase of a detached house with land, without pre-emption, is shown in Figure 2.1 (p. 60-61) as a UML activity diagram. In the case of a mortgage on the parcel in question appropriate agreements must be made in advance between the vendor, the buyer and the mortgagee. In practice, however, such parcels are rarely included in the transfer of land. When selling a parcel for building purposes, plans are required for such purchases. According to the planning restrictions in force, the municipal authority informs the buyer if any pre-emption rights exist. The beneficiary of such rights, and thus the potential first buyer, is the municipality or (rarely) the state. If the municipality renounces its legal pre-emption claim, this must be made official in writing as a provision that – together with the plan information – becomes a constituent part of the purchase contract. The pre-emption rights are excluded in the case of a purchase for or a gift to close relatives (parent/child). Problems may arise if the municipality has interests in land (building sites). This being the case, the owner must first send his purchase offer to the municipality.

The seller and the buyer must meet and initiate the purchase process. It is not necessary that they know all the details about the transfer of property; a notary has the duty to examine all the property data and explain the purchase contract to all parties involved. The buyer should examine the parcel for any possible deviations from the normal conditions. The buyer should also check the land register data on the parcel. The buyer and the vendor may draw up a pre-contract, which they both sign. It is also possible to agree (in the pre-contract) on some partial prepayment or security deposit. Such a deposit may function as an instrument to secure the rights of both vendor and buyer if they resign from the pre-contract. A security deposit is paid to the vendor and cannot exceed more than 10% of the purchase price. In the case of a mortgage on the parcel appropriate agreements must be pre-arranged between the vendor, the buyer and the mortgagee.

A purchase requires a written document (the contract). The buyer and the vendor prepare the contract, preferably with the assistance of a legal expert (notary, lawyer, etc.). The notary must check its contents (details of all parties and properties concerned, signatures, etc.). The notary is also bound to explain to all parties their rights and obligations. The final contract must specify at least the following items:

- clear statement of sale (declaration of transfer);
- identification, names and addresses of contractors;
- identification and description of real property (data from Land Registry and Cadastre);
- purchase price and terms of payment;
- time and manner of real property transfer in possession;

- registration permission for Land registry (*intabulacia*);
- responsibility for mistakes and disputes;
- covering of expenses (taxes);
- moment of validity of the contract;
- place and date of signing of the contract;
- signatures.

The buyer and the vendor sign the contract (the purchase deed). The vendor must pay the property transfer tax (unless otherwise defined in the contract) to the tax authority concerned, which also checks the contract sum against the assessed market value of the property. At this moment the tax authority may decide that a sworn appraiser will assess and define the market value of the property. This may cause a delay of 15 days. The tax authority also registers the purchase price in its database (Property tax register). The notary then authenticates the contract. After the authentication of the contract, the transfer of the purchase sum to the vendor is carried out according to the terms of payment. The date of the final contract is the date of the transfer of possession. The transfer of ownership is formally fulfilled on the date of registration.

The payment details for the property acquired are determined in the final contract. In general, the buyer pays the whole amount to the vendor on the day when the notary authenticates the contract, unless the explicit terms of transaction are defined otherwise in the contract. Such a delay in payment enables the vendor to negotiate any required mortgage loans with their bank, which is possible only if the final contract is complete and authenticated. In connection with the pre-contract and the final contract, the buyer and the vendor negotiate with the mortgagee. The buyer can take over the loan (*hypothec*), or the vendor must pay off the loan together with the purchase sum.

The buyer may (it is not mandatory) submit a registration request (form, final contract, etc.) to the Land registry for the registration of his ownership (within six months at most of the contract date). Upon registration the Land registry issues an invoice for the registration of the title and the buyer (the new owner) pays it before the registration process starts. The Land registry changes the ownership and updates the data in the Land registry database. Once the title is registered the new owner is protected against any third parties. The Land registry informs the buyer (the new owner) and the vendor about the new ownership entry by means of a decree. The appeal period lasts eight days, starting on the day the decree is received. When the appeal period ends, the Cadastral authority is informed of the new ownership and updates the cadastral databases.

With the request for entry in the Land registry the existing easements on the parcel (servient and dominant) are transferred together with the ownership. Any arrangements for new easements or expiries of old easements are

settled either by the purchase, by a special contract or by court decision; these are normally registered at the Land registry. The buyer must pay the real property profit tax if the new purchase contract for the same parcel is concluded earlier than three years from the previous sale.

2.6.5 Subdivision

The owner may decide to subdivide a part of a parcel to form a new parcel. Ownership must be registered in the Land registry or proved by former purchase contracts that are already in the process of formal registration. The newly formed parcel will be entered into the cadastral database, mapped in the cadastral map and registered in the Land registry. The planning authority may impose limitations on subdivisions on building sites or even prevent them. Such decisions are made according to planning regulations or other regulations in the sector. Figure 2.2 (p. 62-63) shows a general Slovenian subdivision case for an as yet undeveloped parcel for building purposes, in the form of an activity diagram.

The owner submits a request for a subdivision to the selected surveying company, which selects a surveyor working for the company who uses their legal and technical authority to carry out the subdivision. The surveyor responsible collects data about the parcel (Land registry, Cadastral databases and analogue cadastral maps) and investigates the subdivision case from the legal point of view. If necessary, the surveyor in charge consults the owner and examines data and prepares a specific strategy for each case according to the conditions and circumstances.

If permission is needed for the subdivision, the responsible authority issues the required permission. If this authority is of the opinion that the planned subdivision will impede the appropriate use of the area it denies permission. The authority's refusal is final and the subdivision case is deemed concluded. The owner may also stop the subdivision procedure at any time during the process until the cadastral authority's final decision comes into effect, but he/she is also responsible for any expenses incurred. If a surveying company ascertains that the subdivision case is not feasible, the company will forward the case to the Cadastral authority, which will investigate further and take other measures in order to resolve the case.

If the old boundaries now forming the newly subdivided parcel are undefined or unclear, the responsible surveyor begins a special procedure for the definition or re-establishment of the old boundaries (partially or completely). The neighbours will be summoned to participate in the field procedure; later on they may also lodge an appeal against the surveyor's and the Cadastral authority's decisions (oral hearing or written provision) and forward this to a court of law. In the event that the parcel does not have legally defined boundaries, a simultaneous procedure of setting up the definitive boundaries for the

parcel must be carried out parallel to the process of subdivision.

The responsible surveyor sets up the new and the old boundaries in field and measures the parcel. In the office the surveyor then calculates the data and updates the cadastral map for the new parcel. The surveying company drafts a detailed report on the subdivision and prepares the subdivision invoice. The owner pays the subdivision costs to the surveying company. The surveying company delivers a detailed report to the owner, accompanied by an explanation of that report to the owner where necessary. The owners may authorise a surveying company to take all further necessary registration steps.

In due course the owner or the surveying company (as the owner's representative) sends to the Cadastral authority a formal request for the entry of the new parcels, enclosing a detailed report. Such requests must be submitted within six months of the last field measurements. The cadastral authority issues an invoice for the subdivision registration and the owner pays the expenses for the formal entry. If the owner does not submit an entry request to the cadastral authority within six months, the responsible surveyor must carry out a rollback process (removal of new boundary marks) at the expense of the owner.

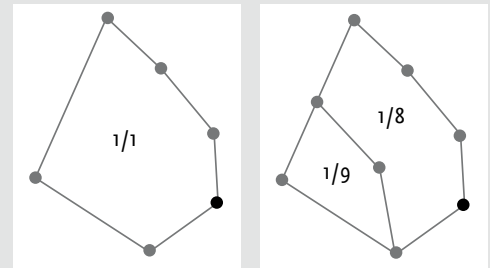
The cadastral authority performs formal audition (revision) of the case regarding the fulfilment of various conditions and the technical quality of the detailed report. In the case of disputed old boundaries the cadastral authority invites the owners and the neighbours to the cadastral office for oral hearings (administrative procedure). Together they try to find the best solution for the disputed boundaries. In the case of dispute the outcome is decided by the court with the help of a special court expert in cadastre (appointed surveyor). The subdivision is carried out in the field even if the old boundaries are disputed.

The cadastral authority issues a written provision (cadastral authority decision), which is sent to the owner and the neighbours. When the owner receives it the fifteen-day period for public appeals against the subdivision begins. The owners and the neighbours are summoned to examine the boundary solution and may also appeal against the decision of the cadastral authority. The laws permit appeals against any administrative procedure.

Subdivision is formally concluded at the end of the appeal period. The cadastral authority concludes the subdivision case and updates the cadastral databases. A detailed report is stored in the official archive. The cadastral authority sends the owner a notice, together with the data (copies of relevant documents) regarding the parcels concerned. The cadastral authority also sends the case provision and the relevant data regarding the subdivision to the Land registry, which updates the Land register database. If the original parcel is burdened by mortgages and easements the Land registry must transfer these rights from the original parcel to their new parts in full. Unfortu-

nately, in Slovenia the surveyor is not directly involved in the consideration of mortgages and easements for any cadastral procedure, such as subdivision. Figure 2.3 shows the Slovenian registration principle for subdivision (the situation beforehand on the left and afterwards on the right hand side).

Figure 2.3 Slovene registration principle for subdivision (the situation before on the left and after on the right)



2.6.6 Purchase and subdivision combined

The vendor (owner) of the parcel sells a part of the parcel; it is subdivided and registered as a new parcel and the buyer registered as the new owner of the subdivided parcel. The purchase of a part of an existing parcel initiates the subdivision, followed by the cadastral registration of the new parcel. The purchase of the newly formed parcel is followed by the registration of its new ownership in the Land registry.

If someone wishes to buy a part of a property, therefore, the procedure will be a combination of the two processes described above. The Slovenian combined purchase and subdivision of undeveloped land for building purposes is shown in Figure 2.4 (p. 64-65). We have assumed that such a transaction involves an urban site for construction development (instance 3 in Subsection 2.2.2). Normally, the seller and the buyer deal in direct contact with each other, without the involvement of an estate agent, but with the possible assistance of a legal expert (notary). Creditors are also unlikely to be involved until later on when the building development is ready to begin; this is normally after the entire process of the subdivision and the sale of the parcel is complete. The parties sign a pre-contract of sale on the basis of which the vendor applies for the subdivision procedure. The subdivision application must be made within six months, otherwise the purchase will be void or the subdivision must be repeated. If the subdivided property is an urban site, the municipality may intervene to exercise its right of pre-emption. Pre-emption here means that the municipality takes over the purchase on the same terms as the original sale. This is rare, however.

The selected surveyor carries out the complete subdivision procedure described above. When the procedure is complete the buyer signs the act of sale with the vendor and pays the purchase price, unless this has already been done before or during the cadastral procedure. After the procedure of the subdivision registration at the Cadastral office has been completed, and the duties and taxes paid, the purchase contract signed and the signatures authenticated by the notary, the new owner applies for the registration of the title to the Land registry. The new owner is then registered and the vendor invoiced for administrative charges.

2.7 Sweden

2.7.1 Background information

By way of introduction, here follows a description of the Swedish property register (*fastighetsregisteret*). The register comprises an entry section (*inskrivningsdelen*) and a general section (*allmänna delen*). The entry section mostly contains particulars of owners, charges and rights which have been created by agreement and without any involvement of the authorities, but which the parties have nonetheless wanted to register. The general section contains particulars of property formation (*fastighetsindelning*) and rights formed in connection therewith. These two parts of the register are co-ordinated, and the property, with its register designation, is the basic unit of all registration. So there can be no registration until a property has been formed and allotted a register designation, although a preliminary entry can be made in both sections of the register to signal that procedures are underway. Registration in the entry section is managed by the land registration authority (*inskrivningsmyndigheten*), while registration in the general section is managed by surveyors of the National Land Survey (*lantmäterimyndigheten*) at the time of property formation.

Transfer processes have been designed to support the aim of the property register, which is to hold up-to-date data on rights of ownership and division into property units. In addition, the content of the register must be accessible to the general public, so that they can at any time check charges and appurtenances, for example, before a property is bought/sold or mortgaged. One of the register's important functions, then, is that of facilitating transactions in the property and credit markets. Registration also facilitates official control in the property sector. It should be added that register maintenance is not burdened with taxation matters. Property values are entered in the register, but only the total assessed value of each property is registered and this is taken from a separate property tax assessment register.

2.7.2 Rights and encumbrances

Leaseholds (*arrende*) and rental (*hyra*) tenures are seldom entered in the property register, because here the law guarantees tenants' rights against third parties without any need for registration. Easements (*servitut*), on the other hand, are entered as a rule, because unregistered easements are not protected against third parties in cases of *bona fide* purchase and attachment. Because easements are important for the rest of this description, we should begin with a few words about their creation, alteration and cancellation.

An easement entitles the owner of a property (the dominant tenement) to dispose of another property (the servient tenement) in some respect. There are two forms of easement, namely contractual easement (*avtalsservitut*) and

official easement (*officialservitut*). Contractual easements result from the owners of two properties agreeing in a contract that one property is to be charged (encumbered) with an easement in favour of the other. This may apply to the whole property or to a certain part of it. The agreement can be entered in the land register to secure it against third parties. The order of priority of contractual easements in relation to other charges is dependent on the date of entry in the land register. A contractual easement can also be cancelled by agreement between the parties themselves. Official easements are also usually based on an agreement made between property owners, but they are created by order of an authority or a court of law. An official easement refers to a particular area of land. This is usually created in a cadastral procedure (*fastighet-sbildningsförrättning*) by a cadastral authority, e.g. in connection with land subdivision, and acquires superior title in the property, so that in practice it cannot be eliminated by *bona fide* purchase or attachment. If it is to be altered or cancelled, a new official decision must be made. In a survey procedure, contractual easements can also be amended or cancelled. The creation of official easements, like the amendment and cancellation of both contractual and official easements, can also take place against the wishes of property owners, in the course of a cadastral procedure by a survey authority.

There are also rights that are similar to the Roman right of superficies, such as utility easements (*ledningsrätt*). Such rights are created in a cadastral procedure.

2.7.3 Purchase

The aim is for the property register to reliably indicate the current ownership of land. This in turn has resulted, for example, in the following standpoint. A promise of sale is not binding. The parties are not bound until a written contract of sale has been signed by both of them. Written options to purchase property at a future date are not permitted (there must be no 'suspended' sales). Conditions of rescission are permitted for a period of up to two years. Ownership registration must be applied for not more than three months after completion of a purchase. Only after registration is a purchase protected *vis-à-vis* third parties. Purchase of part of a property (an area of land) must be followed by subdivision or some other change in the property division. Applications to this end must be filed with a cadastral authority within a certain period of time, otherwise the purchase will be void. Property formation is effected by surveyors employed by a public authority.

Property purchase in its basic form is clearly standardised and easily transacted. Only a few particulars need to be stated in a deed of sale, namely the property concerned, a declaration of transfer, the vendor's and buyer's particulars and signatures, witnessing of the vendor's signature and approval of the sale by the vendor's spouse, where necessary. The purchase price must

also be shown. These, then, are the minimum statutory requirements, but further conditions may be included in the sale. As has already been made clear, the endurance of the purchase (the possibility of repurchase) cannot be left open for more than two years. The buyer sends the deed of sale to the land registration authority to register as the new owner. The buyer is then secured against third parties and is entitled to grant rights charged to the property and to mortgage the property. The parties may make use of a lawyer or some other person to assist with the formalities, but this is not necessary.

An agricultural lessee with a leasehold residence, like the tenant-owner association in an apartment building, has a right of pre-emption (*hembud*) in certain cases if the property is put up for sale. In addition, a municipality may have a right of pre-emption (*förköp*) over land in certain special circumstances. Purchases of agricultural land and forest may be subject to the granting of a permit in certain regions. Companies are not entitled to purchase such land without selling off the corresponding acreage at the same time. In a number of municipalities, purchases of rental housing are subject to the granting of a permit. In practice, both pre-emption and permit procedures are uncommon.

As security for a loan, the property owner applies to the land registration authority for registration of a mortgage and is issued with a mortgage deed (*pantbrev*) showing the amount of security. The priority of the mortgage in the event of attachment is decided according to the registration date. If the owner later wishes to borrow money on the security of the property, a special contract is drawn up with the creditor and the mortgage deed surrendered to the creditor as security for the loan up to the amount indicated by the deed. Thus the loan document itself is merely an agreement between borrower and creditor and is not registered. Instead the mortgage deed surrendered to the creditor constitutes security for the loan. When the loan has been repaid the mortgage deed reverts to the property owner, who can re-use it for a new mortgage. Several mortgage deeds can be obtained on the same property, and security is determined according to the order of priority for payment.

Nowadays the mortgage deed held by a bank is usually in electronic form (*datapantbrev*), instead of being printed on paper. This kind of mortgage deed is entered in the mortgage deeds register (*pantbrevsregistret*) in the form of a 'cyber-deed' and is transferred between creditors by means of entries in the register.

2.7.4 Purchase procedure

After this general description of the conditions of purchase and mortgage, let us consider a typical instance of the normal purchase of a permanent home (see in Subsection 2.2.2). We will assume the involvement of estate agents, a property inspector and credit banks. Our description is partly illustrated in Figure 2.5 (p. 66-67). If the area of the property is less than 3,000 m², there can

be no question of pre-emption and no permits are necessary.

The vendor contacts an estate agent and they sign a contract setting forth the conditions of the assignment. The agent now has responsibilities towards both vendor and buyer, and must help with drawing up the contract of sale if necessary. At the beginning of the process the main task of the estate agent is to advertise the property in the daily papers, on the internet and elsewhere.

Through the estate agent the vendor and potential buyers come into contact with each other. If the potential buyer is interested in the vendor's property, he inspects it, often with the assistance of a property inspector specialising in house inspections. As this is in the buyer's interest, the buyer generally pays for the inspection. With insufficient funds to pay the full price of the property in cash, the buyer approaches a bank to enquire about the possibilities of borrowing money to finance the purchase. If he is judged creditworthy, he will be promised a loan and will thus be enabled to go ahead with the purchase.

If the vendor and buyer, with the estate agent as intermediary, finally agree on the conditions of sale, they often sign a pre-contract of sale (*köpekontrakt*), a preliminary document setting forth the terms of the transaction. Two people, if any, witness the vendor's signature and that of the vendor's spouse. The transaction is binding on the parties and the buyer is protected against the vendor's creditors. Often a deposit is paid, generally 10% of the final purchase price. The date of possession (the date when expenses and income relating to the property pass to the buyer) may be fixed in the contract; if not, it is the date of signing of the final deed of sale.

Before signing a final deed of sale (*köpebrev*), the parties normally meet at the bank to which the property will be mortgaged. They also have telephone contact with the vendor's bank. The purchase price is formally paid over by the bank to the buyer, who in turn remits it to the vendor and to his creditor. In reality, most of the money is transferred between the banks after oral agreement between them. Any mortgage document is transmitted in the opposite direction. Since banks usually hold electronic mortgage deeds, application to the land registration authority will be simply for a note to be made of the mortgage having been transferred from one bank to another. The buyer can also negotiate to take over existing loans, on the same terms as applied to the vendor. A deed of sale is signed, confirming that the purchase price has been paid and the purchase completed. The deed of sale is also witnessed and the creditor bank is instructed to apply for title registration, to request an entry in the register if possession of a mortgage deed is transferred from one bank to another, and if necessary to obtain further mortgage deeds. These instructions to the bank provide it with an assurance that ownership registration will be requested for the purchase and that any new mortgages will be duly affected.

The land registration authority registers the change of ownership, where-

upon the new owner becomes entitled to request a mortgage. The authority enters any new mortgages in the real property register and either issues a mortgage deed as proof of the mortgage or makes an electronic entry in the land register. The land registration authority informs the buyer (but not the vendor) that his ownership has been registered and bills him for the administrative handling charge and for stamp duty. The transfer tax on the purchase is 1.5% of the purchase price for a natural person and 3% for a legal person. The stamp duty on mortgage deeds is 2% of the mortgage amount.

Registration of new ownership and entry of mortgage deeds usually takes place on the same day that the request is received by the authority. Charges and taxes are paid after registration and thus have no effect on the registration procedure. In this way, the land register can always be kept up to date, so long as the documents sent to the land registration authority are legally correct and are sent for registration without delay. This is in the interests of both buyer and bank, to prevent double sales and to prevent the former owner from mortgaging the property he has already sold.

The property is bought and sold with all appurtenant and encumbering rights and public restrictions, except for unregistered easements of which the buyer had no knowledge and could not reasonably have been expected to know about.

If the vendor makes a profit on the sale, the profit is taxable. The vendor declares the profit to the tax authorities after the purchase has been completed. The authority calculates the capital gains tax payable and this is paid by the vendor. Thus the tax aspect has no effect on the purchase procedure but is a subsequent matter between the vendor and the state. In other words, all charges and taxes are paid afterwards and cannot delay the transfer of ownership.

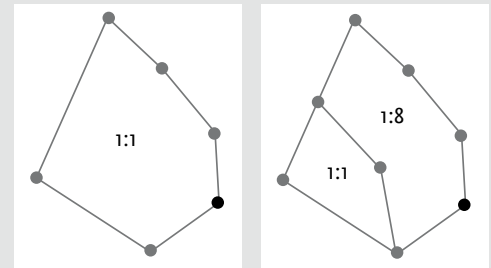
Where pre-emption rights are applicable, the municipality must decide within three months if it intends to take over the purchase. This shall be decided during the registration procedure.

2.7.5 Subdivision

Subdivision (*avstyckning*) is a process whereby an area is detached from an original property (in Subsection 2.2.2). The area thus detached is termed a 'lot' (*lott*) until registered as a property in its own right. During the subdivision process the original property is known as a 'residual property unit' (*stamfastighet*). After the lot has been registered, the residual property unit retains its register designation and all other characteristics not transferred to the lot as a result of the subdivision decision (Figure 2.6).

Subdivision can be handled only by a cadastral authority. This is a national authority, except in around forty municipalities with cadastral authorities of their own. Cadastral authority surveyors are completely independent in their

Figure 2 6 Swedish registration principle for subdivision (the situation before on the left and after on the right)



decision making. When making a subdivision order, surveyors may also make decisions concerning easements, mortgage conditions, uncertain boundaries, etc. The surveyor must consult the landowners and authorities concerned. The new property is entered by the surveyor in the real property register, together with new or modified rights. The changes included in the surveyor's decision but affecting conditions in the land register are recorded, however, at a later date by the land registration authority.

Let us now take a closer look at the subdivision process (Figure 2.7, p. 68-69). An application for subdivision must always come from the person wishing to have the subdivision carried out, who must describe the area he wants parcelled off, preferably with the aid of a map or sketch map. The purpose of the subdivision, i.e. future land use, must also be specified. The application is filed with the cadastral authority within whose jurisdiction the land is situated. The authority appoints a surveyor to take charge of the procedure. In principle the surveyor then has to carry out the subdivision as requested by the applicant, or else reject the request if it is impossible to realise. It is not uncommon, however, for the surveyor to advise on alternative solutions to make an otherwise impossible transaction possible. The surveyor himself organises the subdivision process as he sees fit, i.e. he is not bound by a statutory procedure for the transaction.

After first checking the applicant's authority to apply for a cadastral procedure, the surveyor makes initial investigations, which may include phoning the person concerned, visiting the site, making a legal search of records and checking any plans already adopted for the area concerned. The surveyor will also take into consideration whether he needs to consult other public authorities and hear their opinion on the subject, e.g. the county administrative board (*länsstyrelsen*) on the subject of environmental protection and heritage management, and the road authority on access. The most important thing, however, is to consult the municipality in order to assess the purpose and design of the lot to be parcelled off. In principle, the same assessment must be made concerning the residual property, to ensure that it will also be suitable after the lot has been detached from it.

The surveyor is responsible for ensuring that the appropriate parties are consulted. If the subdivision is technically feasible but affects an existing or new settlement, the municipality may ask that the matter be referred to it for a written statement. Refusal of municipal consent precludes the subdivision. Consultations with public authorities are a land policy safeguard for which the surveyor is ultimately responsible.

In addition to this land policy check, an assessment must be made of the legal and technical qualities of the subdivision lot. Legal assessment may

concern the need for new easements for the detached lot and for the residual property unit, such as road, well and sewerage easements. If the residual property unit has an easement, a share in a joint facility (a facility owned by several properties; *gemensamhetsanläggning*) or a share in a joint property unit (*samfällighet*), it must be decided whether any of the rights are to be transferred to the subdivision lot or shared between the properties in a certain proportion. Otherwise they remain with the original property. It is also possible for a new joint property unit to be formed in favour of the properties together, in which case participatory shares have to be determined. If the original property is charged with an easement or right of use, the surveyor can certify that these are to be removed from the lot or the residual property unit if in future the rights will only be located on one of them. Otherwise the rights will be charged to both properties. Mortgages in the original property can also be certified away in the subdivision lot, subject to certain conditions, e.g. their removal from the lot being manifestly of no importance to the mortgagee, or the mortgagee having consented to the removal of the charge by certification.

One interesting fact is that the mortgagees are not interested parties in the Swedish process and, consequently, cannot be summoned to meetings. Contact between the mortgagee and the surveyor is instead conducted in writing.

The subdivision lot must be measured and mapped. If a boundary is uncertain, the surveyor can summon the owners of the neighbouring properties with uncertain boundaries to decide where the boundary is to be located. If the matter is of a complicated nature or includes boundary definition, the surveyor usually calls a meeting of affected property owners and other right holders so that any points of uncertainty can be resolved in the presence of all concerned.

The transaction is formally concluded by the surveyor's decision. This can be taken at a meeting of the landowner(s) but also without any such meeting taking place. The surveyor decides boundaries and future charges, as well as the appurtenant rights. As we have already seen, he can also eliminate by certification rights and charges entered in the land register. The land registration authority then deletes them from the register on the strength of the surveyor's decision. Localised public restrictions remain in their original location, i.e. the property whose land comes within the restricted area. After making his decision, the surveyor makes a preliminary entry for the lot in the real property register. The computer system has a series of controls to prevent errors being entered in the register.

Following the decision, the landowner, in common with any neighbours involved in the process, is entitled to appeal the matter within four weeks. Failing this, the transaction acquires force of law, whereupon the surveyor formally enters changes in the residual property and the lot in the real property register as a new property unit and the subdivision is complete. The landowner receives a copy of the documents and the surveyor enters the new bounda-

ries on the digital register map.

The land registration authority is notified electronically of the new property and changes to the original one. The land registration authority staff log the owner of the new property (who in this particular case is the same as the original owner), delete any previously entered contractual easements and other rights which are not to be charged to either of the two properties (the residual property or the subdivision lot) and delete any charges on the new property which the surveyor has deleted by certification.

Maps, a description of rights, minutes of proceedings, etc. are sent to be scanned and stored in a digital archive, while the original documents are stored in a safe repository. The tax authority is informed of the transaction and later carries out a tax assessment of the new property and of the original one as now modified.

Lastly it should be mentioned that the landowner pays the transaction costs after the event (when the decision has been finalised). Thus the process is not delayed by financial dealings between the landowner and the authorities. If the property owner fails to pay what is due, other processes will take over, but these, of course, do not affect the property formation.

2.7.6 Purchase and subdivision combined

If someone wishes to buy part of a property, the process will be a combination of the two processes described above. We have assumed that the transaction involves an undeveloped site for development (instance 3 in Subsection 2.2.2). Normally vendor and buyer deal with each other directly, without the involvement of an estate agent (Figure 2.8, p. 70-71). Creditors are also unlikely to be involved until later on, when building development is about to begin, which is normally after the entire process of sale and subdivision has been completed. The parties sign a contract of sale, on the basis of which the buyer or vendor applies for a subdivision procedure. The application must be made within six months, otherwise the purchase will be void. The surveyor carries out a complete subdivision procedure and the only additional point compared with the process described above is that the surveyor also assesses the validity of the contract of sale. When the procedure is complete the buyer pays the purchase price and signs the deed of sale with the vendor, unless this has already been done before the cadastral procedure, at the same time applying to the land registration authority for registration of title.

This being an undeveloped site, the municipality can intervene to exercise its right of pre-emption after registration of title has been applied for. First, though, there are certain conditions which have to be met, such as the land being needed for urban expansion. Pre-emption here means the municipality entering into the buyer's stead and taking over the purchase on the same terms as the original sale. This, however, is very uncommon, and pre-emption

Table 2.1 Components for modeling transactions

| Purchase components | Subdivision components | Generalised components from both components |
|----------------------------|-------------------------------|--|
| Land policy control | Land policy control | Policy control |
| Marketing activities | - | Marketing activities |
| Pre-contracting | Preparation of case | Preparations for decision |
| Contracting | Cadastral decision | Decision |
| Registration | Registration | Registration |

occurs, at most, in ten sales per year.

The new owner is then registered and invoiced for transfer tax and administrative charges. The profit on the sale is declared by the vendor and tax paid on it as already described. The cadastral authority also informs the tax authority that the original property has been altered and a new property formed. The tax authority values the two units and puts a tax assessment value on them. So, as in the previous examples, in this combination of purchase and subdivision all matters relating to charges and taxes payable are sorted out afterwards and have no effect on the change of ownership or on property formation.

2.8 Comparisons

The components initially devised for modelling transactions are summed up in Table 2.1. The usefulness of the components for comparisons will be tested by inserting the activity diagrams for Slovenia and Sweden parallel and in compressed form in a general component model, the purpose being to see whether differences in the main principles of the national transaction systems are clearly and plainly apparent.

The processes compared, over and above a simple sale, are the sale of a detached housing property, the subdivision of an undeveloped plot and the sale of an undeveloped part of a property (instances 1-3 in Subsection 2.2.2). These processes will also be commented on from a market perspective, given the claim in the introduction to the article that the property and credit markets benefit from swift processes. Actors in these markets, however, may be interested in aspects other than swiftness, such as security, i.e. no party incurring an unforeseen loss in the process.

The number of comparative figures may seem rather high, but this is prompted by an endeavour to evaluate the usefulness of the models. It should be mentioned before going any further that the comparisons have been based on partly different methodologies. The first, for simple sale, is based on text comparisons; the second, for ordinary sale, is based on a comparison of figures supplemented by comparison of texts; the third, for subdivision, adds actors, and the fourth deals with heavily compressed activities. In this way we can see what the different model constructions lead to.

2.8.1 Simple purchase

Two comparisons will be made concerning sales. The first shows a sale in its simplest and purest form, in order to highlight principles. This information is extracted from earlier text, but this is not easily done. The country descriptions, therefore, could be rewritten to show this straightforward instance and a figure added. We have deliberately refrained from doing this, so as to show how hard it can be for the curious to check Figure 2.9 (p.72-73) in relation to the preceding text.

A simple sale includes preparations for the purchase (pre-contracting), purchase (contracting) and registration (Figure 2.9). Pre-contracting is much the same in both countries. During the contract phase, on the other hand, a number of vital differences emerge. In Slovenia, transfer tax is payable just after the final signing, while in Sweden tax is paid later. In Slovenia, an expert – the notary – must be involved and must confirm the sale by verification, whereas in Sweden two witnesses verifying the sale are sufficient to confirm that the vendor has title. Practically anyone can be a witness to the signatures of the parties on a contract. The tax question and the notaries make the sale a slower process in Slovenia than in Sweden. The Slovenian process probably comes at a greater expense to the parties because a notary must be hired, even in cases where he is not really needed.

There is yet another difference. In Slovenia, the purchase money is often paid after the contract of sale has been signed, with the result that completion of the sale can be delayed pending payment (which is most often due within 28 days). However, the Slovenian parties are in control of the process and can hasten it by instant payment. Remittance, on the other hand, is a prerequisite of the deed of purchase in Sweden, with the result that, in practice, the purchase money is paid simultaneously with the signing of the contract and the purchaser can apply immediately for registration of title.

We conclude that sale in the two countries largely involves the same components and activities, but that the way in which they are structured and combined through public regulation facilitates more easily administered transfer processes in Sweden, enabling the actors in the property market to operate faster and at lower cost. Swiftness can be said to be achieved at the cost of security, in that the parties may inadvertently frame contracts which do not correspond to their wishes or, due to ignorance, are not formally correct, and that the state risks having difficulty in collecting transfer tax.

2.8.2 Ordinary purchase

The next analysis concerns an ordinary purchase of a single-family housing property (Figure 2.10, p. 74-75). This information is taken from previous figures (Figures 2.1 and 2.5) and their accompanying texts. The figure will be simpli-

fied in cases where there are striking similarities between the two countries. This is done by capturing bundles of activities in an overarching activity when the bundle is essentially the same in both countries. Marketing activities are the same in the descriptions for both countries and can therefore be summarised in the overarching activity of marketing. The growing complexity of the sale when estate agents and banks are included in the process does not therefore emerge from the comparative figure, concealed as it is by the summarising activities. This can be acceptable, however, since the comparisons are meant to indicate similarities and differences, and for a more detailed view of events one need only consult one of the country descriptions. On the other hand, a different type of complexity is highlighted, namely the possibility of a normal sale involving questions of land policy.

First of all we may note that the Slovenian process begins with the vendor having to ascertain whether any private person or other party has a right of pre-emption, in which case that person or party must be given first refusal. He will then be dependent on existing rights of pre-emption, as the property cannot be put on the market before the right holders have confirmed in writing that they are not interested in buying. In Sweden the vendor can put the property on the market straight away.

The marketing activities that follow in order for vendor and purchaser, and also credit provider, to find each other are, as we remarked earlier, strikingly similar and are therefore summarised in the figure as marketing, without further comment.

Once vendor and purchaser have found each other they often sign a pre-contract so as to somehow bind them to each other and thus give each other the confidence to move forward with the sale. In both countries a deposit is often paid at this time as a measure of security for the vendor. This is a risk premium that accrues to the vendor if the purchaser backs out. There is a notable difference here. In Sweden the pre-contract is viewed as a contract of sale, even if the sale has not been finalised and there must in principle be reversion clauses in order for cancellation of the contract to be possible. In Slovenia, by contrast, the pre-contract is not formally binding.

Pre-contract, as we have termed it here, is followed, and completion of the sale preceded, by a succession of activities, depending on how much was settled prior to pre-contracting. This may mean inspection of the house, sale of the old home, purchase of a new one, arranging bank transactions, etc. This period may vary in length, depending on what issues remain to be addressed. Once everything is settled, the sale must be completed. In Slovenia, though, there are a number of separate stages to go through, whereas in Sweden everyone concerned (purchaser, vendor, estate agent and bank representatives) usually attends a single meeting. The purchase money is paid over, the contract of sale and credit agreements are signed by the parties and two persons present witness the transaction. The whole process can be termed instantana-

neous, and application for registration of the purchase, as well as an application, if any, for new charges, can be filed immediately.

Registration is ostensibly a routine procedure in both countries, especially in Sweden, where it is a speedy process. In both countries a check is made on the formal correctness of the sale. One Swedish aspect will be highlighted, however, even though it is not conspicuous in connection with normal house sales. A municipality wishing to exercise its right of pre-emption has three months in which to make a decision to this effect. During this time, registration of the sale remains pending at the land registration authority. A developed house property with an area of less than 3,000 m², however, is excluded from pre-emption, and so the municipality is not normally consulted in connection with a house sale.

The model comprising land policy control, marketing activities, pre-contracting, contracting and registration highlights both similarities and dissimilarities between the two countries. It quite clearly indicates factors of delay in the process in one country compared to the other and makes clear, for example, that the handling of land policy issues is based on different principles, causing them to be addressed at different points in time. On the other hand, Figure 2.10 (p. 74-75) says nothing about what is a reasonable length of time for the sale process, nor does it have anything to say concerning security for the parties involved. It is, however, safe to say that slow processes aggravate the parties' uncertainty, because a protracted period for transfer of ownership augments the likelihood of adverse events occurring.

A number of pivotal questions can be asked as well. Why is a notary needed in the Slovenian process when the Swedish process apparently runs smoothly without one? Why do payments have to be remitted before a service or product is delivered in Slovenia, instead of afterwards as in Sweden? Are these differences due to bad payers, lack of restraint opportunities or tradition?

The comparisons prompt yet more reflections. The Slovenian process in particular seems to be delayed by land policy control, insistence on the involvement of a notary and perhaps also transfer tax payment. If the right conclusions have been drawn from the comparisons made here, it should be possible to carry out efficiency studies in Slovenia with a view to amending the law and thereby speeding up the processes. This does not preclude the possibility of the same applying to Sweden, e.g. concerning the right of pre-emption, which in practice is hardly ever exercised. This being so, do the pre-emption cases currently occurring justify the red tape and uncertainty involved?

2.8.3 Subdivision

The essence of the next model, for subdivision, is a landowner wishing to detach an undeveloped area from his own land, making two properties out of one. In addition, the model is expanded from earlier comparisons by the in-

clusion of actors. In other words, the earlier comparative technique has been enhanced to highlight responsibilities.

As can be seen from Figure 2.11 (p. 76-77), all the components – land policy control, preparation, decision and registration – are present in both countries. Straight activity comparison shows the constituent activities to be very similar. Clear differences become apparent, however, if actors are included in a study of responsibilities.

The first component is land policy control. Slovenia expects the landowner to contact the authorities, which are empowered and duty bound to grant or refuse permission for a subdivision. If the landowner obtains permission for the subdivision from the authorities concerned, he turns to a licensed company. The surveyor who carries out the measurement must also be licensed.

In Sweden, too, the landowner can contact the necessary authorities, but it can be hard for the individual to know which are the relevant authorities to contact. Added to this, the process assumes a surveyor in the service of a public authority to be responsible for these contacts, since he must strike a balance between private and public interests. In striking this balance, which can go against other authorities, he must, however, always comply with laws and regulations. In the matter of urban settlement, moreover, the municipality has the power to veto subdivision, i.e. the urban settlement case comes close to the permit procedure observed by Slovenian authorities. In Sweden the cadastral transaction moves on through the cadastral organisation after land policy control, with the original surveyor in charge.

Both the Slovenian and the Swedish surveyor examine the transaction and measure the new property. One difference, however, is that the Slovenian surveyor cannot examine charges on the property and, consequently, is unable to create new rights or cancel old ones – for example, easements. The Swedish surveyor, by contrast, can create, alter and remove easements. This can be done on the property concerned but may also involve land on neighbouring properties with different owners. He can also examine other rights and charges, such as giving the new property a participatory share in joint facilities and joint property units. In certain situations the Swedish surveyor can also employ coercive methods in pursuit of desirable and necessary measures, such as the creation of an easement on a neighbouring property. In such situations he must also decide on compensation, in particular if the parties are unable to agree on this point between themselves. If, moreover, there are mortgages on the original property, he can eliminate them in the newly formed property so that it will not be encumbered by existing mortgages. All changes, however, must be examined to ensure that no rights are lost by mortgages or other right holders.

The Slovenian surveyor, lastly, draws up a report that is formally transmitted to the landowner but in reality is most often sent straight to the cadastral authority for decision and registration. The Swedish surveyor, by con-

trast, retains the matter for decision and, after the time limit for appeal has expired, enters the transaction in the real property register. He is not, however, empowered to enter ownership particulars in the land register. Instead, particulars of the completed subdivision are automatically transmitted in electronic form to the land registration authority, which immediately registers the landowner for the subdivided lot.

One thing should be added. In both countries, unclear boundaries can be dealt with during the cadastral process, with the difference being that in Slovenia the surveyor proposes a boundary, which is then confirmed by the cadastral authority, whereas the Swedish surveyor determines the boundary.

There are a number of things to be mentioned which are not apparent from Figure 2.11 (p. 76-77) but are revealed only by supplementary text comparisons. In both countries the result is new properties with their own register designations. The original owner is registered for both properties. But there is a difference here. In Slovenia, both properties have rights and charges and no rights are created between them. In Sweden, one of the properties retains the original designation, and rights and charges are primarily vested in that property unless the surveyor decides otherwise. In addition, the surveyor can create rights and charges between the properties. He enters not only the subdivision but also other rights in the real property register and enters the properties together with any easements and other localised rights on the register map.

In Slovenia above all, the rights process is not always concluded after the subdivision process, because further contacts with land registers may be needed for the creation of easements, clarification of charges, etc. This, then, comes after registration in the land cadastre and describes essentially the same process as a simple sale. But there is an element of risk involved. Questions are liable to be left unsettled at the subdivision and then have to be cleared up afterwards. The danger is that they will remain unresolved.

In Sweden, too, a certain amount of work may still remain to be done after the subdivision, especially with regard to mortgages, if the surveyor has been unable to remove them during the subdivision process because the mortgagee risked losing rights. If this kind of supplementation is needed, then in Sweden too the ensuing process resembles that of simple sale.

Having now reviewed similarities and differences, we can also observe that in Slovenia the process jumps about between different actors and in principle it is the landowner himself who drives the subdivision process towards a conclusion. Rights-related processes may have to be added at a subsequent time. The landowner can, of course, make things easier for himself by entrusting the job to the surveyor or another agent. In Sweden, a surveyor employed by a public authority is responsible for everything from the opening official contacts to the finished product, though the property owner may, in some cases, need to put in more work later on the subject of charges.

No figures are available on the average duration of Slovenian and Swedish

subdivision procedures from measurement to registration, but the Slovenian process ought reasonably to be quicker, since it contains fewer elements of a legal nature. These are instead left to the landowner to sort out before and after the property formation. If neighbours are to be involved, e.g. for creating an exit easement, the owner must negotiate with them separately, whereas in the Swedish process this can be handled by the surveyor. Taking the process as a whole from land policy control to registered property with appurtenant rights and charges, the Swedish model probably has the upper hand from an efficiency viewpoint, since everything is dealt with in one process. At least, this is a good hypothesis.

As we have seen, the Swedish surveyor is vested with wider authority than his Slovenian counterpart for legal details connected with the creation of new properties. One can even say that the Swedish surveyor is authorised to establish the new and the residual units, being clearly defined from a legal viewpoint already after the subdivision process. No further steps are supposed to be necessary. Therefore, the property can normally be put on the market immediately after the subdivision process, and the sale of the new property can be handled very quickly indeed. In Slovenia, further legal operations may be needed in order to create easements, eliminate mortgage charges, etc.

Thus the task of the Swedish surveyor is to create effective, clearly defined units for the property and credit markets. In addition, rights like easements are localised, since they can be plotted on the cadastral map. In Slovenia, it is the task of legally trained notaries to attend to this, but they may lack spatial knowledge concerning rational land use. The Slovenian surveyor's function is merely to measure boundaries, even though he could decide on the spot which rights are needed in order to create properties which are practical in every way. The differences in responsibility between the two countries doubtless have their historical explanations, but it is worth pondering what is best for the property and credit markets.

2.8.4 Purchase and subdivision

The next comparison concerns combined sale and subdivision, i.e. someone purchases an area which is to be detached from an existing property to form a new one. It is further assumed that the vendor has made contact with the purchaser without involving an estate agent or credit provider. This restriction is made for the sake of simplicity; in the normal run of things at least estate agents and banks are unlikely to be involved if a private person is selling unsubdivided land.

Sale plus subdivision is a combined process in both countries, since the sale involves one kind of procedure and the subdivision another. Different laws govern these processes. The model components that have been devised are therefore to be combined, one way or another (Figure 2.12, p. 78-79).

At the initial stage, an agreement is concluded for the sale of the area concerned. The Slovenian landowner, however, has matters of pre-emption and permits to deal with first. The fact of the subsequent subdivision process being initiated by the vendor in Slovenia and the vendor or purchaser in Sweden shows that the first contract is not a form of transfer in Slovenia but is in Sweden, where both have an interest in fulfilling the procedure.

The subdivision processes then follow, as described in Figure 2.11 (p. 76-77). This work is based on the contract of sale. It is worth noting that in Sweden land policy control takes the form of a suitability assessment forming part of the subdivision process. Here a weakness becomes apparent. A sale is agreed on and the parties enter into a cadastral process without being certain that it is feasible. If it is not feasible, the purchase is invalidated, but finding this out can take time and cost money. In Slovenia the landowner has already finished with land policy control before entering into a situation of sale and subdivision.

After the subdivision has been effected, the parties meet to sign a final deed of purchase and to transfer the part of the purchase price which has not been paid. The procedure described above for sale (Figure 2.10, p. 74-75) follows here. Any easements which are to be created and other measures which can be attended to in the Swedish subdivision process must be raised in Slovenia by the parties during the final phase and under the supervision of the notary, or even a court.

When the purchaser then wishes to register his title, the municipality in Sweden can exercise its right of pre-emption if the land in question is undeveloped. In other words, a further element of uncertainty is added at this point to the Swedish process. There may, however, be a number of restrictions, and so a right of pre-emption will not necessarily exist.

In principle, then, the processes are similar in terms of results and, in this instance of combined purchase and redistribution, both Slovenian and Swedish properties are firmly defined when the combined process is over.

There is one remark to be added concerning Sweden. The two processes for sale and subdivision are both continuous and apparently efficient, but combining them introduces various points of uncertainty. The process has a weakness in that land policy control does not figure early in the process and, moreover, can appear on two occasions. This is evident from Figure 2.12 (p. 78-79), and especially by comparison with Slovenia. Purely theoretically speaking, even the municipality can approve the subdivision and subsequently exercise pre-emption. This means that in Sweden it may be wise for the landowner or purchaser to apply the Slovenian method and contact the municipality and the surveyor right from the start, to clarify the likelihood of sale and subdivision being feasible. It may be especially wise for the purchaser to consult the municipality at an early stage, to avoid the risk of devoting time and money to something that in the end may be denied him.

2.9 Conclusions

Three typical transactions (see instances 1-3 in Subsection 2.2.2) have been analysed in order to develop the models with components. Activity diagrams have been used to test them. But the choice of typical instances means that other transfers, such as the transfer of forestry land and agricultural land, may conform to other models and the land policy control component in particular may need to be substantively developed. Instead the models are to be regarded as a starting point for further analyses of other transactional processes. A test of other countries, e.g. Finland, Denmark, the Netherlands and England, would presumably develop the models further.

It must also be pointed out that the models have been made general but are evaluated with reference to a certain aspect (the market). The components of the models may therefore need to be supplemented, or reconstructed, if other aspects are emphasised, e.g. if the emphasis is put on monetary flows, the rule of law, information flows or duplication of effort. The models must be constructed according to what is to be investigated.

The following conclusion can also be drawn from the practical work on this article. If nationals describe the rules of a certain process in text, it is rarely possible to compare different countries, or at least it is very hard to understand and still more to make comparisons. If the text is also illustrated using diagrams, e.g. UML diagrams, differences and similarities become easier to detect. But if the information can be modelled in a structured way, even more powerful comparisons will be possible, e.g. with the help of classes, relations and processes. To this end, the present article has focused on procedures and actors by developing what are termed components and then compiling diagrams for countries investigated and core interactions side by side.

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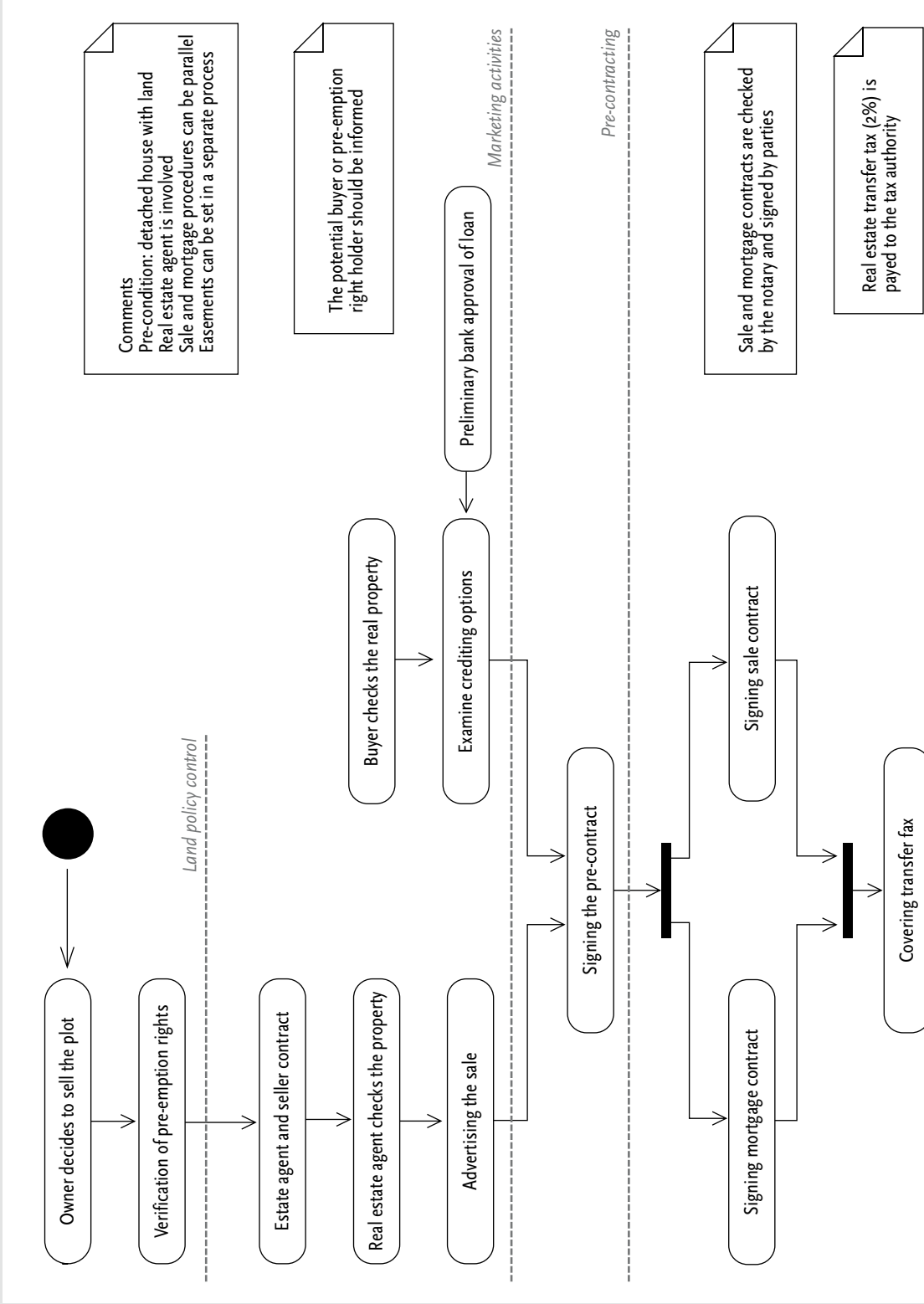
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Figure 2.1 Ordinary purchase of a detached house with land, without pre-emption, in Slovenia



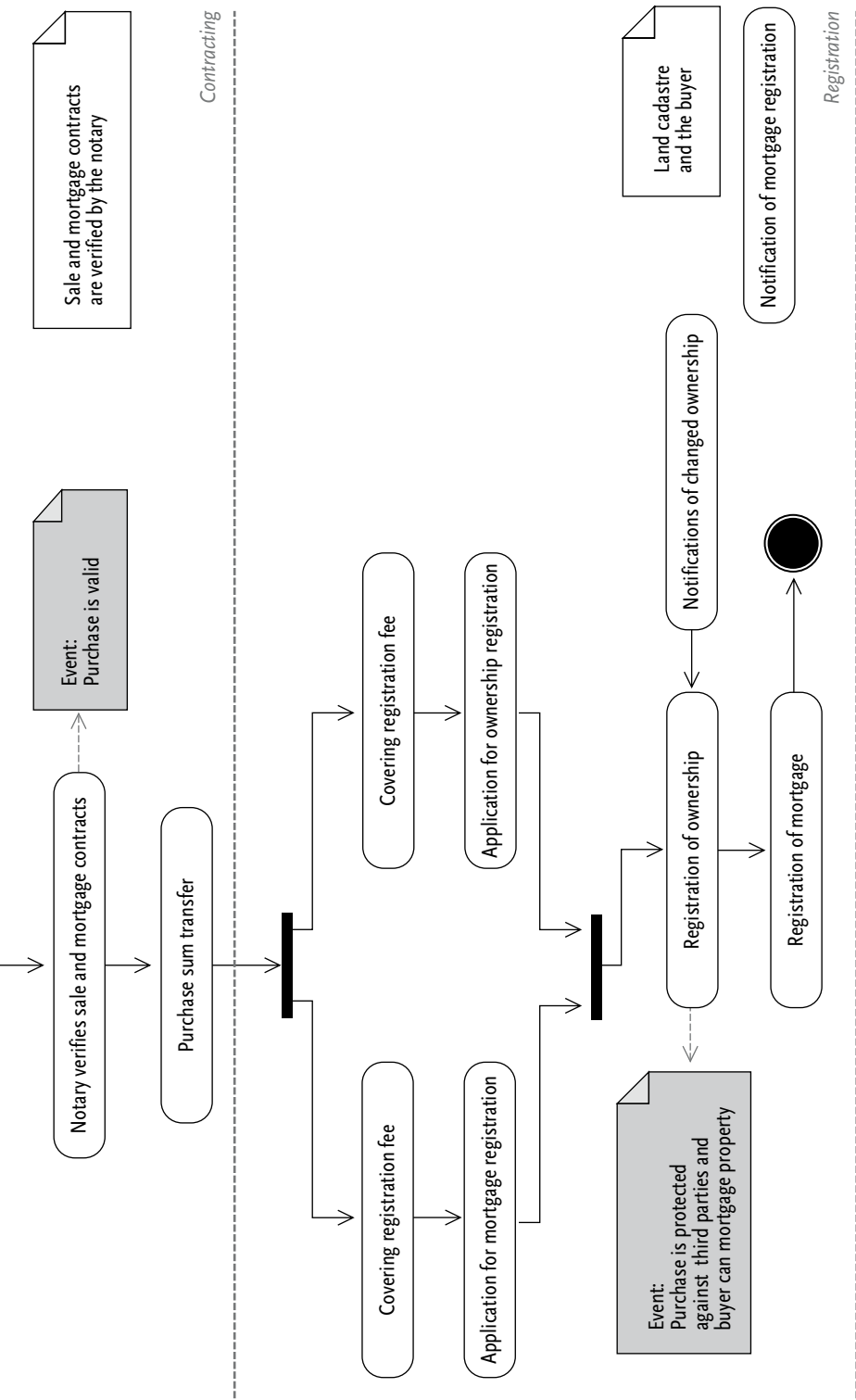
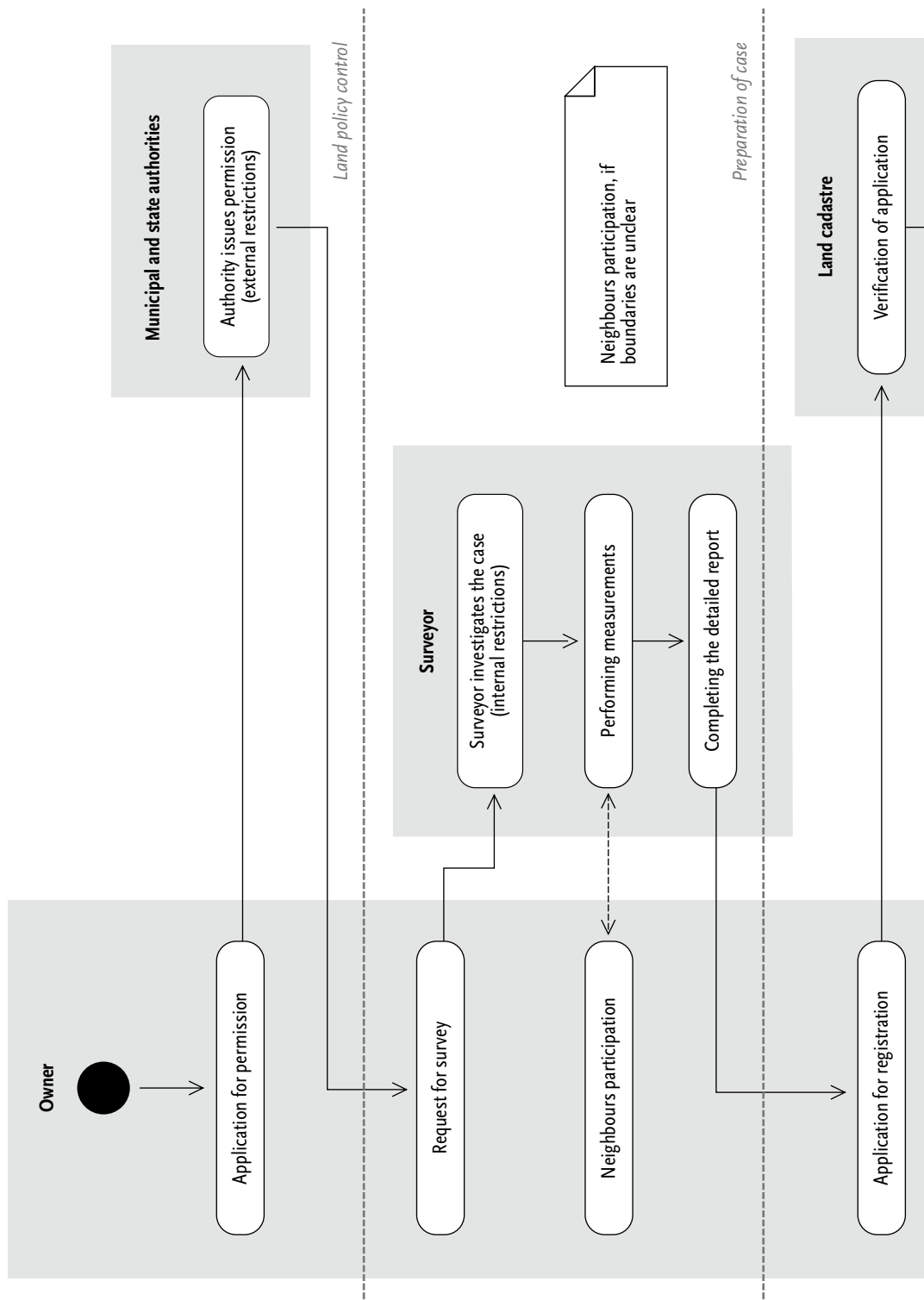


Figure 2.2 General Slovenian subdivision case for an undeveloped parcel for building purposes



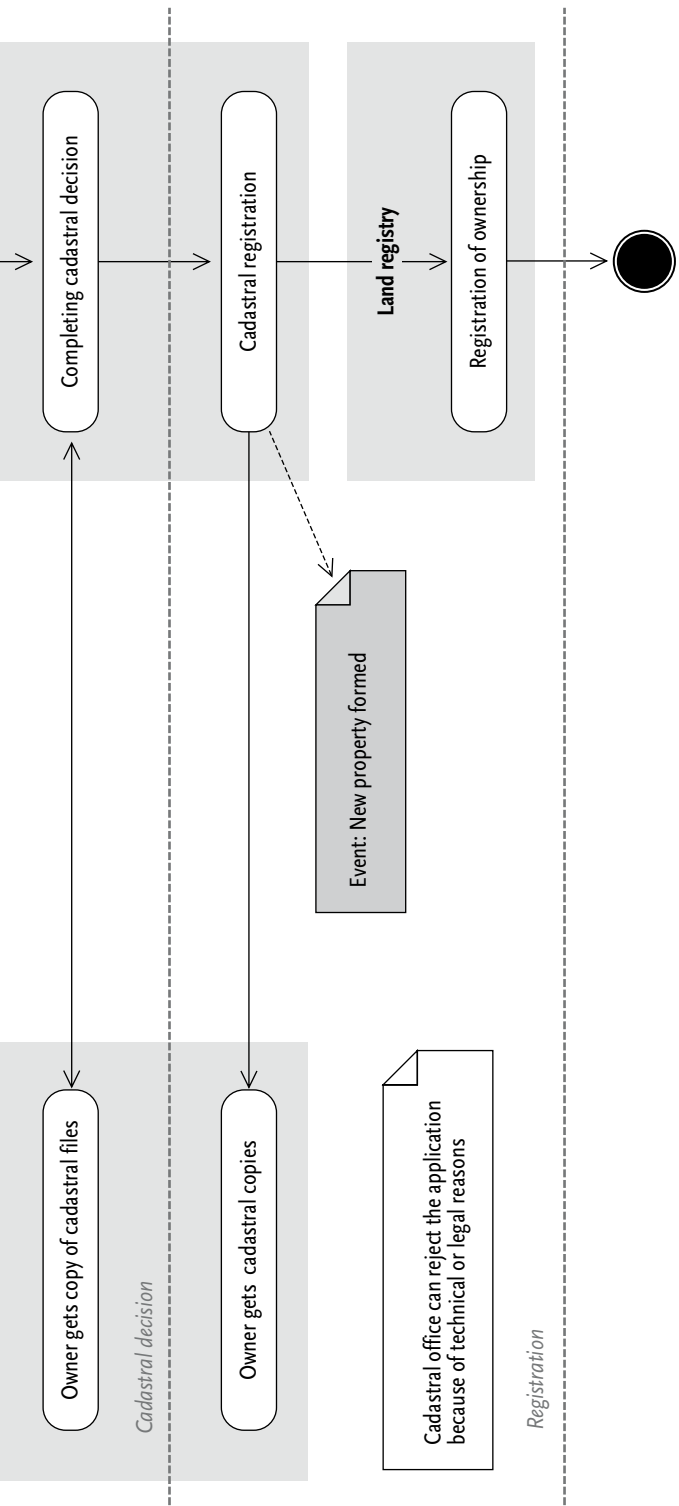


Figure 2.4 Combined purchase and subdivision of undeveloped land for building purposes in Slovenia

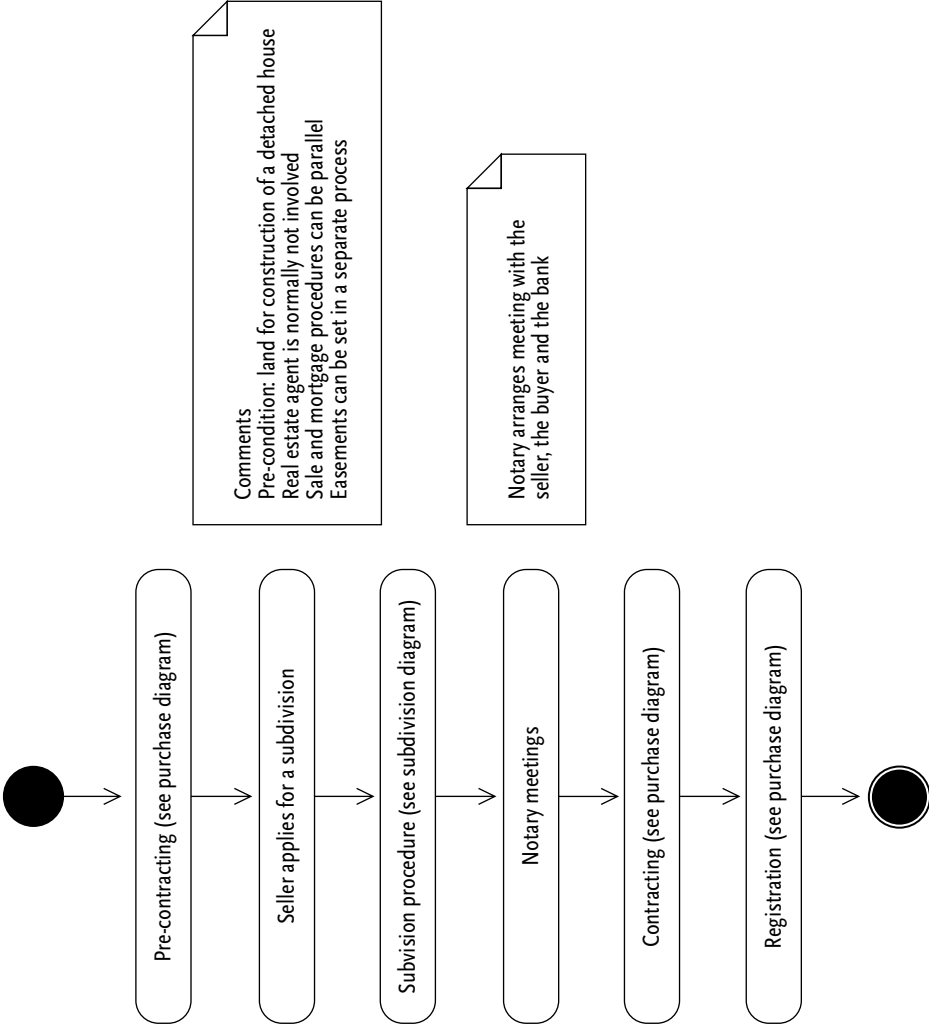


Figure 2.5 Purchase procedure of a permanent house in Sweden

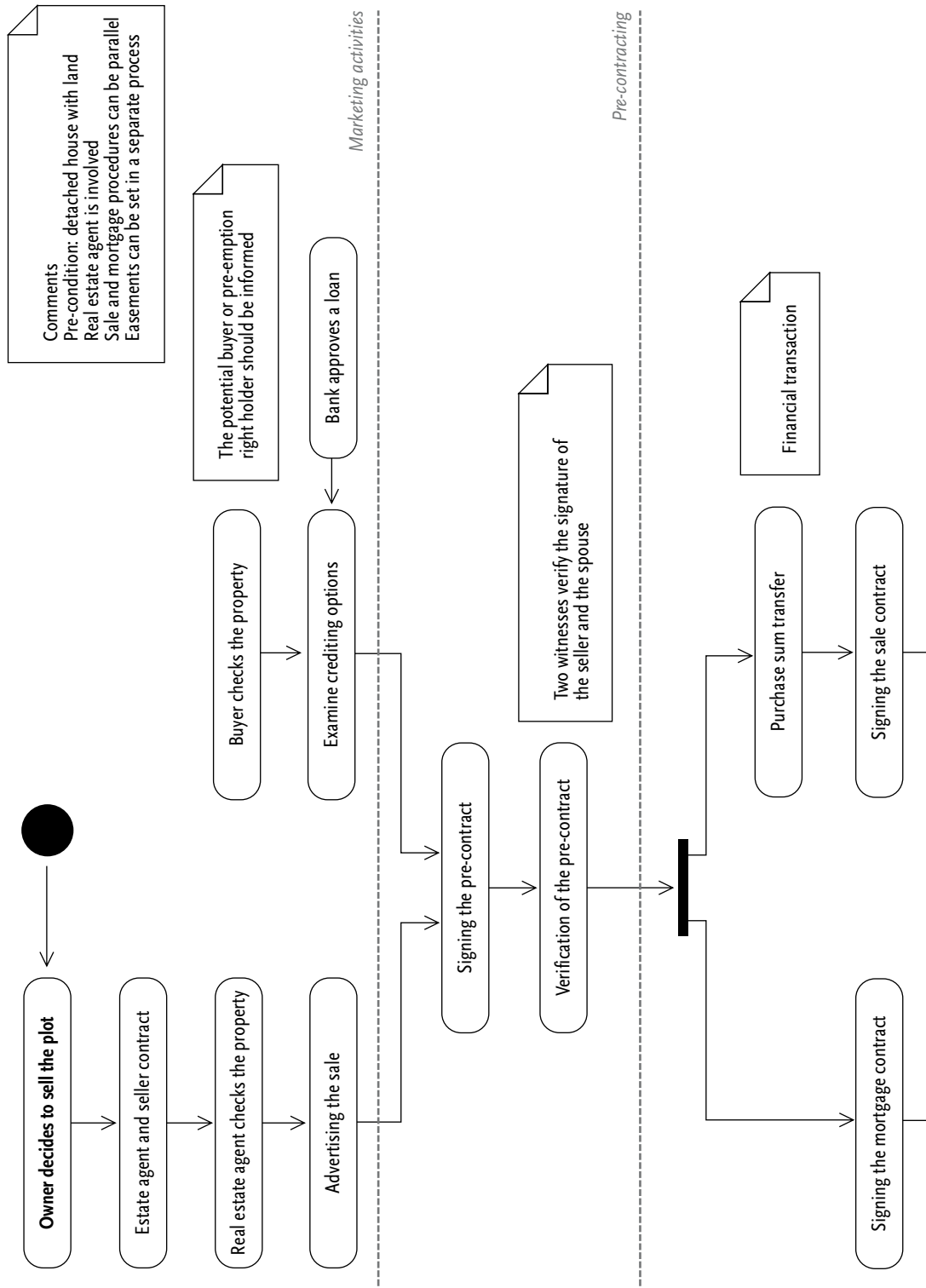


Figure 2.7 Subdivision process in Sweden

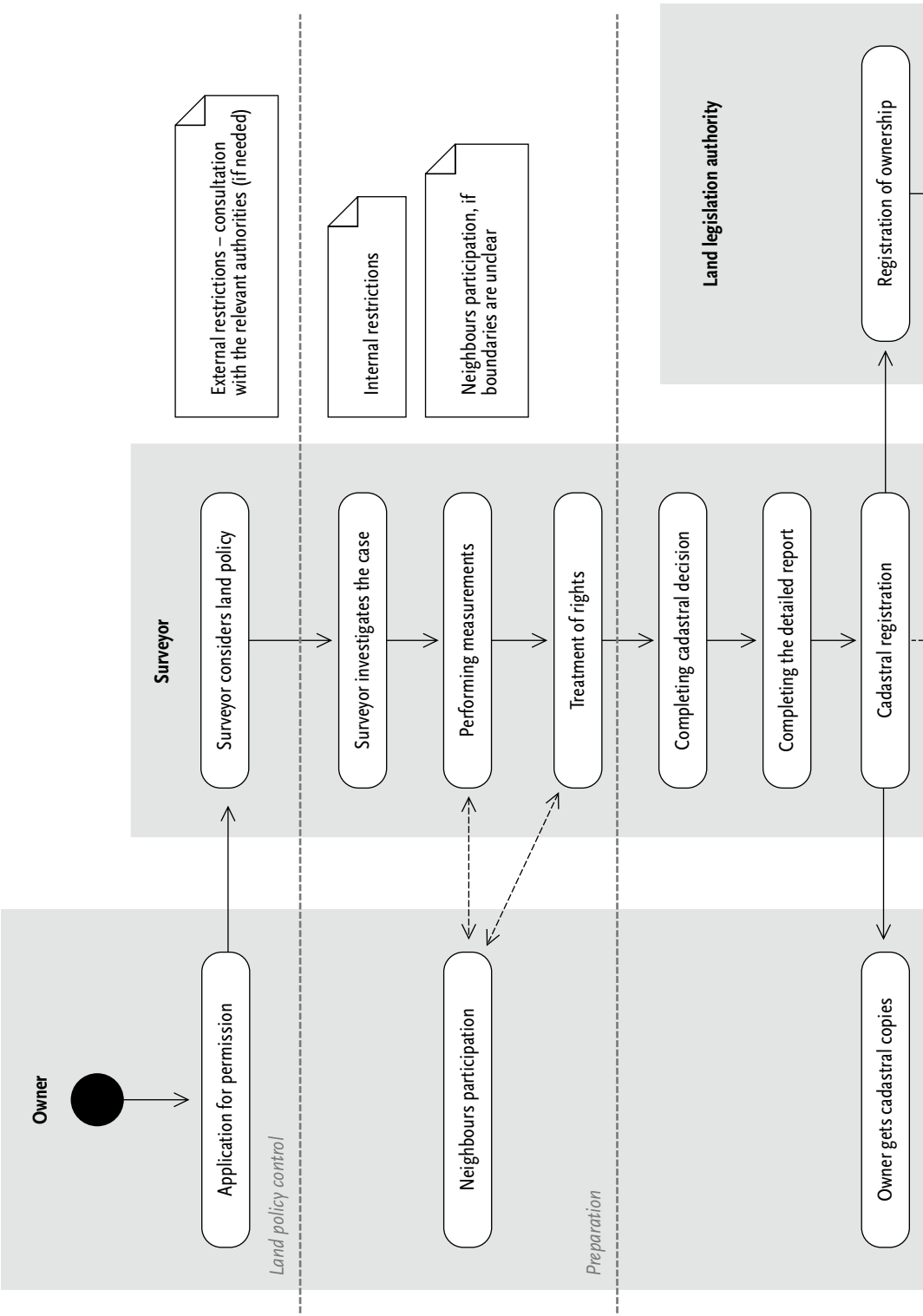
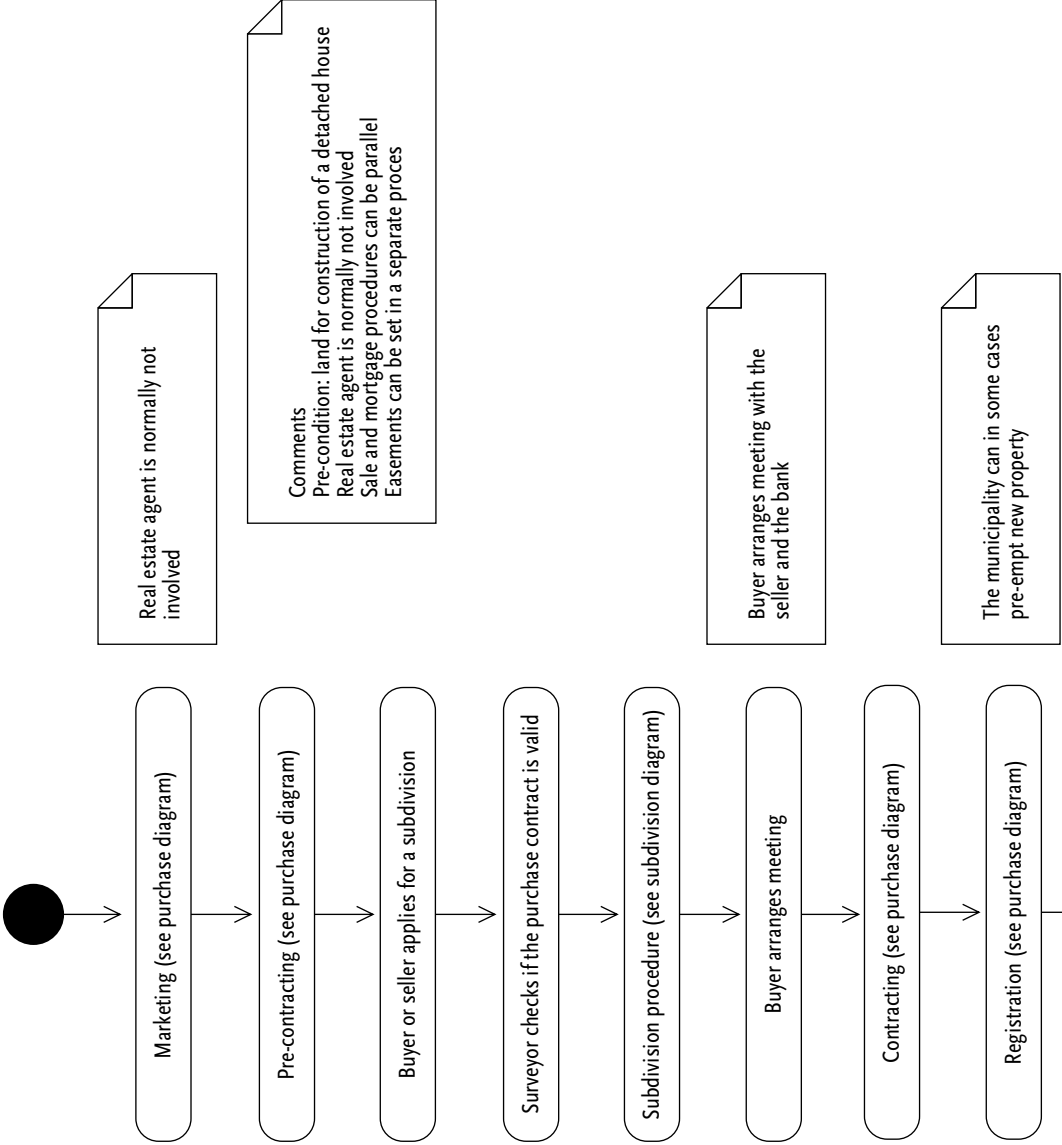




Figure 2.8 Direct communication between vendor and buyer in Sweden, without involvement of an estate agent



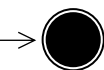
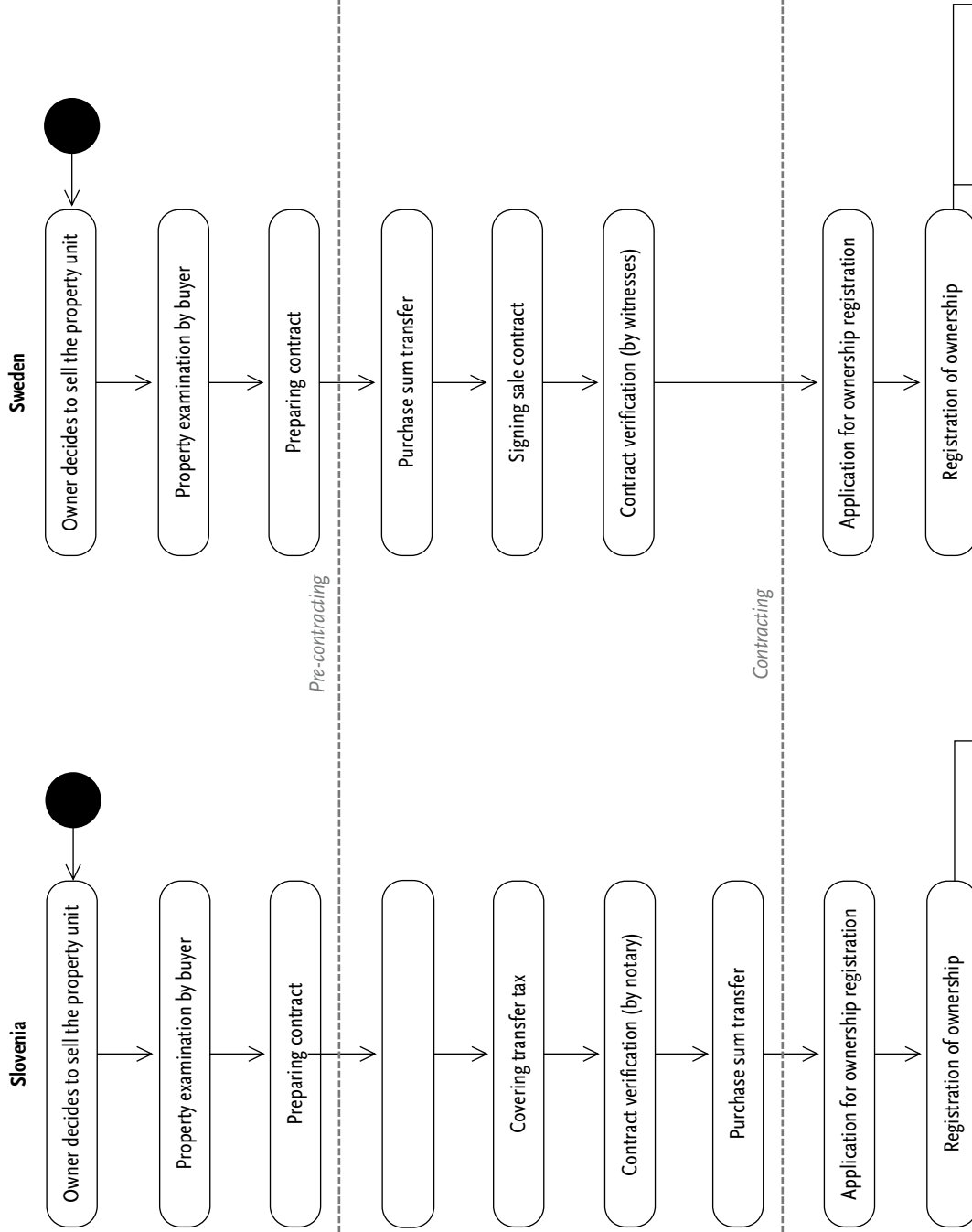


Figure 2.9 Pre-contracting, contracting and registration of a simple sale in Slovenia and Sweden



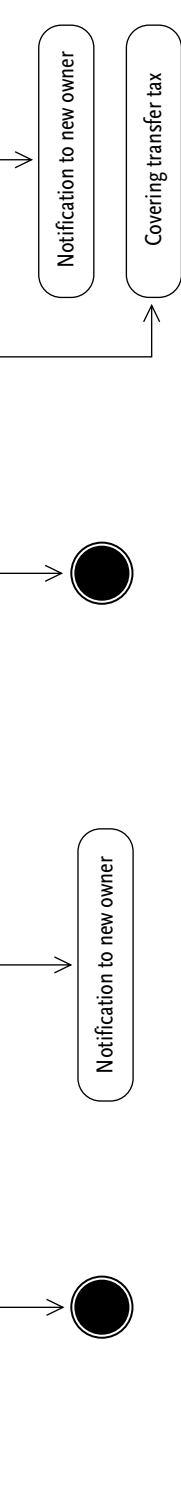
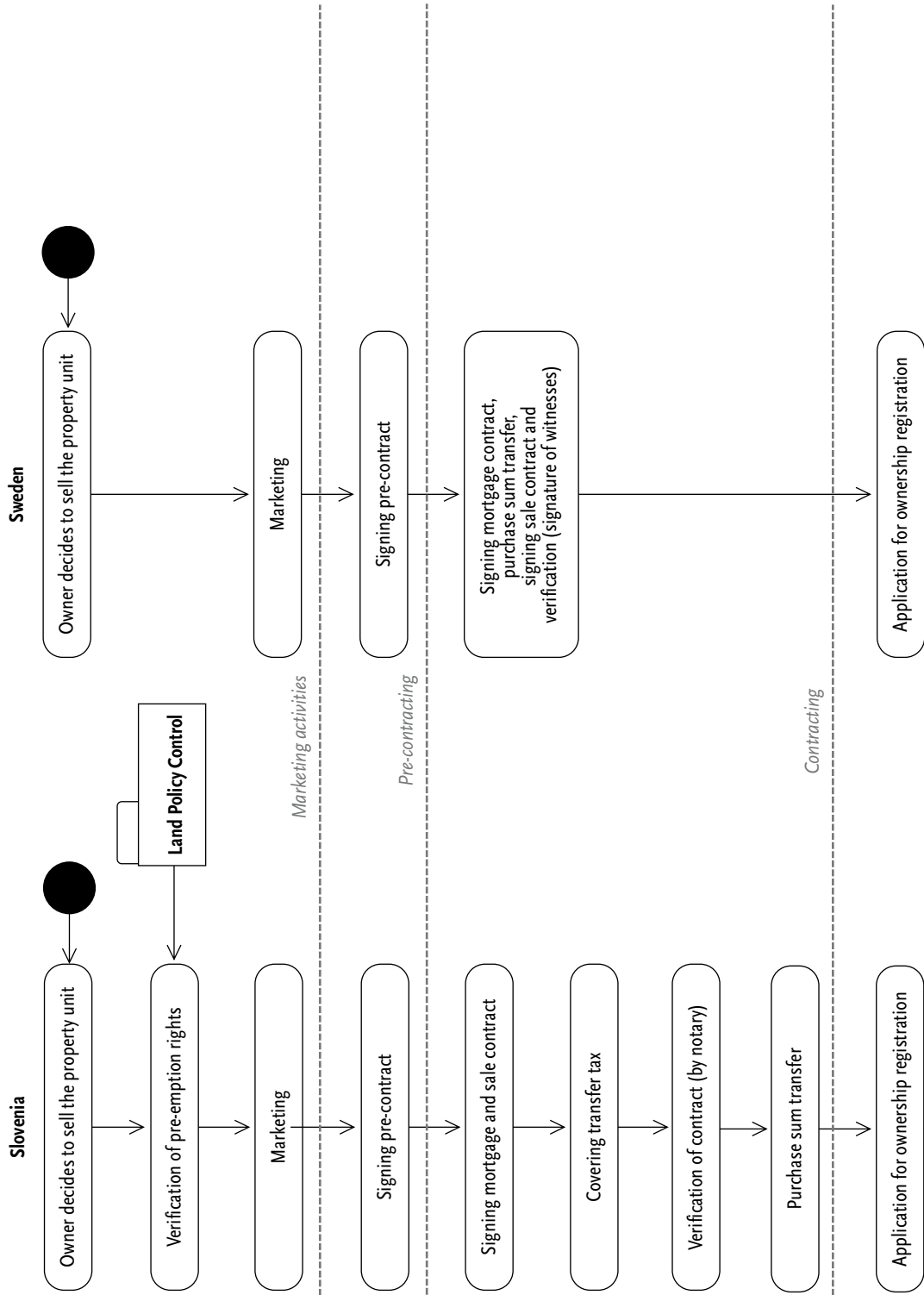


Figure 2.10 Ordinary purchase of a single-family housing property in Slovenia and Sweden



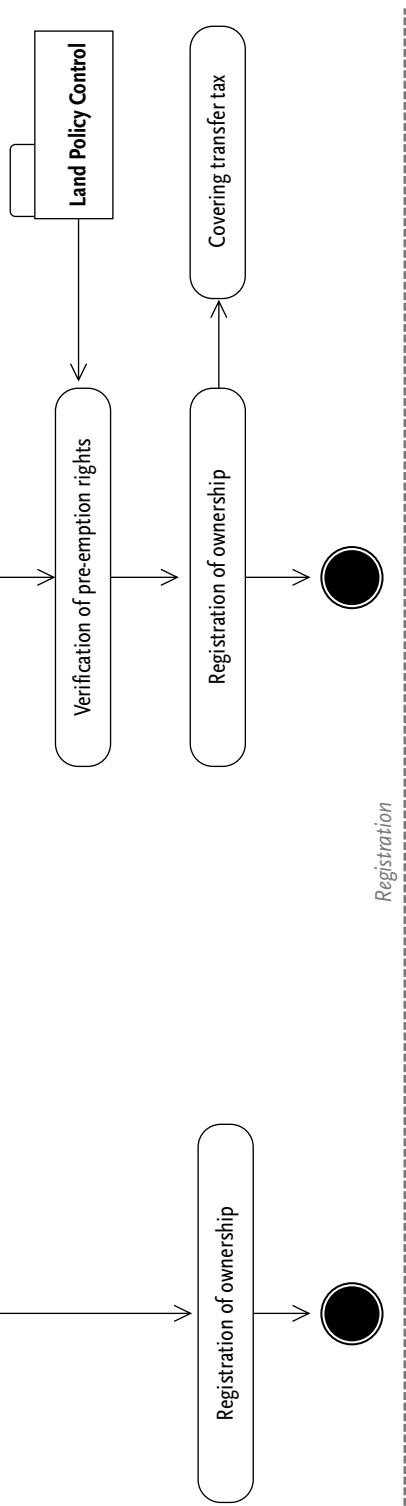
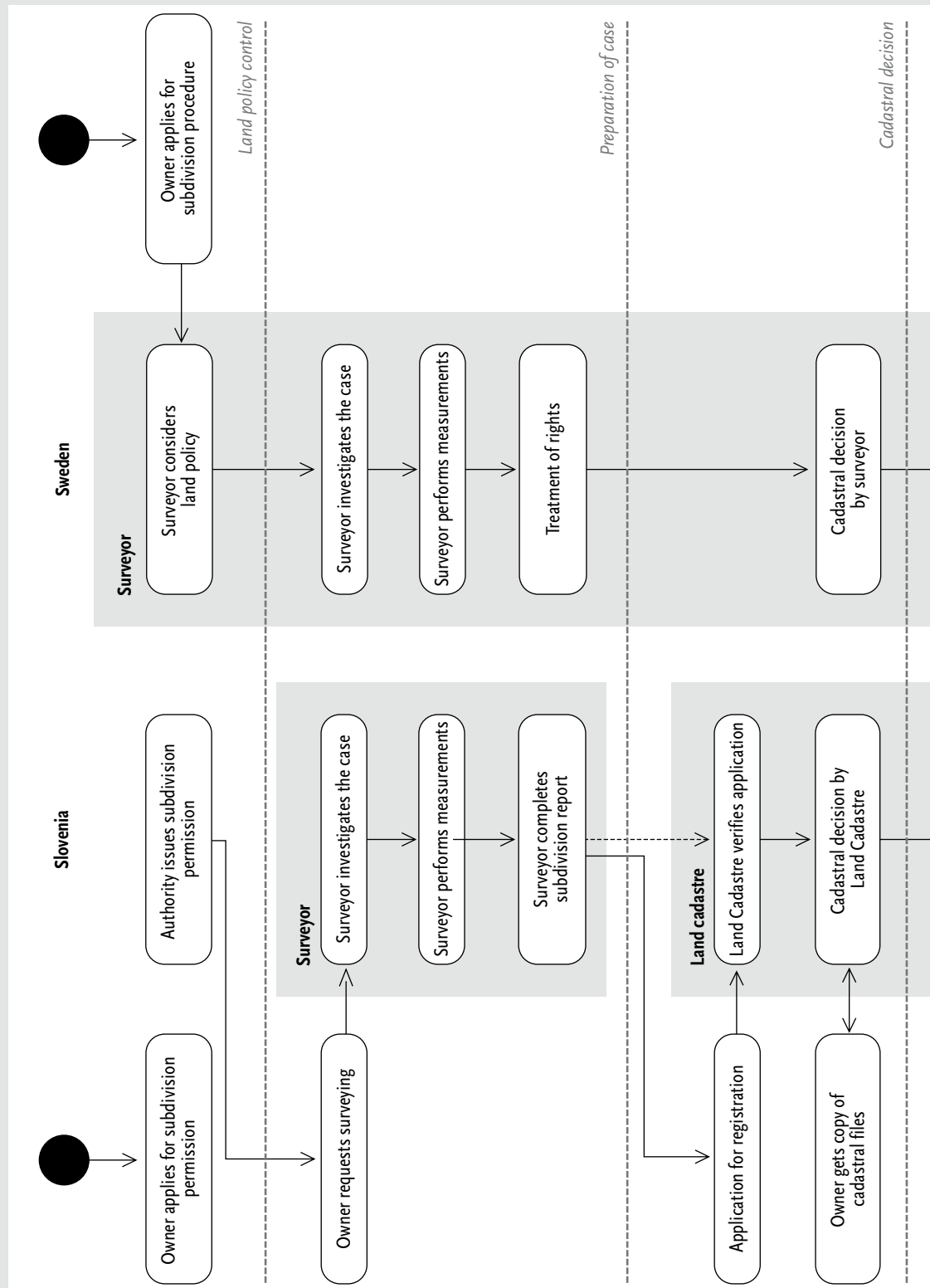


Figure 2.11 Components for subdivision in Slovenia and Sweden



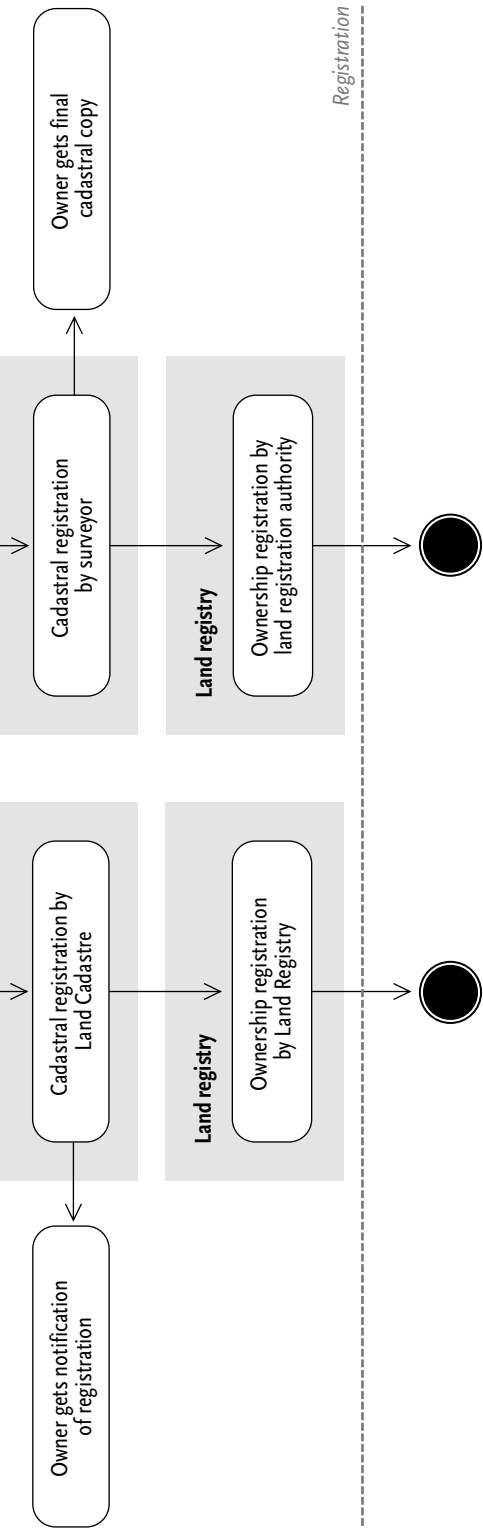
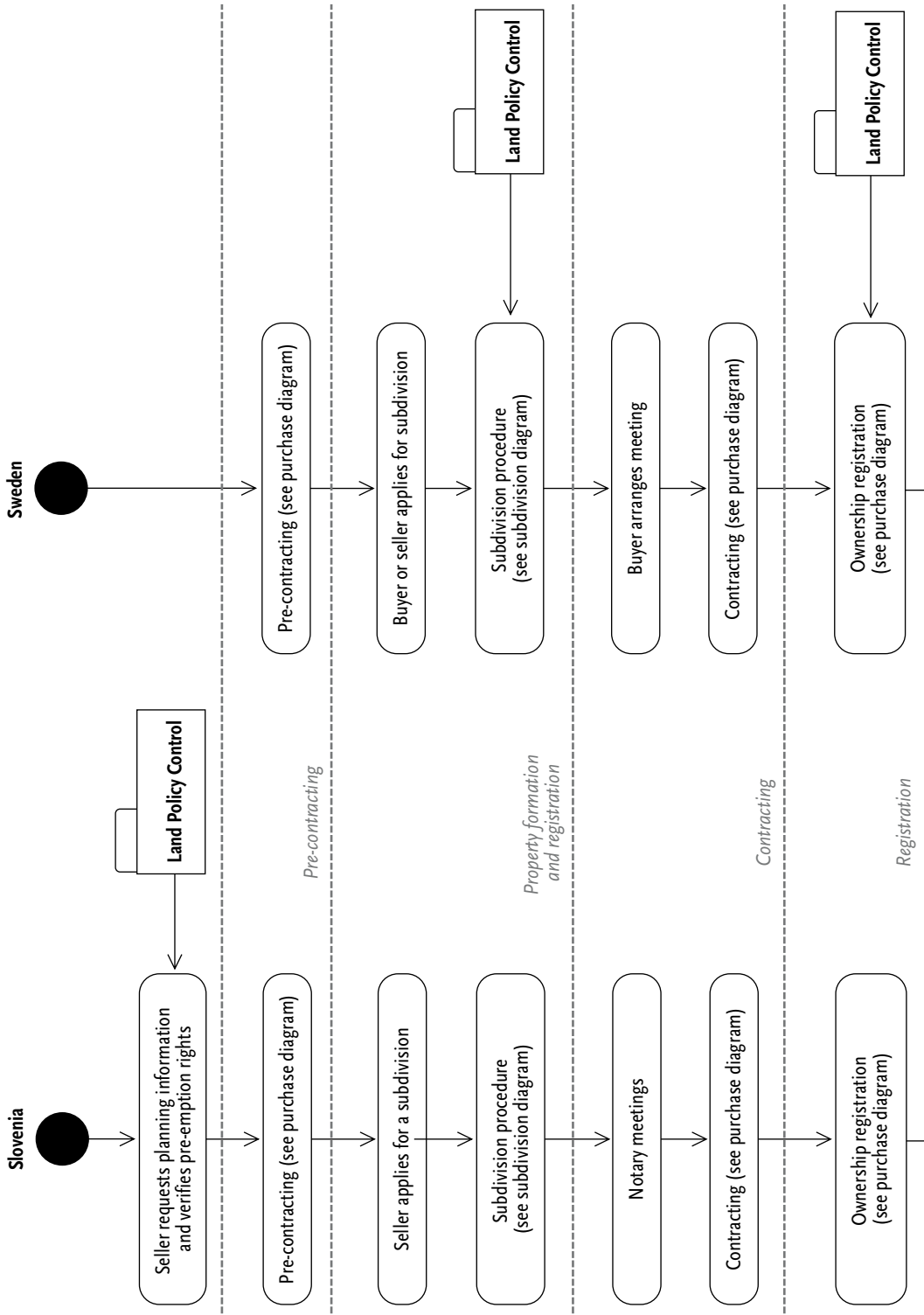
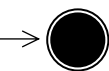
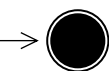


Figure 2.12 Combination of model components for sale plus subdivision in Slovenia and Sweden





3 Towards more efficient transaction procedures in Latvia

Armands Auzins

Abstract

Modelling is an efficient tool for improving real property transactions. Preconditions for the simplification of transaction procedures are clear descriptions of the relevant activities and selection of appropriate procedural models that can be compared and improved according to the identified problems.

The article reports the findings of a study into real property transaction procedures in Latvia. It formally describes three transaction cases: pure sale, pure subdivision and subdivision combined with sale; institutions involved in the procedures are also discussed. Statistics show that real property transactions are rapidly growing in number, and a mortgage combined with a purchase is considered to be a 'normal case' in Latvia.

Organisational issues are reflected not only in the Latvian context; the relevant Lithuanian and Estonian practices are also described. The theoretical part of this contribution is devoted to the identification of the significant features of a cadastral unit. The principal transaction costs and the average duration of the transaction procedures are presented on the basis of case studies.

3.1 Introduction

Legal dispositions on real property are performed by applying set cadastral and legal procedures. One of the most complicated and crucial issues discussed in relation to the real property market is that of institutional aspects, which includes not only organisations and their performance, but also regulatory provisions, or 'rules of the game'. By making institutional changes it is possible to simplify real property transactions and to make them more transparent and secure.

Various stakeholders and parties are involved in supporting real property formation and transaction processes. For example, local municipalities make decisions concerning permitted land use, including cases of property subdivision; they act as land use planning authorities and decision-makers concerning their pre-emption rights. The State Land Service of Latvia supports and technically performs real property formation procedures and is responsible for the registration of cadastral data. Various professionals, such as surveyors, planners and valuers, perform the technical procedures, while lawyers and notaries oversee legal matters. The land register – Land Book offices – register legal rights. Credit organisations – the Mortgage Bank of Latvia and commercial banks – finance activities related to real property. Real property owners and users act as holders of rights and applicants for the relevant procedures.

As regards the administrative framework, it is important to assess the performance of the responsible organisations, especially those working in the

public sector. Therefore, when examining the Latvian situation, we may generally conclude that performance of functions is often doubled, organisation of internal work is ambiguous, and a lack of cooperation and coordination of activities is widely observed.

Rules regarding real property transaction procedures in Latvia may be found in the Civil Code and in a number of legislative acts and regulations. As land reform is still going on in Latvia, the rules of land reform also include some binding provisions related to property transactions.

It must be stressed that the Law on the State Cadastre of Real Property has been enforced only recently, and there is no codified legislation in Latvia regulating real property formation processes, land consolidation activities and real property transactions. In fact, these activities are regulated by general legislative acts like the Civil Code and the Law on the State Land Service. Some instructions and specifications have been developed mainly for internal use by the relevant state or municipal institutions, but these do not have sufficient authority to regulate systemically the above processes and activities (Auzins, 2004a).

It is a known fact that contradicting and incomplete legislative norms do not satisfy society. In the case of real property transactions, the influence of institutional performance (organisation, functions and cooperation) on the efficiency of transaction procedures should be improved.

Efficiency measures are mostly related to the economic efficiency of the procedures; however, the different aspects of real property transactions also involve legal and social efficiency. For instance, people must leave their workplaces in order to queue for cadastral and registration procedures; furthermore the various loopholes in legislation make it possible to bypass the law and to avoid paying the full amount of transfer tax.

3.2 Real property units and transactions

The term 'real property' may be looked upon in two different ways: from the point of view of cadastre and from that of the land register. The cadastral view regards real property as a composition of physical real property objects and includes some specific rights or 'feature of rights'. These specific rights may be rights other than ownership rights; a feature of rights means acknowledgement of rights established by some document, for instance, project documentation of a newly constructed building, or document of a municipality decision. The point of view of the land register is enshrined in the Civil Code. In the light of the Civil Code, the term 'real property' refers to immovable property and is associated with ownership.

Three types of real property may be distinguished:

- land with or without buildings;

- a building or an engineering structure without land (when the land belongs to another owner);
- an apartment or a group of spaces.

Real property objects by definition may be:

- a land parcel;
- a building/structure;
- a group of spaces (apartment).

Some types of transactions, like real property subdivision, amalgamation and readjustment, include real property formation procedures. Formation of a real property or establishment of lease is followed by the process of registration in the cadastral information system, but the result of real property registration in the land register is the recording of real property data and corroboration of real property rights (title). It is also possible to establish other rights in the land register, such as lease, easements and mortgages.

Modelling is considered to be an efficient tool for the improvement of the existing processes of real property formation and transactions as well as institutional performance. From the modelling perspective, the processes are accomplished through inter-organisational business workflows. The models must satisfy the criteria of validity from the point of view of information modelling and the ontological perspective, as well as from the legal perspective (Stubkjær, 2003). The benefit of modelling is widely appreciated in the area of systems analysis and systems engineering, and a wide range of different modelling techniques has been proposed.

3.2.1 Real property transactions

According to Williamson's definition, a transaction takes place when goods or services are transferred across a technologically separable interface. One stage of activity terminates and another begins (Furubotn & Richter, 1998). By applying real property transaction procedures the property rights and parcel lots are established or changed (Stubkjær, 2003); in other words, transactions constitute a transfer of real property rights.

In general, transactions are regulated by the Civil Code and are specified accordingly in the legislation related to the land reform in Latvia. In a comprehensive definition, the Civil Code states that a legal transaction is an action carried out in approved order for the purpose of establishment, amendment or termination of legal relations. In accordance with the provisions of the land reform legislation, land transactions are any dealings that result in a change of land ownership, including inheritance by contract (testamentary inheritance), compulsory sale of mortgaged land and investment in corpora of a limited liability company. Transactions are possible exclusively in real prop-

Table 3.1 Transactions registered in the Land Book

| Transaction type/year | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----------------------|-------|-------|-------|--------|--------|--------|
| Pure sale | 1,165 | 2,953 | 7,320 | 11,126 | 15,415 | 22,195 |
| Subdivision | 100 | 176 | 433 | 1,384 | 1,954 | 2,819 |
| Mortgage | 858 | 1,741 | 3,870 | 8,843 | 11,261 | 18,317 |
| Granting | 820 | 1,565 | 2,504 | 3,500 | 4,303 | 5,775 |
| Inheritance | 259 | 492 | 787 | 781 | 1,617 | 2,637 |

erty to which the rights have been corroborated in the Land Book (Auzins, 2003). The State Unified Computerised Land Book is a database containing aggregated data on all cases of corroboration concerning the main types of transactions:

- pure sale and sale combined with subdivision;
- mortgage;
- granting of rights;
- inheritance.

It is evident from the figures in Table 3.1 that the number of real property transactions grew rapidly during the ten-year period, and that a mortgage combined with a purchase may be regarded as 'a normal case' for a formal description of cases of property use in Latvia.

3.2.2 Object of a transaction

According to the concept of cadastre in Latvia, real property formation includes procedures by which a new real property is registered consisting of different property objects, or the content of an existing property is changed in the cadastral information system (Auzins, 2004: 2). In fact, the procedures 'in the field' are related to the physical real property objects that are determined through the following types of procedures:

- subdividing real property objects into several real property objects;
- amalgamating two or more real property objects into one object;
- joining of part of a real property object to a proximate object without shaping this part as a new real property object;
- changing the configuration or size of a previously registered real property object (building, group of spaces).

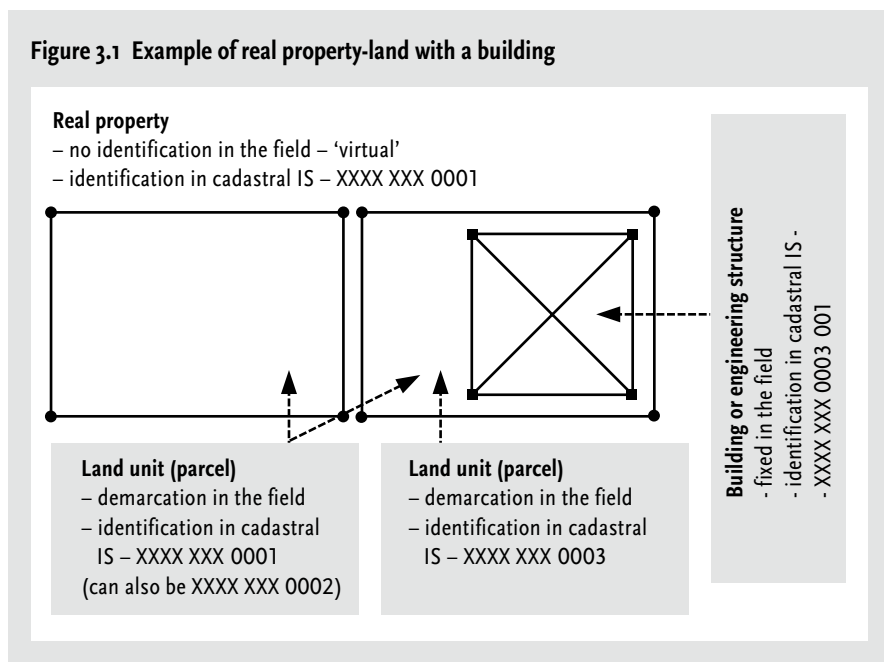
Thus, in the cadastral information system real property is formed by the following:

- shaping a new real property;
- subdividing the registered real property into several independent real properties (including partition of joint properties);
- amalgamating several real properties into one real property (including elimination of real properties – buildings);
- changing the content of a previously registered real property by joining to it or disjoining from it a real property object.

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 (-oct) | Total |
|--------|--------|--------|--------|--------|--------|-------------|---------|
| 29,842 | 39,017 | 49,496 | 59,398 | 65,491 | 76,460 | 49,437 | 429,315 |
| 4,036 | 5,613 | 7,899 | 10,568 | 11,235 | 14,154 | 10,739 | 71,110 |
| 25,094 | 35,675 | 47,699 | 62,707 | 77,601 | 91,716 | 62,886 | 448,268 |
| 7,051 | 7,887 | 9,750 | 11,993 | 11,616 | 13,171 | 11,262 | 91,197 |
| 3,348 | 4,416 | 7,483 | 10,100 | 9,914 | 10,643 | 8,054 | 60,531 |

Source: State Unified Computerized Land Book (<http://www.zemesgramata.lv>), 09.10.2007

Figure 3.1 Example of real property-land with a building



According to the above, for instance, in the case of subdivision, both the real property object and the real property are subdivided, but physically – ‘in the field’ – just the real property object is subdivided. Figure 3.1 shows an example of a real property consisting of three real property objects that are identified in the cadastral information system as cadastral units. Each real property formation case can be seen in combination with the particular transaction case – sale, granting of rights or mortgage.

A cadastral unit may be significantly characterised as:

- a referable set of rights/obligations, or ownership rights;
- a unit for valuation;
- a unit for registration in cadastre and land register;
- enabling performance of transactions;
- enabling development, etc.;
- not accepted for mortgaging.

However, as can be seen, the legislation related to real property formation (Law on the State Cadastre of Real Property) by changing real property objects from their initial situation to a new situation does not include transfer of property rights (ownership or granted rights) and modification of property use (change in the permitted purpose of use); it includes only changes in shape and structure through cadastral procedures. In this case, transfer of property rights is registered in the Land Book when the real property formation procedure is finished and when the interested person applies for registration (Civil Code, Land Book Law). Alteration of real property use, apart from real property formation and registration procedures, is regulated by the Spatial Planning Law.

3.3 Outcomes of transaction modelling

The COST Action G9 'Modelling Real Property Transactions' provided a methodology for modelling selected transactions in Latvia. The methodology designed for national acquisition of evidence and for international comparison can be described on the basis of modelling outcomes (Auzins, 2004b). The comparative analysis can be followed by an explorative analysis of the causes of economic efficiency.

The modelling activity of the above COST action includes the description of legal procedures as perceived by the actors involved, who must assume certain responsibilities. The actors constitute private professionals (surveyors, agents, etc.) and public officials/authorities (judges, notaries, cadastral officials, etc.), representing land administration, legal and financial organisations. Modelling of real property transactions in Latvia is presented through formal descriptions and activity diagrams of three cases of use – pure sale, pure subdivision and subdivision combined with sale.

3.3.1 Pure sale

This type of transaction is related to the sale of a whole real property (conveyance of land with buildings), which may consist of more than one land unit. Before the transaction can be implemented, the seller shall be the owner and the real property must be registered in the Land Book. Both the seller and the buyer may then initiate the sale of the selected real property. In the case of marital property, the seller's spouse also signs the final contract and the notary witnesses the signature.

To perform this transaction, the seller (owner) and the buyer must be willing to enter into a contract; they must meet to initiate the purchase process. If the buyer or the seller requires the support of an expert (technical expert, lawyer, real estate agent) they hire (authorise) such assistance.

Then follows a sequence of subordinated activities:

1. The buyer should examine the real property for any possible deviations (hidden faults) from normal conditions (boundary marks, structures, roads, etc.) and check any data (documents) concerning the real property.
2. The buyer and the mortgagee negotiate opportunities and conditions concerning a loan. If the outcome is positive, the buyer submits an application form, followed by all the other documents required to satisfy the contractual requirements of the mortgagee.
3. The buyer and the seller may draw up a pre-contract, to be signed by both parties. The notary normally does not witness the signatures of both parties. The pre-contract normally covers the intent, purchase amount, terms, security deposit, etc.
4. The buyer and the seller prepare and sign the purchase deed (final contract). In this case the notary normally witnesses the signatures of both parties, but does not take responsibility for the content of the document.
5. The buyer submits the purchase deed to the municipality to meet the condition regarding pre-emption rights, and is usually granted a positive decision.
6. The buyer submits an application to the regional cadastral authority of the State Land Service requesting assessment of the cadastral value of the property and a transcript of the technical inventory (updated), if the real property consists of buildings. All the cadastral data are registered in the cadastral information system and reflected in the cadastral certificate.
7. The buyer submits the purchase deed and the cadastral certificate and the transcript of the technical inventory to the notary, who collects them and issues a request for registration of rights (ownership rights), after the required payment is settled.
8. The buyer submits the purchase deed, certificate, transcript and the request for registration of rights to the land register, where the ownership is registered; after registration, both the registration fee, which is related to the minimum salary officially declared within the country, and the real property transfer tax – stamp duty – are paid. The latter normally amounts to 2% of the formally agreed value of the contract or the cadastral value, whichever is the highest. The judge – official representative of the land register – examines the request for registration of rights and checks to see whether there are already any registered rights connected with the real property in question (Land Book Law, 1937: 77). If registration (decision of the judge) is denied, the buyer may lodge an appeal against the decision.
9. The land register changes the ownership data and updates other data in the unified Land Book database, and the buyer is given the Land Book Certificate (title). The cadastral information system will be updated with the ownership data when the land register sends the particular data on changes in ownership to the regional cadastral authority; unfortunately it is

not possible to do this in an online regime.

10. The buyer (new owner) submits all the other required documents (Land Book Certificate, statement of real property value, insurance document) and pays the mortgage fee to the mortgagee.
11. The mortgagee formally decides to grant the loan to the buyer and, taking into account the previously negotiated conditions, prepares the mortgage deed, which is signed by both parties.
12. The new owner submits the mortgage deed to the notary, who issues the request for registration of the mortgage, after the required payment has been made.
13. The new owner submits the mortgage deed and the request for registration in the land register, where the mortgage is registered, after the registration fee has been paid.
14. The mortgagee issues the agreed sum of money to the new owner, who pays the balance to the seller.

Once this procedure is complete, the buyer should be the owner of the real property. If the new owner has a spouse, he/she also signs the request for registration of the mortgage, and the notary witnesses the signature.

Variations on the activities described above are possible. The purchase deed may be prepared either by the seller, buyer, an expert, or a notary. Mortgage requirements may differ; when granting loans, the mortgager's individual attributes rather than the condition of the real property may be the priority. Where an existing loan (bond of the seller) is transferred to the buyer, the seller also participates in negotiations with the mortgagee. In normal circumstances the mortgagee must be informed before entering into contractual relations regarding the mortgaged real property.

In normal circumstances the notary witnesses the signatures on the purchase deed after the buyer has made the prepayment (or paid the full amount), and proof must be furnished that the real property is not burdened with debt. The notary witnesses either the contract (its content) – a notary act normally prepared and registered by himself, or just the signatures of the parties. In the latter case the notary takes no responsibility for the content of the contract, and the contract is of 'a private character'. The notary is responsible for checking the individuals' identity, their legal capacity and the right of representation of the parties when a notary act is made, and only the identity of the parties in the case of a private document (Notary Law, 1993: 82, 83, 87, 113, 116). The responsibility of the notary to check the legal capacity of the seller of the real property is not clearly defined in the legislation.

When pre-emption rights are exercised, a new buyer replaces the original buyer. Thus, the local government will have pre-emption rights in real property transactions except when a share in joint property is sold (Civil Code, 1939); the beneficiary of pre-emptive rights must make their decision and submit

this to the buyer within 20 days (Law on Municipalities, 1994). In certain cases, leaseholders may also have pre-emption rights according to their contract.

Normally the notary will issue a request for the registration and witness the signature, etc., as described above. However, the request for registration of rights may also be issued by the parish (local) court (Land Book Law, 1937: 60). The request for registration of rights reflects the collected documents and signatures of the interested parties.

When the seller and the buyer are relatives, the real property transfer tax – stamp duty – is 0.5% of the formally agreed contract value or the cadastral value, whichever is the highest.

The buyer may, for a certain charge, authorise a representative of the mortgagee to take overall responsibility for issuing the request for registration of the mortgage and for the registration of the mortgage in the land register; the costs may be included in the loan amount.

3.3.2 Pure subdivision

This type of transaction is related to subdivision of a land unit with buildings, which may be one of several land units belonging to the same real property, without changing the ownership. It is possible to subdivide real property that is registered in the land register. The owner initiates subdivision by applying to either a licensed surveyor (surveying company) or to the regional cadastral authority of the State Land Service of Latvia, which will appoint the responsible surveyor.

Subdivision of a land unit means that at least one new land unit with a unique identification number will be created, and the original real property will be reduced in area but will keep the same identification number; new boundaries will also be determined, measured and marked in the field; in some cases it will be necessary to identify, measure and re-establish the old boundaries in the field.

To perform this transaction, the owner must agree to make the subdivision in accordance with the land use plans of the municipality.

A series of activities should follow:

1. The owner submits an application and the official cadastral map of the real property unit to be subdivided, as well as a copy of the Land Book Certificate, to the selected surveyor.
2. The surveyor consults the owner and investigates the case by considering the situation in the field and finding the relevant data in the archives (the legal background – the surveying file and maps) and the actual cadastral data in the cadastral information system; the surveyor makes a map of the subdivision case in the form of a draft proposal and submits it to the owner.
3. If the owner raises no objection to the surveyor's proposal, he/she submits

it to the responsible authority of the local municipality for approval of the proposed subdivision.

4. The municipality (the responsible authority (-ies) of the municipality) approves or rejects the proposal. If the municipality rejects it, the case is closed. The owner, however, may appeal against the decision of the municipality to the court. The municipal decisions in the case must be in accordance with the master plan, detailed plans, the binding regulations and administrative acts of the municipality as well as other regulations related to the case.
5. If the municipality approves the proposed map for the subdivision, the case must also be examined by the interested parties – other owners and organisations (utility companies, etc.) – having an interest in the area proposed to be subdivided. The owner collects the required statements of approval issued by the interested parties and submits the positive statements to the municipality.
6. The municipality formally confirms the proposed map for the subdivision case.
7. The surveyor, taking into account the relevant legal background, performs cadastral measurements on the basis of the subdivision map confirmed by the municipality.
8. The municipality assigns a new address to the newly shaped land unit, which must be used for future land development purposes; the municipality also determines the purpose of use of the real property, which becomes binding after instrumental measurement and the making of the cadastral act of a land unit. The owner either makes all the visits to the authorities himself/herself or instructs the surveyor to do it on his/her behalf.
9. The surveyor applies for a cadastral number (identification number of the real property unit/land unit), and the regional cadastral authority assigns the cadastral number to the new land unit.
10. The surveyor prepares the new surveying file for the newly shaped land unit, updates the old surveying file for the residual real property unit, and submits the surveying documents – cadastral acts (for each land unit) – to the regional cadastral authority, which checks the legal and technical part of the submitted documents and, if the prescribed cadastral requirements are fulfilled, registers the surveying data in the cadastral information system, prepares the cadastral document and sends the surveying files to the archives. If the prescribed cadastral requirements are not fulfilled, the surveyor makes the required corrections.
11. When the invoices issued by the surveyor and regional cadastral authority have been paid, the owner (seller) receives the cadastral acts of both real property units from the regional cadastral authority.

In the case described above, the cadastral values of both land units – deemed

to be real properties – will appear automatically in the cadastral information system, and the cadastral certificate of both land units can be issued, if requested by the owner. Mortgaging is not involved in the above pure subdivision procedure.

After the completion of the case, the data for the newly formed land units with or without buildings are registered in the cadastral information system and marked on the cadastral index map; the relevant cadastral acts (maps) are made. It then remains for the land register to carry out the following: registration of real property rights to the newly formed property unit in the land register; making changes to the content of the subdivided real property, verification of both cadastral acts and issuing of the Land Book Acts (titles); however, these functions are performed only if the owner applies for them; otherwise no changes in ownership data are made in the land register. In other words, after the completion of cadastral procedures and registration in the cadastral information system, the original owner will not automatically be registered as owner of the newly shaped land units.

Variations on the above activities are possible. The owner may authorise the surveyor to submit the proposal to the municipality, collect the required statements of approval from the interested parties, etc.

The responsible authority of the municipality may put forward additional requirements (e.g. topographic measurements of area in Riga City, etc.). Such requirements may vary from municipality to municipality and are normally laid down in binding regulations (normative acts) or decisions (administrative acts) issued by the municipality. In a subdivision case, the municipality may require compliance of the applicant with the detailed plan instead of confirming the proposed map. The latter principle is commonly applied when landed property is parcelled out and when the master plan has to be observed. The decision of the municipality may be appealed against to the court.

If it is discovered during the field measurements that boundary marks are missing, the procedure for re-establishment of boundaries is initiated and neighbours are involved. Neighbours may object to the results of the boundary re-establishment procedure. If, through the procedure, the case is not resolved, it may then be applied to the court.

If the subdivided real property includes buildings, updated technical inventory information must be presented as reflected in the document of technical inventory issued by the regional cadastral authority, taking into account the confirmed map for the subdivision case.

Municipal and state authorities may impose several restrictions in subdivision cases, based on land use and building regulations (binding regulations issued by the municipality) according to local physical planning, or based on other sectoral regulations (agriculture, traffic, etc.).

3.3.3 Subdivision combined with sale

This type of transaction includes subdivision of a land unit as an object of real property rights which is registered in the land register for the purpose of selling some part of the property. By applying the cadastral procedure, both land units – new and residual – are shaped, and their data are registered in the cadastral information system. Although the real property is changed physically (reshaped), at this point its ownership is not changed. It is possible to make (conclude) the purchase deed on the newly shaped land units, but the ownership will be changed only when, on the basis of the concluded purchase deed, the owner or the buyer applies to the land register for title registration. Before it is submitted to the land register the purchase deed may be characterised as a ‘contract of hope’ (bare contract).

According to the Civil Code, the owner may legally sell only what belongs to him (the content of ownership rights). According to the Land Book Law, the purchase deed will be validated (publicly listed) in the land register when:

1. ownership of both land units is registered; then
2. according to the purchase deed, one of the land units is registered as owned by the buyer; and so,
3. a new file (folio) will be opened and changes made in the original file.

Thus, the owner of the real property is registered in the land register (is granted a title), and has the legal right to deal with (sell, mortgage, etc.) the real property. The mortgage is normally given to the new owner just after the granting of the title.

A conclusion may be made about certain contradictions in the above process, because after the cadastral procedure and registration of the newly shaped land units in the cadastral information system, the legal rights remain unchanged, even if the purchase deed has been concluded. In addition, there are no regulations that would set a deadline for changing ownership rights and would be applicable to the above transaction case.

Concerning the above cases, amendments should be considered and formally approved to improve the transaction processes:

- a formalised and unified procedure for issuing the required approvals to be complied with by municipalities and interested parties;
 - clearly defined cases when the map of the subdivision is required and when the use of the detailed plan is more appropriate;
 - a definite deadline by which ownership rights should be registered or changed after the completion of the cadastral procedure, while, for political reasons, it is not yet possible to synchronise data processing between the cadastral information system and the unified Land Book database;
 - clearly determined cadastral procedures laid down in the Law on the State Cadastre of Real Property and related regulations;
-

Table 3.2 Principal transaction costs

| | |
|--|---|
| Real estate agency – expert or broker, if hired – assistance costs | 5-6% of the purchase sum |
| Cadastral authority/surveyor - cadastral procedures | |
| surveying, map for subdivision case – cadastral acts | €150 - €1,000 (depending on the amount of work) |
| technical inventory – document | €150 - €500 (depending on the amount of work) |
| Cadastral authority – registration in cadastral IS | €20 per real property |
| Notary | |
| witnessing of signatures on the contract (private document) | €35 - €120 per contract |
| witnessing of the content of the contract (notary act) | 0.8-0.2% of the purchase price |
| request for registration of rights | €45 - €70 per request |
| Fee for registration of rights in land register | |
| transaction | €5 - €13 per real property |
| new folio | €5 - €13 per real property |
| Land Book Act | €5 - €13 per real property |
| mortgage | €16 per real property |
| Real property transfer tax – stamp duty | 2% of the highest value – either of the formally agreed or the cadastral value, or 0.5% of the above value, if the parties are relatives |
| Mortgagee | |
| mortgage fee | 0.1% of the loan |
| appraisal | €85 - €430 per real property |
| insurance | €55 - €300 per real property |

- clearly defined and widely applicable terminology resources for real property formation and transactions.

3.4 Costs and duration of transactions

The transaction costs related to an existing property and rights under contract consist of the costs of defining and measuring the resources and claims, plus the costs of utilising and enforcing the specified rights. Applied to the transfer of existing property rights and the establishment or transfer of rights under contract between individuals or legal entities, transaction costs will include the costs of information, negotiation, and enforcement (Furubotn & Richter, 1998). Transaction costs are mostly variable and depend on the volume or number of certain procedures.

Both the transaction costs (Table 3.2) and duration data (Table 3.3) are assessed on the basis of the transaction procedures concerning the three types of transactions as described above. The data included in the tables are taken from the official webpages of the competent authorities, and most of the information (related to the cadastral authority, notary, land register, stamp duty) is in conformity with regulatory acts, but other data (related to assistance costs, surveyors, mortgagees) have been observed in practice and are contract-based.

However, some of the costs, such as brokerage or preparation of the pre-contract document, may be excluded from the expenses of the parties. In such

Table 3.3 Average duration of the procedures

| | |
|--|---------|
| Initiation, hiring of assistance, examination of the real property | 5 days |
| Negotiation with mortgagee, application, acceptance of the loan | 10 days |
| Preparation and conclusion of the pre-contract and purchase deed | 5 days |
| Pre-emption rights of the municipality | 20 days |
| Cadastral procedures | |
| surveyor – surveying, map for subdivision case, cadastral acts | 60 days |
| municipality, other authorities – issuing of approvals | 20 days |
| cadastral authority – valuation, technical inventory, registration, cadastral document | 30 days |
| Notary - issuing of the request for registration of rights | 5 days |
| Land register | |
| registration of ownership | 14 days |
| registration of mortgage | 10 days |
| Mortgagee – preparation and conclusion of mortgage deed | 2 days |

cases, the owner or buyer assumes responsibility (risk) for it. Additional fees may be required for coordination with the set requirements of the municipality and with the other involved parties when the owner applies for approval of the subdivision case. There may be extra charges if an interested party wishes to speed up the registration procedures in the regional cadastral authority and the Land Book office.

The length of time required to obtain the desired product at the end of the service is also a very significant factor if we are to assess the efficiency of real property transactions.

However, some of the cadastral procedures, for example preparation of cadastral acts and the technical inventory document, may be a simultaneous process, and a lot depends on the organisation of customer servicing in the regional cadastral authority. The decision-making process in the municipalities is rather time-consuming, because normally decision makers meet for decision-making only once a month. Credit organisations are willing to cooperate with notaries to speed up and secure transactions on a contractual basis. However, practice shows that the mortgagee will make a loan only after the new owner is registered in the land register, and normally just one loan will be made for one real property.

The above description deals with transaction costs required for changing ownership rights and real property objects and for taking out a mortgage; however it is also worth considering possible transaction costs in the future (opportunity costs) in relation to the permitted land use (as governed by land use planning, special laws, or binding regulations). For instance, the municipal master plans are not very flexible and cannot easily be adapted to some new legal provisions enforced by special laws and regulations. Two examples are the Law on Protective Belts (aimed at restricting construction activities on the Gulf of Riga coast and protecting the environment), and the Regulations on Agricultural Land Areas of National Significance (aimed at protecting valuable agricultural land). In practice, if someone has obtained a detailed plan approval from the municipality permitting them to construct buildings in a specific land area, such a permit may be made null and void because the legislator

may have introduced new provisions by law to be enforced without any transitional period. In this situation, in addition to the direct transaction costs the person may have to bear the costs of a court case to be made against the State.

In the Constitution of the Republic of Latvia (*Satversme*) it is stated that ownership rights are inviolable, but they may be restricted by law. It is very useful to quote one of the judges of the Constitutional Court of the Republic of Latvia: "If someone in this country finds it impossible to comply with the provisions of the law, time will come when the state (taxpayers) will have to pay for the consequences".

3.5 Institutional issues

It is assumed that institutional economics requires that any persons, including authorities, will be willing to cooperate, if and when they perceive some benefit as a result of such cooperation. However, it must be understood that sustainable land management and related processes may be ensured in the long term and comprehensively, and it is often difficult to see considerable benefits in the short run.

With respect to the administrative framework, it is important to assess the performance of the competent organisations, especially those representing the public sector. Two main organisations perform land administration functions in Latvia. The State Land Service working under the Ministry of Justice is responsible for the maintenance of the cadastre, mapping, cadastral valuation, etc., and the Land Book, subordinated to the same ministry, is responsible for land registration. The two State information systems – the cadastral information system and the State Unified Computerised Land Book – are not synchronised; cadastral procedures, including land surveying, are still performed by the State Land Service and private (licensed) surveyors, thus there is competition in this professional field. However, the Cabinet of Ministers has adopted the Concept for Reorganisation of the State Land Service. According to the new concept, the functions of this state organisation will be re-divided and from the start of 2006 land surveying activities will no longer be performed by the State Land Service. Notaries will act as public witnesses and for the most part will perform the same functions as judges working in the Land Book offices.

In accordance with the Land Book Law, the land register contains records of real properties and corroborated rights related to them. The Land register is accessible to everyone and the records are publicly available. The land registration system serves as the basis for insurance of liabilities.

It should be noted that three state information systems (databases) are synchronised – the State Unified Computerised Land Book, the Enterprise Register and the Population Register. One of the last communiqués of the Minister

of Justice of the Republic of Latvia was related to those cases in which there is no longer any need for a notary. It has been decided to amend the Land Book Law by introducing provisions that would allow the reducing of the number of requests for registration of rights made by notaries. The judges of the Land Book offices will perform this function. The fee for legal registration requests will be a fixed sum of LVL 5 (about € 9).

A reasonable way to improve institutional performance is to cooperate with neighbouring countries and become familiar with their practices by taking part in conferences and workshops, as well as by visiting the relevant organisations and universities. In Lithuania there is a Real Property Register, which, as of 1997, provides integrated real property data about physical real property objects and any rights related to such properties. The information in the register is accessible not only to residents of Lithuania, but also worldwide. The real property registration system in Lithuania is based on the self-financing principle, therefore it ensures better servicing (procedures) and products. In addition, there is a Mortgage Centre in Lithuania, which since 1997 has maintained five databases, including the Central Mortgage Register and the Deeds Register.

Forms of closer interrelation between notaries and the land register staff were discussed at the recent international scientific conference in Tallinn. These relations are important, because there is a common objective – to provide legal security and operative and qualitative services to the general public. In 1993 the Notary Law was revised in Estonia, because it was decided in the future to employ notaries not only as public witnesses, but also as authorised representatives and legal advisors, helping customers to achieve their purpose. Efficient cooperation between notaries and the land register has been stressed in Estonia. It was decided to use electronic tools for exchanges of documents and vital information; the main responsibilities of notaries remained as control over legality of documents (conformity of deeds to the law), preventive functions (notary as advisor), protection of the customer and maintenance of the notary's neutrality.

Various representatives of state organisations and municipalities and academic staff of universities were informed about the activities of COST G9 Action 'Modelling Real Property Transactions' during a conference and meetings organised in Latvia. As has already been stressed, there are ways in which institutional performance can be improved, thus making real property transactions easier and less costly.

3.6 Conclusions

Outcomes of the modelling of real property transactions (pure sale, pure subdivision and subdivision combined with sale) and representation of the use cases in the form of a formal description serve to define bottlenecks in both

the procedures of real property transactions and in the institutions regulating these procedures.

Observation of the Latvian situation leads to the conclusion that conflicts between parties involved in specific transaction cases call for institutional change. Also, in some cases processes are rather costly in terms of dead investments, time, court procedures, etc. It is recognised that even when formal performance is smooth, the recognised transaction costs are merely the top of the iceberg: below the surface, costs related to opportunities to use the recently acquired property rights may be hidden. Often these costs are difficult to identify before the purchase decision.

The notion of 'personal commitment' is a topical issue in Latvia. This term denotes the involvement of professionals and politicians and can be defined as the decisive involvement of a highly competent person in any area of activity. The criteria of competence are knowledge, skills and personal characteristics of the person, who is 'the right person in the right place (position)'. Unfortunately, there are notorious examples in Latvia of professionals (planners, lawyers, developers, etc.) demonstrating 'personal commitment' and putting pressure on policymakers and vice versa. The evidence for these statements can be found by examining in more detail such processes as the implementation of land reform, spatial planning, promotion of prior economic sectors, etc.

Public-private partnership is an instrument for simplification of the relevant procedures. Experts such as planners, economists and developers can be involved in the relevant improvement processes to support the work (functions) of the authorities. The latter are very important in the decision-making processes which promote sustainable development of the real property market, which is recognised as a significant pillar in market economy.

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Part 3

4 Transaction costs concerning real property

The case of Finland

Arvo Vitikainen

Abstract

In the process of purchasing real property the most important transaction costs are the cost of determining the price, the cost of negotiating and creating the contract, and the contract enforcement costs. The real property market also presumes the existence of a reliable cadastral system. This creates expenses for society, e.g. for the maintenance of the cadastre and land register. On the other hand, society gains revenue from capital transfer taxes, subdivision fees, and register user charges.

This article considers the special features of real property transactions from the viewpoint of land economics, and analyses the formation of transaction costs on the grounds of the prevailing transaction cost theory and the factors influencing the size of the costs.

In the article the Finnish real property transaction process is modelled in detail, the actors in the process are described, and the transaction costs arising from the various stages of the process are specified. In order to have a general overview of the transaction processes and formation of the transaction costs, the Finnish process is compared to the Swedish and Slovenian transaction processes. Finally, the article gives recommendations for lowering transaction costs.

4.1 Introduction

According to transaction cost theory, costs can be divided into two categories: production costs and transaction costs. Production costs are all costs that are associated directly with productive activities such as manufacturing, logistics and product development. Transaction costs are the costs of running the economic system (Arrow, 1969: 48). Transaction costs are the economic equivalent of friction in physical systems. The difference between friction and transaction costs is that we can very accurately measure friction but not transaction costs (Williamson, 1985: 18-19).

The following article is a consideration of these transaction costs from the viewpoint of real property transaction: their theoretical grounds, allocation between the various actors in a real property transaction, and the factors influencing the amount of transaction costs.¹

¹ Transaction: The exchange of assets, here involving a commodity or a service. Commodities here typically mean ownership rights in real property. The transaction is hampered by the fact that the asset concerned is difficult to identify in detail, thus services, which aim at such specifications, are strongly connected to the transaction. Services typically refer to land registration, as well as to related professional services as offered by e.g. notaries, lawyers, and land surveyors. For example, the transaction aspect of subdivision and other cadastral work is the exchange of money against new or reorganized cadastral identification of parcels and units of real property (Stubkjær, 2005).

In the article, the Finnish real property transaction process is modelled in detail, the actors in the process are described, and the transaction costs arising from the various stages of the process involving the seller, the buyer and society, are specified. In order to have a general overview of the similarities and differences between the transaction processes and formation of the transaction costs the Finnish process is compared to the Swedish and Slovenian transaction processes. The approach for assessing transaction costs adopted here departs from an analysis of the transaction process as performed in specific countries. Alternative approaches include analysis of the legal concepts and the organisational components of the transaction, as performed by Benito Arruñada in a number of studies, including Arruñada (2002 and 2003) and Arruñada & Garoupa (2005).

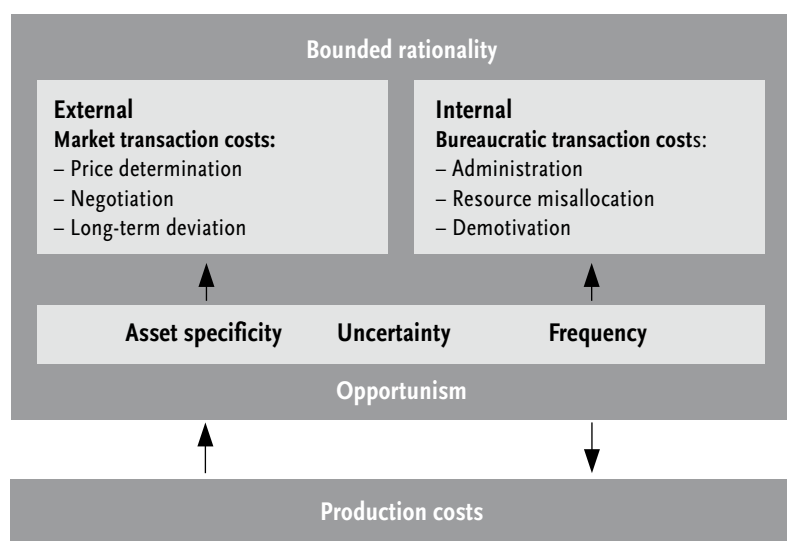
4.2 Transaction cost theory

4.2.1 General transaction cost theory

Ronald H. Coase initially developed transaction cost theory in the 1930s to help explain why certain activities, products or services are carried out internally in firms – while others are bought and sold in the market. Coase defined the term ‘transaction costs’ in his pioneering work *The Nature of the Firm* (1937) by asking two fundamental questions: “Why is there any organisation?” and “Why isn’t all production carried out by one big firm?” His answer was that there are transaction costs that determine what is done in the open market, with price as the regulating mechanism, and what is done inside the firm, with bureaucracy as the regulator. Coase pointed out that “the distinguishing mark of the firm is the suppression of the price mechanism”.

According to Coase (1937) all transactions carry a cost, either as an external market transaction cost or an internal bureaucratic transaction cost. The most important market transaction costs are the cost of determining the relevant price of a product or service, the cost of negotiating and concluding the sales contract, and the cost of information failure (long term deviation). The most important internal transaction costs are associated with the administrative cost of determining what, when, and how to produce, the cost of resource misallocation (since planning will never be perfect), and the cost of demotivation (since motivation is lower in large organisations). In any given industry the relative magnitude of market and internal transaction costs will determine what is done where (Canbäck, 1998).

Williamson (1985: 43-52) extended the argument by noting that two behavioural assumptions are critical. First, individuals in an organisation are boundedly rational. This limitation makes it impossible to structure perfect contracts, and any contract will be incomplete even if all information is avail-

Figure 4.1 The transaction cost framework

Source: Canbäck, 1998, p. 26

able. Second, individuals behave opportunistically. This means that they will act in self-interest with guile. This also includes such blatant forms of opportunism as lying, stealing and cheating. But opportunism more often involves subtle forms of deceit. Both active and passive forms and both ex ante and ex post types are included. The implication is that promises of responsible behaviour are only credible when they are supported by enforceable commitments, since individuals would otherwise break an agreement if it is in their own interest to do so (Canbäck, 1998).

With the two assumptions of bounded rationality and opportunism, Williamson (1985: 52-63) demonstrated that three factors play a fundamental role in determining if market or bureaucratic transactions are optimal. The factors are asset specificity, uncertainty, and frequency of transactions (see Figure 4.1). Asset specificity covers physical assets, human assets, site, or dedicated assets that have a specific usage and cannot easily be transferred to another use. Under this condition opportunistic behaviour can be expected if the asset is part of a market transaction. High uncertainty such as distortion of information (or a lack of information) or business cycle volatility will lead to more bureaucratic transactions and it will be difficult and expensive to create contracts that cover all possible outcomes. If the transactions are frequent there is a tendency to manage the transactions bureaucratically since the repetitive contracting cost will be higher than the bureaucratic cost (Canbäck, 1998).

The transaction costs may also be divided into costs arising prior to and after the moment of transaction. Ex ante transaction costs are the costs of drafting, negotiating and safeguarding an agreement. Ex post transaction costs are the enforcement costs (Williamson, 1985:20-21).

Stubkjær (2005) has divided the transaction costs in the real property market from the ex-ante and ex-post perspective into measurement costs and enforcement costs. Measurement costs (ex ante costs) are the costs of measuring the valuable attributes of what is being exchanged. A surveyor's measurement of the size of an area might be one example of attributes only; 'measurement' is taken in its broadest sense here, and no assumption should be made that the 'measurements' are always quantified. A commodity or service is characterised by a number of attributes that each contributes to or detracts from the utility of the good for a prospective buyer. The number and value of these attributes tend to vary among potential buyers. Each must identify and assess (measure) the value of these attributes. Transaction costs are made up of the information costs of ascertaining the level of individual attributes of each unit exchanged. Enforcement costs (ex post costs) are the costs needed to make parties fulfil the obligations they agreed upon. Enforcement may come from internally enforced codes of conduct, from second-party retaliation, or from third-party sanctions, be it social exclusion or state coercive measures. Enforcement measures are cost effective only as far as the costs of policing are less than the benefits of such enforcement. The likelihood of defection by the other party has to be included into the estimate of costs as a risk premium. The amount of the risk premium may be high enough as to prevent more complex exchanges, or the exchange may be restricted to take place within the circle of personally known parties, where the risk can be reasonably taken into account (Stubkjær, 2005).

Douglas C. North has further developed transaction cost theory with a model in which transaction costs are considered from the viewpoint of the whole national economy. North has especially studied how the state can assist in lowering transaction costs. According to North, lack of information (asymmetric information) offers potential for opportunistic actions and inefficiency of national economy. For this reason the state and the various administrative institutions have an essential role in developing systems for the market which would offer further information to the parties in a transaction and thus lower the transaction costs. Furthermore, according to North, it is the duty of the authorities to create an administrative and legal setting for contractual processes and ensure the enactment of the contracts (North, 1990: 34-37).

North has also pointed out that firms try to minimise total cost, not only transaction costs. Sometimes transaction costs are not minimised because the resulting improvement in production costs can outweigh the increase in transaction costs (North, 1987; North, 1990; North and Wallis, 1994).

4.2.2 Special characteristics of real property transaction

The factors in the real property market distinguishing land and real property from other commodities are described in land economics. The special charac-

teristics of land include the following (Virtanen, 2004: 5-6):

- Land is limited in quantity; it cannot be reproduced like a commodity.
- Land has no production costs in the customary sense. Ground cannot be manufactured, so it has no corresponding production costs either. Costs may, however, arise when the existing 'base land' is developed for certain purposes. For example, a field is 'produced' by clearing, and building land is 'produced' by planning and by constructing infrastructure.
- Land is eternal. It will not get old, go out of fashion or be spoilt as manufactured goods normally do. Land maintains its value and is, therefore, a popular investment. When land is believed to become even more profitable it is often retained in the hope of price rises, and in the meantime it may continue producing e.g. corn or timber. Sometimes land may, however, become contaminated due to erosion or pollution, but these cases are rare exceptions. And although land is eternal, real estate buildings attached to it will get old, and the location of real estate can go – in the economic sense – out of fashion.
- Land is essential for all activity; other commodities may not replace it. For land this means inevitable minimum demand, which arises from the minimum requirement of various actors.
- Each land area is different and unique, at least by location. Commitment to a location gives a certain monopoly to the owner of the area. This monopoly may be relative in that land of the same kind may be for sale with other landowners as well (oligopoly), but sometimes monopoly may also be absolute.
- Land ownership often involves sentimental values, which may partly have an influence on the land market, and land ownership may have other motives than maximisation of economic benefit. For example, the subjective utility value of a forest area as a recreation and hunting area may be higher to the owner than the market value of the land converted into building land.
- The land market is locality-specific (market area). This means that the supply and demand of land and the price level vary considerably, even between similar localities.
- The land market is controlled by society. Freedom of the market may be restricted e.g. by planning, mortgage terms, taxation and land acquisition limitations.

The transaction cost theory explains the transaction costs of produced goods and services in commerce and business between enterprises. Although the real property market differs from the market of other commodities, as presented above, the factors influencing the emergence and quantity of the transaction costs in the real property market may be considered in the context of general transaction cost theory (see Figure 4.1).

Limited rationality and opportunism, the two behavioural assumptions presented by Williamson (1985: 43-52) are critical factors controlling activity in the real property market as well. The seller and the buyer tend to act rationally but are, however, always only limitedly rational. As pointed out above, this limitation makes it impossible to structure perfect sales contracts in the property market, and any contract will be incomplete even if all the information is available. In the real property market there is always the possibility that the seller and the buyer will tend, where possible, to act opportunistically and in their own interest. In the property market, more generally, opportunism and self-interest refers to the incomplete or distorted disclosure of information, and especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse.

Real estate is normally not manufactured to the market in the same way as commodities and services and the share of internal transaction costs in the real property market is, therefore, rather small.² In spite of the special characteristics of the land market the specificity of the products (real estate), uncertainty of the market situation, or frequency of transactions (market frequency) have an impact on the magnitude of external transaction costs also in the real property market, and on the number of various types of real estate coming to the market.

The specific characteristics of the object (real estate) for sale, such as exceptional quality, extraordinary building stock or specific purpose of use determined by the plan, increase the potential for the seller's or the buyer's opportunistic behaviour. They may also increase the costs of determining the market price of the item and the negotiation and contract costs by requiring the assistance of external specialists (see Figure 4.1).

Factors of uncertainty, such as uncertainty of the future price development of the object of the transaction, lack of information regarding the characteristics of the real estate, lack of information regarding purchase prices, lack of information of the content of the plans (future land use) in the area will reduce the quantity of selling items coming to the market, increase the costs of determining the market price of the item and the negotiation and contract costs (see Figure 4.1).

Regularity of transactions in the real property market may signify, for example, that in a certain area private landowners or the municipality constantly supply real estate suitable for a certain purpose of use (e.g. residential building) to the market. In that case, the persons or enterprises regularly acting in the real property transaction business are aware of the market situ-

² The consideration of external and internal transaction costs in the real property market may be relevant e.g. in cases where an enterprise is upgrading its real property to the market or if e.g. a municipality is planning and selling land for building sites.

ation. This will lessen the potential for opportunistic behaviour by the participants and decrease the costs of determining the market price of the item and the negotiation and contract costs. The specificity of the real estate to be sold and the factors of uncertainty in the market may also more often lead to disputes between the seller and the buyer after the conclusion of the transaction and cause substantial costs for the enforcement of the contract due to civil actions in the court (see Figure 4.1).

4.3 Details of property transaction in Finland

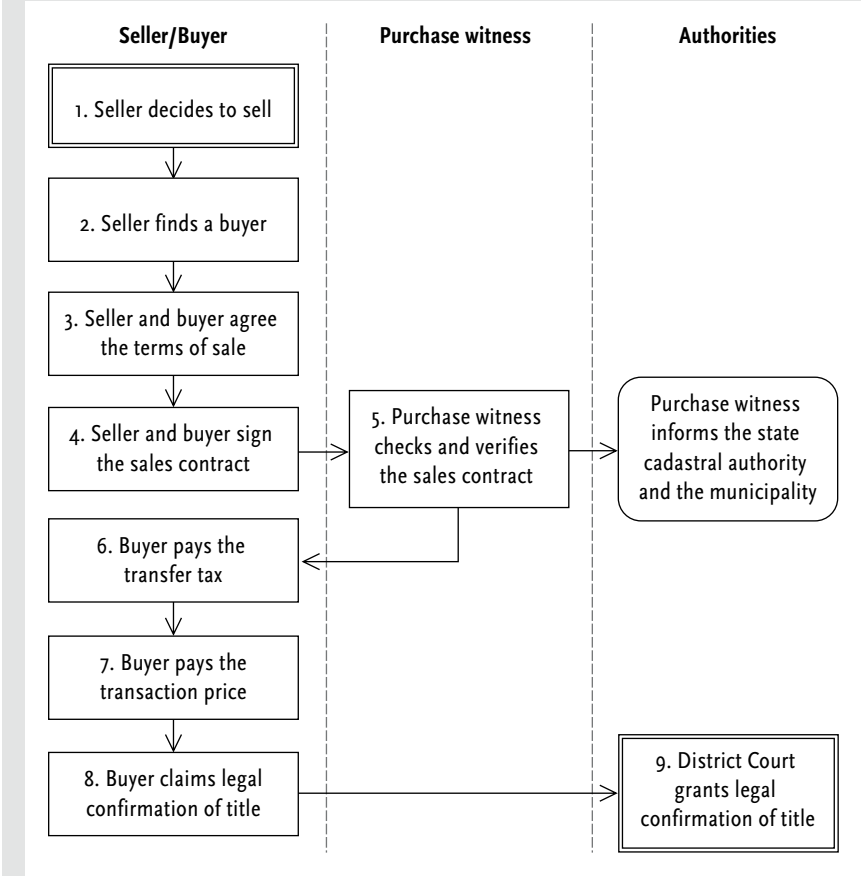
The actors in a Finnish real property transaction are the buyer, the seller, the public purchase witness³, the cadastral authority, and the land registration authority (District Court). In addition to these mandatory actors the buyer and/or the seller often use the services of field professionals, such as estate agents and property valuers. Figure 4.2 shows the most elementary transaction process where the buyer and the seller conclude a real property (cadastral unit) transaction without the assistance of an estate agent, property valuer, or any other external specialist.

Figure 4.2 shows the following:

1. The seller decides to sell the property.
2. The seller markets the property himself and finds a buyer.
3. The seller and the buyer agree on the terms of sale and draw up a sale contract.
4. The seller and the buyer sign the sale contract.
5. The public purchase witness selected by the seller and the buyer ascertains that the sale contract fulfils the requirements stated for a sale contract in Chapter 2 §1 of the Code of Real Estate, and attests the sale in the presence of the buyer and the seller. Within seven days of attestation the public purchase witness sends the sale information (property conveyance notice) to the cadastral district office (Official Purchase Price Register/Cadastre) and the municipality where the real property is located.
6. The buyer pays the transfer tax (4% of the purchase price or other compensation) to the state.
7. The payment of the transaction price may be freely agreed upon by the seller and the buyer. Normally the title will transfer to the buyer when the transaction price is fully paid. After the transfer the buyer is entitled to claim legal confirmation of title to the real property.

³ Public purchase witnesses ex officio are certain civil servants, such as surveyors, district registrars, bailiffs, police commissioners, and persons specially appointed to this task by the District Court. The public purchase witness is a part-time attesting authority.

Figure 4.2 The basic process of real property transaction in Finland



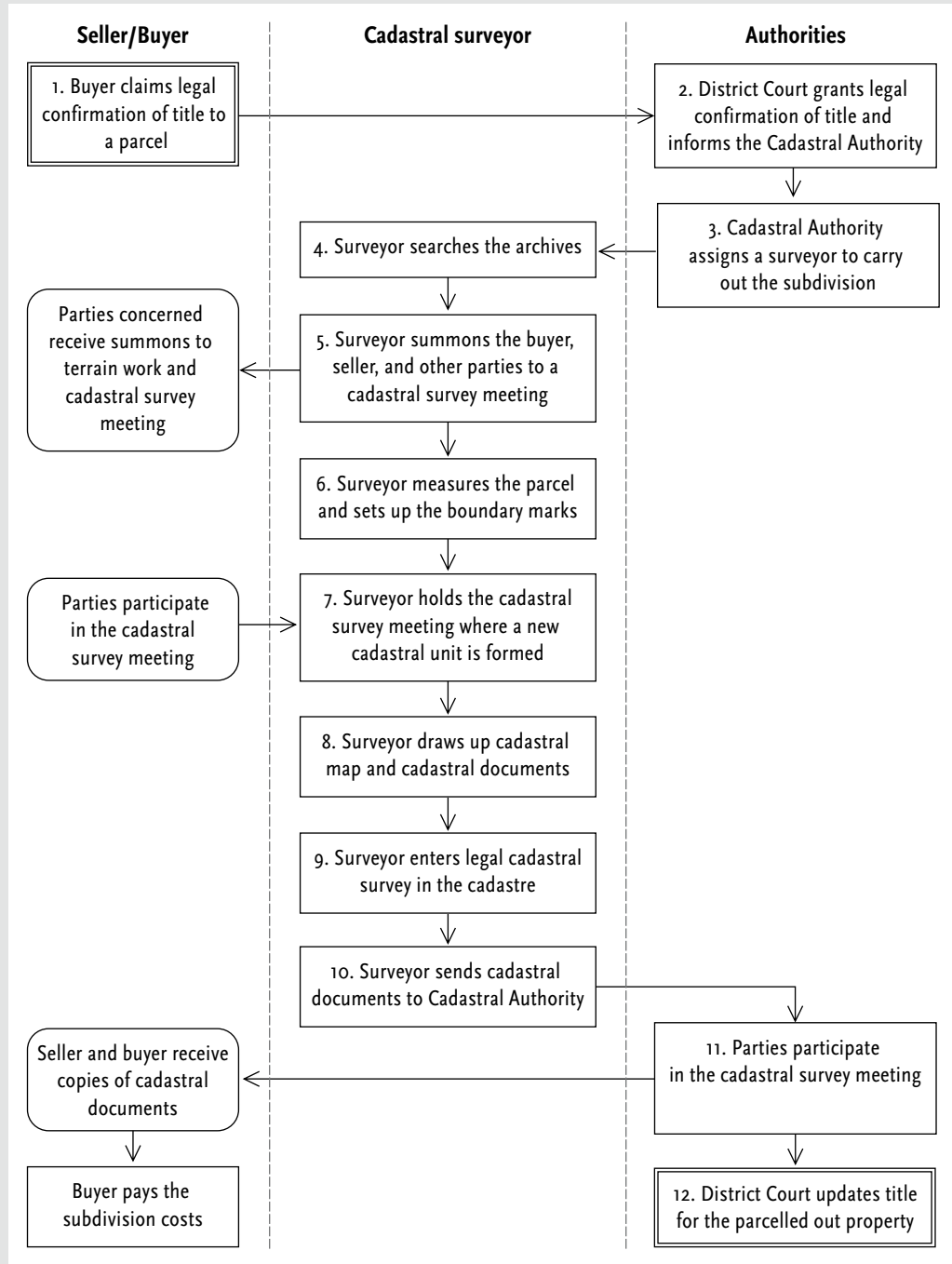
- 8. The buyer claims legal confirmation of title at the District Court (register of land ownership and mortgage) of the locality of the real property.
- 9. The District Court will investigate the legality of title and establish legal confirmation of title to the buyer's real property.

If an unseparated parcel of land is sold, the subdivision is made by a surveyor employed by the National Land Survey or the municipality, after the establishment of legal confirmation of title to the real property. Figure 4.3 shows the process of subdivision.

Figure 4.3 shows as following:

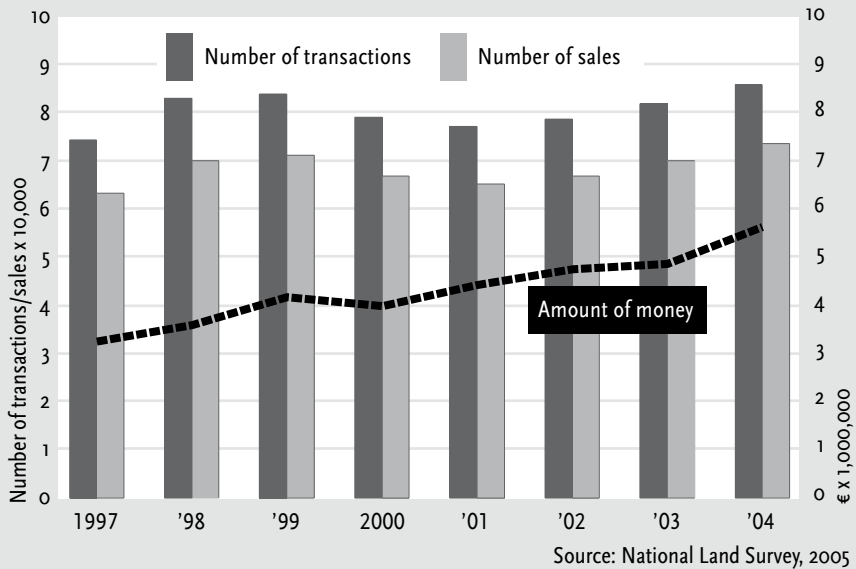
- 1. The buyer claims legal confirmation of title to the transaction of an unseparated parcel at the District Court of the locality of the property.
- 2. The District Court establishes legal confirmation of title to the buyer's property. The buyer settles the statutory payment for the registration of title. The District Court informs the Cadastral Authority of the registration of title to an unseparated parcel of land. Cadastre is maintained by 86 cities for the area covered by detailed plans, and the National Land Survey for the rest of Finland.

Figure 4.3 The basic process of subdivision in Finland



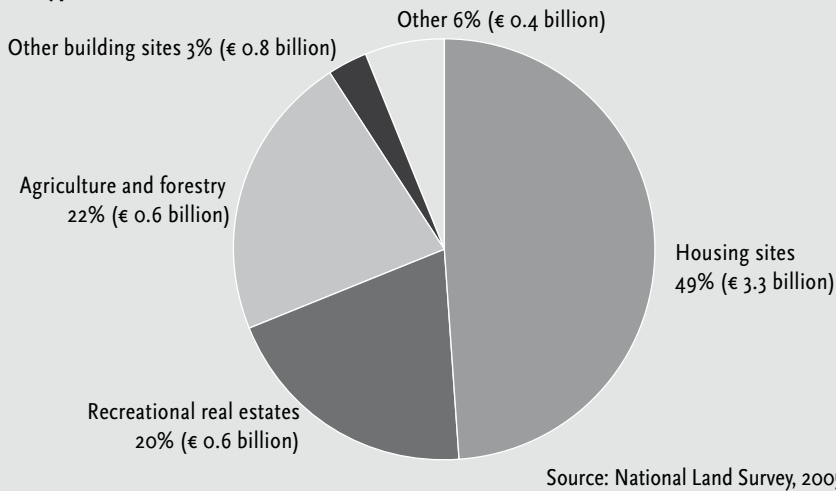
3. The Cadastral Authority registers the official notice and orders a surveyor to carry out the subdivision. The subdivision takes action without further petition from the buyer.

Figure 4.4 Number of real property transactions and the amount of money in real property sales in Finland, 1997-2004



4. The surveyor investigates the preconditions for the subdivision and searches the archives for existing easements and mortgages.
5. The surveyor summons the buyer and the seller, and if required, the neighbours or other parties, to a cadastral survey meeting.
6. Pertaining to the cadastral survey meeting the surveyor measures the extent of the unseparated parcel of land and sets up the necessary boundary marks.
7. The surveyor holds a cadastral survey meeting where a new cadastral unit is formed. The division of the former easements between the newly formed estates is decided upon, the new easements and rights of way are decided upon, and the division of the mortgages between the residual property unit and the unseparated parcel of land is treated.
8. After the cadastral survey meeting the surveyor prepares a cadastral map and other documents.
9. The surveyor registers the cadastral survey after the appeal period (30 days). Those discontent with the decisions made at the cadastral survey may appeal to the Land Court.
10. The surveyor sends the cadastral documents to the Cadastral Authority for filing.
11. The Cadastral Authority informs the District Court of the registration of the subdivision, sends copies of the documents to the seller and the buyer, and an invoice for the subdivision to the buyer.
12. The District Court updates the registration of title and potential mortgages to take into account the new unseparated parcel of land in the land register.

Figure 4.5 Number (%) of real property transactions (and the amount of money) by land use types in Finland in 2004



4.4 Real property transaction costs in Finland

The market

The total value of the Finnish real estate cluster is approx. € 500,000 million, corresponding to ca. 70% of the national property. The business volume of the cluster is ca. € 40,000 million a year and it employs some 500,000 persons, i.e. one fifth of the labour force. The number of real property transactions (direct ownership) varies between 70,000 and 90,000 each year, and amounted to ca. 86,000 transactions in 2004. The share of property sales is approx. 85% of all transactions (other transactions are gifts, changes of real estate units and partition agreements). In 2004, the amount of sales was ca. 73,400 and the total volume of transactions was € 5,685 million (see Figure 4.4). About 30% of the transactions in number usually concern detailed planned areas. Rated in money private individuals are sellers and buyers in two out of every three purchases. About half of the transactions in number or money are transactions of real estate for housing purposes (see Figure 4.5). Transactions of real estate company shares are not included in the figures⁴ (NLS, 2005; Viitanen *et al.*, 2003: 5-10).

Transaction costs from the viewpoint of the seller and the buyer

The transaction costs from the viewpoint of the seller and the buyer consist of information collection for the object of sale for price determination (mar-

⁴ In Finland, land and buildings can be owned directly as real property (having a title to the property) or in the form of real estate securities, which usually means ownership of shares in a real estate company or in a residential housing company. The main part of the housing and commercial property transactions is made in shares, and they are concentrated in urban areas. The volume of housing transactions in shares was approx. € 6,400 million in 2003, covering approx. 71,000 transactions. The volume of commercial property transactions was approx. € 3,200 million in 2004 (Statistic Finland 2004, Catella, 2005).

Table 4.1 Real property transaction costs (in euros) from the viewpoint of the seller and the buyer (the price of an unseparated parcel is €107,000).

| Cost item | Seller | Buyer | Total |
|---|-----------------|-----------------|------------------|
| Public purchase witness's fee | 38.50 | 38.50 | 77.00 |
| Capital transfer tax (4%) | 0 | 4,280.00 | 4,280.00 |
| Confirmation of title to the District Court | 0 | 60.00 | 60.00 |
| Subdivision fee to the legal land surveyor | 0 | 850.00 | 850.00 |
| Compulsory transaction costs in total | 38.50 | 5,228.50 | 5,267.00 |
| Estate agent's fee (4,5% + VAT) | 5,874.00 | | 5,874.00 |
| Normal real property transaction costs | 5,912.50 | 5,228.50 | 11,141.00 |

Source: Mikkonen, 2005

ket intelligence), negotiation and preparation of the sales contract, and the enforcement of the contracts (see Table 4.1).

1. The price determination costs may include, for example, collection of the purchase price information (from the Official Purchase Price Register), the costs of the cadastral and land register certificates, potential subdivision costs (including the costs of measurement of an unseparated parcel) and the costs of any other information necessary for determining the price of the item, and the fee of a potential property valuer.
2. Costs for negotiations and preparation of the sales contract may include an estate agent's fee or a lawyer's fee for assistance in preparing the sales contract.
3. Enforcement costs of the sales contract may include the public purchase witness's fee and payment for the registration of title. In addition, in disputes the enforcement costs are the attorneys' fees and court fees falling to the seller and the buyer.

Table 4.1 shows the transaction costs of a Finnish real property transaction allocated to the various items of the process. The object of sale is a single-family house site costing € 107,000 (five times the national income per capita). In the basic real property transaction process in Finland it is not obligatory to use an estate agent or other external specialists. However, in ca. 75% of real property transactions the seller engages an agent to market the item and assist in the transaction process. The average fee of the estate agent is 4% to 5% of the sales price + VAT. If the item is an unseparated parcel, a legal land surveyor must separate it as an independent real estate unit and the buyer will pay the subdivision costs (price of an unseparated parcel costing € 107,000).

As shown in Table 4.1, the main part of the transaction costs in Finland is generated by capital transfer tax and the potential estate agent's fee. In a typical transaction of a single-family house site the transaction costs to the seller and the buyer are ca. 10% of the transaction price (see Viitanen, 2003: 65).

Transaction costs from the perspective of the national economy

From the perspective of the national economy the transaction costs of a real property transaction may also include the costs to society of maintaining the

Table 4.2 Estimates of costs of real property transaction in Finland about 2004, in millions of euros

| Agent/cost item | | Costs of real property transactions | |
|--|-------------------|---|--|
| Real estate agents | | 192,0 | |
| Engineering consultancy and developers | | ? | |
| Legal activities (Lawyers) | | ? | |
| Banks | | ? | |
| Public purchase witness's fees | | 6,6 | |
| Law courts | Court costs | 18,0 | |
| | Certificate fees | 16,2 | |
| National Land Survey | Cadastral costs | 12,0 | |
| | Subdivision costs | 21,5 | |
| | Subdivision fees | 21,5 | |
| Total, without capital transfer tax | | 287,8 | |
| Transfer tax (4%) | | 228,0 | |
| Total with capital transfer tax | | 515,8 | |
| Number of sales 73,900 | | Transaction costs/sale (all sales) €4,000 | |
| Average cost of unit €77,000 | | to €8,000 | |

land data bank system. These transaction costs are related to the establishment, development and maintenance costs of social data systems involved in real property transaction processes. The objective of these data systems is to offer more information to the transaction parties and thereby to decrease the transaction costs. The most important data systems in Finland related to immovable property are the cadastre maintained by the National Land Survey and 86 municipal cadastral authorities and the land register maintained by the Ministry of Justice and by the local District Courts. In addition, the Official Purchase Price Register covering all conveyances of real property is maintained by the National Land Survey.

The maintenance costs of the cadastre were ca. € 12 million in 2003. These costs are composed of the registration of legal cadastral surveys and register decisions made by the National Land Survey and the municipal cadastral authorities, and the registration of the decisions made by other authorities in the land data bank system and other system maintenance, the registration of the transactions of unseparated parcels in the cadastre, the filing of legal cadastral surveys, modernisation of the cadastre, maintenance of the Official Purchase Price Register, and updating of the building and apartment register (Lukkarinen, 2005).

The share of real property cases in the operating expenses of the District Courts was ca. € 18.2 million in 2003. A total of 110,271 legal confirmations of title were treated in District Courts in 2003. Legal confirmations of title concerning unseparated parcels were 25,356. Mortgages to real properties were confirmed at 150,417, and usufructs over real properties (leaseholds, servitudes, etc.) were registered in the land register as 7,683 (Ministry of Justice, 2005).

The cadastre contains 2,540,000 real estates (cadastral units) in Finland. The costs of maintaining the cadastre may thus be calculated at ca. € 5/real

estate unit/year. Correspondingly, the maintenance costs of the land register are ca. € 7/real estate unit/year. This means that the total costs of maintaining a modern and accurate cadastre and legal land register system in Finland are ca. € 13/real estate unit/year.

When considering transaction costs it must be pointed out that the state and the municipalities also obtain revenue through public purchase witnesses' fees, subdivision fees and registration document sale. The public purchase witnesses' fees and subdivision fees cover the costs arising. The courts of law had revenues of € 14,732 million for attending to real property matters, which is ca. 80% of the costs incurred. In addition, when considering revenues, it must be pointed out that revenues from capital transfer tax were ca. € 227 million in 2004 (NLS, 2005; Ministry of Justice, 2005). Table 4.2 shows estimates of transaction costs in Finland in 2004.

4.5 The Finnish real property transaction process in an international comparison

The World Bank has compared the registration process for business properties in various countries (World Bank, 2004). The analysis covered 145 countries. Table 4.3 presents the results for some of the countries. The factors considered in the analysis were the amount of work at the registration stages; time consumed in the process, and the share of registration costs in the transaction price as a percentage. To facilitate the comparison, the property has a value of five times the national income per capita in the country in question. The registration costs include all mandatory expenses, which the applicant must pay in order to have a property registered. Such charges include taxes, notary fees, registration and documentation fees. The number of procedures represents the number of stages necessary for official registration of a property in a given country. The time represents the number of days consumed implementing this process. The comparison does not, however, include any additional work stages, or working time and expense factors caused by subdivision. The presented figures are also indicative of other real property transactions. It should be considered in the case of Sweden that the share of the stamp tax is larger (3%) for a real property transaction made by an enterprise. Therefore, if the buyer in this case were a private person, the share of the costs would be lowered to 1.5% (World Bank, 2004).

Mikkonen (2005) has studied the mandatory costs falling to the seller and the buyer in a real property transaction in Finland, Slovenia and Sweden. According to the report, the transaction costs for a non-built single-house site are formed as presented in Tables 4.4 to 4.6 (in the tables the price of the site is 5 times the national income per capita in the country in question).

In Sweden the costs for subdivision are higher on average than in Finland

Table 4.3 The main indicators for registering real property

| Economy | Procedures (number) | Time (days) | Cost (% of property value) |
|----------------|---------------------|-------------|----------------------------|
| Norway | 1 | 1 | 2.5 |
| Sweden | 1 | 2 | 3 |
| Netherlands | 2 | 2 | 6.2 |
| New Zealand | 2 | 2 | 0.1 |
| United Kingdom | 2 | 21 | 4.1 |
| Austria | 3 | 32 | 4.5 |
| Finland | 3 | 14 | 4 |
| Iceland | 3 | 4 | 2.4 |
| Spain | 3 | 25 | 7.2 |
| Estonia | 4 | 65 | 0.5 |
| Germany | 4 | 41 | 4.1 |
| Hungary | 4 | 78 | 11 |
| Switzerland | 4 | 16 | 0.4 |
| United States | 4 | 12 | 0.5 |
| Australia | 5 | 5 | 7.1 |
| Portugal | 5 | 83 | 7.4 |
| Denmark | 6 | 42 | 0.6 |
| Poland | 6 | 197 | 1.6 |
| Russia | 6 | 52 | 0.4 |
| Slovenia | 6 | 391 | 2 |
| Belgium | 7 | 132 | 12.8 |
| Italy | 8 | 27 | 0.9 |
| France | 9 | 183 | 6.5 |
| Greece | 12 | 23 | 13.7 |
| Nigeria | 21 | 274 | 27.1 |

Source: World Bank 2004

Table 4.4 Transaction costs in Finland, in euros (the price of the property is €107,000)

| Transaction costs | Seller | Buyer | Total |
|--|--------------|-----------------|--------------|
| Public purchase witness's fee | 38.50 | 38.50 | 77 |
| Capital transfer tax (4%) | 0 | 4,280 | 4,280 |
| Registration of title (Registration Authority) | 0 | 60 | 60 |
| Subdivision fee (National Land Survey) | 0 | 850 | 850 |
| Total | 38.50 | 5,228.50 | 5,267 |

Source: Mikkonen, 2005

and Slovenia. This is partly due to the higher wages and salaries in Sweden. All things considered, the highest transaction costs are in Finland. This is due to the capital transfer tax, which is highest in Finland (4%).

Unlike in Finland and Sweden, the transaction costs to the seller in Slovenia are higher than those to the buyer. This is due to the fact that the seller has to

Table 4.5 Transaction costs in Slovenia, in euros (the price of the property is €47,000)

| Transaction costs | Seller | Buyer | Total |
|--------------------------------------|--------------|------------|--------------|
| Cadastral surveyor's fee | 500 | 0 | 500 |
| Charge of the Cadastral Authority | 20 | 0 | 20 |
| Charges of the municipality | 40 | 0 | 40 |
| Notary fee | 70 | 70 | 140 |
| Capital transfer tax (2%) | 940 | 0 | 940 |
| Charge of the Registration Authority | 0 | 88 | 88 |
| Total | 1,570 | 158 | 1,728 |

Source: Mikkonen, 2005

Table 4.6 Transaction costs in Sweden, in euros (the price of the property is €114,000)

| Transaction costs | Seller | Buyer | Total |
|--|----------|--------------|--------------|
| Stamp tax (1,5%) | 0 | 1,710 | 1,710 |
| Payment to the National Land Survey | 0 | 1,600 | 1,600 |
| Registration of title (Registration Authority) | 0 | 90 | 90 |
| Total | 0 | 3,400 | 3,400 |

Source: Mikkonen, 2005

have an unseparated parcel subdivided before the transaction. Also, the capital transfer tax is paid by the seller, unlike in Finland and Sweden. Furthermore, costs arise to the seller in the form of payments to the municipality, cadastral authorities, and the notary.

The fastest implementation time for the process is in Sweden and the slowest in Slovenia. This is due to the time difference between the registration of title. In Sweden the registration of title is available two days after subdivision, in Finland after 14 days, and in Slovenia after 391 days (World Bank, 2004). The time difference between Finland and Sweden is due to the fact that in Finland the capital transfer tax has to be paid before applying for the registration of title, whereas in Sweden the tax payment is not included in the title process.

4.6 Conclusions

According to transaction costs theory small transaction costs improve the functionality of the real property market. The transaction costs may be reduced by lowering the following:

- transaction price determination costs;
- costs for negotiations and preparation of the sales contract;
- costs for the implementation of the sales contract.

The state and the various administrative authorities have an essential role in developing cadastral systems which would offer more information to the parties in a transaction process and thereby lower transaction costs. Further-

more, the duty of the government is to create the administrative and judicial framework for contractual processes and to ascertain the implementation of the contracts.

A modern cadastral system also enables simplification of the real property transaction process. All unnecessary tasks may be eliminated and reduce the number of actors in the processes. On the grounds of the Nordic experiences, the number of application stages suspending the progress of the process may be decreased, and tasks, which in many countries belong to the notary system, are transferred to financial institutions outside the transaction process.

An essential factor affecting the total amount of transaction costs is the capital transfer tax. By reducing the tax base of the capital transfer tax and shifting the collection of capital transfer tax outside the transaction process to the tax administration the state can essentially intensify the real property market and expedite the processes and the implementation of the contracts.

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5 Towards national real estate accounts

The case of Denmark and other European jurisdictions

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Abstract

Transactions in real estate include conveyance of title, mortgaging, and cadastral changes of boundaries of property units. The costs of these transactions determine the operation of the real estate market and have important influences on the society concerned. Research into transaction cost issues is an emerging area. In order to assess transaction costs in a more complete way, it is proposed to establish national or 'satellite' real estate accounts, according to the Systems of National Accounts.

Conceptual issues relating to national real estate accounts are discussed. First steps towards such accounts and the difficulties involved are illustrated with Danish, Finnish and Slovenian data and using the Danish societal structure as a framework. The investigation suggests increased concern for product statistics for service businesses, for yearly reports from government agencies, and for competition authority investigations of aspects of the market in real estate.

5.1 Introduction

In recent years, transaction costs in the housing and real estate markets have gained increased attention, not least because labour market mobility may be hampered if high transaction costs occur in combination with a high rate of home ownership (CPB, 2000; BBR, 2006). Given a broad preference for home ownership, transaction costs for property purchase are a key area of interest (BBR, 2006:4). A related factor is the development and diffusion of transaction cost theory. Transaction costs were originally defined by Ronald Coase in 1932 in motivating the boundaries of a firm or company. The concept of transaction costs was applied to property and real estate markets, notably by Douglass North (see North, 1990). This motivated research efforts aimed at assessing the costs of real estate transactions by modelling the national transaction practices in a comparable way (cf. Stuckenschmidt *et al.*, 2003). These efforts have so far produced comparable and fairly detailed descriptions of the processes through which main property transactions are performed: conveyance, subdivision and mortgaging.

The cost of performing basic real estate transactions can be assessed in several ways: an obvious approach is to (a) assess the costs for the parties concerned, typically seller and buyer. The costs include the parties' own efforts in searching and investigation, fees and duties payable to public services, as well as charges and honoraries to private companies. Fees and other charges seem to be fairly easy to record. The cost of honoraries is more difficult to establish in a comparable way, in particular because of the national differences in services provided. The cost of the parties' own efforts may be accounted

for in verbal form, including references to search facilities available and their charges. These costs may then be compared, for comparable procedures and property units. Accounts have been prepared according to this scheme for Finland (Viitanen, 2003), and compared. See, for example, Lisec (2004) for Finland and Slovenia, and BBR (2006) for Germany and other countries.

This approach only very indirectly accounts for the national investments in the judicial-administrative infrastructure that supports the abovementioned transactions, in particular the cadastre and land registry agencies. The amount of fees for transaction services may reflect a governmental cost recovery scheme, but can also include a substantial fiscal element as well as a more or less intended subsidy. This fact could be addressed by (b) applying a societal approach, which takes into consideration governmental (state and, where applicable, municipal) gross expenditure for land registry and cadastre, in addition to accounts for real estate related services in the private sector. The remainder of the paper pursues this latter societal approach in an effort towards making progress in accounting for transaction costs, despite the many obstacles, as we shall see.

The proposed societal approach is based on the System of National Accounts framework, and more specifically the so-called 'satellite accounts'. Satellite accounts are described within the System of National Accounts, or SNA (UN, 1993). SNA is a monumental work, endorsed by all the major international statistical agencies and establishing international standards for statistical description of national economies worldwide. This statistical description is mainly, but not only, in monetary terms, to enable aggregation and comparison of diverse flows and stocks. In the EU, the SNA is applied through the European System of Accounts, or ESA (Eurostat, 1995), which is enforced through EU legislation.

The SNA Chapter 21 on satellite accounts does not set firm standards, but provides only draft guidelines for the evolving work of providing statistical descriptions of particular fields of policy interest. These fields surround the central SNA framework, so their accounts are known as 'satellite' accounts. Most of the work on applying these ideas has been done by the OECD, which has so far provided guidelines for accounts on agriculture (OECD, 1999), health (OECD, 2000), tourism (OECD, 2000), and environment (UN, 2003). As pioneering efforts, the OECD manuals strike a balance between policy needs and resource and data availability and are still a far cry from the ambitious ideas described in SNA. OECD publications generally avoid the term 'satellite', as it is confusing for the general public; similarly, we have tended to use the term 'national' in this paper.

The SNA satellite accounts provide a framework for statistical description of a part of the economy of particular policy interest. The idea is to use as much as possible of the central SNA framework, and to extend it where necessary with other definitions and variables, in particular of a non-monetary nature.

The central framework includes standard classifications of products and services, of activities, of institutional sectors, of transactions, of purposes, and of accounts. There are two main advantages in analysing a policy field ('a segment of society' or 'a market') using this standard framework. It allows for comparable definitions across countries and over time and, moreover, demonstrates the relative importance of the field in the economy and its links with the rest of the economy.

To the best of our knowledge, no formal initiative has so far been proposed to the OECD or any other agency to start work on real estate accounts. An obvious first step is to define the field of interest (Section 5.2) and define current practice in the field. Transaction costs are estimated in the context of providing capital stock statistics for buildings (Section 5.3.1, drawing on Danish material). The real estate market appears in the context of the ordinary national accounts, which is illustrated in Section 5.3.2, drawing on Slovenian material. The Danish case is used to further specify the field of interest and finally to assess the transaction costs (Section 5.4) which also includes data from Vitikainen (Chapter 4). Producing accounts for more countries and analysing them as a basis for recommendations for policy purposes falls outside the scope of the present paper, as it is our belief that empirical data at this stage serve mainly to clarify conceptual issues, as discussed in Section 5.5. While we think it is largely premature to expect policy recommendations, in our conclusion we propose increased concern for development and use of accounts on product statistics for the services sector, as well as development and use of yearly reports from the government agencies concerned.

5.2 The real estate segment – the core and issues of boundary determination

Land and buildings constitute the tangible basis of transactions in real estate. However, property unit transactions are not physical events. Rather, they are provided through an institutionalised process, which changes financial and non-financial, and produced and non-produced (natural) assets (land assets) in the balance sheets of national accounts (cf. SNA 21.126). National legislation, as well as the land registry of the local courts and the cadastral agency, are components in this institutionalisation of property rights in land. The provision of these government services, as well as the related professional services, may thus contribute to capital formation (cf. also De Soto, 2000).

The notion of property rights makes sense internationally; for example, property rights are mentioned in the UN Universal Declaration of Human Rights, article 17. However, property rights are specified and enforced country-wise, or more precisely jurisdiction-wise, and the unique history of each society has placed its mark on the way in which immovable property rights

are attributed to tangible assets. Immovable property rights are a socially constructed superstructure on a specific, localised and tangible base. Therefore, property rights cannot be reduced to either financial or, alternatively, physical assets. We propose that the notion of satellite accounts be applied to allow for inclusion of rights as a complementary concept, relative to the conceptual framework of national accounts (cf. SNA 21.4b).

The segment of society that we are addressing is defined by the occurrence of a change of the rights in or the legal attributes of units of real estate. This includes changes to legal boundaries as well as changes in spatial planning provisions, for example from agricultural to urban use of land, etc. The real estate segment is part of the housing sector. It includes furthermore real estate activities, including the letting of non-residential buildings. The segment may be delineated by referring to neighbouring or – from the present point of view – secondary activities. The construction sector produces buildings, etc., and thus changes the stock of fixed capital as well as physical accounts. The financial sector produces financial instruments, including mortgages. These two sectors are here considered neighbours to the real estate segment. Government institutions and legal services are included within the segment, but are for the most part outside the segment and thus considered neighbours as well. Activities regarding units of real estate may be of a physical or legal nature. Changes of a physical nature are not part of the real estate segment. This excludes construction and excavation (mining and quarrying). Improvements to dwellings are equally excluded. A part of this is covered by the national account on household expenditure on durable goods. Development is a compound type of change. It is included within the segment, as the characteristic change is a change in legal nature, namely from one type of property unit to another. Often, however, this goes hand in hand with construction in a way that cannot presently be detailed.

5.3 Present ways of addressing transaction costs of real estate

5.3.1 The cost of ownership transfer in national accounts and in capital stock statistics for buildings

In the national accounts, the cost of ownership transfer for dwellings and buildings is treated as an investment and not as intermediate consumption or final private consumption expenditure. Consequently, the investment value of a newly constructed building intended for office use is equal to the costs involved in constructing an office building and any cost incurred by the purchaser and seller in connection with the sale of the office building. The reason why cost of ownership transfer is treated as an investment is that the

purchaser must pay the total value involved in acquiring the office building which, as a matter of fact, also includes the cost of ownership transfer.

In present-day statistics, transaction costs are estimated in order to arrive at an account of capital stocks for buildings. The statistics on capital stock for buildings are compiled in accordance with the international standards laid down in the international National Accounts Manual (SNA 93), the joint European national accounts manual (ESA 95) and the OECD manual for compiling statistics on capital stock (Measuring Capital – OECD Manual, 2001). The value of dwellings and non-residential buildings is, in practice, estimated separately, but where the same primary statistical data are used there are only minor differences in methodology. Consequently, the description given below will be focused on an overall description of the compilation method for buildings.

The total value for buildings is given by conducting an aggregation of two subcomponents: direct estimated value of stock of buildings plus stock value for cost of ownership transfer.

Direct estimated value of stock of buildings is arrived at by estimating gross stock, and then deducting accumulated consumption to arrive at net stock. The gross stock of dwellings and non-residential buildings is estimated by means of the direct statistics on stocks. The principle of direct statistics on stocks presumes that physical statistics on stocks are available for dwellings and non-residential buildings, given by square meter age. If this information is combined with the construction price per square metre, the gross stock value for buildings can be estimated. The gross stock value for a building thus indicates the price for constructing a similar building as new.

The net stock for properties is arrived at by deducting the accumulated consumption of fixed capital from the gross stock for all buildings, which are still included in the gross stock. The depreciations are arrived at by making assumptions about economic lives (59 to 75 years), depreciation profiles and survival functions, whereby the annual consumption of fixed capital can be estimated.

As regards the stock value for cost of ownership transfer, the Perpetual Inventory Method (PIM) is used for estimating the stock value of cost of ownership transfer. PIM is the standard method used in estimating stocks, when only the level of investments is known, but no sources for direct stock estimates are available. In addition to knowing the investments, assumptions about economic lives, depreciation profiles and survival functions must also be made. The underlying idea of PIM is to continuously keep track of increases (investments) and decreases (depreciations). Depreciations are compiled on the basis of the scope of previous investments, assumptions about economic lives of investments, depreciation profiles and survival curves.

The economic life for cost of ownership transfer depends on the number of times the building is sold. Cost of ownership transfer must be depreciated

Table 5.1 Costs of ownership transfer, current prices (DKK 1,000's)

| | 1993 | 2000 |
|--|------------------|------------------|
| Law courts, public sales revenue (S752310) | 180,000 | 145,217 |
| Real estate agents (T703110) | 1,686,386 | 4,897,491 |
| Legal activities (T741100) | 2,462,556 | 3,447,922 |
| Total costs of ownership transfer | 4,328,942 | 8,490,630 |

over the period in which a building is expected to be owned by the persons who pay for the cost of ownership transfer. The economic life is fixed at 30 years in the Danish estimates.

The Danish national accounts have presented figures on the building stock since 1966 and in accordance with the abovementioned provisions since 2001. The stocks and flows are distributed by the 53 industry groupings in the national accounts. Furthermore, the following types of capital are listed separately: 1) Machinery and Equipment, 2) Transport equipment, 3) Dwellings, 4) Non-residential buildings, 5) Civil engineering projects, 6) Livestock, 7) Software, 8) Entertainment, literary or artistic originals, and 9) Mineral exploration.

Within this framework, the costs of ownership transfer as applied in the national accounts are provided for two selected years in Table 5.1. The following sources are applied in the national accounts when cost of ownership transfer is estimated:

- For law courts, public sales revenue (S752310) – which comprises stamp duty in connection with the sale of buildings – information from the Danish finance act is available with respect to the scope.
- Real estate agents (T703110) are available as turnover in the sectors which are engaged in 'Development and selling of real estate (70.11.00)', 'Buying and selling of own or leased real estate (70.12.00)', 'Estate agents (70.31.10)' and 'Allocation of housing (70.31.20)'. This information is known from the accounts statistics.
- Legal activities (T741100) are available as turnover in the sector 'Legal activities (74.11.00)'. The information is known from the accounts statistics.

All costs of ownership transfers concerning trade in real estate – built up and not built up – are ascribed to investments in buildings. This is a simplified assumption.

The above account of present-day statistical practice provides one link between the ordinary SNA and the proposed satellite accounts on the real estate market.

5.3.2 A reading of supply and use tables: the case of Slovenia

The SNA covers all the transactions and 'other flows' in the economy, both market and non-market, as well as the stocks, and presents them in the framework of accounts and balance sheets. The following aims at avoiding a focus only on the services which support real estate transactions. Rather, real

estate accounts in a broader definition should also include primary real estate transactions. These include both the value of property which has changed ownership, as well as capital services of the real estate itself as a production and consumption good, and so link the stocks and flows of the SNA. We consider it useful – vital even – that the proposed accounts also provide data for indicators of transaction costs relative to the values of transacted real estate and of capital services of real estate.

In the SNA, services and activities are two complementary yet different topics. Real estate activities are the production of services by a firm or other unit which has real estate as its main activity. Units active in real estate may also produce other so-called secondary services. Conversely, real estate services may also be produced as secondary services by units which are classified under other activities.

In Slovenia, real estate services are a wider concept than real estate activities, at SIT 408 billion versus SIT 365 billion in the year 2000, as some of these services are produced by other activities. Let us illustrate this point by selecting real estate rows and columns from the Slovenian supply and use tables (Statistical Office, 2003). Supply and use tables are supposed to be produced regularly by EU member states, so they can be compared across countries.

From supply and use tables for Slovenia the following picture of real estate services and activities can be derived: of a total supply of real estate services (70) of SIT 408 billion, SIT 361 billion or 88% was produced by units classified as real estate activities; the rest was produced by many other activities. The customers, users of these services, were many activities (businesses), which used these services as their intermediate consumption (18% of SIT 408 billion), households (80%, the majority being implicit rents – value of housing services of owner-occupied dwellings), and the government (0.5%), while a small percentage of these services (1.5%) were also included in the value of national capital formation.

From total revenue of real estate activities of SIT 365 billion, almost all of it (SIT 361 billion) came from the supply of real estate services. The cost structure (use) of this revenue was as follows: 18% was spent on intermediate consumption of goods and services, while 82% (SIT 298 billion) was value-added. A very small percentage of this value-added activity was made up of wages and other compensation of employees (only SIT 7 billion), net taxes on production were SIT 4 billion and major shares were depreciation ('consumption of fixed capital') in the amount of SIT 125 billion and net operating surplus (in different forms of property incomes like rents, interest and dividends) of SIT 162 billion.

Supply and use tables enable comparison of real estate in standard format with other services and activities and also comparisons between countries and over time. We shall not go into comparison of real estate with comparable structures of other services and activities here. Nor is the comparison of real estate transactions across countries a direct goal of the above ac-

count. Still, for the international reader interested in the economic meaning of Slovenian figures we will provide here some benchmark figures and conversions. The Slovenian gross domestic product (GDP) in 2000 was SIT 4,252 billion, with real estate services at 9.6% (408/4,252 billion) (remember: including imputed rent – in Slovenia, some 90% of dwellings are owner-occupied). The exchange rate in 2000 was SIT 205 to € 1, so the Slovenian GDP stood at € 20.7 billion or € 10,371 per capita. In purchasing power it represented some 68% of the EU15 average. Most of the figures in international comparisons can be made comparable by calculating them as a percentage of the GDP or per inhabitant. Slovenia's population is almost 2 million.

5.4 The SNA classifications applied to the Danish real estate market

The following section applies the SNA provisions to the Danish real estate market. Some repetition of information is inevitable, but it is included for reasons of completeness.

5.4.1 Market agents

The SNA offers the following classification of agents, separating the production aspect from the consumption aspect (SNA 21.83):

- a. market producers;
- b. non-market producers (producers for own final use; and other non-market producers);
- c. government as a collective consumer;
- d. households as consumers;
- e. rest of the world.

The market is assumed here to be the total of transactions regarding immovable property. The notion of transaction is taken in a broad sense, implying that making a tenancy agreement on a rented flat or the leasing of agricultural land is considered part of the market.

a. Market producers

'Production' in this segment of society consists of transaction services that are consumed by owners, buyers and other asset holders. The class of market producers therefore includes a number of professions, including lawyers, notaries, estate agents, civil engineers and land surveyors, who offer their services as detailed below. Market producers also include banks, mortgage credit institutes and other organisations offering financial products or lending services in the context of real estate trade.

b. Non-market producers (producers for own final use; and other non-market producers)

The main non-market producer in the segment is the government. The 'product' relevant for property transactions includes the enforcement of contracts, and is some subset of general law and order, which is produced through the operation of law courts. However, the government also contributes towards the enforcement of contracts through proactive means. According to the SNA, natural assets must be under the effective control of an institutional unit in order to be taken into account by the SNA (21.126). Government agencies 'produce' immovable property (or real estate) units and provide records of rights in these units. Recorded rights are maintained by the Land Registries, which traditionally are part of the law courts. The property units themselves are specified through the Cadastre, which is related to topographic mapping within the Ministry of the Environment. The transparency of the market is furthermore advanced through the collection of sales reports and the production of sales statistics by the Ministry of Taxation, and through the general service of Statistics Denmark.

Finally, this class includes the sellers and buyers of the market, who produce 'measurement activities' for their own final use in order to assess the attributes of the market commodity, the property unit.

c. Government as a collective consumer

Central and local government appears as consumer in its role of owner of a property unit, be it for office, recreation or military purposes. The government is also in possession of notable areas of public roads and railways, and often also of forests. These possessions hardly appear in the market, except for office property units and the renting of office space on the market.

The fact that the government collects duties: registration duty, formerly stamp duty, as well as a cadastral duty from the market may well be considered a kind of consumption. The question remains, to what extent these duties are collected for fiscal purposes or as part of a cost recovery scheme.

d. Households as consumers

Households are consumers in their search for a home. However, companies (or firms, establishments) may be considered consumers as well, as they require a physical base for their activities.

e. Rest of the world

A (small) number of owners of Danish property units are non-Danes. This applies to embassies, to non-Danes owning farms, and to foreign companies. More often than not, however, these foreign companies will own shares in a Danish registered company.

A (small, but growing) number of Danes own property units abroad, and to

some extent draw on Danish expertise and perhaps mortgaging in foreign transactions.

Specific conditions for parts of the Kingdom of Denmark, namely Greenland and the Faeroe Islands, may be noted as well.

5.4.2 Main activities related to the performing agents

'In a given field a list of characteristic activities has to be established' (SNA 93:21.99). In the context of the COST G9 action, such activities have been modelled in some detail. Table 5.2 relates the above classification of agents to their main activities.

The division of labour among the professions may be described as characterised by core activity domains, which by statutory law or practice are generally exclusive to that profession, and accessory activities, which may be performed by neighbouring professions as well. The compartmentalising of activities is sustained by the professions through the establishing of professional codes of conduct and the providing of professional liability insurance for activities within their core competencies.

The boundaries of the segment are blurred: while real estate agents operate almost entirely within the segment of real estate transactions, the other professions perform activities within other fields: lawyers within business, family, international, etc., affairs, and engineers and surveyors within construction. Some professional associations prepare statistical accounts on time dedicated to the different main activities.

Financial intermediation is mostly provided to owners and property purchasers through local branches of commercial banks, while mortgage loans themselves are provided by mortgage credit institutes. The mortgage institutes were once quite specialised in offering mortgage loans only to well-defined owner groups, but since the 1980s, mergers in the financial sector have led to changes in this tradition. Some pension funds invest in real property as well.

The boundaries of this segment seem to be less blurred. The amount of mortgages recorded in the Land Registry is well described in terms of number of documents. As regards amounts, mention is made of the practice that in the case of conveyance of one-family houses, the mortgage normally amounts to 80% of the sale price, while the seller accepts a mortgage deed amounting to 15% of the price. The amount of these private mortgage deeds has been assessed (Danmarks Statistik, Nationalregnskabet 2003: 3, p. 5).

The government provides services to the segment mainly in terms of the Land Registry within the court system (*Domstolsstyrelsen*), and the cadastral part of the National Survey and Cadastre within the Ministry of the Environment. The Land Registry undertakes the largest volume of activities in checking and recording conveyance and mortgage deeds, etc. Foreclosure action is

Table 5.2 Main categories of agents and activities related to immobile property

| | Agents | Activities |
|---------------|--------------------------------------|---|
| Professions | Real estate agents | Sale of a unit of real estate |
| | Lawyers | Transfer of immobile rights. Inheritance, mortgaging, leasing, granting of easement |
| | Civil engineers | Building surveys (Danish: Tilstandsrapport; Energimærkning) |
| | Land surveyors | Cadastral procedures, identifying the property unit and its boundaries. Location of easements |
| | Diverse offices | Allocation of dwellings |
| | Agricultural consultancies | Leases of agricultural plots |
| Companies | Mortgage banks, banks, pension funds | Mortgaging |
| Public bodies | Law courts | Land Registry Foreclosure auction (or compulsory sale, forced sales) |
| | | Court cases on compensation for expropriation |
| | | Court cases of title and boundary disputes |
| | Cadastre; Other state activities | Recording of real property units in files and on maps |
| | | Assessment of property value for taxation |
| | | Expropriation (or compulsory purchase) |
| | Municipalities | Taxation of real property |
| | | Inducement and lifting of restrictions due to spatial planning, etc. |
| | | Exercise of public pre-emption rights |

Source: Stubkjær, 2004

performed by the execution office of the court, which also handles non-real estate business. Court cases on compensation in the case of expropriation and on title and boundary disputes are mentioned for the sake of completeness. The cadastral procedures include a quasi-judicial procedure (*skelforretning*), which must be completed before a case on boundary disputes can be heard by the ordinary court. As court rulings generally support the land surveyor's case work, there are few court cases.

In Denmark the Cadastre is made up of a central unit only. This differs from many other countries, in which the organisation includes regional and even local units. The cadastral map is updated through cases submitted by the land surveyors. However, recurrent improvements, e.g. of the set of control points and other basic mapping is integrated with the general mapping tasks of the National Survey and Cadastre. The land surveyors, who undertake cadastral work, are organised into around one hundred private companies all over the country (2002). These companies offer consultancy and provide technical maps for construction, etc.

Expropriation is performed by specialist units within the Ministry of Transport: the State Commissioners for Expropriations, and by the municipalities. The amount of compensation may, after appeals within the specialised system, be brought before the High Court.

The Ministry of Taxation performs assessment of the market value of real property, largely based on compulsory sales reports, the national Real Property Data System, and their own analyses. The municipalities provided assistance for assessment activities for roughly 50 years, but computerised records

and processing allowed for substantial changes to be made in 2002, leading to a reduction in municipal involvement.

The municipalities perform an array of activities that may or may not be considered part of the segment concerned. The Real Property Data System provides the basis for the collection of property tax and municipal fees (water, sewerage, refuse disposal), as well as the basis for property assessments and the reporting of data for construction statistics. This should definitely be included under the segment. Furthermore, the municipality owns and maintains immovable property for administrative purposes (excluding educational, social work, health and cultural institutions), public areas (parks, sports centres and other leisure areas, and cemeteries, excluding public roads and other areas for technical infrastructure), and areas for housing or industrial development. In addition, activities pertaining to these property units are in general included under the segment, to be understood as collective consumption by (local) government, for example. Whether spatial planning and other land management activities should be counted under the segment may be a more open question. These activities do definitely have an impact on real estate transactions, but this holds for construction activities as well. If spatial planning activities are not included within, for example, environmental accounting schemes, Danish practice may suggest they are included within the real property segment.

5.4.3 The activities of the segment in terms of the NACE standard classification

‘The production activity of characteristic producers is studied in detail. This covers ... the analysis of output by kind of products and the number of units produced, the destination of this output (consumption, capital formation, exports) and the labour and fixed assets used. As to labour, ... the number of people employed is shown in detail. Fixed capital formation is covered. Stocks of fixed assets in monetary value and/or physical quantities ... are essential’ (21.100).

The ‘characteristic producers’ include the abovementioned governmental services, which may or may not coincide with actual organisational boundaries of government agencies, as well as the companies of the professions. The kind of products are the services offered. The bundling of these services differs from country to country. The output, the number of units produced, may be rendered by the number of cases of different kinds, but the units selected could also be more specifically related to outcome, for example as number of new cadastral identifiers, new and changed property units, and new and changed entries (rights, summarised in a line) in the Land Registry. The fixed assets used include the national information systems with databases, which are established and used by the Cadastre and the Land Registry. The labour

Table 5.3 Adapting the Danish segment of real estate to the NACE classification scheme

| Agents according to NACE/ DIC code | Activity |
|---|---|
| Owners: 70.12.00 | Buying and selling of own or leased real estate |
| Real estate agents: 70.31.10 | Estate agency; intermediating in buying, selling, renting, and appraising real estate |
| Developers: 70.11.00 | Development of real estate projects, by bringing together financial, technical and physical means to realise real estate projects for later sale, whether residential or other |
| 70.20 Letting of own property. Owner categories: 70.20.10/.40 | Letting and operating of self-owned real estate, including apartment buildings and dwellings, non-residential buildings, e.g. exhibition halls, and land Management of real estate for own final use |
| Professional management: 70.32.10 | Management of real estate on a fee or contract base; includes rent-collecting agencies and facility management |
| House owners' associations: 70.32.20 | Managerial activities of condominium and similar owner associations |
| Tenants' associations: 91.33.10 | ?? |
| Diverse offices: 70.31.20/.30 | Allocation of housing; letting of holiday homes (or weekend cabins, summer cottages) |
| ?? (consultancies: 01.4) | Leasing of agricultural plots |
| Legal activities (Lawyers) 74.11.00 | Transfer of immobile rights, incl. foreclosure processes |
| Engineering consultancy, construction: 74.20.10 | Building surveys (of existing buildings, in context of sale) |
| Land surveyors: 74.20.70 | Cadastral cases |
| Mortgage credit institutes: 65.22.30 | Mortgaging |
| Banks: 65.12.00 | |
| Pension funds: 66.02.10 | |
| Law courts: 75.23.10 | Land Registry |
| 0175 Domstolsstyrelsen | Foreclosure auction (or compulsory sale, forced sales) Court cases on compensation for expropriation Court cases of title and boundary disputes |
| State activities: 75. National Survey and Cadastre; 0033 Kort- og Matrikelstyrelsen | Recording of real property units in files and on maps |
| Taxation | Assessment of real property value for taxation |
| § 9 Told Skat | Expropriation (Synonym: Compulsory purchase) |
| 0066/67 Kommissarius | Management of real estate and rented rooms for own consumption (administration) |
| 0043 SlotsEjendomsstyrelsen | |
| Municipalities | Taxation of real property; spatial planning, etc.; expropriation Management of real estate and rented rooms for own consumption (administration) |

Source: Stubbjær, 2005 (modified)

force may be accounted for in categories as graduated and technical staff. As for stocks of fixed assets, the number of units of real estate, buildings, etc., first comes to mind, but office and measurement equipment used by the various agents may be worth considering as well.

In responding to the quoted demands, Table 5.2 is modified to accommodate the NACE rev. 1.1 standard classification of activities (Eurostat, 2004),

which has been implemented as the Danish Industrial Classification (DIC) of activities. Data for the resulting Table 5.3 are omitted here, as quantification details may be found in Stubkjær (2005).

Data on production activities are available from Statistics Denmark's product statistics of business services (Danmarks Statistik, 2005: 68). However, the degree of specification calls for wide-ranging estimates. For civil engineers, lawyers and letting of holiday homes, gross figures are given. Engineering consultancy in terms of building surveys of existing buildings within the context of sale is estimated within the amount rendered for 'services related to maintenance and facility management'. For lawyers, the statistics specify 'real estate consultancy'. The information used below was taken from a publication specifically addressing the services of lawyers (Danmarks Statistik, 2004).

Unfortunately, data on real estate agents and chartered surveyors are not provided in published statistics. An estimate of real estate agent turnover is based on internal material in Statistics Denmark (Gysting, 2005); personal information). Further information on this sector is available from investigations by the Competition Authority (cf. Konkurrencestyrelsen, 2004). As for chartered surveyors, an estimate is based on information provided by a report by the Competition Authority (Konkurrencestyrelsen, 2004) compared with estimates of European scope (CLGE, 1996) and accounts by the profession (Ene-mark, 2002).

The transaction costs relative to mortgaging are difficult to assess. In the System of National Accounts, the transaction cost of a non-financial transaction is treated as an investment, while the transaction costs related to financial transactions are treated as current costs which are very difficult to identify in the national accounts. An investigation into the accounts of the major banks and mortgage credit institutes might provide some cost assessments, but the boundary between mortgages and mortgage renewals related to conveyances and mortgages for financial reasons, etc. must be taken into account.

Remarkably, the NACE classification gives very little detail on public activities. This needs to be redressed, as the presently investigated segment of society comprises official activities as much as market activities. Here, figures are provided in order to account for different Danish duties. To increase specification of public activities, codes from the Danish Budget system (<http://www.oes-cs.dk/nummerstruktur/index.cgi>) are given. Finally, some entries were made for the sake of completeness (91.33.10 and 01.4), without being based on detailed knowledge of the activity.

The economic aspects of the governmental units appear from the yearly Budget, but only in gross figures. For the present purpose, newly developed Yearly Reports provide the necessary detail.

The number of completed court cases in 2003 amounted to a total of 4,122,105 completed cases (2003), of which 3,533,325 concerned the Land Registry. More specifically, 195,748 deeds of conveyance and 759,445 mortgage

Table 5.4 Profit and loss account for Danish Land Registry, in million DKK (€1 ~ 7.46 DKK)

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|--|-------|-------|-------|-------|-------|
| 11.41.02 The law courts | 120.4 | 106.2 | 107.4 | 108.1 | 116.3 |
| 11.42.03 Compensations | 0.4 | 0.8 | 1.2 | 1.1 | 0.4 |
| 11.43.01 Duties (Danish: Retsafgifter m.v.) | 3.3 | 3.5 | 3.5 | 4.3 | 5.1 |
| Net primary activity | 117.5 | 103.5 | 105.1 | 104.9 | 111.6 |
| 11.41.02 Cost of conversion to IT | 75.8 | 61.4 | 0.0 | – | – |
| 11.43.02 Revenue from the computerised Land Registry | 166.5 | 172.8 | 209.5 | 231.0 | 270.6 |
| Return of the year | -26.8 | 7.9 | 104.4 | 126.1 | 159.0 |

Source: Domstolsstyrelsen, 2004; Årsrapport 2003, Bilag 2, p. 38

Do note: Stamp duty (Tinglysningsafgift) is not included; see text.

deeds were processed, as well as a large number (2,458,862) of ‘other’ documents. Lastly, 119,270 documents regarded movables (security in cars). Processing time varied between 1.1 and 11.3 days, with the mean being 5.6 days. Foreclosure action on real estate was requested in 9,123 cases (2003) and actually performed in 1,842 cases (Domstolsstyrelsens Årsrapport, 2004).

Comparing the number of deeds of conveyance (195,748) with the number of sales (91,854), a substantial difference appears. It may be that (most?) deeds are recorded twice during the course of the transaction: firstly as an encumbrance to secure the buyer right in the property unit before the agreed sum is transferred to the owner, and next as a title deed. However, this is far from explaining the difference. In economic terms, the activity may be detailed as in Table 5.4.

The conversion to IT took place during the 1990s; only the last few years are shown. The courts apparently do not discern between duties collected for fiscal purposes and fees charged as part of a cost recovery scheme. The total costs of the courts amounted to DKK 1,567 million (2003), all court duties to DKK 470 million, and the revenue from the computerised Land Registry to DKK 271 million, making the cost for the state DKK 826 million (Årsrapport, p. 8). From the citizen’s point of view, the ‘revenue’ of the computerised Land Registry is a cost, and again restricting us to the Land Registry affairs, it seems that citizens pay DKK 116.7 million plus the ‘revenue’ of DKK 270.6 million for the Land Registry activities. The computerised Land Registry provides certificates to be used in conveyance and mortgage transactions, etc. Besides the duty mentioned in the table (*Retsafgift*), the Land Registry also charges another duty, a type of stamp duty *Tinglysningsafgift*. According to the Budget, this ‘*Tinglysningsafgift*’ amounted to DKK 6,147 million in 2003 (Budget, 2005; pos 38.16, page 109).

The cadastral activity proper (code 3000) amounts to revenue (fees) of DKK 25.5 million and costs of DKK 42.4 million, rendering net costs of DKK 16.9 million. The corresponding figures for the Danish National Mapping and Cadastre totals amount to 95.8, 281.8, and -186.1 respectively, the deficit largely being covered by the appropriation. The degree of cost recovery therefore amounts to about 60% on cadastral activities proper and 34% in general. The figures for cadastral activities proper render the minimum. Administrative costs (overheads, code 9000), which amount to about 6%, should be added, as

well as a percentage of the costs for general mapping (codes 1000 and 2000). In addition to the fees, the KMS collects a duty for pure fiscal reasons. This duty amounts to DKK 36.0 million. During 2003, 7,800 new property units were established. This figure does not indicate the substantial number of cases in which the attributes of existing property units were changed.

In closing, the report notes that the cadastral, topographic and maritime databases are very important assets for the KMS. The report goes on to say that the value of these databases is difficult to assess in a reliable way, and hence their value cannot be quantified. The KMS is contemplating methods to account for the updating costs and provide stock valuation, as part of a general cost accounting system. The implementation of such methods may change the accounting of the databases.

5.4.4 Estimate of the costs of real estate transactions in Denmark and Finland

The effort to assess the costs of transactions in immovable property units must be based on available evidence as well as estimates or, more appropriately, guesswork. The account made here suggests three major kinds of costs: cost of consultancy activities – approx. DKK 6,800 million; cost of government services – approx. DKK 470 million, as well as stamp duty of DKK 6,500 million. In Table 5.5, the amounts are rendered in euros, based on the 2003-2004 exchange rate (0.134 Euro/DKK). Comparable Finnish data have recently become available (Vitikainen, Chapter 4) and are included in the table as well. Total transaction costs of a sale amounts in both countries to 10-12% of average cost of a property unit, and in both countries about half of this amount are taxed for pure fiscal reasons. The costs of services of financial institutions – mortgage credit institutes and banks – have not been assessed due to difficulties mentioned in Section 4.3. Furthermore, it should be noted that the amount of Danish stamp duty mentioned in the table originates both from sales (duty on conveyance and related mortgage deeds) and from mortgage deeds, which an existing owner registers in order to liquidate capital from the estate. Further investigations are needed to allocate the appropriate amount to sales with mortgages and mortgage renewal for financial reasons only respectively.

5.5 Discussion

Conventional understanding holds that transaction costs cannot be recovered when selling the property (BBR, 2006:4). However, land registries and other public records in fact retain relevant information produced during the transactions and thus retain some value of the transaction costs. This means that

Table 5.5 Estimates of national costs of real property transactions in Denmark and Finland (about 2003-2004)

| Agent - Danish DIC code | Denmark (in million euro) | | Finland (in million euro) | |
|--------------------------------------|--|----------------|--|--------------|
| Real estate agents: 70.31.10 | | 656.6 | | 192.0 |
| Legal activities (Lawyers) 74.11.00 | | 206.4 | | ? |
| Land surveyors 74.20.70 | | 46.9 | | ? |
| Engineering consultancy 74.20.10 | | | | |
| Developers 70.11.00 | | | | |
| Consultancy, total | | 909.9 | | 192.0 |
| Mortgage credit institutes: 65.22.30 | | ? | | ? |
| Banks: 65.12.00 | | | | |
| Law courts: 75.23.10 | 11.41.02 Court cost | 15.7 | Court cost | 18.0 |
| | 11.43.01 Certificate fees | 36.3 | Certificate fees | 16.2 |
| | | | Public purchase witness's fees | 6.6 |
| National Survey and Cadastre: 75.. | Cadastral costs | 5.6 | General cadastral costs | 12.0 |
| | 23.91.02 Cadastral duty | 4.8 | Subdivision costs | 21.5 |
| | | | Subdivision fees | 21.5 |
| Registering costs, total | | 62.4 | | 95.8 |
| Total without duty and tax | | 972.3 | | 287.8 |
| | 38.16 Stamp duty | 871.0 | Transfer tax (4%) | 228.0 |
| Total with duty/tax | | 1,843.3 | | 515.8 |
| | Transaction costs/sale (all sales): | | Transaction costs/sale (all sales): | |
| | €11,000 to €20,000 | | €4,000 to €8,000 | |
| | Number of sales pro year: 91,854 | | Number of sales pro year: 73,900 | |
| | Average cost of unit: €160,000 | | Average cost of unit: €77,000 | |

the costs of subsequent transactions are potentially lowered and, furthermore, information asymmetry among the transaction parties is reduced. It is interesting to note that these benefits in Denmark are achieved for less than 10% of the cost of transaction consultancies.

Both in Denmark and Finland a substantial amount of stamp duty or transaction fees are charged on the real estate market. The concern for labour market mobility which was mentioned in the opening Section apparently has to compete with alternative governmental objectives. Until 2006 in Denmark such an alternative objective might be the reduction of national foreign debt. The example illustrates how the issue of transaction costs is linked with political preferences and more or less reflected practices. Transaction costs originating from the financial sector have not been assessed. This is due not only to the complexity of the various cooperation schemes and price settings among service agents, but also due to the immaterial nature of the services offered. Some transaction costs must indeed exist and perhaps the greatest weakness of the present investigation is that even the order of magnitude of these costs is not assessed.

The figures provided should be understood as a means to illustrate an application of the concept of national accounts, as mentioned before. The product statistics on business services from Statistics Denmark has provided a

source of data, which holds promises for a more complete coverage of the real estate market. The problem is that for the professions with comparably high turnover: real estate agents and lawyers, the services relevant for the real estate market need to be more clearly specified. As for the professions with lower turnover: engineers and surveyors, their services need to be included in order to arrive at a complete account of transaction costs. The Danish product statistics are made in cooperation with Eurostat and such European cooperation might provide a framework for further developments.

A more profound problem in the provision of data for the national accounts is that the market in real estate is unevenly developed among European countries. This fact has implications not only for data provision, but also calls attention to the availability of services, the needed expertise, and the level of quality. Here the national competition authorities seem to be in the best position to lay focus on the part of the national real estate market that holds the best potential for contributing to the overall development of the market. The ad hoc investigations of the competition authorities might thus pave the way for more sustained provision of market statistics.

The role of competition authorities is furthermore underlined by the fact that they are in a position to request a higher and more relevant specification of public accounts. For example, companies providing maps and other spatial data may claim that the price fixing of similar governmental products leads to a distortion of competition. In order to assess such claims, competition authorities need information of the kind available in the above quoted yearly reports, which thus ought to be generally available and comparable among EU countries. Of course, the provision of such yearly reports does not guarantee a complete picture. For example, the Danish Yearly Report of the Courts (Domstolsstyrelsen, 2004) mentions one duty (*Retsafgift*) but not another (*Tinglysningsafgift*). An account of the latter is only available through the general Budget. This calls for cooperation among the professions involved, the mentioned government units, and academia, a cooperation which would benefit from being incorporated into the mandate of one of the mentioned government units.

5.6 Conclusion

The establishment of national accounts for the real estate market within the framework of the System of National Accounts was introduced, proposed in some detail, and illustrated using available data. An initial and highly tentative estimate of transaction costs for real estate conveyance in Denmark and Finland was presented. Sources of data for such national accounts were found in the product statistics for business services of the national statistical services, in the investigations of the competition authorities, and in yearly reports

of government agencies. The discussion includes proposals for the next steps in the provision of national accounts for the real estate market.

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Part 4

6 A socio-technical analysis of cadastral systems

Maarten Ottens & Erik Stubkjær

Abstract

Complex tasks, like the construction and operation of a large airport, have motivated a new branch of research on 'socio-technical systems'. The existence and functioning of technical infrastructure like airports and harbours depend on interactions between the technical and social aspects and research is emerging conceptually analysing these systems.

In order to get more insight in the constitution and functioning of such systems, this approach is used to analyse the cadastral system. The development and management of cadastral systems compare to the complexity of the airport example, but as the physical and technical aspects are relatively simple, the analysis focuses on the social aspects.

Cadastral systems bring together several facets of daily life in our modern, complex societies. On the one hand they are technology based representations of land units, but on the other hand they are part of the institutional arrangements relating to land and its functions within the societies they serve.

This chapter describes and analyses cadastral systems as a socio-technical system. The expanding scope from 'simple' technical artefacts, through technical systems to socio-technical systems is explained, as are the limitations this brings in 'engineering' such systems. Contemporary cadastral literature is described with this in mind, and a first cut at a socio-technical description of cadastral systems is presented.

6.1 Introduction

Physical reality is not restricted by boundaries we draw; it is, however, restricted by boundaries drawn by nature, that is, by the laws of nature. A short article in a Dutch newspaper (2004) links these remarks to cadastral systems:

Over 15 years, a small island in the north of the Netherlands 'walked' 2 kilometres eastwards. Due to this historical and ongoing natural process, whole villages disappeared in the sea. Now, however, the island moved into another province. For an island to be able to move into another province, we need not only the natural movement of the island, but also the social concepts of provinces and boundaries; in this case, boundaries fixed to a geodetic reference system and described by map coordinates. With this movement, legal questions regarding responsibility arose. A boundary correction would solve these apparent problems, but would lead to financial losses for the province and the municipality losing area.

This brief example shows how physical reality and social concepts can affect each other. Real estate boundaries and jurisdictions are socially defined concepts; they might but do not necessarily coincide with the natural movement of the land. The choice to switch to one boundary system or another is

a social choice and implications are not easily foreseen. The above example shows what influence the choice of a certain method of delineating interests in land can have.

There is a strong interplay between social and technical aspects and choices in this example. To measure coordinates we need technology. This technology is then essential for solving disputes over legal boundaries in a rational fashion. This interplay between social and technical aspects is the subject of research into the nature of so-called socio-technical systems¹. In the present paper, we will address two research goals. We use the concept of the socio-technical system, as explained below, to increase understanding of the cadastral system, whilst also gaining more insight into the concept of the socio-technical system itself by studying the cadastral system.

6.2 Terminology and theory behind socio-technical systems

The socio-technical system is a social concept itself, which means that we need to clarify the framework we will use as a basis for the socio-technical analysis, as well as other essential terminology used in this paper.

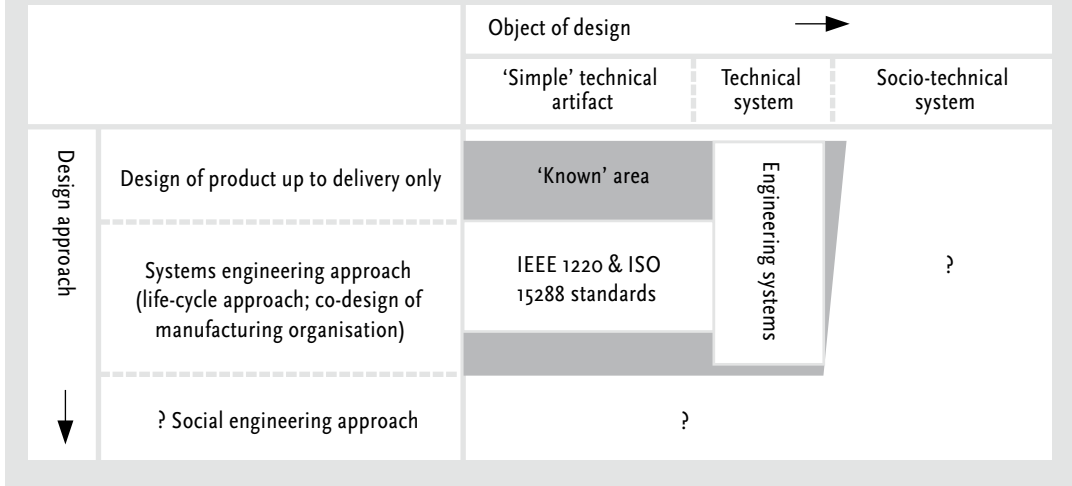
The term ‘system’, as a whole of related elements, can be used for almost everything in this world, from a group of atoms to the whole universe. This makes it both a very versatile and a very empty term. To introduce some conceptual clarity, we will distinguish between two kinds of systems: synchronic and diachronic.

1. The synchronic is the system as it exists at a certain moment in time; it is a snapshot of the constituents of the system, its elements and the relations between them. We will refer to this as a static system view.
2. The diachronic are systems where the elements are connected in time. The same physical object can be seen changing over time, where different states resemble elements related in time. These elements can be systems of the first kind by themselves. We call this a dynamic system view.

This distinction is conceptual; practically speaking, it will be impossible to exhaustively map a system at one moment in time, taking all elements and relations properly into account. Systems, especially socio-technical systems, are subject to constant change.

By a cadastral system we refer to the official mirroring of interests in land by means of an information system. The information system need not be

¹ This research is part of Understanding Complex Systems, a Next Generation Infrastructures research project (see www.nginfra.nl).

Figure 6.1 Two forms of complexity and an overview of the research frontier

computerised, but must include (written) records which are structured in some way, as well as provisions for mirroring the changes on the ground.

The pertinent literature often uses the term 'cadastral systems' or alternatively 'land administration'. The terms refer to the recording of transfer of real property rights at the land registry Section of the courts, as well as to the activities of a cadastral or mapping agency, which provide more or less complete identification of the individual real estates. The transfer of property rights includes the conveyance of title and mortgaging. The transfer processes are closely related to changes to the extent of the property, and to the formation of new parcels. The transfer processes and the stock of real estate are used for the collection of a variety of fees and taxes, and may be integrated with spatial planning and other environmental purposes.

"In many parts of Europe, the cadastre evolved as a support for land taxation, while the legal processes of land registration were dealt with separately by lawyers and the records entered in land books, for example the German Grundbuch. Dual systems therefore emerged" (UNECE, 1996, p. 4).

Having reviewed a variety of terminology uses and definitions, the cadastral part of this dual system, the 'cadastre', was defined as "a systematic and official description of land parcels, which includes for each parcel a unique identifier. Furthermore, the description includes text records on attributes of each parcel. The prototypical means of identification is a large-scale map that provides information on parcel boundaries" (Silva & Stubkjær, 2002, p. 410). Complementary to this definition of cadastre is the definition of the 'cadastral system': "the combination of a cadastre – with its spatial focus – and a land register – with its legal focus" (ibid., p. 410-411).

Much research regarding systems is done within the field of 'systems engineering'. In Ottens (2005) this field is characterised as a reaction to the increasing complexity of both the product to be designed and the design approach in engineering. This characterisation shows a lack of approaches

Table 6.1 Three kinds of engineering systems

| | Without actors | With actors |
|-------------------------|-----------------|--------------------------|
| Without social elements | 1) Landing gear | 2) Airplane |
| With social elements | - | 3) Civil aviation system |

and understanding in dealing with socio-technical systems.

The product to be designed became more complex over the years, from simple technical artefacts like bridges to complex systems like the civil aviation system, which includes non-technical elements.

The increasing complexity in the design approach refers to an approach where an increasing amount of phases in the life cycle of an object are taken into account. More technical disciplines need to be included and eventually also social aspects and disciplines. The inclusion of social aspects poses new demands for the design approach, since these aspects are embedded in a social infrastructure changing over time and beyond the direct control of the designer.

This distinction in the field of systems engineering tells us that in order to deal properly with complex systems we must take aspects other than technical aspects into account. This calls for a design approach that can sufficiently deal with this increased complexity.

6.3 Socio-technical systems²

The concept of the socio-technical system is analysed in Kroes *et al.* (2006). An analysis of the status of actors and social elements with regard to engineering systems suggests that at least three different types of system can be distinguished (see Table 6.1). The types are (1) engineering systems that perform their function without either actors or social elements as sub-functions within the system; (2) engineering systems in which some actors perform sub-functions but social elements play no role; and (3) engineering systems that need actors and some social/institutional infrastructure to be in place in order to perform their function. Only in the last case does it seem appropriate to speak of socio-technical systems and, in our view, most large-scale (information) infrastructures are of this kind.

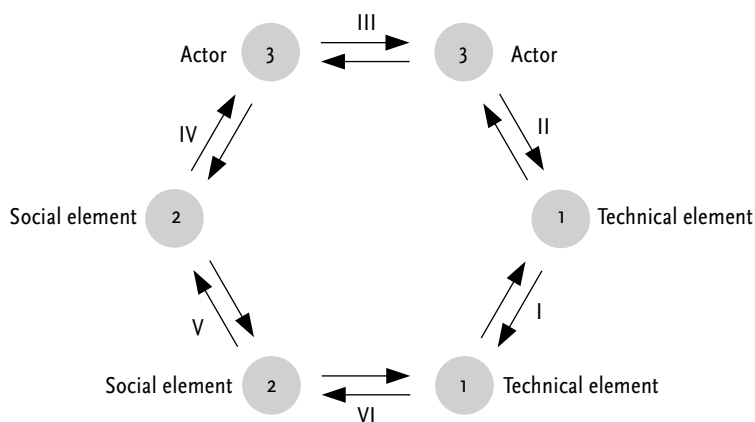
We find three different systems where the complexity increases because of the different kinds of elements in the system. This distinction is based upon our argumentation for socio-technical systems.

Argumentation

When we talk about socio-technical systems, we refer to systems where the elements not only differ within the technical realm, for example as mechan-

² Originally, the notion of the socio-technical system by Emery & Trist (1960) referred to the organisation of labour in relation to technology, but we take a different approach that focuses on the fundamental differences between elements in socio-technical systems.

Figure 6.2 Elements (1-3) and relations (I-VI) in a socio-technical system



ical, electrical or optical, but where the nature of the elements is more fundamentally different. We introduce two distinctions between elements forming the basic arguments for setting up a preliminary conceptual framework of socio-technical systems, which can be used to analyse and understand such systems.

The first distinction is a distinction between elements with and elements without intentionality, or acting and non-acting elements. Contrary to theories like the Actor-Network Theory (cf. Callon, 2001) and Systems Engineering approaches, we believe a fundamental distinction between actors³ and non-actors must be made. Even though objects can be made with certain intentions in mind, by which the user is limited in its actions, these objects cannot act intentionally themselves. They have no beliefs or desires. We take intentionality to be a broader notion than rationality: the actors' behaviour can be unexpected, unreasonable and unreflected but still intentional, i.e. based on certain beliefs and desires.

The second distinction is a distinction based on the influence of the laws of nature on the functioning of the different elements. The abovementioned elements, like mechanical and electronic elements and human physics, depend on the laws of nature for their functioning. There is, however, another group of abstract, rule-like, elements, such as agreements and decisions which, in their functioning do not depend on the laws of nature. It is for example not impossible to make contradictory acts that defy the laws of logic, or to make a statutory act which obliges stones to fall upwards. These elements might materialise into objects (documents, databases) that are bound to the laws of

³ The use of the term 'actors' is always tricky; an alternative term would be 'agents', but both terms come with problems. 'Actors' also refers to a person performing in a play on stage, and is the preferred term in political science studies, e.g. of policy issue networks, whereas 'agent' is widely used in informatics. By 'actor' we mean any entity that can act intentionally, both individual humans and groups of humans that are organised such that they can be seen as a single acting entity. Both terms could be used, but in this paper we have chosen to use actors.

Table 6.2 Kinds of relations

| | | | | |
|-------------------------|----------|------------|-------------|-----------|
| I technical - technical | physical | functional | | |
| II technical - actor | physical | functional | intentional | |
| III actor - actor | physical | functional | intentional | |
| IV actor - social | | functional | intentional | normative |
| V social - social | | functional | | normative |
| VI social - technical | | functional | | normative |

Source: Ottens, 2005

nature, but neither the rules themselves nor their functioning are dependent on these laws. Of course, it is highly impractical to pass a self-contradicting act, but it is possible and it does happen.

Based on these two distinctions we introduce a preliminary framework with three kinds of elements and, as we will argue, four kinds of relations (Figure 6.2 and Table 6.2).

Elements

The first kind of element is called a *technical element*. This kind spans all the previously mentioned mechanical and electronic, etc. elements. Technical elements have no intentionality and are subject to the laws of nature for their functioning.

The second kind of element also has no intentionality, but does not depend on the laws of nature for its functioning, unlike the technical element. We call this kind a *social element*. The group of social elements is big and diverse, and includes legislation and norms, for example.

The third kind of element has intentionality, it can act and is a so-called *actor*. This element is subdivided into individual, human actors and groups like organisational units.

An analogy between laws of nature constraining technical elements and social rules constraining the behaviour of actors emphasises the difference between technical elements and non-technical elements. The constraints laws of nature place on the behaviour of technical elements are real constraints – the stone will drop – while the link between social rules and the behaviour of actors is much weaker – a traffic light can be ignored. Even though this link is much weaker it does exist and should be taken into account.

Relations

Based on an analysis of the three different elements and their fundamental differences we came up with four different kinds of relations in this framework (see Table 6.2).

First of all, material elements can be physically related. They can touch, stand on top of each other and two elements cannot occupy the same space at the same time. This physical relation can, but does not necessarily, contribute to a function. For example, friction between tyres and the road contributes to the function of transportation of a vehicle, but the friction between the same vehicle and the air while driving seems not functional.

The second relation just introduced is a functional relation. An actor can

fulfil a function in a transportation system and so can a truck. Even a road traffic act can fulfil such a role, in preventing accidents and therefore promoting smoother transportation. The functioning of social elements is not based on the laws of nature, as we argued. The social elements can even be abstract on all levels, for example in non-written rules (customary law), and yet they can have impact on the system. For the most part this can be understood by means of functional relations. The scope of functional relations must be stretched beyond physical functional relations. For example, certain rules function as assistance in applying a policy.

With the incorporation of elements with intentionality, the actors, we bring in a third relation: an intentional relation. The actor has certain beliefs, desires and intentions regarding other elements. Their attitude towards a designed element may fail to match the element's function as originally intended by the designer. This can have a great impact on the functioning of the system. In order to understand a system, and how it works or how it fails, we have to take the intentionality of the people participating in the system into account.

A fourth kind of relation is introduced to clarify direct relations among social elements that are not functional in the sense mentioned above: a normative relation. Legislation, for example, prohibits us from stealing; it relates to us normatively (cf. relation iv in Table 6.2). As a framework, it functions in making society run smoother, but it has no direct functional relation to the actors (relation of type v). Other examples are technical norms prescribing the size of nuts and bolts (relation vi). Such standards, issued by the International Organization for Standardization, for example, do not have a direct functional relation with the nuts and bolts. From a higher perspective their function is easing fabrication and maintenance, but the relation between the norms and the nuts and bolts is merely normative. They prescribe what dimensions the nuts and bolts should have in order to be called a certain nut or bolt. The only way to control or check this relation, however, is through human action.

Boundaries

When dealing with systems we are not only concerned with the elements and relations in the system, but also with the boundaries that delineate the system. These boundaries make a bundle of elements and relations into a whole and are used to decide whether a certain element could be considered part of the system or not. In the literature, we can find several attempts to define a method for delineation. We will focus on two boundary conditions as used within Systems Engineering practice: 'being essential for the functioning of the system' and 'being open for design'.

The first condition does not imply that there is something like the 'system function'. Different persons looking at the system will all see a different system function. Looking at individual elements, however, it is to a certain extent

possible to agree on their sub-function in the system.

Systems engineers use the second condition to exclude social elements, like legislation, from their systems. To them, these elements are not considered open for design. This position is only tenable from a strictly engineering point of view. If we consider all human-made constructs as being designed, we cannot exclude, for example, legislation based on this condition. Legislation is human-made and therefore designed. By considering social elements open for design, we have to stretch the meaning of design beyond the one entertained in the engineering disciplines and include other disciplines in the system design, since the design of social elements is different from the design of technical elements.

We are aware that this still does not give us a method to delineate the system sharply. Therefore, it is essential in system analyses and delineation to place the system in its context and to describe not only the system, but also its environment.

6.4 Concluding the exposé of the socio-technical framework

Based on the inclusion of elements with intentionality and social elements, we came up with a list of four relations. We also introduced 'being essential for the functioning of the system' and 'open for design' as bounding arguments for the constituents of the system.

Questions arising with regard to the conceptual framework introduced here are as follows:

- Is the list of constituents sufficient and exhaustive to deal with the cadastral system?
 - Are the characterisations of the elements useful and meaningful?
 - Are the boundary conditions for the system useful and meaningful?
- And related to that, the question:
- What is open for design and what is design?

The cadastral system as a socio-technical system

Rather than simply filling in the above-sketched framework, we will take the cadastral system as given and analyse it conceptually, not limiting ourselves upfront to the given elements, relations and boundary conditions. Starting from this analysis we will look at the constituents of the system and their relation to the socio-technical framework.

Cadastral systems in literature

Cadastral systems are addressed in the literature from various perspectives. The oldest strand is the teaching material of largely national scope prepared

for university education of the custodians of the cadastre. As developing countries with donor assistance wanted to increase their economic performance, a new strand of literature emerged, aiming at the introduction of Western institutions in these countries (Feder, 1988; quoted in several textbooks; publications of the FIG, the International Federation of Surveyors; Deininger, 2003).

In recent years, the outcome of field studies has informed this development process (De Soto, 2000; Janvry *et al.*, 2001). A further strand focuses on applications of the technology for mapping (including remote sensing and GPS, global positioning systems) and for computing (GIS, geographical information systems), as well as the corresponding standardisation efforts, e.g. in terms of the ISO 191xx family of standards, and specifically the proposal for a Core Cadastral Model (Lemmen, 2003). Finally, a more analytical approach to cadastral systems is taken (Frank, 1996; Stubkjær, 1999; Bittner, 2001; Navratil, 2002; Silva & Stubkjær, 2002; Zevenbergen, 2002; Silva, 2005). The present paper relates to the latter effort.

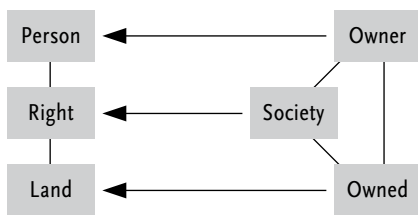
Conceptual analysis of cadastral systems

Cadastral systems deal with ownership of real property. For ownership we need something that can be owned, we need an owner and we need a context in which the idea of ownership is accepted, usually a society.

Both 'who can be an owner' and 'what can be owned' are defined by law. While these concepts might fluctuate and are subject to change (Ottens, 2004), the complete construct of ownership – not just *what* and *who*, but also *how it can be owned* – is even more intricate. Ownership can only exist if it is acknowledged and properly enforced within a society. Enforcement always included the use of brute force, but nowadays basic norms require this force to be executed according to the law and minimised through government. The efficacy of a cadastral system depends on its embedding in this societal context. Without properly working judicial and law enforcement systems, the cadastral system is bound to fail, even if the legal texts are perfect. Experiments with implementing cadastral systems in developing countries prove this assumption. If we, for example, design a system with a perfect legislation on paper and all necessary technology in place and try to implement it in a country where people do not trust the government, because the government itself does not live up to its own rules, the system does not function as intended. A cadastral system thus needs a society in which formal ownership is accepted and embedded.

The models presented by Lemmen *et al.* (2003), Oosterom *et al.* (2004) and Kaufmann and Steudler (1998; 2004) conceive of the cadastral system as based on a relation between a person and land through rights, either taking the person or the land as the starting point (see Figure 6.3). A model for the cadastral system that deals with rights without reference to a society, which sup-

Figure 6.3 The threefold relation related to the owner-right-owned relation



ports the right, might be useful as a descriptive model, but it seems too restrictive to be a prescriptive model for the implementation of cadastral systems in a society without trustworthy judicial and law enforcement systems.

These models would work if people were bound to legal laws in the same way that matter is bound to the laws of nature. There is, however, a fundamental difference between social elements and technical elements, as we argued before. We cannot defy the laws of nature, but we can defy laws of a legal nature. For a cadastral system to function properly, we argue, it takes more than a good technical system and a good legal framework. Here we adopt Zevenbergen's ideas on trustworthiness (2002). The system has to be trustworthy, otherwise it will not work, and since the system needs to be enforced by judicial and law enforcement systems, we not only need to trust the cadastral system itself, we need to trust the government as a whole. Here we enter a vicious circle: people will only trust a system if it works and the system only works if people trust it. We will address this problem later.

We focus on the constituents we think necessary for the functioning of the cadastral system and take a threefold relation between owner, owned and society as a conceptual basis for this system (see Figure 6.3). This implies that we will look at the societal embedding of the system as well.

6.5 The socio-technical cadastral system

In the following section, we address the cadastral system on two levels: first, we list all cadastral elements, and then we classify these elements at the level of the socio-technical framework, either fitting them into the framework or suggesting changes to the framework.

6.5.1 Actors

If we consider how actors are conceived in system theories, we find two extremes with regard to intentionality. In certain social theories the actor is seen as having intentionality, and in the engineering sciences the intentionality of the actor is not taken into account; the beliefs and desires of the actors are taken to be solely cooperative to the system as designed by the engineer. The actors are seen only as fulfilling a technical sub-function in the system, like operators of machines. Similarly, in economic sciences, neoclassical economics views the actor as highly rational and having intentionality, but it assumes the actor's desires are always to maximise the actor's own utility. Following up on the two extremes, we can think of a subdivision within the actor element, namely between actors who can be automated (like operators), and

actors who cannot be automated (like users). We will come back to this distinction in actors later, using the term roles.

In discussing the actors in the cadastral system, we came up with the following list:

- owners and other end-users;
- companies (professionals: surveyors, lawyers; financial institutions: banks; computing: software vendors and service providers);
- authorities (government, judiciary (and police); municipalities; government and municipal officers);
- schools (universities, etc.);
- groups (squatters, social movements).

This list introduces actors of quite a diverse character, raising several questions about the actor element and the introduced distinctions within this element.

In the theoretical account on the framework, we included groups as actors. The reason for this is that legal groups can act in a legal sense and can be held responsible for their acts to a certain extent. From a certain philosophical standpoint, however, groups cannot be categorised as being intentional, since intentionality is directly linked to a mind (Stanford & Routledge Encyclopaedias of Philosophy) and groups and organisations do not have minds of their own. Including them would defy our intentionality argument. Others, however, state that there is such a thing as collective intentionality, even though it is still located in individual minds (Searle, 1995). As a historical fact, groups of people have indeed acted with shared intentionality, e.g. through deliberations within associations and social movements. Furthermore, organisations are designed to bring about sufficient shared intentionality among their members to achieve stated objectives. These objectives and the strategies implemented in order to reach them can be ascribed to the organisations, therewith suggesting a form of desires of the organisations as such. Following this pragmatic line of reasoning we consider organisations and, as appropriate, organisational units as a subcategory of the actor element.

If we look at the list of actors presented above we have to conclude that a strict distinction between actors that can or cannot be automated is not sustainable. For professionals performing complicated (unique) cases, like researchers at universities, the unexpected is part of their work. They cannot be automated⁴.

Through further analysis of the cadastral system, we realised that besides

⁴ Bjørn Jespersen (Department of Philosophy, TU Delft) suggested that intentionality might contribute to the robustness and flexibility of a system, instead of being considered by some engineers as only a cause of failure or instability. The freedom of professionals to disregard rules when acting in an emergency might contribute to the functioning of the system.

discerning between individual actors and organisations, we also have to deal with groups without a formal status. Native inhabitants (indigenous people) form such groups. Squatters in an area or a building are sometimes treated as a group. This brings us to a subdivision of formal groups (companies, governmental units, schools, etc.) and informal (non-institutionalised) groups. Informal groups may have rights and their importance and influence is sometimes unclear, yet it can be substantial. It is, however, unclear whether these informal groups can be seen as actors like the individuals and formal groups.

We consider groups and individuals as actors in the system, while we discern between formal actors, both groups and individuals (in their roles as professionals), and informal actors, again both groups and individuals (like (ab)users). The formal-informal distinction may be used to further characterise the processes performed by the diverse types of actors, and will be used in the subsequent Section on social elements as well. It is used in favour of the distinction between being a candidate for automation and not being a candidate for automation introduced before.

6.5.2 Social elements

‘Social element’ is a rather vague term; we use it as a catch-all term for elements whose functioning is not dependent on the laws of nature. In our analyses, we will assume for now that social elements are rule-like elements, for example in governing or directing the behaviour of individuals or rules for identifying a group of individuals as being a particular organisation, or technical norms. In discussing the cadastral system, we came up with several rule-like constituents we consider essential for the functioning of the system:

- procedures;
- legislation (e.g. stating rights);
- standards;
- statutes;
- study programmes;
- rituals;
- customary law;
- norms/values (trust);
- socialisation.

In Section 2.4 concerning the boundaries of socio-technical systems, we proposed ‘being open for design’ as a possible boundary condition for the system. If we look at the above list of elements we can probably stretch the notion of design to include legislation and other more institutionalised social elements, but it seems rather impossible to place customary law and rituals within this boundary. Nevertheless, the cadastral system is influenced by and may even depend on these non-designable notions. If, for example, trust in society is es-

Table 6.3 Formal and informal social elements

| Formal | Informal |
|---|-----------------------------|
| Technical norms | Social norms/values (trust) |
| Legislation (establishing rights and obligations) | Customary law |
| Standards (of technical nature) | Tacit knowledge |
| Statutes (of organisation, etc.) | |
| Study programmes | Socialisation |
| Procedures | Rituals |

Source: Ottens, 2005 (modified)

essential for the functioning of the cadastral system, it is not an option to simply ignore this. In the actor analysis above we encountered similar, non-designable, elements (e.g. groups of squatters) that could influence the functioning of the system to a notable degree. We will use the same subdivision in formal and informal elements as coined in the actor analysis to gain more clarity (see Table 6.3).

While the elements in the informal category are not considered designable, they exist and do come about somehow. Instead of being consciously designed they emerge or evolve. To deal better with social elements we must drop ‘open for design’ and look for another boundary condition.

Another question arising here concerns knowledge. We find this explicit under tacit knowledge, but it can be found in other social elements as well. Knowledge links to actors in, for example, schools creating/teaching knowledge, and to information as mentioned under technical elements. We will postpone the matter of dealing with knowledge and its associated processes and elements to the discussion Section.

6.5.3 Technical elements

The list of technical elements arising in our analysis proved more challenging than we had anticipated because the categorisation of some elements here was not obvious, as we shall see:

- satellites;
- computers and networks;
- coordinate measuring devices;
- databases with, for example, coordinates, archives; documents and maps;
- markers (of legal boundary, of geodetic network, as well as road sign posts and house number plates).

If we now investigate whether the functioning of all these elements is dependent on the laws of nature, we find that for some elements it is not even clear what their functioning is. One of these problematic elements is the information in the system. Documents, coordinates, etc. might *have* a function, but *do* they function as well? What is the status of the data in the databases or in the system in general? Other problematic elements are the symbols or signs used in the system, such as boundary marks and boundaries drawn on maps. We classified these elements under technical elements because of their

not-rule-like character and their link to technical language as opposed to the more social language of legislation. Although symbols and signs have a function, their functioning is not obviously dependent on the laws of nature. A boundary on a map does function because we recognise it as such, as does a boundary mark in the field, which also requires actors to respect it. The functionality of the boundary mark can be seen as somehow related to the laws of nature: a boundary mark in its material appearance does use gravity to stay in position and therefore to some extent does depend on the laws of nature for its functioning. A similar (relative) permanence of matter can be found regarding text and its appearance in documents. Because of this permanence, and our ability to make sense of the text, we take the recordings as trustworthy testimonies of past agreements and decisions.

The problems with these constituents originate in the assumption that social elements are rule-like elements. This intuitive assumption is in conflict with the 'functioning dependent on laws of nature' separation and will now be disregarded. We do, however, encounter another problem here, which was touched on above as well: the problem of how to classify knowledge or meaning. The essential function of symbols, signs, documents etc. cannot be described without reference to their meaning. To understand what we mean we need to refer to language and more specifically to domain language (see here also 'object language' (Bucciarelli, 1994)). In order to understand the meaning of documents and symbols, one has to refer to this object language, the domain-specific language. Language should be filed under the social elements, even though it might be called a technical (sub)language (Grishman & Kittredge, 1986; Sabou *et al.*, 2005).

6.5.4 Relations

In our analysis we focus mainly on elements and to a lesser extent on relations. Nevertheless we try to understand how the different elements relate, what relations are possible and what might be useful to take into account in the socio-technical framework. Referring to the boundary conditions, we argue that the relations should contribute to the understanding of the functioning of the system, or possibly even to the description of this functioning. The introduced relations do so. Furthermore it is meaningful to talk about intentional and normative relations separately from functional and physical relations, because even while they might be part of the functional processes in the system, they can be seen as conceptually different and they highlight the fundamental distinction between the several elements.

In the above analysis of the elements we ran into the problematic terms 'knowledge' and 'meaning'. Introducing a new relation can help us fit these terms into the framework. When we, as actors, encounter a symbol that tells us to stop, we can act intentionally upon this symbol. The symbol is backed

up by an act, which relates normatively to us through enforcement and we relate intentionally to the symbol. However, before we can do so we need to recognise the symbol, we need to know what it means. Therefore it seems useful to introduce a relation that describes this attribution of meaning to an element. We now propose the introduction of a semiotic relation to relate the actor to the meaning of the object. This relation might be useful in talking about knowledge as well; data or information becomes knowledge if actors recognise it as such and understand what it means.

6.5.5 Boundaries

In Section 2.4, we introduced a set of boundary conditions. In the above analysis, we tried to look at the constituents while ignoring these conditions in order to assess how useful and meaningful it is to distinguish specific constituents. Now we will reconsider the boundary conditions.

The first condition we proposed, ‘being essential for the functioning of the system’, seems a tenable and useful condition. If the goal of the socio-technical framework is to understand socio-technical systems, focusing on the constituents that are in one way or another essential for their functioning seems particularly useful. However, a societal embedding is essential for the system to function and one can argue that everything in a society is in some sense essential for the functioning of that society; this condition alone is not sufficient. Based on an intuitive approach towards this condition, a gross classification can be made of the elements in and outside what is the system of interest, but more is needed.

The second condition, ‘being open for design’, is more problematic. By including this boundary condition we seem to focus on engineering approaches towards systems. This, however, is not the case. Although the developed framework is embedded in the research project of a University of Technology, which is focused on engineering practices, we do not aim to use engineering approaches (or so-called social engineering) for the ‘design’ of social elements. We are mainly interested in the questions of what these systems are and how they come about.

We took the term ‘design’ as a starting point for the discussion and, following the above analysis, the use of the term design as used by engineers seems untenable. In the theoretical Section we already stretched the term design to include all intentionally created artefacts. Simply excluding elements from the analysis or modelling that are essential for functioning, but not open for design, will not improve modelling. This analysis shows informal social elements that are not open for design (at least not in the sense formal social elements are and certainly not in the sense technical elements are), but which have a notable impact on the system. If, then, these elements or externalities are not in place, an effort to design the system without considering this fact

will most likely run into problems.

Reports under the heading of technological fix, technological shortcut, and social engineering convey mixed experiences. The fate of land titling (cadastral) development projects (Holstein, 1996) tends to confirm this reservation. It was posited above that the formal-informal distinction be related to intentionality in the way that formal social elements are designed, while informal elements emerge through processes that are not controlled. Perhaps the main cause of the mixed outcome of development projects is that the impact of informal elements was grossly underestimated.

If the informal elements are not open for design, two roads may be taken to adjust the framework to deal more adequately with these existing 'externalities'. We can focus on the external influences on the system. In order to build the system, we need to know about its externalities and how they relate to the system. Since the (socio-technical) system is a relative notion, it is not only important what is in the system and what its constituents are, but also what is outside the system and how this so-called context is related to the system, to frame the relativity of the notion. We can also change the boundary conditions to include what is open to change through human action. This way we can include the informal elements in the system, while still excluding, for example, the laws of nature, because they cannot be changed through human action. What potentially can be changed are the conditions in which we make use of the laws of nature, e.g. through experiments, as well as social constructs like institutions. The formal-informal distinction becomes more important this way, since it introduces a degree of possibility to change. The change process of both formal and informal elements is complicated by the fact that the norm for behaviour of the actors is what has to be changed. This implies more often than not that parties in the change process first have to accept new restrictions on their behaviour and next have to confirm their commitments in practice.

Our conceptualisation of the social elements brings informal elements into focus. Here also, the notion of an institution, as coined by Douglass C North, comes to mind: "Institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behaviour, conventions, and self imposed codes of conduct), and their enforcement characteristics" (North, 1993). This concept of institution seems to fit very well with the abovementioned social elements of the cadastral system.

6.6 Discussion

In this last section we will discuss the questions raised in the analysis and come to some concluding remarks.

Trust

How can we describe the concept of *trust* in the cadastral system? Trust is related to behaviour; certain formal social elements such as procedures to govern trustworthy behaviour are designed. Informal social elements, on the other hand, are not designed but analysed to be able to better design formal elements. In the cadastral setting, a person's trust in another person or in a government service depends on the behaviour of the other: will they perform a specific action that corresponds to the expectation of the trusting person? In more refined terms, trust emerges where "the trustor expects to be intentionally gratified by the trustee's action ... The trustor's expectation of the trustee's 'acting with goodwill' towards him is the central belief of the trustor involved in rational trust" (Meggle, 2001). The intention of the trustee is informal. It cannot be designed, but it is possible to influence it, for example, through basic and professional education and through sanctions. And it may be analysed, e.g. through interviews.

The interpersonal trust is influenced by the setting of the exchange, e.g. whether a witness is present. This setting, for the most part, may be designed. This designing includes the practice of creating associations and organisations, in addition to Parliament-related processes, and includes instruments of conflict recognition and resolution other than the informal use of brute force. This should definitively not be restricted to the formalised domain, but should include whoever is affected by the changed norms. The position thus taken allows us to address questions of trust.

Trust builds on regularity. Our laws of physics are also built upon regularity, but in a different sense: we have no choice but to obey the laws of nature, while the regularity needed for trust is a choice. Trust relates exclusively to the social domain; it is a quality of the relation between two actors, one trusting the other. Actors may be formal or informal groups. Trust is eventually a relation between two individuals representing the groups, e.g. a chairperson and a spokesperson, or a citizen and a government officer. Within the cadastral domain, trust may depend on the availability of the government officer, and on the transparency and consistency of institutions. Standards which favour certain actors over others in obscure ways leave little room for trust. It is possible to research the extent of trust. Such research is advisable in development projects where citizens' trust in the government is not demonstrated in action.

The 'only trust if it works' and 'only works if it is trusted' cycle may be broken by reference to research conducted by Hernando de Soto (2000), who demonstrates that trust exists in sufficient measure to make local, informal markets in real property work. Trust depends on shared values and the intention and, to some degree, the ability to behave according to those values. Thus, the challenge seems to be to find collective routines and values of local origin and then find ways to extend the shared values and mutual trust following from this to members of a wider collective.

Domain language

Is it necessary to include *domain language* as a social element in the socio-technical framework? One might worry about bringing such a large and complex field of study as *language* into the conceptual framework. Including language in the system leads to the use of language to describe the functioning of language, which is what the conceptual framework is about. We might end up in a circular argument, which will not provide much benefit. However, precisely because of the functional boundary criterion, which we introduced in Section 6.2 on the socio-technical system, we need to include a form of language in the system, otherwise we cannot describe the functioning of certain elements of the cadastral system like symbols. Incorporating the complete field of language seems intuitively too much. However, the inclusion of a subset of domain language, e.g. technical terminology, might help significantly in understanding the functioning of the system.

Furthermore, recent research interest in domain ontologies may be interpreted as an effort towards the consolidation of domain terminology and domain knowledge into a consistent system (cf. Sabou et al., 2005). Focusing on the mentioned endeavours, as well as the functional aspects of communication (Jakobson, 1960), the inclusion of domain language as a social element within the socio-technical system seems defensible.

Knowledge

Is it necessary to include *knowledge* as a social element in the socio-technical framework? While some of the informal social elements are already rather vague in their conceptualisation, knowledge is an even more vague notion. A widely used distinction is the distinction between explicable knowledge and tacit knowledge. The first connects to the concept of data or information, however a random bunch of data is not knowledge. Before being qualified as knowledge it needs to be recognised as information and valued. This knowledge is knowledge that can be written down or be explicated in any other form. The second form of knowledge is often associated with skills. This kind of knowledge is not explicable and has to be learned through practice, like cycling or swimming.

Both types of knowledge are essential for the functioning of almost any system. The formal elements in the analysis are tied more to explicit or explicable knowledge, while tacit knowledge seems to have more ties with the informal elements. To change these elements therefore requires a different approach than changes to the formal elements.

Rather than as elements both types of knowledge can be seen as attributes of actors, like preferences or resources. So far we have refrained from introducing attributes and refer to possible relations to cover these concepts, like an intentional relation concerning preferences and a semiotic relation for knowledge.

Institution

Is the suggested notion of *institution* and accompanying concepts adequate for wider use in the socio-technical framework? The concept of an institution as used by North has similarities to the social element as defined in this paper. It seems useful to look more closely at this concept and the body of knowledge existing in this field, so as to further enhance the socio-technical framework. The main distinction, however, is that North's institution is an overarching concept containing both formal and informal elements, while social elements can be both the overarching concept and the formal or informal elements separately. Social element as used here is much more widely applicable. The term institution is, besides North's definition, subject to many interpretations. North includes rules and organisations, but others (cf. Dodder et al., 2004) refer almost exclusively to the organisational side. North's interpretation refers to both the formal and informal elements as 'humanly devised', which might be a good alternative for 'designed' in the boundary conditions. The analysis of the term institution shows similarities with our analysis of the social element. Since, however, the term institution is much more laden we refrain from using it and stick to social element.

Data, processes

What is the status of *data* in the socio-technical framework? To be able to deal with data we propose an adaptation to the framework, namely to include dynamic aspects in the socio-technical framework. In Section 6.2 we briefly discussed synchronic and diachronic systems, the first referring to the static structure and the second to the dynamics. During the analysis we found that the latter distinction, seeing synchronic as solely static and diachronic as solely dynamic, is not tenable. To be able to understand the functioning of the synchronic system, that is, the system at a certain moment in time, we need to take processes that keep the system running into account as well. These processes may be seen as part of the synchronic system view (the system structure), while other dynamics change the structure of the system over time. The distinction between synchronic and diachronic is thus better rephrased as, on the one hand, static elements and processes (dynamics) *within* the system and, on the other hand, the dynamics (changes, evolvment) *of* the system.

To learn more about the dynamic aspects within socio-technical systems, we have to focus on the processes in the system. These processes involve for the most part the exchange of data between elements, which can be seen as a way the elements are related. It seems fruitful to focus on the relations in the system in order to study the processes. Data flow through the system and assist in relating elements functionally. Next to data, matter and energy flow through the system. There is extensive literature on modelling flows in systems that might be of assistance. Magee and de Weck (2004) introduced

a classification of processes involving matter, energy, information and value. This classification focuses on the processes in the system and adds value to the previously introduced flows. The reasoned introduction of values is highly interesting, as we have so far considered the intentions of actors without reflecting the value of intentions from a community or system functioning point of view. System dynamics on the other hand focuses exclusively on the flows in the system and uses models to emulate systems and their behaviour. This adaptation requires more in-depth research into system dynamics and a further development of the terminology involved. This, however, is beyond the scope of this paper.

6.7 Conclusion

Our discussions and analysis gave us valuable insights into both the socio-technical framework and the cadastral system. We will summarise here briefly some of the most important points related to the twofold objective of this paper: to use the concept of the socio-technical system to gain more understanding of the cadastral system, and to gain more insight into the concept of a socio-technical system itself by studying the cadastral system.

With regard to the cadastral system we came up with the following remarks:

- We outlined the elements in the cadastral system that are essential for its functioning and we pointed out the problem with informal elements, since they are not 'open to design', yet they are essential for functioning. This is borne out by empirical findings.
- The distinction between social and technical elements seems a useful one to get a better grip on the problems of 'designing' cadastral systems. We emphasised the more fluid character of the social elements and their embeddedness in larger informal social structures on which they depend for their functioning, although not in the same way as technical elements depend on the laws of nature.
- Real-life systems are always more messy than abstract models, so it was not unexpected that we encountered several problems in relating the constituents of the cadastral system to the theory. The conceptual framework of socio-technical systems, which we introduced in the theoretical section, turned out to have some shortcomings.
- In the framework there was no way to deal adequately with meaning. Because of this, we ran into problems when we discussed knowledge, and symbols and signs (an essential part of cadastral systems). We proposed that a new conceptual relation be added to account for this: a semiotic relation.
- Another main point that emerged from this analysis was the suggestion to change the framework to be able to deal better with the dynamic aspects of

the system. We found it essential to give explicit attention both to processes of change within the system, as well as to the dynamics of the system. It is simply impossible to understand the functioning of a system solely on the basis of its static structure. The processes that keep the system running have to be considered aside from changes in the system's structure. In fact, the latter change is often what motivates an engineering effort.

- Furthermore, from the boundary criteria in the initial framework, 'open to design' and 'being essential for the functioning of the system', the latter seems to be a tenable and useful, but in itself insufficient, condition. The analysis suggests a distinction between formal and informal social elements, where only the formal elements may be bounded by the 'open to design' criterion, while the informal elements are tentatively bounded by a 'being open to change through human action' criterion. The analysis also pointed to the need to systematically address the context or environment of the system.
- Finally, the exercise has pointed to the benefit of relating the framework to several existing theories and ideas on complex systems, e.g. Magee and de Weck's (2004) classification of processes involving matter, energy, information and value. The approach taken in this paper also appears to have similarities with North's theory of social institutions. In further research these links will be explored in more detail.

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7 Real property transactions

An approach towards standardisation of legal issues

Jesper M. Paasch

Abstract

Applying standardised, terminological methods to legal issues is a means of structuring parts of the cadastral domain. A structured approach focusing on the classification of real property rights and restrictions is a contribution towards improving the common understanding of the legal issues when dealing with real property transactions. A model classifying real property rights and restrictions might be a way of bringing logic to a complicated legal field, influenced by historical and cultural traditions. A standardised approach makes it possible to classify, for example, existing real property rights and restrictions and place them in a terminological framework. A better understanding of the rights and restrictions limiting or benefiting ownership of real property is a way to further real property transactions.

7.1 Introduction

This paper is a contribution to the ongoing research on modelling real property transactions. The aim is to discuss a hypothesis, describing an approach for standardisation¹ of legal issues concerning real property transactions.

Real property transactions can be both time consuming and expensive – depending on the amount of work involved in identifying and executing all elements involved in the transfer². A standardised approach aiming at creating a model for classification of real property rights and restrictions might therefore be a contribution to the ongoing research.

In recent years there have been a number of publications regarding the harmonisation, unification and methodology of law³. However, the internationalisation of law is an old dream, including visions of legal integration and even unification of legal systems, which has resulted in numerous publications spanning more than two centuries describing the nature and content of law and problems regarding the harmonisation and unification of different legal systems.

¹ It might correctly be argued that the term standardisation traditionally belongs to the technical/industrial domain in regard to the standardisation of technical products and specifications. However, the aim of any standardised process is to create an improved exchange and service through a common structure and framework for the handling and exchange of information and goods. Standardisation is in this paper used as a general term which refers to the efforts towards better understanding and description of the legal domain.

² See Stubkjær (2003) for an introduction to real property transactions.

³ See Hoecke (2004), Hoecke & Ost (2000) and Zweigert & Kötz (1998) for an introduction to the methodological problems concerning harmonisation, unification and classification of law.

However, the different opinions put forth by legal scholars concerning the epistemology and methodology of comparative law and harmonisation of law are considered outside the scope of this paper. The approach taken here analyses the theoretical aspects of modelling formal real property rights and restrictions. It focuses on the concept of ownership, thus producing a classification of rights and restrictions associated with real property, previously published by this author (Paasch, 2005a).

In recent years, a number of projects and other initiatives have been launched to increase our understanding of real property rights and restrictions and other aspects of the cadastral domain. In the author's opinion, three initiatives deserve an introduction because they contribute to an increased understanding of real property rights and restrictions and are connected to the research presented in this paper. The initiatives are described below.

One attempt to increase the common understanding of the cadastral domain, including real property rights and restrictions, is the EULIS⁴ initiative, which provides a facility for accessing online and updated information about land across European borders, focusing on mortgaging and conveying of real property, in order to improve opportunities for cross-border activities and also to compare national practices (Laarakker & Gustafsson, 2004). EULIS is an important contribution in spreading knowledge of national real property domains to interested parties in Europe. However, the initiative does not provide a fully standardised description of the information concerned, even if the information is described in a uniform way, making comparison easier for the user.

Another attempt to describe legal issues were the guidelines produced by the UNECE⁵ concerning real property units and identifiers (UN, 2004), aimed at supporting effective national land administration and land management. The guidelines are a contribution to the harmonisation of information. The guidelines include a survey of existing real property rights encountered in 18 countries in Europe, illustrating the existing diversity of real property rights encountered in a number of European countries. The guidelines are an important contribution to furthering an improved understanding of other nations' real property legislation and to facilitate international cooperation in land administration.

A third attempt to further an international understanding of other nations' real property legislation is the construction of a standardised core cadastral model (CCDM) (Oosterom et al., 2006). The model aims at creating a common understanding of the structure of a (multipurpose) cadastre, as a basis for creating cross-border information services, where semantics have to be shared

⁴ European Land Information Service. See www.eulis.org and Ploeger & Loenen (2004).

⁵ United Nations Economic Commission for Europe.

between countries in order to enable translations of real property terms. However, even if the CCDM is a step in the right direction, it is this author's opinion that the model does not focus enough on the problems concerning the establishing of a common terminology in the domain.

The EULIS service, the UNECE guidelines and the development of the CCDM are steps towards a better understanding of the legal issues of cross-border real property transfer and increasing our understanding of the cadastral domain.

Even if the initiatives mentioned above are examples of the ongoing activities in researching and structuring the cadastral domain, the problems concerning the terminology and semantics encountered in the cadastral domain need to be researched in more detail as part of the procedure to ensure the correctness of legal aspects of real property transactions. In recent years there has been an increase in research in cadastral modelling and legal and administrative issues⁶, but there is still a need for research, e.g. focusing on the rather broad collection of real property rights and restrictions influencing the use of real property.

Real property rights and restrictions often relate to physical objects on the ground, e.g. the right to use a specific well or road. Nevertheless, they are the result of legal, political and historical processes and the rules for their implementation are given in parts of a nation's legislation. They are therefore part of the legal domain.

7.2 The legal domain

The legal domain can be described as a collection of formalised rules, regulations or court decisions accepted by society, and it is a standardised way of instructing groups and individuals how to behave in specific areas, e.g. how to behave in traffic, or how and when to pay taxes or what rights or restrictions may influence ownership of real property.

The legal domain is, in other words, an instrument for furthering the standardisation of social behaviour in an organised society. In any large group, general rules and principles must be the main instrument of social control, and not particular directions given to each individual separately (Hart, 1961). It might not be entirely correct to talk about one, single legal domain throughout the world. Europe, for example, has several legal traditions which are the result of European history and cultural development. The legal domain can be seen as a collection of different sub-domains, e.g. the cadastral domain.

⁶ Examples of contributions to the research topic are Oosterom *et al.* (2006), Paasch (2005b), Mattsson (2003; 2004), Stubkjær (2004), and Zevenbergen (2004a; 2004b).

These sub-domains cover specific objects and activities, but the structure and delineation of the sub-domains depend on the different legal systems applied throughout the world at different periods in history. These different legal systems can be arranged in 'legal families' depending on their origin and content, e.g. Roman law traditions, German law traditions or Common Law traditions. Examples are the Romanistic legal family, the Germanic legal family and the Anglo-American legal family (Zweigert & Kötz, 1998)⁷.

However, the fact that legal systems can be classified into legal families does not mean that they are static. They are the result of culture, history and other developments in society that influence legal thinking. They are dynamic and part of a constant process of development, taking influences from human and non-human activities in history. The way we act today may be different from the way we acted yesterday and will most likely be different from the way we will act tomorrow, resulting in the constant development and evolution of rules.

Problems concerning legal terminology and semantics are however not limited to the cadastral domain, but exist in the legal domain in general. Legislation is a complex body, but it can nevertheless be described in a standardised way. Blackwell (2000) illustrates this by applying object-orientated analysis and design to legislation. In *Finally Adding Method to the Madness* he states that:

"Once the problem domain has been adequately described, the object-oriented legislative drafter can move into the design phase of the drafting project. In creating a logical solution to the problem based upon the results of the analysis phase, the drafter will begin to create interaction diagrams that illustrate how objects in the resulting statute will interact to fulfill the requirements of the problem domain" (Blackwell, 2000, p. 283-284).

In order to be able to create clearly illustrated interaction diagrams, the objects illustrated in these diagrams have to be properly described. Without any description using words which all involved parties can understand, any attempt to create interaction between the parties involved is doomed to failure. As stated by Hart (1961, p. 123), rules involve recognition or classifying of particular cases as instances of general terms. Without the use of recognised words and meanings any rule or court decision would be difficult, or even impossible, to follow.

⁷ The classification of legal 'families' can be done in a number of different ways, depending on the purpose of the classification. For example, a classification could also be made according to how many people are governed by a certain type of legal system or according to when legal systems are created, etc.

7.3 Terminology

Every standardised approach must be based on agreements and every agreement must be based upon defined terms and conditions. A standard consists of descriptions, including definitions which can be described as statements illustrating the essential properties of the things to which a given concept applies to. It might be needless to say that any successful communication requires a language that is based on common concepts and that the very description of an object must be based on communication between the parties involved.

In recent years, scientific attention has been dedicated to the field of comparative law and artificial intelligence⁸. Any comparison of legal systems must include a study of to what extent the words used in the legal systems bear the same meaning (Hoecke, 2004; p. 175). Hoecke also states that “in order to understand technical words in legal language, one needs an insight into the rules covering the concept and the actual reality it covers, which may be rather broad”. Without a proper understanding of the meaning of a word such as ‘easement’ or ‘servitude’⁹, we cannot exchange any information between legal systems since we cannot be sure that the information is understood correctly by the receiver.

The terminological difficulties regarding the description of objects must not be underestimated. A thorough definition of any term used to describe something is of vital importance for their correct understanding by the persons (or computer systems) involved in the information exchange. A good definition must therefore contain words and meanings which are not to be misunderstood. However, words and meanings can easily be misunderstood. Ambiguity of words makes it difficult to express precisely what is meant, which might create grounds for misunderstanding. The aim of producing definitions is therefore to produce statements which are as correct and precise as possible.

However, constructing definitions is especially difficult when it comes to defining specific terms usually used in a broader context. Firstly, a person may know the meaning of a word and know its use in many situations, without knowing the present best criteria for the application of the word; secondly, a person may know the meaning of a word and not be able to apply it correctly, and thirdly, a person might even know the meaning of a word and apply it correctly in one domain, but be unaware of the fact that it is used in a different way in another domain. Taking these factors into considera-

⁸ See Hoecke (2004) and Hoecke & Ost (2000) for contributions to the harmonisation of private law and epistemology and methodology of comparative law and Susskind (1989) & Wahlgren (1992) for an introduction to the legal aspects of artificial intelligence.

⁹ Hoecke (2004; p.174) gives an example stating that ‘easement’ comes close to ‘servitude’, but is not the same.

tion shows that the importance of defining terms and expressions in order to avoid misunderstandings cannot be underestimated.

7.4 Classification of real property rights and restrictions

The existence of different legal ‘families’ and a multitude of different real property rights and restrictions within these legal ‘families’¹⁰ precludes a supranational terminology describing real property rights and restrictions in all national legislations involved in real property transactions. However, a standardised terminology used for the exchange of information might improve the security of real property transactions. A standardised model might act as a ‘common (legal) language’, i.e. a terminological supranational framework for a selected part of the legal domain, e.g. real property rights and restrictions.

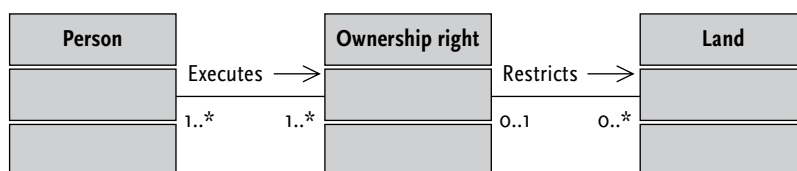
A potential non-national buyer of real property might need to know what limitations there are in the use of a property before buying it, for example. Describing the source of these limitations, i.e. real property rights and restrictions, in relation to physical objects (land) is vital for furthering cost-effective real property transactions.

If all mankind has unlimited access to land, we can talk of *open access*. Open access might effect ecological stress on the land if mankind is allowed to do anything in the name of development and economical or personal gain. There exists hardly any direct connection between subject and object, except for rare cases concerning the open sea¹¹. The connection is most often established through a right. The dominant use of the concept of ownership in legal systems where land is private is the execution through ownership rights. This relationship is what we normally call real property, parcel, freehold, etc. However, defining real property is difficult and it is perhaps for our purpose easiest to say, like Mattsson (2003), that real property is what a national legislation defines as real property. However, to be able to make a theoretical approach, the concept of real property is in this paper used as a combination of the three elements *person*, *ownership right* and *land*. The concept is based on Henssen (1995), who states that land tenure is more than the ‘man-land’ relationship, and can be defined as an institutionalised relationship of people.

It might seem strange that land can theoretically exist without any ownership right executed by a person, illustrated by the 0..1 relationship between

¹⁰ The problem has been noted in the UN guidelines, which mention that the terminology used in land administration differs between countries (UN, 2004).

¹¹ In most areas where land and water have an economic value, national or international restrictions are applied, e.g. in international treaties regulating fishing in economic zones at sea.

Figure 7.1 Model describing a relation between person, ownership right and land

Based on Henssen (1995), Mattsson (2004) and Paasch (2005a, p.123)

Ownership right and Land in Figure 7.1. However, this is because land can be indirectly owned through ownership executed by a real property. It is possible for real property to own land, according to some national legislations, e.g. in Sweden.

The opposite to open access is the right of access to an area or piece of land where the right of ownership or use is regulated. Here we can talk of limited access, in contrast to open access. Fundamentally, a right entitles one or more persons to use the land while others are excluded from doing so: the land is individualised. The access to land can be regulated by means of privately agreed real property rights or officially imposed regulations (Mattsson, 2003; 2004).

The International Federation of Surveyors FIG¹² has produced a vision describing a future cadastral system in 2014. One statement of the vision is that a cadastre will show the complete legal situation of land, including public rights and restrictions¹³. Besides being a formidable task to register, the complete registered legal situation, or selected parts of it, will also have to be exchanged in cross-border transactions, due to the existence of different legal ‘families’. However, if the content of a cadastre or other land administration systems are to be exchanged internationally there need to be tools, terminological or otherwise, to classify the great variety of existing real property rights and restrictions with their roots in the existing patchwork of legal families and traditions throughout the world.

A real property right is a link between the legal owner of the right and the area(s) of land in question. An area of land will nearly always have one or more rights attached to it. Ownership is a very strong right commonly connected with land and is executed by the legal owner, e.g. the government, a company or one or more private individuals, according to the legislation in the country in question. Ownership of real property is, however, what is defined as ownership in a nation’s legal system. In its simplest form, ownership states that a piece of land is owned by a person.

However, it is not the actual piece of land or the resource itself that is owned, but the rights connected to the use of land. These rights can be classified in different ways, for example, according to their influence on real property own-

¹² International Federation of Surveyors; see www.fig.net.

¹³ Kaufman & Steudler (1998; Ch.3.3).

ership. The author has published a hypothesis claiming that it is possible to classify real property rights and restrictions, based on their influence on real property ownership (Paasch, 2005a)¹⁴. The model is briefly described below.

Without a legal basis, it would be very difficult to establish and maintain a cadastre. A cadastre must therefore be as general as possible to be able to function as a core model which is expandable to fit the specific needs of a local cadastre. At the same time, it has to contain the main groups of rights and restrictions related to real property ownership. However, there does not yet exist any agreement as to how these main groups of rights and restrictions should be structured in detail. The CCDM introduced earlier in this paper only describes rights and restrictions on a rather general level.

An important aspect of the model is the abolishing of specific terms like 'servitude' and other legal terms rooted in a nation's legal tradition. They have no place in a standardised legal model functioning as a terminological framework and system of classification. However, national terms should of course remain in use in the national legislations where they are used today. The important aspect is that they are classified according to the common model when used in real property transactions.

The legal relations between person, ownership right and land can be described in a conceptual model, as illustrated in Figure 7.2. The model illustrated in this paper is designed to incorporate the definition of real property used in this paper (i.e. the combination of person, ownership right and land) and also personal property related to ownership (Paasch, 2005a)¹⁵.

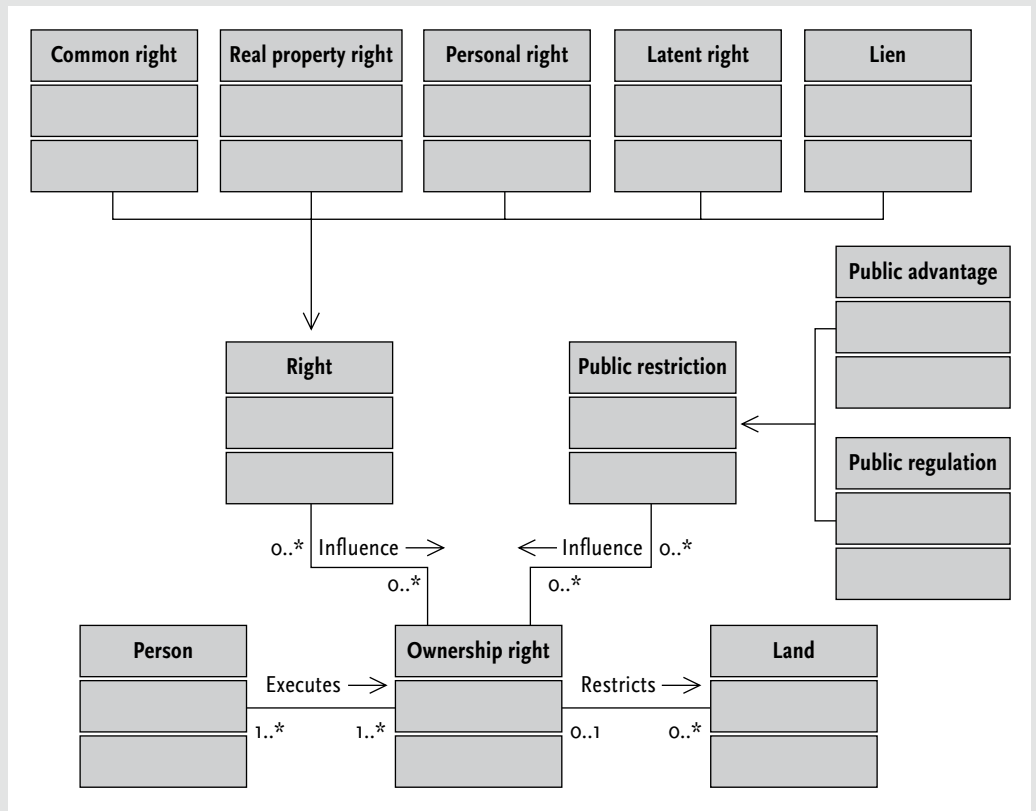
The model excludes the classification of informal/customary rights and restrictions to land, e.g. the concept of adverse possession, where the occupation of land is inconsistent with the rights of the true owner, is not covered by the model. Such rights, however important they might be, are not a part of the formal legal framework in the narrow sense used in this paper. However, the model could be expanded to cover informal types of real property rights in the future.

The model is based on the hypothesis that real property rights and restrictions, regardless of their origin in a specific legal system, can be classified and bundled into a small number of groups, depending on who executes the right or restriction. The model is based on the fact that there are certain 'rules'

¹⁴ See Paasch (2004; 2006) for discussions regarding the modelling of the legal cadastral domain.

¹⁵ The model described in this paper has a slightly different layout to the original model presented in Paasch (2005a). The *Right* class illustrated in this paper was divided into two classes, an *Appurtenant* class and an *Encumbrance* class, for pedagogic reasons. The *Public restriction* class was not present in the original model, because the *Public advantage* and *Public regulation* classes were directly connected to the *Ownership right* class. This was also done for pedagogic reasons. However, the content and relations described in the model described in this paper are the same as in the model presented in Paasch (2005a).

Figure 7.2 Legal cadastral domain model



Based on Paasch, 2005a; 2006

attached to ownership of real property which can be expressed as either beneficial rights or burdens to the ownership. All classes have relations to the Ownership right class, since they are benefiting or limiting the ownership right in some way and thereby, according to the definition used in this paper, regulate the real property as such.

The two major classes influencing ownership are 'Right' and 'Public restriction'. The Right class contains all formal rights being appurtenant or an encumbrance to ownership, i.e. being either beneficial to or burdening a real property. The rights in this class originate from the private law domain. The class is divided into 5 sub-classes, named after the types of right they contain, based on a theoretical classification: Common right, Real property right, Personal right, Latent right and Lien.

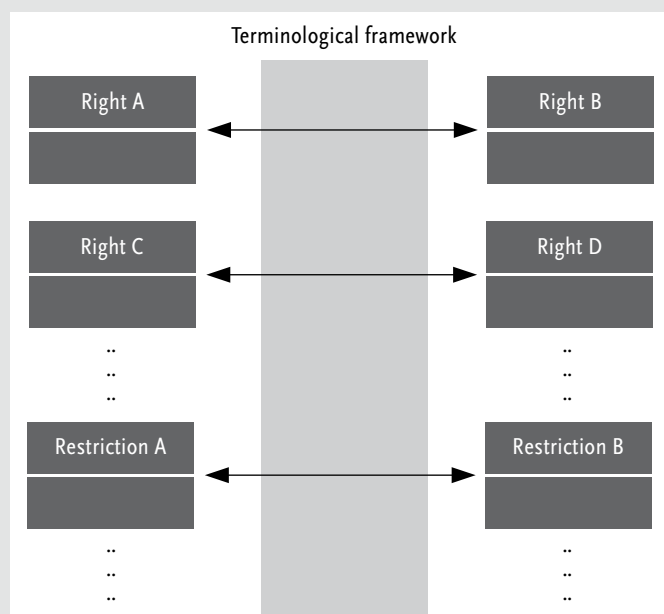
■ A Common right is a right which is executed in a common property unit owned by two or more real properties. Each real property owns a share of the common property unit. The right belongs to the properties, not to the owners of the properties. When one of the properties owning the common property is sold, the right follows the property, not the previous owner. The class does not describe the situation in which several people own a piece of land together.

- A Real property right is a type of right that can benefit or restrict an ownership right. A real property right is a right by which a real property has the right to use another real property. It is a right enjoyed by one real property (the dominant tenement) over another (the servient tenement). Examples include the right of access or for the passage of water or electricity. If the property is sold, the right follows the property, not the previous owner. The right is executed by the owner of the dominating real property. The right can be specified to be located on the whole property, can be localised to a part of a property or it can be unspecified. An example of an unspecified right is the right to drill and use a well on another property, but the geographical location of the future well is not described.
- A Personal right is a right executed by a person, company or organisation, in contrast to the abovementioned real property right, for rent or lease or the right to use the fruits of the land. A personal right can be very strong regarding how it affects the use of a real property. One example is that the right might follow the land as an encumbrance when the property is sold. A personal right can be given to a person, company or organisation on a time-limit basis or for life. Theoretically, a personal right might also be inherited.
- A Latent right is a right which is not yet executed. One example is a pre-emption right for a neighbour's property. Another example is an expropriation situation where the government has given permission for expropriation, but the expropriating party has not fulfilled the procedure by seeking a court decision for taking possession.
- A Lien is equal to security for payment. Lien is an economic/financial right, which can be executed on real property and thereby regulates the ownership. A general example is a mortgage, which is a financial security granted by an owner of a real property to a person, normally a financial institution. The financial institution may ask the court to authorise a forced sale of the property if the mortgage holder does not fulfil the specified financial obligations. A lien might be seen as a latent right, but is in this model described as a separate class. A security for payment might not in an everyday sense be seen as a restriction to ownership. Nevertheless, the right regulates the right to use of the property since one might not be able to sell it or use it for specific purposes without conferring with the holder of the right.

The Public restriction class contains two sub-classes: 'Public advantage' and 'Public regulation'. The classes contain officially imposed advantages and regulations, e.g. planning permissions issued by the local municipality. Public advantage and Public regulation are officially imposed restrictions, e.g. municipal zoning plans regulating the use of a real property. Public advantage and Public regulation are granted by government authorities.

- A public advantage is a potential asset, a positive result of legally imposed burdens. A property might benefit from one or more public advantages. A

Figure 7.3 Principle of a terminological framework allowing the matching of real property rights and restrictions



Based on Paasch, 2006

regulation might, for example, be altered or taken away on one property, e.g. by granting a dispensation, which benefits the property that, when compared with the original regulation, still regulates the neighbouring areas.

- A public regulation is a restriction which is legally imposed by public bodies, e.g. a municipality, on one or more specific properties, e.g. a planning regulation concerning what colour to use when painting buildings in a specific town or area. However, general rules in legislation regulating the ownership right of all existing real properties are not worth covering in this model.

The reason for dividing the Public restriction class into two sub-classes is that most restrictions are an encumbrance to ownership, but some regulations might be an appurtenance to ownership, allowing one to do something on one's property which others might not do on their property.

The classes in the model are a hypothesis, and might be changed or in other ways refined, for example by adding more sub-classes if deemed necessary according to future research. For example, the Personal right class might be refined by adding sub-classes for time-limited personal rights and non-time-limited personal rights.

The establishing of a standardised terminology for the classification of the different rights and restrictions would make it possible to 'match' the different real property rights and restrictions existing in one national legal system with their counterparts existing in another legal system, even if they are not created by the same legal process and have a different terminology. For example, right 'A' could be compared with right 'B', since both rights have the same impact on

ownership, e.g. a *Personal right*. This principle is illustrated in Figure 7.3.

As stated above, the model is a hypothesis and in need of being examined on 'real-life' real property legislations to either be confirmed, corrected or proven wrong. The author is in the process of testing the model on different legislations. So far, the Dutch real property legislation has been examined in detail in a case study. The study revealed the following:

[T]hat there are great similarities with the Dutch rights and restrictions and the theoretical model. Even if the rights as such can be classified into certain categories, it is obvious that the definitions stated by Paasch (2005) are sometimes contradictory to the traditional Dutch interpretations, especially concerning the group that is called personal rights by Paasch (Paasch, 2005b; p. 12).

National interpretations is a matter which has to be taken into account in further research developing the legal model, e.g. by widening the definitions describing the content of the classes. It might also be argued that legal tradition and interpretation might take precedence and that a right or restriction might be classified in accordance to its national interpretation. In the Dutch case study, for example, usufruct is classified as a real property right by tradition, but should be classified as a real property right, according to the description in the legal model (Paasch, 2005b; p. 5-6).

7.5 Conclusions

The approach described in this paper is based on a hypothesis claiming that a standardised model which classifies real property rights and restrictions can act as a terminological framework to enhance security in real property transactions.

A nation's real property rights and restrictions are the result of a long cultural and historical process, deeply rooted in national history and culture. Consequently, a standardised legislation defining real property rights and restrictions on an international scale appears not to be feasible. However, it seems possible to standardise a limited number of categories in which existing rights and restrictions can be placed, regardless of their cultural or national origin, thereby rendering them comparable and thus promoting security in cross-border transfer of real property information. Furthermore, the creation of a terminological framework describing the legal content of national real property rights and restrictions is a step towards an improved understanding of their nature and constructions according to different legislative systems.

The proposed framework is part of the ongoing research activities focusing on standardisation of real property information and is assumed to be vital for the development of cost-effective cross-border transactions.

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8 Ontology engineering for comparing property transactions

Claudia Hess & Marina Vaskovich

Abstract

The paper presents an ontology-based approach to the comparison of property transactions. The approach developed within the framework of the COST Action G9 'Modelling Real Property Transactions' extends first initial comparisons of process models to a formal, ontology-based methodology which supports domain experts in the detailed analysis of differences and commonalities between national property transactions. We demonstrated the feasibility of applying our approach by modelling and comparing purchase processes in Denmark and England/Wales.

8.1 Introduction

Property transactions differ worldwide not only in complexity but also in cost generated. In some countries, property transactions are 'user friendly' and relatively inexpensive, while in others they are intricate and costly. To better understand how property transactions are arranged in different countries, they can be represented in a formal way through a clear description of the activities involved. It is widely acknowledged that formalisation introduces clarity and 'permits clear and rigorous reasoning about phenomena too complex to be handled in words' (Simon, 1957). Different modelling technologies are available to formalise a domain of interest, ranging from Entity-Relationship models to object-oriented approaches and, most recently, ontological modelling. We present a methodology based on ontological modelling as it provides a higher expressiveness than the previous approaches as well as computational support to make implicitly modelled facts explicit.

The goal of ontological engineering, according to Guarino (1997), is "to develop theories, methodologies and tools suitable to elicit and organise domain knowledge in a reusable and 'transparent' way". Geographical information systems are one of the application domains in which ontologies are used to make existing information accessible and sharable (Fonseca, Egenhofer, Davis & Borges, 2000). The rapid development of a joint global market, including the property market, demands shared and reusable knowledge in all sectors of the economy. A recent example of such an approach is the EULIS (European Land Information Service) project¹ which aims to provide a single access point via the internet to real property information from various European countries. However, there are separate links to the property information of each country. To be able to provide a complete integration of nation-

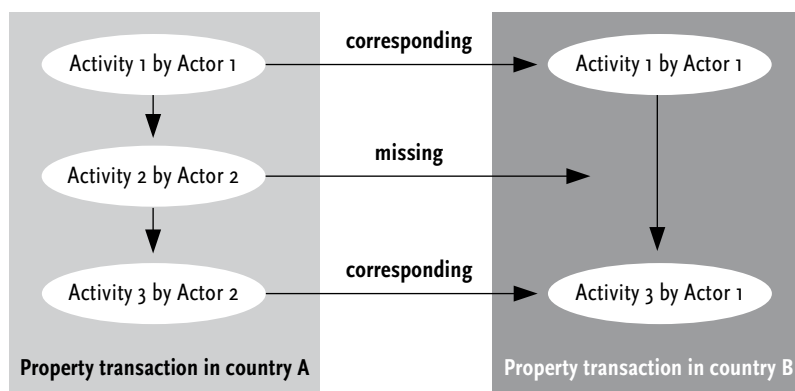
¹ <http://www.eulis.org/>.

al property information, a thorough understanding of the correspondences between national systems represented by their data and process models is required. Therefore the comparison of property transactions constitutes an important step towards exchanging property information between countries. This is addressed in the research activities performed within the framework of the COST Action G9 'Modelling Real Property Transactions'. The comparisons lead to a better understanding of national processes and also facilitate the identification of their drawbacks, which in turn increases the transparency of national systems. Furthermore, the developed models can in future be applied to analyse the efficiency of property transactions with regard to transaction costs. To support such comparisons, we propose a general approach based on ontological modelling to compare process models. We will illustrate the approach by applying it to the comparison of national property transactions. In particular, the approach is demonstrated using the example of property purchase in two European countries: Denmark and the United Kingdom. However, it is not restricted to the cadastral domain.

The paper is structured as follows: Section 8.2 starts with initial, rather 'informal' comparisons of property transactions. Section 8.3 works out on their basis a methodology for a formal, ontology-based comparison. This approach is applied to an example from the cadastral domain in Section 8.4. Section 8.5 provides an evaluation. The last Section (8.6), summarises the presented approach and highlights areas for future research.

8.2 Initial comparison of property transactions

Initial comparisons within the framework of the COST Action G9 started by preparing text descriptions of two processes, namely property purchase and property subdivision for Denmark and the United Kingdom (jurisdiction of England and Wales). The prepared descriptions were revised by several national domain experts working in research and practice. Activity diagrams, a certain type of diagram provided by the Unified Modelling Language (UML) (Object Management Group, 2003) to represent processes, were developed on the basis of the textual descriptions. The processes were intuitively divided into activities, the smallest pieces of work, normally performed by a single actor (i.e. a government authority or a private company/individual). Activities were assigned to the actors responsible for them. In other words, Literate UML models consisting of UML diagrams and explanatory texts (Arlow et al., 1999) were developed. The models always describe the standard procedures in the countries in question without emphasising differences emanating in exceptional cases. So the property transactions describe the standard procedures for the purchase or the subdivision of a real property, considering real property as a combination of land and a single-family house built on it. The national

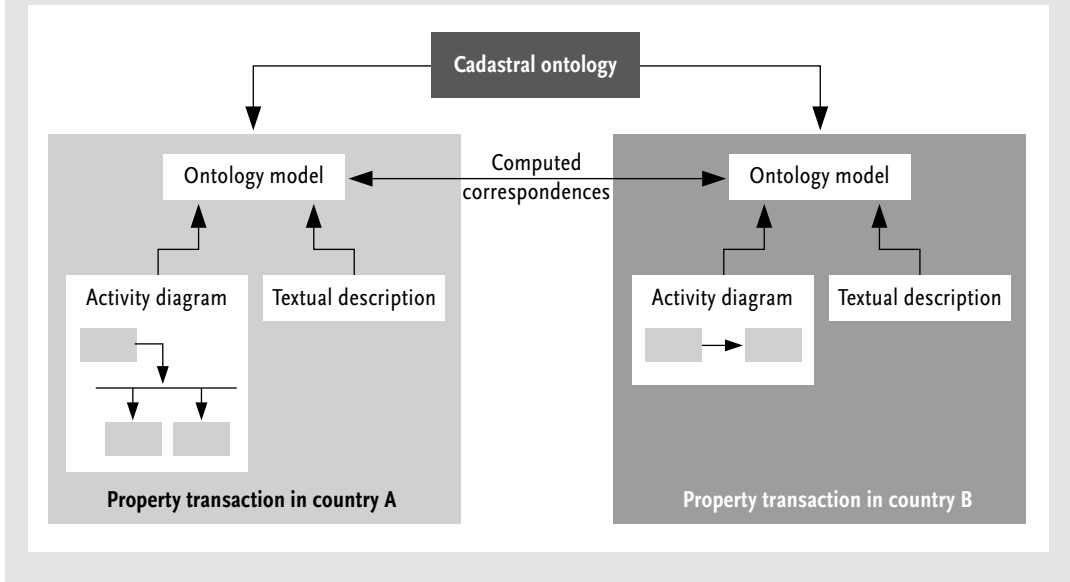
Figure 8.1 Initial comparison of property transactions (by activities performed)

processes were directly compared because until now no reference process has been available. Such a reference process would permit comparison of national models only with the reference process and then allow us to derive correspondences between the national processes on the basis of the correspondences between the national processes and the reference process.

The initial comparison comprised three steps: the identification of activities, their graphical representation, and a comparative analysis. At the start, the following comparison criteria were proposed: by actors involved, by activities performed, by clarifying each actor's role in the process, or by identifying the decision-making body. Applying this to Denmark and England/Wales, we can say that in both countries subdivision starts with an *Initiation* activity and ends with *Registration*. By matching the corresponding activities, the missing/additional activities in each country were identified and, therefore, the subdivision process was comparatively analysed. As an example, the approach is illustrated in Figure 8.1. The detailed comparison together with the UML diagrams developed for property purchase and property subdivision in Denmark (DK) and England/Wales (E&W) can be found in Vaskovich, Dixon-Gough & Stubkjær (2006).

The results provided by the initial comparisons gave interesting insights into the differences and commonalities between national property transactions. However, the initial comparisons took only one criterion into account: processes were compared either by actors involved or by activities performed, etc. In Figure 8.1, 'Activity 3 of property transaction in country A' corresponds to 'Activity 3 in property transaction in country B' only if compared by activities performed. Comparing by actors involved would give different results: both activities would no longer correspond. Results would be more consistent if both criteria were integrated in a single comparison. However, comparing process models merely by 'looking at them' without computational support makes a multi-criteria comparison very difficult. Including more than two criteria and perhaps more than two countries, it becomes even unfeasible without computational support because of the increased complexity. We therefore propose an ontology-based comparison in which inference services on the

Figure 8.2 the ontology-based comparison of property transactions



ontology models support the domain experts in analysing property transactions with regard to several criteria.

Furthermore, the ontology-based approach offers a formal way of comparing process models in contrast to the rather informal first comparisons. A formal comparison aims to guarantee that only those models are compared which represent processes at a similar level of detail. Some process models seem at a rather abstract level to be 'identical' but appear to be very different when the comparison is based on a more detailed representation. The degree of conformity between national process models can be assessed and hence, it can be explained why a transaction in country A is more similar to one in country B than to another in country C. The formal comparison is made on the basis of ontology models of the processes due to the provided inference services.

8.3 A Formal, ontology-based comparison

8.3.1 Overview of the approach

A domain ontology defines the basic concepts and properties for modelling the processes to be compared. In the case of the process models from the cadastral domain, a cadastral ontology encompasses the concepts and properties necessary to describe property transactions. Then the ontology models of the processes to be compared are modelled. Concepts and properties are chosen from the domain ontology to describe the processes. A single vocabulary is thus used for all processes. In our example, this is to say that appropriate concepts from the cadastral ontology are used to describe the different steps taken in each national property transaction resulting in an ontology

model for this transaction. Appropriate concepts are selected on the basis of the textual descriptions of the national processes and the respective activity diagrams. Taking the ontology models as input, an ontological reasoner computes the correspondences between both models. For instance, an activity *x* in process 1 corresponds to an activity *y* in process 2. These correspondences are jointly interpreted by domain experts and knowledge engineers. Figure 8.2 gives an overview of the approach.

The approach suggests several iterations: based on the reasoning results and their interpretation, the ontology models can be refined. Reasoning results are then again interpreted and this feedback is used to improve the models. In the presented approach, the computational support provided by the reasoner assists cadastral domain experts in their modelling task by making suggestions but it does not prescribe what the models have to look like.

8.3.2 Developing the domain ontology

The domain ontology contains the concepts and properties that will be used for the description of the process models to be compared. Ontologies are based on a set-theoretical interpretation of concepts. According to this extensional view adopted in ontologies, a concept (also called class) denotes a set of individuals by defining the characteristics that these individuals have in common. These features are described in terms of necessary and sufficient properties (also called slots or roles).

In the following Section, the approach for developing such domain ontology is described for the cadastral domain. It might be necessary to adapt this approach when developing domain ontologies for domains other than the cadastral one. Defining the basic concepts for property transactions, we analysed the glossary provided by the Workflow Management Coalition (WfMC). The WfMC is a non-profit organisation aiming to develop common terminology and standards which promote workflow technology (Workflow Management Coalition, 1999). The concepts and properties proposed by the WfMC can be applied to describing different types of processes. Where applicable, we have chosen concepts from the WfMC's glossary. We added additional concepts to tailor our basic vocabulary to the requirements of the cadastral domain. The resulting set of basic concepts is thus supplemented with concrete concepts for describing property transactions, so-called cadastral concepts.

- **Activity:** An activity describes a piece of work that constitutes one step within a process. In property purchase, an activity would, for example, be 'signing the sale contract'.
- **Actor²:** A group of participants exhibiting a specific set of attributes, qualifications or skills. In the cadastral models, an actor in the activity 'signing the sale contract' is, for instance, the owner of the property.

- **Result:** An activity may result in a document such as a contract or a report, in a decision or an oral agreement. Results can be structured in different ways. One approach is to distinguish tangible and intangible results. For instance, the tangible result of the activity ‘signing the sale contract’ is the sale contract, while an example of an intangible result within a purchase process is the secured title. Another approach by Larsson (1991) distinguishes four types of evidence (i.e. results), namely witnesses for oral agreement, deed without registration for private conveyance, registration without guarantee for deed registration, and, finally, the fourth type is registration with proof of title for title registration. Such distinctions can be used to structure the results in a hierarchy.
- **Function:** The purpose of an activity. Zevenbergen (2002) defines function [of an element] as ‘what this element causes to happen as a desirable contribution to the greater whole, in order to achieve the goal(s) of this whole’. In our case the purchase process is the whole, while an activity can be considered as an element of the whole. In a property transaction such as purchase, the function of an activity might be to protect the seller’s interests. Different activities might have the same function but fulfil in a completely different way. Such differences are elucidated by the proposed formal comparison.

The chosen basic concepts (activity, result, function) are supplemented with specific concepts for describing national processes. We propose to develop the cadastral ontology in a bottom-up approach on the basis of the national process models. This is to say that we start with a particular country and identify for each activity its function(s) and result(s) based on the description of the property transaction. In order to be able to reuse these functions and results, we choose names independently of national particularities. Considering in a next step the transaction in a second country, we reuse as far as possible the concepts already defined. If necessary, we add new functions and results to the cadastral ontology.

In contrast to this bottom-up development, which starts with the analysis of specific processes and generalises them, a top-down approach would start on a high level of abstraction – supposing that domain experts have very good domain knowledge independent from specific national processes – and refine the ontology.

■ This concept is only indirectly applied to the ontology models. It means that names of actors might be used to explain functions and/or results. We decided not to include it as comparison criteria because it leads to difficulties as the same actors play different roles in different countries. For example, a surveyor in Nordic countries is responsible for some tasks that are accomplished in other countries by a legal expert.

8.3.3 The ontology models

The ontology models are developed on the basis of the Literate UML models of property transactions. This means that an ontology model integrates the activity diagram and the textual description of the respective national process. Ontology modelling languages offer a higher expressiveness than object-oriented modelling languages like UML. In contrast to the activity diagrams, the additional information, which is provided in the text document, can be included in the ontology models. Activity diagrams are restricted to presenting the activities in the order in which they are executed and assigned to the actor responsible for them. However, in this graphical representation by the activity diagram, it is difficult to have activities with several actors involved. Ontology models allow us not only to include further characteristics of the activities by defining their properties but also to express constraints. This can be used to define, for example, that an activity ‘sale contract signing’ results in exactly one signed sale contract. There cannot be different signed sale contracts but all existing copies have the same text and the same signatures on it. It would also be possible to distinguish with the help of constraints whether something is compulsory or optional, e.g. a legal expert may, but not necessarily, participate in a certain activity. Defining constraints therefore leads to a more precise definition of the process.

To transfer a Literate UML model of a property transaction into an ontology model, the following steps are taken: firstly, each activity in the activity diagram becomes an ‘activity’ in the ontology model: they are directly represented as subclasses of the concept ‘activity’ in the ontology models. Secondly, activities in the ontology model are characterised by several properties. Currently, the properties *hasFunction* and *hasResult* are used. Their values are also taken from the cadastral ontology.

8.3.4 Ontological reasoning to compute correspondences

Ontology models provide not only a high expressiveness but inference services derive the facts that are not modelled explicitly but only implicitly. They detect what is not obvious. In the presented approach, the implicit facts to be made explicit by the reasoner are the correspondences between the different national processes. It is not necessary to add explicit relationships between the models because we use the concepts from the cadastral ontology for describing all process models. Corresponding activities are computed by an ontological reasoner such as Pellet³.

Types of correspondences computed by a reasoner are equivalence (\equiv)

³ <http://www.mindswap.org/2003/pellet>.

Table 8.1 Examples for functions defined in the Cadastral Ontology

| Function | Description of the function | Example activity |
|-------------------------|---|------------------------------------|
| BindPartiesLegally | Signing a contract binds the involved parties legally and thus withdrawal by one of them entails legal consequences | SaleContractSigning |
| TransferPropertyRights | Signing the sale contract provides the basis for the transfer of the property rights | SaleContractSigning |
| OfficialTransferOfTitle | The title is officially transferred only when registered by the registration authority. ¹ This official transfer protects the new owner against third parties. | Registration, FinalRegistration |

1) *Registration authority denotes any governmental authority performing ownership registration. It can be a Land court, a Land Registry, or the registration authority itself.*

Table 8.2 Examples for results defined in the Cadastral Ontology

| Result | Description of the result | Example activity |
|--------------------|--|------------------------------------|
| SignedSaleContract | The sale contract is signed by the involved parties and is immediately legally binding | SaleContractSigning |
| SecuredTitle | The title is secured, i.e. the official transfer of property is completed and thus the ownership right of the new owner is protected against third parties | Registration, FinalRegistration |

and subsumption (\sqsubseteq , \sqsupseteq). Equivalence means that two concepts are identical because the set of individuals denoted by each of them is identical. This set of individuals is defined by their properties. Subsumption means that one activity is computed to be more special than another activity, i.e. $A \sqsubseteq B$ for A is more special than B . The set of individuals denoted by the more special activity is a subset of the set of individuals denoted by the more general one.

Structuring the values for the properties in a hierarchy and linking them in that way to each other increases the number of correspondences that can be computed by the reasoner. For instance, two activities with the same functions but slightly different results will show a specialisation relationship if one result can be declared as more special than the other.

8.4 Comparing purchase in Denmark and England/Wales

We used the ontology-based approach to compare purchase processes in Denmark and England/Wales to show the feasibility of applying it to real applications. According to the above presented approach, we proceeded as follows: we started by defining the cadastral ontology. Then we transferred the national models (activity diagrams and descriptions) for property transfer into ontology models by using the concepts defined in the cadastral ontology. The ontology models were adapted on the basis of the reasoner results. In preparatory work for the paper we refined the models in three iterations in order to

Table 8.3 Property transfer in Denmark: activities, functions and results

| Activity | Function | Result |
|---|---|---|
| DK_Advertising | FindABuyer | BuyerAndSellerBrought-Together |
| DK_PreContractNegotiation | ConfirmIntentionsFor-PropertyTransfer | LegallyBindingOralPre-ContractAgreement OR ContractNote |
| DK_CollectingLegal-Information | ProveOwnershipRight | ReportOnProperty |
| DK_PropertyExamination | QualityControlOfProperty | KnowledgeOnPhysical-StateOfProperty |
| DK_MortgageNegotiation | SecurePurchase | FormalMortgageOffer |
| DK_SaleContractPreparation | PrepareTransferDocuments | SaleContract, SalesReport |
| DK_SaleContractSigning | BindPartiesLegally, TransferRightsOn-Property | SignedSaleContract |
| DK_UpdatingTaxRegister | ProvidePropertyTaxation-Information | SaleContractWithTaxed-Value |
| DK_ApplicationForProvisional-Registration | AskForReservingTitle | ProvisionalApplication-Completed |
| DK_VerifyingRegistration-Documents | CheckOfLegalRequirements | VerifiedSaleContract |
| DK_ProvisionalRegistration | SecureAgainstSellersFraud | ConditionallyRegisteredTitle |
| DK_MortgageContractSigning | BindPartiesLegally, GuaranteeMortgage | SignedMortgageContract |
| DK_PaymentOfPurchaseSum | CompleteExchangeOfAssets | PurchaseSumOn-DepositAccount |
| DK_ApplicationForFinal-Registration | AskForSecurityOfTitle | ApplicationCompleted |
| DK_FinalRegistration | OfficialTransferOfTitle | SecuredTitle |
| DK_PropertyTransfer-Completion | HandOutDocuments | PurchaseOnBankAccount, Completion-Statement, EndorsedSaleContract |

represent the national processes correctly. Here, we will present the results of the third iteration.

A cadastral ontology was developed on the basis of two preceding processes. Table 8.1 and Table 8.2 show examples of some of the defined functions and results⁴. To facilitate their reuse, the activities in which they are typically used, as well as descriptions, are provided. The names of the example activities can be understood as a suggestion for the names of the activities for the specific national processes.

Table 8.3 and Table 8.4 show the definition of each activity in terms of functions and results. The activities also include the name of the respective country in their name, i.e. DK for Denmark and EW for England/Wales.

The ontology models are formulated in the ontology modelling language OWL (Ontology Web Language) (World Wide Web Consortium, 2004). The ontology models were prepared with the help of ontology editor Protégé, including the OWL PlugIn⁵.

For the sake of clarity, the purchase processes have been divided below into three general phases, namely pre-contracting, contracting, and registration (adapted from Chapter 2 of this book and Šumrada, 2005).

⁴ Readers interested in the complete cadastral ontology are invited to contact the authors of the paper directly.

⁵ <http://protege.stanford.edu/>.

Table 8.4 Property transfer in England/Wales: activities, functions and results

| Activity England/Wales | Function | Result |
|------------------------------------|--|----------------------------------|
| EW_ProvisionalMortgage-Negotiation | GetPromiseForMortgage | ProvisionalMortgageCertificate |
| EW_Advertising | FindABuyer | BuyerAndSellerBrought-Together |
| EW_PreContractNegotiation | ConfirmIntentionsFor-PropertyTransfer | OralPreContractAgreement |
| EW_PropertyExamination | QualityControlOfProperty | HomeBuyerReport, BuildingSurvey |
| EW_TitleInvestigation | ProveOwnershipRight | FormOnProperty, ReportOnProperty |
| EW_MortgageNegotiation | SecurePurchase | FormalMortgageOffer |
| EW_SaleContractPreparation | PrepareTransferDocuments | SaleContract |
| EW_SaleContractSigning | BindParties, Transfer Rights On Property | SignedSaleContractToBe-Exchanged |
| EW_SaleContractExchange | PutContractInAction | SignedSaleContract |
| EW_MortgageContractSigning | BindPartiesLegally, GuaranteeMortgage | SignedMortgageContract |
| EW_PaymentOfDeposit | SecureAgainstBuyersFraud | DepositOnDepositAccount |
| EW_UpdatingTaxRegister | ProvidePropertyTaxation-Information | SaleContractWithTaxed-Value |
| EW_PaymentOfRemaining-PurchaseSum | CompleteExchangeOfAssets | PurchaseSumOn-BankAccount |
| EW_ApplicationFor-Registration | AskForSecurityOfTitle | ApplicationCompleted |
| EW_VerifyingRegistration-Documents | CheckOfLegalRequirements | VerifiedSaleContract |
| EW_Registration | OfficialTransferOfTitle | SecuredTitle |
| EW_PropertyTransfer-Completion | HandOutDocuments | EndorsedSaleContract |

■ Phase 1: Pre-contracting

■ 1. EW_ProvisionalMortgageNegotiation

There is no activity corresponding to EW_ProvisionalMortgageNegotiation in Denmark. In contrast to England/Wales, no formal certificate stating the amount to be granted by a bank is required for property purchase in Denmark.

■ 2. DK_Advertising = EW_Advertising

Both activities concerning the advertising of a property are equivalent. A property is advertised in both countries in the same way, for example, the same media are used for advertisement: the Internet, print.

■ 3. DK_PreContractNegotiation, EW_PreContractNegotiation

In Denmark, a legally binding agreement can be either written or oral. Both written and oral agreements pose legal obligations on the involved parties, whereas in England/Wales the oral agreement has no legal consequences. These differences in the formal requirements lead to the fact that no correspondence can be established. Results cannot be structured in a clear hierarchy as the Danish case differs from the 'normal' case for most countries in which an oral agreement does not impose any legal obligations. It would contradict the definition of an oral agreement to define the Danish case (oral but legally binding agreement) as more special.

■ 4. DK_CollectingLegalInformationOnProperty \supseteq EW_TitleInvestigation

The E&W activity for collecting legal information about the property is more special than the corresponding Danish activity. This computed relationship is appropriate since more investigation on the title is required in England/Wales than in Denmark. In the former country, a legal professional must undertake the title investigation as the land register still does

Figure 8.3 Results of the ontological reasoning



not cover the whole territory of England/Wales, in contrast to Denmark where the buyer himself can examine the legal status of the property at the land registry. If the buyer wishes, a real estate agent will assist him in collecting the legal information. But this is not a must.

■ 5. `DK_PropertyExamination` \equiv `EW_PropertyExamination`

Both activities refer to the examination of the physical state of the property. The functions are basically the same. Only the results vary in the level of formalisation. In both countries the reports are prepared by experts: in England/Wales, the expert responsible for the property examination must prepare for the buyer either a homebuyer's report or a building survey. In Denmark, in the case of conveyance among non-professionals, it is practice to have a report prepared (Tilstandsrapport) which compares to the homebuyer's report. A more comprehensive type of investigation (Teknisk besigtigelsesordning for fast ejendom) seems not to be in widespread use. Due to the correspondence in both function and result, the activities can be considered as equivalent.

■ 6. `DK_MortgageNegotiation` \equiv `EW_MortgageNegotiation`

This correspondence seems to be reasonable. As a rule, the buyer in both countries has to negotiate about the conditions of the mortgage contract. Differences in the internal workflow of the banks, e.g. the types of documents that are required in order to obtain a mortgage, are not considered.

■ Phase 2: Contracting

■ 7. `DK_SaleContractPreparation` \subseteq `EW_SaleContractPreparation`

The preparation of the sale contract in Denmark includes a larger number of documents than in England/Wales. Therefore a subclass relationship is computed by the reasoner.

■ 8. `DK_SaleContractSigning`, `EW_SaleContractSigning`, `EW_SaleContractExchange`

No direct correspondence can be established between the classes related to signing the sale contract. In Denmark, a sale contract is legally binding as soon as it is signed by both involved parties, i.e. after signing, the parties cannot withdraw from the property transfer without penalty provision. In England/Wales, however, contracts are exchanged after all the contracts in the purchase chain are signed. Until that time the legal expert may hold the contract and the contract is not yet legally binding. Despite having identical functions, the activities `DK_SaleContractSigning` and `EW_SaleContractSigning` do not correspond. Their results cannot be modelled in a clear hierarchical way. The English result of a signed but not yet legally binding sale contract is an exceptional case. It cannot be modelled as more special than the 'normal' result `SignedSaleContract` which refers to a signed, legally binding sale contract, because it would overwrite its essential property, i.e. to be legally binding. An alternative would be to merge both English activities in order to obtain a correspondence between the new, merged activity and the Danish one. However, this would no longer reflect the particularities of the English system and represent it at a much more general level.

■ 9. `DK_UpdatingTaxRegister` \equiv `EW_UpdatingTaxRegister`

The equivalence computed by the reasoner for the activities `DK_UpdatingTaxRegister` and `EW_UpdatingTaxRegister` is appropriate. The ontology model does not include any detailed knowledge about the way the tax registers work in the different countries. The correspondence is based only on the fact that functions and results are identical.

■ 10. `DK_MortgageContractSigning` \equiv `EW_MortgageContractSigning`

The activities representing the signing of the mortgage contract are considered as equivalent in Denmark and England/Wales. The activities do not take into consideration the internal document flows and workflows of the banks.

■ Phase 3: Registration

■ 11. `DK_ApplicationForProvisionalRegistration`

There is no directly corresponding activity in England/Wales as no provisional registration is made.

■ 12. `DK_VerifyingRegistrationDocuments` \equiv `EW_VerifyingRegistrationDocuments`

Both activities referring to the verification of the application for title registration correspond. The function of both activities, the verification of whether all legal requirements are met, is identical, as are the results.

■ 13. `DK_ProvisionalRegistration`, `EW_PaymentOfDeposit`

There is no correspondence between both activities because the way of securing the parties for transfer completion differs in both countries. In England/Wales, the seller is secured by receiving a deposit before registration, whereas in Denmark, on the contrary, the buyer is typically secured by the provisional registration. In particular, registration in Denmark is divided into two steps: firstly, provisional registration when the title is only conditionally registered and secondly, a final registration that takes place only after the payment of the entire purchase sum. However, there is now also the possibility to secure the parties by paying a deposit which is here not yet modelled.

■ 14. `DK_PaymentOfPurchaseSum` \supseteq `EW_PaymentOfRemainingPurchaseSum`

Both activities have the same function: the purchase sum should be paid in order to complete the exchange of assets. The activity in England/Wales is more special than in Denmark since the owner of the bank account to which the purchase sum is transferred is more restricted: in Denmark the purchase sum goes to a deposit account, whereas in England/Wales it is directly transferred to the seller's bank account.

■ 15. `DK_ApplicationForFinalRegistration` \equiv `EW_ApplicationForRegistration`

These activities are equivalent as both ask for security of title, normally at some registration authority.

■ 16. `DK_FinalRegistration` \equiv `EW_Registration`

The equivalence between the activities representing title registration is reasonable as `DK_FinalRegistration` and `EW_Registration` have the same

Table 8.5 Results of the comparison

| Property Transfer Denmark | | PropertyTransfer England/Wales |
|------------------------------------|--|---|
| 1 | - | EW_ProvisionalMortgageNegotiation |
| 2 | DK_Advertising | \equiv EW_Advertising |
| 3 | DK_PreContractNegotiation | EW_PreContractNegotiation |
| 4 | DK_CollectingLegalInformation | \supseteq EW_TitleInvestigation |
| 5 | DK_PropertyExamination | \equiv EW_PropertyExamination |
| 6 | DK_MortgageNegotiation | \equiv EW_MortgageNegotiation |
| 7 | DK_SaleContractPreparation | \subseteq EW_SaleContractPreparation |
| 8 | DK_SaleContractSigning | EW_SaleContractSigning EW_SaleContractExchange |
| 9 | DK_UpdatingTaxRegister | \equiv EW_UpdatingTaxRegister |
| 10 | DK_MortgageContractSigning | \equiv EW_MortgageContractSigning |
| 11 | DK_ApplicationForProvisionalRegistration | - |
| 12 | DK_VerifyingRegistrationDocuments | \equiv EW_VerifyingRegistrationDocuments |
| 13 | DK_ProvisionalRegistration | EW_PaymentOfDeposit |
| 14 | DK_PaymentOfPurchaseSum | \supseteq EW_PaymentOfRemainingPurchaseSum |
| 15 | DK_ApplicationForFinalRegistration | \equiv EW_ApplicationForRegistration |
| 16 | DK_FinalRegistration | \equiv EW_Registration |
| 17 | DK_PropertyTransferCompletion | \subseteq EW_PropertyTransferCompletion |
| \equiv Equivalence | | |
| \subseteq, \supseteq Subsumption | | |

functions and results.

- 17. DK_PropertyTransferCompletion \subseteq EW_PropertyTransferCompletion
Both activities complete the property transfer and have as results the final documents. They represent the last interaction between buyer and seller.

Table 8.5 summarises the results of our ontology-based comparison.

8.5 Evaluation

8.5.1 Evaluation of the results

A fairly large number of correspondences were computed between property transfer in Denmark and England/Wales. Matches between 12 of the 17 comparisons indicate that an appropriate level of detail was chosen: the results reflect commonalities as well as differences. If the result only consisted of completely matching activities, the processes would likely have been modelled too abstractly without going into enough detail to detect the differences.

We defined three concepts as basic building blocks for the cadastral ontology and from which all other concepts were inferred. Activities in the national processes were modelled in a very detailed way by defining for each activity its function(s) and result(s). The concepts ‘function’ and ‘result’ analysed the property transaction ‘purchase’ from a point of view which had not explicitly been considered previously. The concept ‘function’ has proven to be the most inter-

esting concept since it focuses on the reasons why some work is accomplished. We placed more attention on the question of why an activity is carried out than on who is responsible for accomplishing it. This might also help to identify useless activities while restructuring a property transaction. Adding the concept ‘result’, i.e. the documents or decisions resulting from the work carried out during an activity, increased the quality of the comparison. In contrast to the initial comparison, correspondences are finer grained and give more detailed insight into differences and similarities. One example is the activity ‘SaleContractPreparation’ in Denmark and England/Wales: the initial comparison showed the activities DK_SaleContractPreparation and EW_SaleContractPreparation to be identical. This correspondence was based on experts’ knowledge that the function of both activities is the same while results were not taken into account. In the formal comparison, we came to the conclusion that those activities are not fully identical as their results differ in terms of details.

Correspondences were often achieved by structuring the potential results of activities in a hierarchical way. In some cases, the hierarchical structure is quite obvious, but often different hierarchies are conceivable depending on the decisive criterion. The results from the activities in which a pre-contract is made between seller and buyer show this difficulty. Possible results are either an oral agreement, which in Denmark is legally binding but in England/Wales is not, or a written and signed agreement (Denmark). Correspondences between the activities differ depending on whether the pre-contract is to be legally binding or to be oral/written and these are decisive for the hierarchy. It is very difficult to obtain a sensible hierarchy. Such cases have to be further discussed. The elements of the cadastral ontology could also be further structured on a higher level of abstraction, for instance according to ‘tangible result/intangible result’. This would normally not change the results of the comparison but it could facilitate users in gaining an overview of the cadastral ontology and the provided concepts.

Analysing the resulting correspondences between property transfer in Denmark and England/Wales and the questions we discussed during modelling the processes, we recommend not including the activities describing the application for registration in the process models. The activities ‘Application For(Provisional)Registration’ seem to be not very useful for our formal comparison as their functions are inseparably linked with the functions of the activities (Provisional/Final)Registration. Moreover, it proves to be difficult to identify the results of the ‘Application’ activity.

8.5.2 Evaluation of the approach

The formal ontology-based comparison assists in verifying intuitions on correspondences. In the example worked out, results computed by the reasoner conformed to the cadastral experts’ intuitions. This is above all due to the fact

that a detailed understanding of the national transactions was already developed during the modelling activities within the COST Action G9 and that initial comparisons have already been made. However, more detailed knowledge about commonalities and differences has been revealed by the formal comparison. This statement can be exemplified by the activities ‘pre-contract negotiation’ in Denmark and England/Wales. The initial comparison identified that these activities correspond whereas the formal comparison highlighted the differences in the formal requirements of the countries, namely that, besides written agreements, an oral agreement poses legal obligations on the involved parties in Denmark.

The iterative approach had many advantages: feedback from the reasoner was used to discuss modelling decisions and lessons learned from the discussion were integrated in the next version of the ontology models and the cadastral ontology. It was also possible to test the effects of different modelling decisions on the results. The iterative approach greatly increased not only our knowledge about the national processes in question but also the knowledge about different approaches employed in the various countries, such as the way of securing the different parties for transfer completion.

Including further national process models in the ontology-based comparison requires modelling them in terms of the cadastral ontology. As the cadastral ontology is modelled in a bottom-up approach, it has to be discussed for the activities of the newly modelled process whether a concept from the cadastral ontology can be reused or whether a new concept must be included. Having modelled a third country – Belarus (although not yet included in the formal comparison) – we can state that most of the concepts developed here have been reused. To highlight the national peculiarities of the analysed transaction, new concepts have also been introduced. This seems reasonable since every country has its specific features of property transactions in terms of institutions involved and requirements demanded.

We aimed to reduce the time necessary to become familiar with the ontology by providing a detailed description of each activity and by reducing the number of functions and results as much as possible. We can recommend a joint development of the ontology models by a cadastral expert and a knowledge engineer because a detailed knowledge of property transactions is much in demand as well as knowledge on ontological modelling and the effects of modelling decisions on the results.

8.6 Future work and conclusions

We presented an ontology-based approach to a formal comparison of process models. Ontology models represent the process to be compared. We demonstrated the approach by applying it to the comparison of process models

for property transfer. The developed ontology models serve for a formal comparison in contrast to previous initial comparisons based on the Literate UML models. National processes were described in the ontology models by using concepts from a cadastral ontology which has been developed within the presented work. Reasoning support on the ontology models then permitted us to compute correspondences between the activities of the national processes. The correspondences identified in our examples by the reasoning procedures led to a more comprehensive analysis than the initial comparison based on the visual and textual descriptions. By its formal approach, the ontology-based comparison depends less on the personal impressions gained by reading the descriptions than the initial comparisons. The knowledge gained through the comparative analysis – supported by ontological modelling and inference services – entitles us to conclude that the ontology-based methodology seems to be useful for comparing property transactions. Although the examples are all from the cadastral domain, the ontology-based comparison is not restricted to the cadastral domain. It can be applied to the comparison of any process models.

Results of the comparison between property purchase based on the criteria ‘function’ and ‘result’ in Denmark and in England/Wales highlight two areas for future research. On the one hand, additional criteria for comparison could be introduced and therefore would permit us to analyse the process from a different perspective. The concepts for further comparison might be chosen according to the main objective of comparison, for example, to clarify who is the main actor in the course of the whole process in the countries in question, who takes a legal decision, etc. Further research could also consider alternative activities, e.g. as regards ways to obtain secure transfer, as well as the temporal order of the activities: a new property could be introduced which requires the results of the previous activity as a starting condition, for instance the sale contract must be signed before continuing with the registration. On the other hand, future work should extend the comparison over other countries and further types of processes like property subdivision as well as more complex processes like property purchase plus subdivision.

It is to be concluded that ontology engineering is an informative approach for comparing property transactions as it helps not only to represent processes in a formal way but also to identify their drawbacks and shortcomings and, thereby, to structure the domain itself. In other words, the ‘added value’ of applying ontological modelling technologies to the cadastral domain is ‘cognitive transparency’ (Guarino, 1997) thereof. Comparing national processes, according to the ontology-based approach, the transparency of the national ways of transferring property could be increased and an analysis of the efficiency of the respective national procedures could be started. The main hypothesis was that not all the results might be necessary for the process to be carried out efficiently (especially if we analyse property transactions

in countries like Belarus). Thus, we can suppose that some results could be taken away without detriment to the process's efficiency, i.e. the number of results can be decreased and thereby the process might become less bureaucratic and more user friendly. The ontology-based comparison and the knowledge gained also provide the basis for the development of a reference process. In Chapter 9 of this book the development of a reference process is described on the basis of the results of the ontology-based comparison.

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9 Ontology-based development of reference processes

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Abstract

Reference processes are templates for business processes of a private or public organisation. They give a structured description of the activities that produce a specific service for the customers of the organisation. Property transactions such as sale processes or property subdivisions constitute typical business processes of cadastral authorities. The primary motivation for describing cadastral reference processes comes from cadastral standardisation initiatives (e.g. Lemmen *et al.*, 2003) and comparative studies of different national cadastres (e.g. Stubkjær, 2003). A core issue for any description of cadastral reference processes is the choice of an adequate computational modelling technology. We present an ontology-based modelling approach that assists domain experts, typically cadastral scientists, to develop reference processes. The paper complements the comparative study of Hess and Vaskovich in the previous Chapter by exploring the potential of ontology-based modelling beyond the task of simple process comparison. We show how to use the modelling approach to inductively develop reference processes by evaluating process models from different national cadastres. Correspondences between the processes are computed through ontological reasoning. The reasoning results allow us to suggest relevant activities for the reference process. Examples from sale processes illustrate the approach.

9.1 Introduction

Reference processes, that is, formal descriptions of standard workflows, are widely used to design, maintain and adapt IT infrastructure in the field of business information systems. The success of off-the-shelf standard software like SAP modules relies on the interaction between standardisation, which makes knowledge about reference processes explicit, and customisation, which adapts reference processes to the specific requirements of a company. From a business information system perspective, the cadastral domain could also benefit from reference processes. On the one hand, reference models facilitate the development of new cadastral systems and the modernisation of existing cadastral systems as they represent best practices in the respective domain. On the other hand, reference models facilitate the comparison of application-specific processes, which is an important aspect in the research activities within the COST Action G9.

Taking these considerations into account, we present an approach for the inductive development of reference models. This is to say that reference models are developed on the basis of the knowledge gained from a thorough analysis of national cadastral systems and their formal ontology-based comparison. The approach aims at supporting cadastral experts in developing such reference models by suggesting parts of reference models and letting the

experts revise their reference models based on the suggestions in several iterations. We focus on the development of reference processes. However, slightly adapted, the approach could also be applied to the development of reference data models.

The approach uses ontological modelling technology for the inductive development of reference processes. Processes used as a base set for the development of the reference process – in the cadastral domain the process models of the different national property transactions – are represented as ontology models. These ontology models describe the different steps that are executed in the course of the property transaction. The different steps, called ‘activities’ in the following sections, are characterised by certain properties. In a simple UML activity diagram¹ it is not possible to refine activities by formalising their properties. In an ontology model, the activities can be described in a very detailed way: properties are described which are further specified by constraints. For example, the mandatory results of an activity can be explicitly stated. Furthermore, inference services are provided. The automatic reasoner used with the ontology infers facts that are only implicitly modelled and makes them explicit. Reasoning can also detect inconsistencies in the models. We will demonstrate the feasibility of our approach by developing a simple version of a reference process model for property transfer. As knowledge engineers, however, we do not claim that this process model is comprehensive from the cadastral point of view.

The remainder of the paper is structured as follows: Section 9.2 describes the use of reference models in different application domains and discusses the use of reference processes in the cadastral domain from a computer science perspective. Section 9.3 introduces the ontology-based approach for developing reference processes. Section 9.4 illustrates the presented approach with some examples from European processes for property transfer. Section 9.5 contains our conclusion.

9.2 Reference models for processes

To obtain a broader computational perspective on reference models in the cadastral domain, we start with comparing reference processes in different application areas of computer science. Reference models are available at different levels of abstraction fulfilling different functions. There are reference processes on a rather high level that describe, for instance, how to develop software efficiently by using established techniques proven in successful soft-

¹ Activity diagrams in the Unified Modelling Language (UML) are used to model processes such as operational workflows and business processes.

ware engineering projects. In contrast to these abstract reference models, application-specific reference models are on a very concrete level, such as reference models for business processes.

9.2.1 A software engineering reference process: the rational unified process

Software engineers follow a reference process when they design and develop software. The reference process identifies several phases of software development ranging from the analysis of the problem to the specification of the application and the implementation of the software. Modelling tools support the modelling experts and developers in the different phases.

The Rational Unified Process (RUP) is one example of such a software engineering reference process. It was originally developed by Rational Software (now IBM). It aims to support the development of high quality software within time and budget constraints by exploiting best practices identified in successful software development projects as well as experiences made in unsuccessful projects. A software engineering reference process, the RUP, containing different aspects and views on the software to be developed, is provided. The process can be applied to a broad range of software development projects. Companies worldwide follow the RUP in their project development software for various domains of applications and of different size. The RUP provides guidance on implementing a well-defined and well-documented software development process. Following the RUP reduces the risk of failure because it is designed in such a way that problems are anticipated and not simply handled when they occur (Krutchen, 2004).

Models in the Unified Modelling Language (UML) (Object Management Group, 2003) support the development of the software application along the different phases. This aspect is also used in the modelling activities within the COST Action G9, although they do not aim at the development of concrete software but at the analysis and comparison of national cadastral systems and their respective processes. Activity diagrams are for instance modelled for property transactions and subdivisions in European countries.

Organisations developing software according to the RUP can adapt the process to better suit their own needs. It therefore constitutes an open process framework. Organisations aiming to follow the RUP in a software development project define their own subset of the RUP. RUP Process Components, i.e. modules of process knowledge, are selected and assembled with further RUP Process Components to the organisation's individual RUP configuration. Defining an individual RUP configuration, organisations can start – according to their needs – either from scratch putting together process components, extending one of the ready-made configurations to their own needs, or using one of the predefined configurations (Krutchen, 2004).

9.2.2 Business processes in the R/3 reference model

The SAP R/3 business software package (and its successor mySAP ERP), the business software with the most installations worldwide, comes with a set of reference models. The R/3 Reference Model, also known as R/3 Business Blueprint, contains a number of reference models that reflect the business processes of successful companies, i.e. they describe best practices. Such models are available for all main aspects of Enterprise Resource Planning (ERP) Systems such as sale, logistics or accounting. They have been developed on the basis of the experiences, recommendations and requirements of leading companies in various sectors. The reference business processes represent directly the functionality provided by the R/3 system while abstracting from technical and implementation details. The R/3 Reference Model thus provides an overview of the different reference processes and functionalities available. An organisation installing R/3 selects from this pool of business processes those that are relevant for its specific needs. The reference processes provide the basis for the concrete implementation of the standard software and its customisation. This is to say that these organisations start by analysing the reference processes provided in the R/3 Reference Model and then adapt their own business processes to them. This allows them to progress quickly with the 'normal' parts, i.e. the parts in which they proceed in the same way as other companies, because these parts can be directly taken out of the Reference Model. This gives them more time to concentrate on the business processes that are special to their organisation and which differentiate them from their competitors. This approach is in contrast to an approach starting in the organisation with analysing and describing its specific processes and only then looking for software that suits the needs defined in the first step. Such an approach would emphasise the individuality of the company and claim that standard software cannot match its special requirements in spite of being customisable. However, this approach often fails because it is very time consuming and often appropriate software must be developed from scratch, increasing the costs even more. (Curran *et al.*, 1998)

Having this set of reference processes offers many advantages during the installation procedure of an R/3 system from the beginning with the first analysis up to the implementation. The reference processes facilitate an SAP R/3 introduction by providing business solutions which can directly be used. However, adapting the reference processes to the specific requirements of a company permits the fine-tuning of the business software. Furthermore, these reference processes have proven to be suited to the needs of various companies of different sizes and from different industries. Even if they are adapted to individual needs, they provide one starting point and one language. Comparing the business processes specific to a certain company with the reference processes provided in the R/3 Reference Models can give hints on are-

as for potential optimisation. The reference models which aim to model business processes in a user-friendly way can be used for demonstrating the concrete processes in a company as well as the interdependencies between the processes. Therefore they can also be used during training courses for future users (Curran et al., 1998).

9.2.3 Reference models in the cadastral domain

The success of both the Rational Unified Process for software development projects and the R/3 Reference Model in the domain of business software suggests that a similar approach might be taken in the cadastral domain. Summing up the commonalities between the Rational Unified Process and the R/3 Reference Model, we can say that in both cases a reference process or a set of reference processes are defined and then adapted to the specific requirements of the organisations. Note that in neither case having a reference process implies having identical processes in the organisations. Note also that both the RUP and the R/3 Reference Model are adopted by organisations operating under all sorts of legal systems. To put it differently: harmonisation of legal systems is not a prerequisite to successfully using reference processes for designing IT infrastructure. Nevertheless, it could be the case that ‘de facto standards’ emerge if cadastral software is designed using reference processes. No company is forced to use the R/3 Reference Models but many companies worldwide do so, thereby establishing a sort of standard. However, even ‘de facto standards’ give organisations the possibility to adapt them to their own requirements.

The RUP and the R/3 reference processes operate on different levels of abstraction and therefore apply different modelling technologies. The RUP supports the development of software applications and uses modelling technologies such as UML. The RUP describes in a generic way, independently of specific projects and particular software applications, how to proceed in the different phases of software development. The UML models that are developed in a software engineering project, however, are specific for that project. This approach is also widespread in the cadastral domain. As the software developed for the different national cadastral systems is typically individual software, the corresponding projects often work according to the RUP and develop UML models. Therefore, cadastral experts are familiar with the UML diagrams as they are used in the COST Action G9, too. In contrast, R/3 reference models are developed as business processes abstracting from the implementation details. They are generic enough to be applicable to companies from different sectors. This approach became widely accepted in the context of Enterprise Resource Planning Systems as shown by the SAP example. In the cadastral domain, however, starting with the development of generic business processes and developing on the basis of them standard off-the-shelf software is not yet accepted.

Next to standard software for the cadastral domain, reference processes for the different property transactions could be useful. Redesigning the IT infrastructure of a cadastral system within the context of modernising an existing cadastral system or the complete new building up of a cadastral system in a country not having a (or at least not a complete) cadastral system would benefit from having a set of reference models. The new cadastral system does not have to be built up from scratch but the reference models can be used as a starting point. This would support the building of cadastral systems in a more efficient way because predefined structures are reused and known best practices are considered. The reference processes could also be used as teaching material for the professional users of a newly designed cadastral system as it is used for the users of SAP business software. It can also be used in the educational context, for example for students in land management and similar studies aiming to get a good overview of cadastral systems. Furthermore, reference processes for property transactions facilitate the comparison of national processes such as property subdivision or sale. They permit comparison only with the respective reference process instead of requiring pair-wise comparisons between all national processes. The differences between national processes could be inferred based on their individual comparisons with the reference process. Having several countries to compare, it will be much more efficient to compare each model only with the reference model.

Despite all these advantages of reference processes that have already been shown in other application domains, reference processes are not yet very common in the cadastral domain. Comparing the situation in the domain of business software with the approach taken in the cadastral domain to the development of cadastral systems, we can say that most countries focus on their own processes. They start modelling their own processes with the idea that no standard software would be able to match their specific requirements. Individual software is therefore developed in each country. These projects have a high risk of failure for the reasons described above. They often start from scratch and are therefore time-consuming. But professionals in the cadastral domain often claim that systems cannot be developed as mere extensions of a reference process due to the different roots of the cadastral systems and the underlying legislation. However, there are recent approaches providing the basis for the development of reference models and even first versions of reference models. In the COST Action G9 'Modelling Real Property Transactions', researchers have been working on this issue. They describe national cadastral processes and the underlying cadastral systems. They agreed on one modelling language, namely the Unified Modelling Language, and therefore use a common language, which allows for unambiguous communication. Each researcher or professional in cadastral agencies familiar with UML is able to understand the meaning of the graphical models without reading a description for each model which explains how the boxes and

pointers used in the respective diagram are to be interpreted. Using the same type of models (above all UML activity diagrams and UML class diagrams), the data and process models of different countries can be compared. An ontology-based methodology further supports these comparisons.

Another approach for developing a reference data model for cadastral systems has been taken by Lemmen *et al.* (2003). They define a core cadastral domain model that should act as reference model for arbitrary cadastral systems. However, this model is still under development: new versions, modified after discussions with academic experts and professionals from the cadastral domain, have been presented (e.g. van Oosterom *et al.*, 2004; Zevenbergen, 2004). This core cadastral domain model is not yet an agreed standard and it is a difficult process to make it a standard because there is still much opposition against standard models for the cadastral domain. These approaches are very encouraging even though agreed reference models are still missing. The methodology described in this paper aims to support the development of reference models, above all of reference processes.

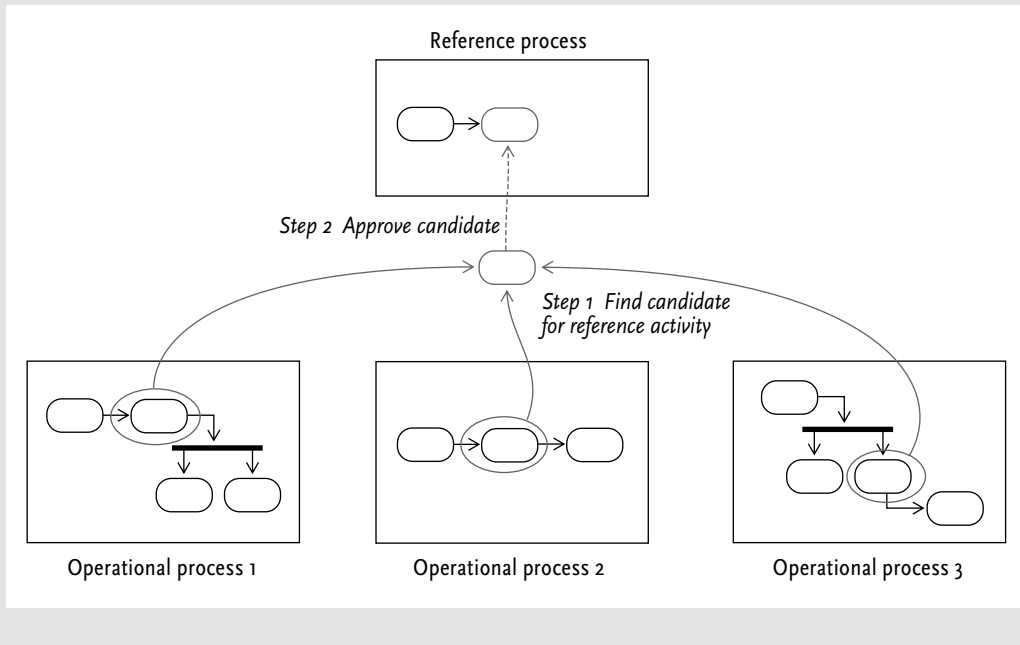
9.3 Designing reference processes with an ontology-based approach

9.3.1 Inductive development of reference processes

Two different approaches are conceivable for developing a reference process: either top-down or bottom-up. To model a reference process top-down means that experts in this domain come together and define the reference process from scratch such as it is done in standardisation consortia. In contrast to the top-down approach, a bottom-up approach aims at harmonising existing operational models. This approach is also called an inductive approach because existing process models are generalised in order to obtain the reference process. Such an approach is for instance taken by companies improving their co-operation in the supply chain. Representatives of the main company come together with representatives of suppliers and define on the basis of the respective operational processes in all companies a new reference process. The processes of all involved companies have then to follow the reference process. 'Follow' means that they use an extended version of the reference process which is adapted to their own requirements.

We propose the inductive development of reference processes on the basis of several well-defined operational processes such as property transactions executed in different national cadastral systems. The idea is to identify in the operational processes candidates for reference activities, i.e. activities to be included in the reference process. Reference activities can become those activities that are frequently found in the different operational processes.

Figure 9.1 Identifying candidates for reference activities



Applied to the cadastral domain, this would mean that we start with identifying the activities that are executed in many countries within the same property transaction such as purchase or subdivision. An activity that is executed in all – or at least most – countries under consideration will be a candidate for a reference activity. Analysing purchase processes in European countries, for instance, we note that the sale contract has to be signed in all countries by the buyer and seller. This permits us to derive that an activity ‘Signing the sale contract’ should be included in the reference process. As the approach proposed is an assistance system being not completely automated but supporting cadastral experts in developing reference processes, the candidates for reference activities have to be confirmed by the cadastral experts in order to be included as reference activities in the reference process. Figure 9.1 illustrates this approach.

In our approach, the way in which the candidates for the reference activities are determined differs clearly from the approach which is normally taken. The decisions on which activities have to be included in the reference process are normally made on the basis of the process models, for instance available as UML activity diagrams, during discussions between experts. We propose an approach in which the candidates for reference activities are determined in a formal way. The models which constitute the basis for the inductive development of the reference process are represented in an ontology modelling language. The ontology models allow for very exact definitions of the activities (using for instance quantifiers) and reasoning on the models. This is to say that an ontological reasoner is able to infer automatically those facts that are not explicitly modelled. These ‘hidden’ facts are in our case the correspondences between the activities from the different national processes. It is no

longer an intuitive decision on whether activities in different countries are similar enough to be generalised to a reference activity. On the basis of the correspondences calculated by the reasoner, reference concepts are suggested.

We propose to proceed in five steps, which will be further detailed in the following sections:

- Selection of ‘similar’ process models that constitute the basis for the inductive development of the reference process, i.e. a set of the processes is determined from which the reference activities will be derived.
- Preparation of ontology models for all selected national processes according to the methodology developed in Chapter 8 by Hess & Vaskovich for the ontology-based comparison of cadastral transactions.
- Ontology-based comparison of the ontology models in order to calculate correspondences between the national processes. Correspondences are calculated automatically by an ontological reasoner.
- Identification of reference activities based on an analysis of the calculated correspondences: criteria are defined according to which appropriate activities are selected as reference activities.
- Evaluation of the candidates: domain experts approve, modify or discard the suggestions.

9.3.2 Selection of similar process models

The step of selecting process models that serve as a starting point for the inductive development of a reference process is of crucial importance. Think of a case where the selected process models simply do not yield a single reference process. A reference process mixing activities of national process models that would have better resulted in two different reference processes will make it difficult or even impossible to model national cadastral processes as an extension to the reference process. The comparison of national models via such mixed-up process models will be virtually impossible. Therefore, the inductive development of reference processes starts with an analysis of whether the process models selected for generalisation allow for the derivation of a single reference process or whether more than one reference process must be developed. This requires a clustering of the different process models according to similarity. A specific reference process is then developed for each cluster containing homogenous process models.

There exist different approaches to assessing the similarity of process models. Process models can also be represented as graphs. Methods analysing the structure of the process models can therefore be applied. For instance, data mining techniques such as subgraph mining could be used to identify all those process models that have a similar structure (e.g. Meinel & Fischer, 2005). We could also start with a process that we absolutely want to include

in the base set and find all processes similar to it with the help of similarity measures (for an overview and comparison of similarity measures see Jones & Furnas, 1987). However, these structure-based approaches do not consider the semantics of the process steps. Matches are for example only computed on the basis of structural similarity or on the basis of similar names of process steps. In contrast, ontology models capture the semantics of the activities that are accomplished within the process by specifying properties such as the results of an activity or the actors involved. This has been used in the ontology-based comparison and will be used in the following for the inductive development of reference processes.

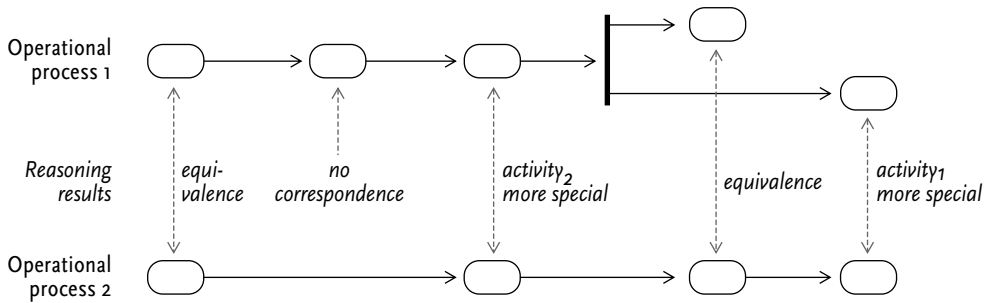
9.3.3 Preparing the ontology models

In order to determine the candidates for reference activities, we rely on the results of the formal ontology-based comparison discussed in the Chapter 8 by Hess & Vaskovich. According to this approach, national process models for property transactions are compared on the basis of their representation as ontology models. The activity diagrams with their refining texts are transformed into models in an ontology modelling language such as OWL. This transformation is effected as follows: the activities (or process steps) that are executed within a property transaction are modelled as concepts (classes) in the ontology models. For a sale process, we have activities for the signing of the sale contract or for the registration of the title. Each of the activities has certain properties defined. For instance, the result of each activity is indicated, such as ‘title is registered’ for an activity ‘registration’ within a sale process. In order to describe in these ontology models the properties of the activities, country-independent concepts are used. These concepts are defined in a cadastral ontology. Hess & Vaskovich developed a first version of such a cadastral ontology for property transactions on the basis of purchase processes in England/Wales and Denmark. For a detailed description of this approach see Section 4.4 in this book.

9.3.4 Computing correspondences by ontological reasoning

Having defined all selected national transactions in the terms of the cadastral ontology, an ontological reasoner infers automatically which activities of the national processes correspond to each other. This means that the reasoner provides results of the type ‘activity x in country A is equivalent to activity y in country B’ or ‘activity x in country A is more special than activity y in country B’. There is no need to identify all these correspondences manually – this is computed by the reasoner.

The result of the ontology-based comparison is a number of correspond-

Figure 9.2 Results of the ontology-based comparison

ences calculated by a reasoner. This is shown schematically for two example processes in Figure 9.2. The types of the automatically computed correspondences are *equivalence*, i.e. two activities are identical in both countries according to the comparison criteria, and *subsumption*, i.e. one activity is more specific than another activity with respect to the defined properties. Furthermore, *overlapping* concepts could be identified by knowledge engineers and domain experts in a manual analysis, supported by sending a set of queries to the reasoner². A correspondence of the overlapping type is weaker than equivalence or subsumption. Nevertheless it indicates a certain similarity in the activities.

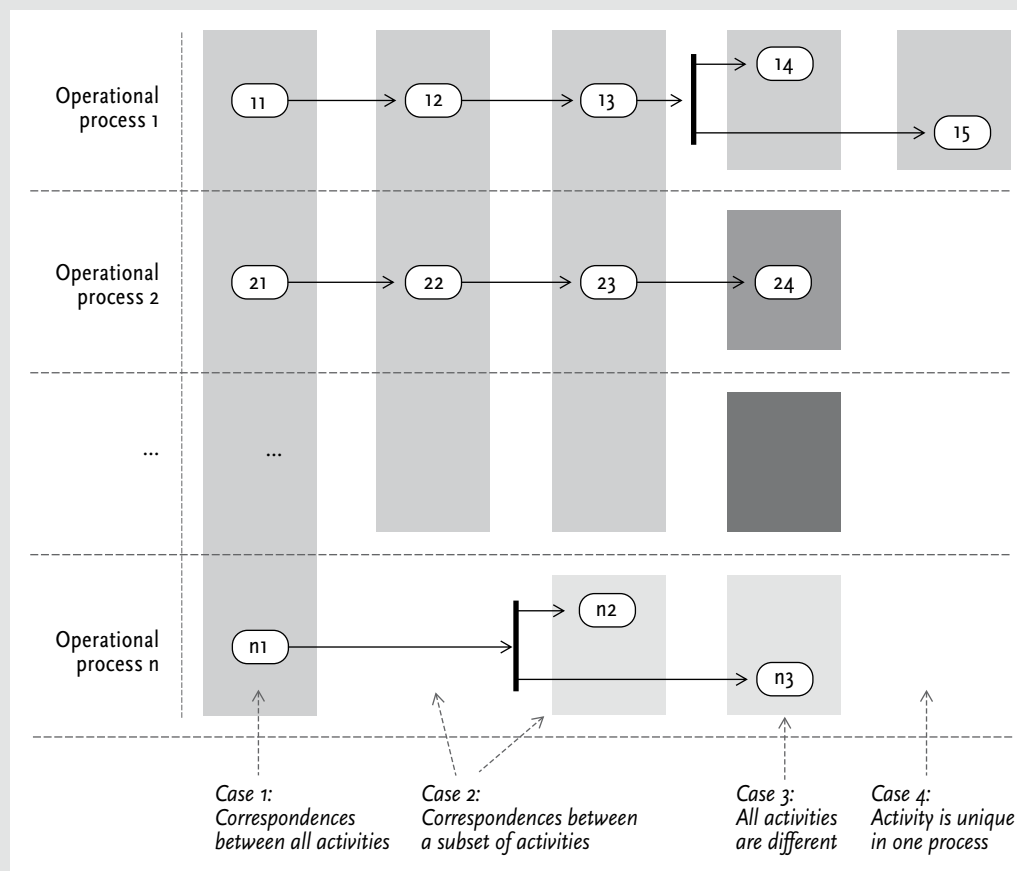
9.3.5 Suggesting candidates for reference concepts

Candidates for reference activities are now suggested on the basis of an automated interpretation of the reasoning results. The ontological reasoner computes the activities that are identical or at least very similar across different processes. The identified correspondences are analysed in the order in which they occur in the processes. The activities of the different operational processes considered can be in different relationships to each other as not necessarily all processes show corresponding concepts or at least no correspondences of the same type. Four cases with different relationships can be identified, as illustrated by Figure 9.3. In this figure, activities are marked in the same colour if a correspondence is computed by the reasoner. In the different cases, different actions can be taken – ranging from automated suggestions to cases requiring an analysis by cadastral experts.

■ **Case 1: Correspondences between all activities** – This case is the easiest case but also the case that will happen only very rarely. There are correspondences between all n activities. Reference activities can directly be suggested on the basis of the computed correspondence type Table 9.1 shows an example of potential combinations for three processes. Note that the approach is not restricted to three processes but can easily be applied to a

² The detection of overlapping queries is not a built-in functionality of current ontological reasoners, i.e. there is no query of the type: ‘are concepts A and B overlapping?’. So we have to send a set of separate queries to the reasoner.

Figure 9.3 Possible relationships between activities of different processes



greater number of operational processes.

- **Case 2: Correspondences between a subset of activities** – It is very likely that correspondences are only computed between a subset of the n activities and not between all activities. This means that no correspondence can be established between all activities. There are two possibilities:

- No activities are available in the other processes that could match.
- Activities are available in the other processes but no correspondence is calculated.

To identify a reference activity, we could use a majority vote. This means that the number of activities that correspond is important: do the majority of the activities show a correspondence between each other? If this is the case, then a candidate for a reference activity will be suggested. The appropriate activity is chosen according to the criteria defined in Table 9.1, applied to those activities that correspond. If there is no majority of activities corresponding, then it will be checked whether the respective activities are really necessary for the reference process or whether they reflect national particularities of a single country.

- **Case 3: All activities are different** – This case is characterised by the fact

Table 9.1 Criteria for suggesting reference concepts

| Process 1 | | Process 2 | | Process 3 | Result |
|------------|-------------|------------|---------------|------------|---|
| activity 1 | = | activity 2 | = | activity 3 | The candidate reference activity corresponds to activity 1 which is identical with the other activities |
| activity 1 | \subseteq | activity 2 | $=/\subseteq$ | activity 3 | Activity 3 will become the candidate for the reference activity because it is the most general one of the compared activities |
| activity 1 | \cap | activity 2 | \cap | activity 3 | The least common subsumer ¹ of activity 1, 2 and 3 will become the candidate for the reference activity ² . |

= Equivalence

\subseteq Subsumption

\cap Overlapping

¹ The least common subsumer (also called least upper bound) of a set of concepts is the concept that results from the minimal generalisations of all overlapping concepts.

² Having one of the overlapping relationships replaced by equivalence or subsumption, the least common subsumer will normally be less general as in the case that overlapping concepts are found in all processes. Having only overlapping concepts, the candidate has to be checked more thoroughly and modifications will be more likely.

that there are no corresponding activities in all compared processes. A manual analysis would be helpful in order to analyse why there are such huge differences across the operational processes. Often slight modifications in the models can provide sensible results, for example, by generalising the values of the properties and therefore making the activity a little more general. Applied to a purchase process, the type of result of an activity might be defined in a more general way.

■ **Case 4: Unique activity** - An activity might only be available in a single process. In the cadastral domain, this is an activity that is really specific to the respective country and will therefore not be included in the reference process.

9.3.6 Evaluating the candidates

In the previous step, candidates have been suggested and correspondences were highlighted which should be further analysed. The candidates have to be approved by domain experts in order to become reference activities. Activities suggested as reference activities can also be modified before becoming reference activities or can even be rejected. In addition, domain experts must also have the possibility to manually add reference activities. However, if doing so, it must be verified whether this manually inserted activity complies with the activities in the national models or whether it contradicts them.

9.4 Examples from purchase processes

We will illustrate our approach with some examples from the ontology-based comparison of sale processes in Denmark and England/Wales discussed in the previous chapter. The examples sketch the way that candidates for reference

concepts are suggested according to the ontology-based methodology. We do not aim at obtaining a complete reference process but at giving an impression of the possible applications.

- Case 1: Correspondences between all activities – An activity for which a correspondence between England/Wales and Denmark is calculated by the reasoner is the payment of the purchase sum. We can assume that such an activity can be found in many countries and can be defined in similar terms. The functions of these activities are identical, or at least similar enough to induce a correspondence, namely to complete the exchange of assets. The results are similar and can be structured hierarchically in order to generalise from small differences, e.g. the money can be deposited in the deposit account of a third party such as a notary or can be sent directly to the seller. Therefore it is possible to automatically suggest a reference activity on the basis of the national activities such as the payment of the remaining purchase sum in England/Wales or the payment of the purchase sum in Denmark. The candidate for a reference concept will be an activity ‘PaymentOfPurchaseSum’ which abstracts from the question of whether the purchase sum is paid directly to the seller or to a deposit account. This is to say that the candidate has the most abstract result provided by the activities in the national processes.
- Case 2: Correspondences between a subset of activities – Considering the different national activities related to the signing of the sale contract, we could identify correspondences between activities in several European countries: the sale contract is signed at the same time by seller and buyer, often in the presence of some third party, like a notary. The signed sale contract is immediately legally binding. This is, for instance, the case in Denmark. In contrast to this approach, the case is different in England/Wales where it is difficult to identify a clear correspondence with the signing of the sale contract in the other countries: due to purchase chains, the contracts are signed at a different time by the involved parties and held back by solicitors until all contracts are signed. Then the contract is exchanged and only then does it become legally binding. So we have in England/Wales a specific case that differs from the ‘normal’ way of signing the sale contract. The identification of a candidate for a reference activity should be based on an analysis of what is done in the majority of the activities. Therefore the suggestion is oriented to the ‘normal’ case such as in Denmark and a candidate for a reference activity is ‘Signing the sale contract’ which results in a signed sale contract which is immediately legally binding.
- Case 3: All activities are different – Analysing the sale process in England/Wales and Denmark, we see that no correspondence is computed between the activities that secure the transfer of the property. Both countries do this in a completely different way: in Denmark, the title is conditionally registered, whereas in England/Wales, the buyer is obliged to pay a deposit.

Although the objective of both activities is similar, it is impossible to compute a direct correspondence because the results differ and both activities place different emphasis on who should be protected. Having to pay a deposit such as in England/Wales protects the seller, whereas provisional registration protects the buyer against fraud by the seller. In this case, a reference activity cannot directly be suggested. However, a rather general activity could be suggested that describes the securing of the process in an abstract way and which does not adhere to local particularities.

- Case 4: Unique activity – There is an activity which is characteristic for England/Wales but which is not typical for other European countries, namely the provisional mortgage negotiation. In this activity the buyer negotiates mortgage conditions with the bank. The negotiations result in a certificate that allows the buyer to start the complete sale process. This activity will not be suggested as a reference activity because it appears to be specific to England/Wales.

9.5 Conclusions

Ontological modelling technology has gained attention in recent years in projects related to the cadastral domain. For instance, the European Land Information Service project (EULIS)³ uses ontologies in the translation of cadastral information between European countries. The so-called EULIS Glossary defines core concepts and respective national translations. These definitions are used in the portal provided by EULIS which gives access to national cadastral information such as descriptions of land transaction processes (Tiainen, 2004).

In the COST Action G9, different applications of ontological modelling to the analysis and comparison of national cadastral data and process models have been developed. These approaches have in common that ontological models are developed which are more expressive than the object-oriented models that had been used before. For instance, in process descriptions, UML activity diagrams lack a way to specify the internal structuring of the different activities. This aspect can easily be expressed in ontology models. In addition, the analysis of models from the cadastral domain benefits from ontological reasoning. So the consistency of the models can be proven and facts are inferred. These inferences are for example used in the ontology-based comparison to calculate which activities in the national property transactions correspond to each other.

Applications of ontological modelling technology in the cadastral domain show their difference from RUP/UML. These technologies are tailored to sup-

³ <http://www.eulis.org>.

port software development projects from analysis up to implementation and testing. Ontology modelling, however, aims to bridge the gap between different projects and to capture data and process models that the different projects have in common.

This paper presented a methodology for an inductive, semi-automated development of reference processes for cadastral transactions. According to this approach, reference concepts are automatically suggested on the basis of the correspondences computed between national cadastral transactions by the ontology-based comparison as described in the previous chapter. This approach differs from the ontology-based verification of core model conformity (Hess & Schlieder, 2006) as the reference models are developed and not assumed as given. In conformity verification, the conformity between existing reference models and national models has been analysed. The underlying technology is similar: the models from the cadastral domain are represented as ontology models and ontological reasoning is used to support the respective tasks, namely the conformity verification and the design of the reference process. However, the results of the ontological reasoner are interpreted completely differently. In the case of conformity verification, a single national model is compared with the reference model and results have directly been used to make modifications in the national model or the reference model depending on whether the models were fixed. In contrast, in the development of a reference process, correspondences are compared across a large number of countries. National models are not modified but a reference process is extracted from the national models. The conformity verification can be used for extending a reference process that has been developed with the help of the proposed ontology-based methodology to a larger number of countries. This means that for a newly considered country, whether its property transaction conforms to the reference process will be verified.

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10 Hierarchies in subdivision processes

Gerhard Navratil & Andrew Frank

Abstract

Comparison of cadastral processes in different countries creates different results based on the level of detail. Sub-processes, which are comparable at one level of detail, may show significant differences when adding detail. In this chapter we investigate how to structure the processes hierarchically so that we can model and compare them.

The basic assumption to obtain a hierarchy is that we can separate objects of the real world, socially constructed objects, and intentions of cognitive agents. This separation emerges from the 5-tier ontology (Frank, 2001). In each of these tiers the subdivision is treated differently. We identify the differences between the tiers and show how to model the objects.

10.1 Introduction

Land administration requires different kinds of processes. Areas of land, usually called ‘parcels’, need an identifier to separate them from each other and to attach attributes to them. The parcel provides spatial reference for these attributes. One of the attributes is the legal situation: ownership and encumbrances. The processes are needed to update these attributes and to restructure space by changing the shape and number of the parcels.

Comparison of these processes throughout Europe is difficult. Even if the processes look similar on a general level they may become incomparable when looking at their details. This became evident during the comparisons performed within the COST action G9 (Vaskovich, 2004).

The goals of cadastral systems are similar in all countries: society needs a system providing information on land ownership and offering additional information required by other processes within society, e.g. taxation of land. The physical elements are similar, too. Land is the main focus of land administration and documents provide evidence. Still, there are major differences between the systems. Bogaerts and Zevenbergen presented a list of alternatives, which lead to different systems (Bogaerts & Zevenbergen, 2001). The choices determine the system and depend heavily on the philosophy of the society. Societies based on trust in the honesty of citizens create systems based on trust, whereas societies with less trust create more rigorous systems.

Zevenbergen presented a systems approach to deal with these differences (Zevenbergen, 2003). The comparison of processes requires a method to separate between elements that are equal in all systems and elements that are different. The method should have a clear concept of separation between those groups. The way the systems approach was applied did not provide

such separation. Therefore we use a hierarchical approach in this work. The hierarchy separates physical objects, social context, and actors. The hierarchy is based on the 5-tier ontology (Frank, 2001). Each of the hierarchical levels has a different structure. The physical objects follow physical law, whereas the social context is defined by social behaviour. Actors usually follow both physical laws and social roles. In addition, they have goals they want to reach. The physical laws are the same in all cadastral systems, whereas the social behaviour is different. This provides a strict separation, which can be used to structure the processes.

In Section 10.2 we start with a brief overview on the use of hierarchies in modelling. It shows the wide range of possible applications for hierarchies and shows our motivation to apply hierarchies for the problem at hand, the comparison of cadastral processes. Section 10.3 introduces the ontological framework and connects the problem of subdivision to it. The result is an ontological hierarchy of the subdivision process. Section 10.4 contains a discussion of the different levels of the hierarchy. An example for modelling the levels physical objects and social context in Section 10.5 shows the advantage of this separation when modelling systems from different societies. Section 10.6 discusses connections and dependencies between the levels and, finally, Section 10.7 presents our conclusions.

10.2 Hierarchies and their application

Hierarchies are a common way to structure information. Hierarchies provide a representation for different levels of detail or different viewpoints. Buildings, for example, can be represented in different levels of detail. The simplest form in 3D is a cube. Adding the general layout of the roof increases the detail. Further refinements may include roof details, façade structures, windows, doors, internal walls, interior decoration, etc. The different representations sorted by the level of detail contained by the model form a hierarchy. Buildings can be structured based on function, too. We can separate public and private buildings and further split the latter class into apartments, factories, and shops and offices. Finally, hierarchies can represent different steps in a process. The life of a building, for example, consists of planning, constructing, using, and removing the building. Each of these phases has a different treatment and legal terms. Since these phases structure the life of the building they form a sequence, which is a simple form of hierarchy. In the following Sections we will see examples for the application of hierarchies to structure knowledge.

An important application of hierarchies in computer science is storing spatial data in a database. File structures on the physical level of computer memory or hard disks are sequential. Thus, access times for elements in the database depend on the position of the element if the simplest access method,

sequential access, is used. In this case each access process starts with the first entry and the file is read until the needed entry is found. Indexing structures have been introduced to cope with the problem of access times. Spatial indexing is even more difficult than indexing in linear structures since there is no predefined order. One solution to this problem is the quadtree structure, where the area covered by the database is separated recursively into four parts. The advantage of hierarchical approaches for storing spatial data is their ability to focus on the interesting subsets of the data (Samet, 1990).

Maps are an example of a hierarchy based on the level of detail. The level of detail increases with the scale. A map of 1:10,000 contains more detail than a map of 1:25,000 or 1:50,000. The representation between these maps changes. Separate buildings may be represented by a common symbol or the shape of the building may be simplified. Sometimes buildings may be completely removed from the map. Timpf discussed these changes within the hierarchy for buildings and street networks (Timpf, 1997; 1998).

Hierarchies in wayfinding processes have been discussed extensively in literature. Timpf *et al.* (1992) described a conceptual model for wayfinding with three levels of abstraction. They separated planning level, instructional level, and driving level. The planning level uses abstract street graphs, where each intersection is represented by a point. The instructional level requires more detail to produce driving instructions. Lastly, the driving level uses direct observation to select a lane if there is more than one. The driving level deals with real objects whereas the other levels use abstractions of these objects. An ontology for this hierarchical process and a discussion on the connection to the granularity of graphs has been presented by Timpf & Kuhn (2003).

Car pointed out the influence of hierarchies in road networks on wayfinding tasks (Car, 1993). Generalisation of the methodology led to the theory of hierarchical spatial reasoning (Car & Frank, 1994; Car, 1997). An implementation of the concepts showed a considerable increase in performance for the computation of shortest paths if compared with the traditional Dijkstra approach (Dijkstra, 1959; Car, Mehner *et al.*, 1999).

Also closely connected to wayfinding processes is the mental map of the street graph. An empirical study by Casakin, Barkowsky, Klippel and Freksa showed that test subjects used main roads as a framework when asked to draw a schematic road map (Casakin, Barkowsky *et al.*, 2000). The test subjects had to eliminate roads to simplify the network. Most of the eliminated streets were unimportant streets such as dead ends. The test subjects avoided removing main roads. The authors concluded that the relative hierarchical level of roads influenced the inclusion or exclusion of streets and that hierarchy influences the mental representation. Voicu described a computational model for working with a hierarchical cognitive map (Voicu, 2003).

Hierarchies have also been used successfully to structure representations of space for building robots. Kuipers developed a spatial semantic hierarchy con-

sisting of the sensory level, the control level, the causal level, the topological level, and the metric level (Kuipers, 1996; 2000). The hierarchy consists of multiple interactive representations, both qualitative and quantitative. Each level has its own representation. This allows us, for example, to compose uncertainties into components that can be handled by the different representations. The concept has been used with different robots, as reported by Kuipers (2000).

The examples show that hierarchies are a useful tool for structuring information and decisions. Hierarchies are used to structure processes, representations and classifications. We have even seen evidence that the human way-finding process is hierarchically structured. Even ontologies, as the science of what is, use a top-level ontology and therefore a hierarchy to combine different ontologies (Smith, 2003).

10.3 Subdivision process in an ontological framework

Ontology is a specification of concepts that occur in a domain (Kuhn, 2000). It answers the question “what is here?”. While philosophers tend to find a solution to fit all situations, ontologies in computer science are used as a concept to describe models. Ontology here is a description of what is included in the model and what is ignored.

5-Tier Ontology

Frank proposed a tiered ontology to describe phenomena in the real world (Frank, 2001). The ontology consists of 5 tiers:

- Tier 0: Physical environment.
- Tier 1: Observations of the environment.
- Tier 2: The world of objects.
- Tier 3: Socially constructed reality.
- Tier 4: Subjective reality of cognitive agents.

Tier 0 describes the physical environment we live in. The underlying assumption is that there is only one single physical environment. Tier 1 contains the results of observing tier 0. The separation of these two levels dates back to the Greek philosopher Plato. Plato pointed out the necessity to separate reality from our knowledge of it. Frank assumes that each point in space and time has determined properties and that space and time are the fundamental dimensions of this reality. The observations and thus the knowledge about the world will be incomplete since it is impossible to observe all properties for all points in space and time.

Tier 2 deals with objects. Objects are defined by uniform properties for regions. Since the properties are observed in tier 1 the formation of objects

is based on that tier. A definition criterion for objects is that they continue in time. Temporal constructs for objects have been defined by Al-Taha and Barrera (1994), extended by Hornsby and Egenhofer (1997), and formalised by Medak (2001).

Tier 3 describes the socially constructed reality. Socially constructed reality is based on social processes, which may create external names. Examples of external names are 'Gerhard Navratil' and 'Andrew Frank', the names of the authors. According to tier 2 the authors belong to the classes mammal, human being, man, etc. This is not enough for social processes – the tax authority, for example, requires detailed identification in order to tax income. Society has therefore invented external names. Social rules may create facts and relationships between these facts. The facts are only valid within the context of social reality. One institution created by social reality is money (Searle, 1995). A piece of paper with specific properties counts as 'money' in the social context of 'Austria' and some other countries. Outside the corresponding social context this piece of paper cannot be used as money. This context may also change over time (try to pay today with 'Schilling', the Austrian currency until 2000). In general, the status of an object may change if it is used as a social object.

Lastly, tier 4 is the subjective reality of agents. Agents have to make decisions. They use their knowledge of the world to derive other facts and make these decisions. Agents acquire their knowledge gradually through observation. They observe reality directly and obtain observations indirectly from other agents by observation, e.g. by using maps, as shown by Frank (2000). Knowledge is therefore acquired gradually. This may cause problems if a phenomenon changes over time because the knowledge lags behind reality.

Subdivision process in the 5-tier ontology

Subdivision is only possible if we have objects that can be divided. Thus the process of subdivision can only take place in tiers 2, 3 and 4. We will start with the simplest form, the objects, and then move to the socially constructed reality and the subjective reality.

Subdivision of objects

Subdivision of an object is a process that splits an object into two or more separate objects. Such processes are well known for different kinds of objects. Objects like flour and coffee do not have a fixed shape; we take a quantity and separate it from the rest. The resulting objects again have arbitrary shapes. Objects like cakes, apples and pizza are different; we create physically separated objects by cutting the original object. The shape of the resulting objects is based on the shape of the original object. However, hard objects like apples tend to keep their shape better than soft objects like pizza. Thus a unification of the separated objects is simpler with apples than with pizza.

Subdividing a piece of land is similar to subdivision of apples but there are some important differences. Land is an immovable object. Subdivision of a piece of land must create different pieces of land and these pieces can only be recognised if the boundaries of the objects are clearly visible. It is not possible, as in the case of the apple, to move the piece of land so that the gap between the pieces shows that there are different objects. This must be done by visible marks like fences or walls. The boundaries, however, fit together perfectly. An example of such a subdivision is a horseback riding farm. It needs a large number of separated areas to let horses out of the stables while still keeping them apart to avoid fights. Separation may be carried out using fences.

Subdivision of socially constructed objects

Subdivision in the socially constructed context must be treated differently. A well-known socially constructed object is money. As a physical object, money is a printed piece of paper or a piece of metal with engraved symbols. Subdivision of a specific amount of money cannot always be done by separating two different amounts. Subdivision of a € 20 bank note into two equal amounts is only possible if there are two banknotes of € 10. Subdividing the banknote cannot be done using a pair of scissors and cutting it into two pieces. This would render the banknote invalid because none of the pieces would bear the necessary marks.

An important social construct for land management is the construct of ownership, which creates a link between an object and a person. The person has some power over the object if he is the owner. According to Austrian law, ownership is *‘the competence to rule the substance and the use of a thing ... and to bar anybody else from substance and use.’*¹ (§354, ABGB 1811). Subdivision of this construct is possible in two ways:

- The object is subdivided and each person becomes owner of one piece. This is possible if the object can be subdivided, e.g. ownership of firewood.
- The right of ownership is shared between the persons. This is necessary if the object cannot be subdivided in a useful way. Subdividing a car between two persons in a way that each person owns a part of the car is not possible if the car is to work properly.

Ownership of land can be subdivided in both ways. Shared ownership allows all owners to use the land. Additional agreements may regulate the use so that each of the owners can actually use the land. However, it is also possible to subdivide the land itself and create separate parcels. When speaking of subdivision of land we refer to the second possibility.

¹ Orig.: “Als ein Recht betrachtet, ist Eigenthum das Befugniss, mit der Substanz und den Nutzungen einer Sache nach Willkühr zu schalten, und jeden Andern davon auszuschliessen”.

Subdivision in the subjective reality

Subjective reality as a mental model of the world comprising knowledge, emotions and intentions may differ from the socially constructed reality in several ways. Firstly, subjective reality cannot be communicated directly. Frank discussed the difficulties of communicating knowledge for mental maps in navigation processes (Frank, 2000). The limited possibility to compare the subjective reality with the socially constructed reality leads to deviations between those two. Secondly, our knowledge about the world as a part of subjective reality may be incomplete or inaccurate and thus conclusions drawn from it may be wrong. A typical example of inaccurate knowledge is the assumption of a straight boundary line where other evidence, including cadastral maps, shows a curved line. The reason for the incompleteness and inaccuracy is that we gain knowledge by observation, which is subject to errors. Thirdly, our intentions are usually different from those of society. The subjective view has the benefits of the subject as the point of interest, whereas society tries to keep peace between the subjects forming the society. The target functions or intentions are thus different.

It may happen that subjective realities contradict each other. A boundary dispute is one such situation. Each subject has its own subjective reality and within this reality the parcel owned by the respective person has a specific boundary. Neighbouring parcels share a common boundary and must not overlap. Boundary disputes emerge if the boundaries derived from the subjective realities do overlap.

The intention of a subject within a subdivision process appears to be to perform the subdivision. This, however, is not completely true. The subdivision provides a benefit for the user and this benefit must comply with the intentions of the subject. Let us assume that the owner of a parcel wishes to build a house on his parcel. In some countries this may require a building permit, which is connected to fees whose amount depends on the size of the parcel. The owner will try to minimise the size of the parcel if saving money is one of his intentions. The owner will have to subdivide the parcel to fulfil his intention.

The owner of a parcel is typically not the only person involved in a subdivision process. Other persons may be neighbours, surveyors, lawyers, administrative bodies, etc. Each of these subjects has their own subjective realities and different intentions. The easiest cases are surveyors and lawyers: they want to earn money. In the other cases, hidden intentions may be involved. A neighbour, for example, may intend to build, too, and could require a specific shape and position of the boundary to do that. The process of subdivision must be structured in a way that takes care of all those intentions to fulfil the intention of society – keeping the peace.

10.4 The hierarchies for the subdivision process

As shown in Section 10.3, the result of a subdivision process differs between the ontological tiers. The important tiers are the world of objects, the socially constructed reality, and the subjective reality. The objects in the land administration are boundary markers, pieces of land, and documents as sheets of paper with text, graphics and signatures. The socially constructed objects are documents as legally valid contracts, parcels and rights. The result in the subjective reality is a change in the social environment that corresponds with the intentions of the subjects.

The results in the subjective reality can be created in different ways. The process in Slovenia is different from the process in Sweden and England. Descriptions of processes in various countries do exist (Dixon-Gaugh, 2004; Mikkonen, 2004; Sismanidis, 2004; Vaskovich, 2004; Zevenbergen, 2004). Questions can be used to structure the steps in the subdivision process. A simple list of such questions could be as follows:

- Do I need to tell someone that I want to subdivide? Whom?
- Do I need a document? Who may create it?
- Do I need a boundary description? How detailed? Who may do it?
- Do I have to consider encumbrances? How? Do I need experts?
- Do I have to consider other rules? Which ones? How? Do I need experts?

This list illustrates the complexity of the process. Different subjects may be included in the process to deal with specific parts. The answer to the first question, for example, may be to inform the land register. The land register (or the clerk who processes the case) is then a subjective agent with his own view. This view should correspond with the view of the land register as an organisation. Errors occur if the views do not correspond.

The answers to the questions also define the objects necessary for the process. The document itself is an object from the real world. A restriction concerning the possible creators separates the socially constructed object from the real world object. In the following Sections we assume that we need a document and this document must be registered to create a subdivision.

10.4.1 Creating the physical objects

The first task for subdivision is evaluating the extent of the piece of land under consideration (the object) as far as necessary. These boundaries are often fiat boundaries and need not be defined by qualitative heterogeneity (Smith & Varzi, 2000). Boundary markers may have to be located (by observation) and old maps may need to be inspected to check the position of these markers. The basic assumption here is that the physical reality does not change significantly between the placement of the boundary markers and the subdivision

and thus problems like landslide are ignored. Sometimes there may not be enough physical evidence to define the boundary. In this case an agreement between the involved landowners will be necessary to specify the boundaries and thus locate the social object parcel in the real world. Evaluating the extent of the parcel is thus a social process. The result, however, is a physical piece of land with its boundaries shown in the real world; as such, it is a physical object.

Subdivision of the piece of land must start from the marked points and the result is then fixed by placing new boundary markers. In a strict sense a subdivision splits a piece of land into several pieces such that the pieces can be treated separately, e.g. they can be sold. Excluding the case of shared ownership, the decision is made by a single person based on his intentions. The decision on where to place the internal boundaries thus includes no social agreement. These internal boundaries are then marked by placing walls, fences or stones connected by (invisible) straight lines. The process of subdivision thus creates separated pieces of land as real objects. The old boundaries have been defined by social processes and thus represent social agreement. The new ones are based on the owner's intention. However, the new pieces of land are not social objects yet, since social objects require the completion of a social process. In this case it includes documentation and (eventually) registration.

The creation of documents and descriptions may be necessary to provide evidence for the enforcement of property rights (Stubkjær, 2003). Seen as a physical object, a document is a sheet of paper with text or graphics on it. In the first case it is a text document, otherwise it is a map. Other elements like signatures or markings will be necessary to indicate the creators of the document.

Entries in databases and books are physical objects, too. A land register consists of a set of entries in a database representing the legal situation for each parcel. Traditional land registers use books and the entries are written in the book. Each entry is a part of the object 'land registry book' and can be seen as a separate object. Digital land registers use databases to store the entries. This changes the storage medium only. Since the medium still has a physical representation, the entries are physical objects.

10.4.2 Creating the social objects

The pieces of land created by subdivision as physical objects are not yet social objects. The piece of land is called a parcel if it is a social object. A parcel is the representation of a piece of land that is subject to any system granting ownership. The process of creation must be a process of the social reality. The processes of creating and changing parcels are the processes of the cadastre as discussed throughout the COST Action G9 project (Stubkjær, 2002). Applying these processes separates the social object 'parcel' from the physical object 'piece of land'.

In the previous Section the necessity of having documents was discussed. Documents contain elements like signatures, text, graphics and markings. Documents must be produced following legal procedures to become a social object. This includes the elements entered on the paper, the order in which the elements are attached, and the agents involved in the creation process. A document is valid if all requirements are met. A document where the text was added after the signatures, for example, will be illegal because the signatures prove that the signatory agrees with the contents of the document; this is at the very least in doubt if the text is added after the signatures. It may also be important that a notary, a licensed surveyor, or a court creates a document. For example, in Austria only a court may create documents for expropriation.

Finally, it may be necessary to have proof of the legal situation of a parcel. This can be done by registration in a public register. Acquisition of ownership on land in Austria consists of two steps: firstly, buyer and seller set up a sales contract and, secondly, the contract is registered at the land register. Only with the second step does the buyer become owner of the parcel (within the Austrian jurisdiction; in other jurisdictions ownership may be conveyed among the parties concerned). Another method would be having a document proving the right of ownership. The possession of this document proves the ownership if the document only exists once.

Each of these cases is regulated by society. Since social regulations are often written down in laws, these texts provide the basis for the processes. However, in some cases the practice emerges from missing legal regulations. Title insurance may be necessary to minimise the risk of the buyer if there is no official proof of ownership. Insurance companies try to minimise their own risk and thus collect purchase documents and other documents affecting ownership of land. These customs will not be defined in law texts, but in internal papers of private companies. Still, the buyer will follow the processes if his costs are less than the risk he takes if he does not follow the rules of the process.

10.4.3 Fulfilling the intentions

Systems within a society will remain stable over an extended period if they comply with the complex rules, norms and enforcement that constitute the institutional framework. Changes to the system typically consist of small adjustments to the institutional framework (North, 1997; 83). The framework is designed in a way that the actors involved gain from it. Although systems are not fully based on self-interest (Mansbridge, 1998), systems where only a few actors win are not stable. We must determine the actors in a subdivision process and look at their intentions to see where they benefit from the processes in a cadastral system. Since the systems throughout Europe are quite different, not all of the agents listed will be part of the process in each country.

Nevertheless we can distinguish four different groups of actors with different intentions:

- owner(s) and person(s) interested in purchase
- neighbours
- municipality and government departments
- experts.

The intention of the owner is to have separated parcels. The reason may be a planned sale, an intention that requires a person interested in a purchase. The owner starts a process that will eventually result in fulfilling his intentions, i.e. a process that produces separated parcels that he can sell. The user wants this process to be fast and efficient. The intentions of the user are thus fulfilled if the result of the subdivision process is a situation where he can do what he intended to do. Additionally, the costs of the process, both in money and time, should not exceed the benefits to the user. In Section 3.2.3 we used the example of the process of granting a building permit. The subdivision in this case is only useful if the reduction of the permit costs exceeds the costs of the subdivision.

The process of subdivision may involve the owners of neighbouring parcels. Subdivision may require a preceding agreement on the position of the boundary. This is only possible if the neighbours are involved in the process. The neighbours want to protect their rights, i.e. they want to protect the extent of their land. The neighbours define the extent of their land based on subjective knowledge. The intention of the neighbours is to protect the subjective position of their boundary.

The municipality wants land to be used effectively. Land is part of the production chain, in addition to capital and labour. In order to strengthen the economy of the area, all parts of the chain should be optimal. The municipality therefore tries to plan the use of land in a way that guarantees maximum effect.

Finally, there may be experts like notaries, lawyers, real estate agents or surveyors involved in the process. Their intention is to make money. However, they may also require the results of the process for future tasks. A surveyor, for example, may need the result of a subdivision process as a starting point for a further subdivision (cf. Stubkjær, 2004). Thus they require the process to be predictable to plan accordingly.

10.5 Formalisation of a real world and a socially constructed object

A formal description of real world objects and socially constructed objects will clarify the differences. The language used for the formal model is Haskell,

a functional programming language (Thompson, 1996; Hudak, Peterson *et al.*, 1997; Bird, 1998; Peyton Jones, Hughes *et al.*, 1999). The advantage of using a purely functional language is its mathematical correctness and possibility of execution for the result. As an example we will use the creation of documents both as real world objects and socially constructed objects.

Several actions can be performed with documents alone: we can create an empty document, add contents, inspect the contents, and destroy the document. The last action is not useful in the context of land registration because documents provide evidence of the legal situation and destroying the evidence will cause problems. The creation of an empty document is a simple action. Someone prepares an empty sheet of paper of the correct size and thickness. This is done by the function `emptyClass`. The contents are added sequentially by the function `addElement`. This task is performed by an agent as expressed in the signature of the function. The opposite action is inspecting the contents, which is provided by `getElements`. The result here is a list of elements with their respective creators. We assume that the order reflects the order of adding to the document and the first element in the list is the first one added to the document. Removing elements from the document may be possible but is prohibited if we want to create a legally valid document. Therefore we did not include a function `removeElement`.

```
class Documents a where
  emptyDocument  :: AgentType -> a
  addElement     :: AgentType -> DocElement -> a -> a
  getElements    :: a -> [(AgentType,DocElement)]

data ExpertType = Lawyer | Notary | Surveyor | REAgent

data AgentType = Owner | Neighbour | Municipality | ExpertType

data DocElement = Text | Graphics | Signature | Marking
```

The list of agent types is restricted to Owner, Neighbour, Municipality, and ExpertType in the formalisation. Experts listed in the model are lawyer, notary, surveyor and the real estate agent. Additional experts can be easily added.

The code above describes a document as a real world object. It does not yet include the conditions to be valid in a social context. The conditions were discussed in the previous Section. Three conditions must be met:

- all necessary elements must exist
- the elements must be applied in the correct order
- the creator of the document must be entitled to create such a document.

The operation `isLegalDocument` checks the conditions and returns a Boolean

value expressing whether the document is a legal document or not. The document receives the status of a social object only if it passes all the checks. The sequence of checks does not matter. Some checks, however, are easier to perform. The document is not legally valid if it fails at least one check. Therefore the simple checks may be performed first and the most complex checks at the end. This would eliminate illegal documents as early as possible. The following code shows a formalisation of the checks.

```
class (Documents a) => LegalDocs a where
  isLegalDoc      :: a -> Bool
  isLegalDoc d = correctCreator d &&
                  correctContents d &&
                  correctContentOrder d

  correctCreator      :: a -> Bool

  correctContents     :: a -> Bool
  correctContents d =
    ((elem Text cont) || (elem Graphics cont) ||
     ((elem Text cont) && (elem Graphics cont))) &&
    (elem Signature cont) &&
    (elem Marking cont)

  where cont = ((map snd).getElements) d

  correctContentOrder :: a -> Bool
  correctContentOrder d =
    ((remDup.(map snd).getElements) d == [Text,Signature,Marking]) ||
    ((remDup.(map snd).getElements) d == [Graphics,Signature,Marking])

  remDup :: Eq a => [a] -> [a]
  remDup [ ] = [ ]
  remDup (x:xs) = x:(rd' x xs) where
    rd' l [ ] = [ ]
    rd' l (a:as) = if a == l then rd' l as else a:(rd' a as)
```

Checking the creator of the document varies significantly with the country and the type of document. In Austria, a subdivision including the creation of an easement requires a surveyor and a notary. The licensed surveyor documents the subdivision, while the notary creates the easement. This is not valid, for example, for Sweden, where the surveyor performs both tasks. Thus the implementation must be done in an instance where the model is applied to a specific jurisdiction.

The contents are similar in all types of legal documents. There must be either text or graphics or a combination of both. This is checked by the expression

```
((elem Text cont) || (elem Graphics cont) ||
((elem Text cont) && (elem Graphics cont)))
```

in the function `correctContents`. In the case of textual and graphical representation both parts must be congruent. In addition, the document must contain signatures and the markings of the creator.

Checks on the document contents can only check the completeness of necessary data and the logical consistency. It is possible, for example, to check the existence of the necessary data on boundary markers. One test may be to check whether it is specified what kinds of markers have been used. It is not possible, however, to check the correctness of the data without comparing the document with reality. If the document has stones as boundary markers, a formal check cannot decide whether this is true and if the stones are in the correct position. This is the reason why the signatures and markings of the creator are important since he guarantees the factual correctness of the document.

Finally, the elements must be added in the correct order. Text and graphics carry the message of the document. Therefore they must be added first. Later the document is signed by all involved parties, expressing their agreement with the contents. The markings must be added as the last step because the creator of the document is responsible for the correct creation process and thus he finishes the process by providing a marking. The order is checked by `correctContentOrder`. Since each element may occur more than once, e.g. different pieces of text added by different persons, duplicates are removed by applying `remDup`. Different occurrences will be reduced to a single occurrence and the test will fail if, for example, text has been added after signing the document.

The other objects from the real world and the social realm can be modelled in a similar way. It is a two-step process for each object: first, the model defines the real world object with its properties and then the conditions for the social object are applied. This separation shows the difference between physical requirements and social context.

10.6 Conclusions

We have seen that the process of subdivision in the land administration domain consists of several tiers. On the tier of physical objects, pieces of land are subdivided by erecting fences or other barriers. Other physical objects involved are documents, databases and books, and the entries in them. On the tier of socially constructed objects the physical objects must fulfil special re-

quirements and then receive a new status. A piece of land, for example, becomes a parcel when the social process of subdivision is complete. Finally, the result of the process must fit the intentions of the actors.

The processes within these tiers are different. Cutting a € 20 banknote in two pieces creates two different physical objects. The process of subdivision is completely different if we consider that the banknote is a socially constructed object, too. The process of splitting the banknote into smaller pieces works differently.

A comparison of the processes throughout Europe shows similarities and differences on the ontological levels. On a physical level the processes are comparable throughout Europe. The process of separating areas in a horse-back riding farm is the same in England, Sweden and Slovenia. The differences between subdivision processes occur only on the social level. The construction of society influences the processes by defining the methodology used. The level of cognitive agents combines both aspects. Cognitive agents have the same intentions everywhere in Europe; they want to secure their rights on land. The number and type of agents involved in the process varies since in some countries notaries do not exist or some experts perform tasks that are shared between agents in other countries.

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Part 5

11 The real property and general boundary system of England and Wales

Robert Dixon-Gough & Glyn Hunt

Abstract

The 'English' development of the concept of real property and boundaries has been a gradual process in which the general boundary system evolved from that of an indication of land ownership to that of urbanised real property ownership. The paper describes how the 'English' system has evolved, largely as a result of continuity but also through the inability of Parliament to act as a catalyst for fundamental change in the ways in which boundaries are defined. Even though the majority of boundaries in England and Wales are now in urban environments, the system used to define the extent of real property still has its roots in the agrarian or 'power' function of boundaries that delineated land ownership. This contrasts strongly with a 'mathematical' or numerical concept of property and boundary that might be found in, for example, most other German-speaking (and French-speaking) jurisdictions and indeed, most of the former colonies and dominions of the British Empire.

This paper traces the evolution of the boundary in the rural and urban landscapes of England and Wales and the transformation of the function of that general, agrarian boundary from land ownership to real property ownership. This has been achieved without any change in the definition and nature of the boundary largely through the combined processes of gradual political, social and economic evolution that has left the nation with a boundary system technically unsuited to an urban environment, difficult to legally administer through a land registration system, and difficult to define by a national mapping agency that has a functionality only of recognising and surveying physical boundaries.

However, despite the fundamental problems inherent in the general boundary system of England and Wales, it has proved to be sufficiently robust in nature for it to be transformed from an agrarian and 'power' function to that of a boundary between high density, real property units in an urban environment with the minimum of boundary disputes. Furthermore, it is functional and relatively cheap to maintain and, under the normal considerations of design and functionality, still very much fit for purpose.

11.1 Introduction

Boundaries are fundamental and essential elements of real property, and are embedded in the British landscape largely as a result of the continuity of land ownership. They can vary between 2D or 3D constructs that are either visible or invisible, but remain important bounds in the definition of real property. Furthermore, they are indicators of rights and responsibilities relating to land and property, and as such are essential components in the transaction of real estate properties. Throughout the UK, boundaries are thought of as physical barriers, having evolved from their original roles in restricting livestock movements, to newer responsibilities as urban residential properties' divisional

lines. Thus, a once agrarian function has now become a function of land ownership. The physical boundaries in both rural and urban areas of the UK exist as landscape elements in a wide variety of forms or combinations of forms, which might include hedgerows, lines of trees and shrubs, stone walls, earth banks and grass strips (Petit et al., 2003).

Such boundaries can be found in many parts of the world, and historically they represent a long-term interaction between agrarian communities, land ownership and their environments (Burel, 1996). However, in most parts of the British Isles such boundaries have been replicated in urban and residential environments, with the result of fundamental confusions concerning both the nature and spatial definition of that boundary. Thus, in both rural and urban areas of the British Isles, boundaries play a significant role in the cultural (Rackam, 1984) and political landscape (Barr & Parr, 1994).

11.2 The evolution of boundaries, property and land ownership in England and Wales

In the jurisdiction of England and Wales, the word 'boundary' has no special meaning in law. It is primarily related to the bounds of land ownership and, as such, it is understood in two ways. The regions' agency primarily charged with these concerns defines these as follows (LR, 2004):

The legal boundary - is a line, which is not visible on the ground, that divides one person's land from another's. It is an exact line having no thickness. It is rarely identified with any precision either on the ground or in the deeds.

The physical boundary - is a feature such as a fence, wall or a hedge.

The legal boundary may be intended to follow the physical boundary but this is not always the case. For example, the legal boundary may run somewhere within a feature or along one particular side of it, or beyond its near or far side, or include any or part of an adjoining roadway or stream.

This concept of a boundary generates problems in a (i.e. British) society where power and land ownership is inexorably intertwined. Furthermore, it is the result of a gradual evolution whereby boundaries effectively became the demarcation zone between centres of power rather than land ownership. Since there has never been any fundamental catalyst for change, the system has gradually been allowed to evolve from 'seats of power' through to the ownership of individual 'real estates' in the form of boundaries between houses or apartments. Taken in their historical context, boundaries throughout England and Wales were either physical enclosures created as a means of preventing the

movement of either livestock or humans, or demarcations between geographically-related entities (e.g. rivers), which may or may not represent ownership or seats of power. However, changing social values and attitudes throughout the British Isles have gradually led to changes in the perceptions and rules of land ownership, whilst the institutionally-based, regulatory framework defines the nature of the property itself (Dixon-Gough & Deakin, 2003; Dwyer & Hodge, 2001).

Cosgrove (1998) takes this concept of changes in social values and attitudes further and examines the wider historical connotations of this evolutionary process. Partly as a result of the Crown's military interest in naval rather than land power, and as a logical consequence of England's geographical position, the role of the English aristocracy as a military land-owning class had diminished by the sixteenth century (for the sake of brevity, 'England' here includes its neighbouring Welsh principality). Furthermore, wealth during this period increased in importance, crucially not being linked to land ownership but rather to success in trade or commerce.

... the English land owning class ... was unusually civilian in background, commercial in occupation and commoner in rank (Anderson, 1974: p. 127)

Thus, the English relationship between land ownership and commerce was unique in much of continental Europe. This was largely the result of England's substitution of naval power for land warfare, which effectively eliminated the main role of its feudal aristocracy – that of the provision of land armies. Furthermore, this naval policy meant that the tools or skills of force could alternate between military and commercial use. As a result, land ownership and power evolved into a symbiotic system whereby the enclosed estates of the aristocracy (often on former monastic land) produced wool, which was then purchased by merchants and traded using English ships with continental Europe. In conjunction with colonial possessions, the strength of England's merchant shipping assured stability to both the landowners and the commercial classes. With time, the commercial classes gained the respectability and trappings of the aristocracy together with the culture of land ownership. Because of these factors (and the wealth generated through colonial expansion and trade), mortgages could be raised on land, providing means for both consolidating land holdings and for agricultural improvements. Also, neither the landowners nor their tenants experienced the tax burden necessary to maintain large armies. These factors led to the concept of a boundary becoming integrated with that of property ownership, with the latter taking priority over the former. This occurred in a society where land ownership represented a far greater level of power than the military establishment, the government, and (to a further extent) the Crown.

Although the power of landowners with huge areas of land gradually dimin-

ished, the decline took place during a period of time in which other significant social and economic changes were also taking place. Placed in this context, the transfer of land from some large landowners to individual family farms had little effect upon boundaries *per se*. For example, in England and Wales the percentage of agricultural land leased by farmers reduced from 85% in 1885 to 33% in 1997, with boundaries (as parcels of land) remaining intact, whilst permitting the subdivisions of larger estates into smaller, family-owned units. Cannadine (1992) identifies two key elements of this gradual process in England and Wales, which have their origin in political and social changes.

Firstly, there is a strong correlation between the Voting Reform Act 1885, which extended passive voting rights to farm workers and tenants, resulting in a significant decline in the number of landowning Members of Parliament. This permitted policy changes in taxation and land rights to be enacted to the benefit of tenants rather than of landowners. One of the effects was the introduction of income tax to landowners, and a shift of tax burdens from the tenants to the landowners. Finally, inheritance taxes were introduced on land holdings in 1895. This redistribution of tax burdens from tenants to landowners reflected the changes in the balance of political power. Furthermore, as the influence of the landowners in Parliament declined, the inheritance taxes increased correspondingly. By 1919, only 10% of parliamentary seats were held by landowners and inheritance taxes had increased to 40%. In 1930, the inheritance tax was increased further to 50%, rising to 60% in 1939. Thus, as the influence of the landowners in Parliament declined, inheritance taxes increased correspondingly.

Secondly, there was a gradual change of ownership rights/land policies in favour of tenants and to the expense of landowners. Until 1875, a landlord could evict tenants without compensation, and furthermore could dictate the way in which the land was farmed. The evolution from leased land to privately owned land was slow until 1914. But this slow and gradual transition enabled the former tenant farmers to adjust to the demands of private ownership.

It is also important to note that land ownership and power are, in effect, a multi-layered sum of economic variables and cultural values that change with time and place, with either economic or cultural values being dominant at various periods throughout history (Daniels & Cosgrove, 1988). The temporal/spatial changes of economic variables and cultural values, when combined with either economic or cultural values, was defined by Hoskins (1970) as the stable layers of historical accretion. It is summarised by Williams (1973) as follows:

... in the final analysis we must relate these histories to the common history of a land and its society.

This historical evolution of boundaries and land ownership in England and Wales must be examined in the context of evolutionary patterns and these patterns' modern-day implications, since there is a considerable body of evidence that suggests that many of the present land and property boundaries can be dated to the pre-medieval period.

11.3 The medieval landscape of boundaries

Field systems have been imposed upon the British landscape from Neolithic times and their boundaries were physical and took the form of earthworks (embankments and ditches). The characteristic hedgerow evolved in a widespread manner when the enclosure of the open field system commenced during the late sixteenth century. However, it is difficult to date this evolution precisely since the process of enclosure was slow and regional. Furthermore, in some parts of Britain stone walls were used instead of hedgerows, as in northwest England, where field boundaries were established during the seventh to ninth centuries as hamlets and settlements became established in sheltered valleys. Rocks were cleared from the land and used to make small enclosures for the protection of livestock close to farms (Williamson, 2003).

By about 1500, many of the monastic livestock farms of the thirteenth and fourteenth centuries had been leased to tenant farmers, and the plots were subdivided into smaller units that corresponded to an increase in the population living in the smaller hamlet communities (Winchester, 2004). In the period between 1540 and 1640 there was a significant change in the nature of hill farming, which included both the beginning of commercialisation and the enclosure of pasture (Winchester, 2000b), leading to a transformation of many upland valleys from hunting forests to pastoral landscapes.

It is beyond doubt that boundaries existed during that period. For example, in northwest England, there is documentary evidence of arguments over boundaries that resulted in mediation followed by careful delineation. A reference from 1605 [CRO(K): 1] referred to 'ould markes and mears' (old marks and boundaries) and the prohibition against using any 'outrake' (rights of passage or communal paths from the enclosed land to the communal land) other than those used 'time out of mind' (beyond living memory). This appears to indicate that some form of land division had taken place some considerable time before. Furthermore, tenants were ordered to 'mylke and foder within theyre own boundes according as they have done heare to fore' (milk and feed within their own land as they have done before) [CRO(K): 2]. To ensure that tenants kept their animals within the area in which they lived, boundaries were made permanent through the erection of dry stone walls (Parsons, 1993).

Parsons (2002) also describes the administration of such areas during the sixteenth century and it is interesting to note that such systems prevailed

in this region until the mid-eighteenth century. Most communities in the region were anxious to exclude outsiders, even the Lords of the Manor who, technically, owned the land. The particular settlement Troutbeck, described by Parsons (2002) was essentially administered by twelve jurymen who not only reported to the manorial court but also effectively ruled the settlement, despite its theoretical subordination to the manorial court at Windermere. The communal tenure that was unique in this region of England meant that the tenants could sell their tenancy, subdivide it, and bequeath it to their heirs. This system of communal farming gave all tenants a choice to participate in its supervision, to bring about necessary changes, and to elect the twelve jurymen. Disputes were settled by arbitration, with any economic advancement tending to be held in check by partible inheritance, i.e. the division of the holding amongst heirs.

An example of the independence of tenants is given by Parsons (2002) who describes a case during the seventeenth century when a family constructed a weir above a mill to increase the flow of water for grinding cereal crops. This impeded the movement of trout and salmon to Windermere (a lake), which resulted in the family being called to the Court of the Exchequer (the manorial lord being King James I). This was successfully contested by the family, with the support of their community, since the king was attempting to alter the favourable nature of their communal tenure.

By 1686, market opportunities were making it increasingly difficult to maintain the communal system of farming and tenants began to enclose parcels of land. This was acceptable up to a point although in the late 1600s other tenants instigated a case in Chancery against the family for 'oppressing' the communal pasture and contravening custom for their own private gain (Parsons, 2002).

Further examples of enclosure are given by Winchester (1987) who cites the case of a commission (1571-1572) that was appointed by the Bishop of Carlisle to enquire into enclosure in the Forest of Westward (an area of common pasture). From the evidence presented it would appear that 127 enclosures, containing an aggregate of 545 acres, had been affected, which presumably meant that 127 new tenants of an average area of 4.5 acres had been created. Houses had been built on 32 of the enclosures and 205 acres allotted to them (each having on average 6 acres). The remaining area of about 430 acres had been allotted to tenants having ancient farmsteads.

By the beginning of the seventeenth century it was becoming common practice for tenants to surround their smaller fields with a physical boundary (either a hedge or a stone wall) and thus the landscape was beginning to assume its current appearance (Bouch & Jones, 1961). By 1600, enclosed fields existed in at least 220 townships out of 288 in Cumberland, where they covered about 15% of the total area (Elliott, 1960). Similar examples may be found elsewhere in the Lake Counties and have been described, for example, by Simpson (1929), Porter (1929), and Butler (1929).

During the pre-industrialisation period, town and country were connected economically, socially and politically (Slater, 2000; Dyer & Giles, 2005). During the medieval period boundaries around towns were tightly constrained since it was important for the Lords of the Manor to be able to distinguish freehold tenants in the town from those holding land by rights of service in the countryside. Bailey (1993) has identified that many of the boundaries revealed in the First Edition, twenty-five miles to the inch plans of 1880 (1:2,500) were derived from unenclosed open field strips and many of the subsequent property boundaries run unbroken from the street front to the rear of the plot (Seddon, 1999). Once urban property development had begun, each owner was responsible for his own subdivision, but most looked to their neighbours to determine a common back boundary and a reasonable breadth for each property. The plots in many medieval towns were very long, regular in width, and appeared very much like agricultural strips (Beresford & St. Joseph, 1979), which might have begun life as fields, land or pasture used by the first- or second-generation town dweller and later transferred into a more urban form. Furthermore, as settlements developed they were rarely the result of 'planned' urban development and a pattern of growth that followed in a piecemeal fashion, following field boundaries as small parcels of land were used for building.

11.4 Formal enclosure

Agrarian improvements in England and Wales were, in effect, a combination of changes in farming practices and fundamental institutional procedures, the most important being the processes of enclosure and the consolidation of holdings leading to increased farm sizes. As discussed above, most of the English landscape had been enclosed by 1700, and even as early as 1500 much of the land was held 'in severalty' (i.e. in walled or hedged fields, leased or owned by a single person). Most of the unfenced grazing areas were on agriculturally-marginal land (Williamson, 2002). The process of enclosure (or inclosure, as it was known until the nineteenth century) involved converting such land into private property, which could be achieved in one of the two ways outlined below.

Chronologically, the first type was through piecemeal enclosure, which involved a process of land consolidation whereby either through purchase or exchange, groups of adjacent strips of land came under single ownership. The new plots were consequently enclosed by a hedge, fence or wall (Yelling, 1977). Much more involved and complicated was the second process of general enclosure, which required the cooperation of all landowners to reshape and enclose the land, including any open or township fields. Very often, general enclosure followed a period of piecemeal enclosure.

During the medieval period, the influence of the landowner over his tenants had been weak since it was based upon the feudal system in which rent had replaced services and was administered through the Manorial Courts, which normally found in favour of the tenant rather than the landowner (Winchester, 2003). Furthermore, there was extensive reliance upon communal rights of common land and the open field systems of agriculture. Largely as a result of the way in which the tenanted and communal land was administered through the Manorial Courts, the tenants had virtually total control over their land and the way in which it was farmed and, during this period, referred to by Allen (1991) as the 'Yeoman Revolution', the significance of the role of tenants was reflected in the expression 'Statesman' used to describe tenant farmers in the remote parts of northwest England (Martins, 2002).

The 'English System' of land ownership was noted by Arthur Young (cited in Lake, 1989) when, during his travels throughout France at the end of the eighteenth century, he remarked that:

*Banishment alone will force the French to execute what the English do for pleasure
– reside upon and adorn their estates.*

This comment referred to the strength of the landlord-tenant relationship, which continued until the great land sales following the First World War. This concept is referred to by Martins (2002) as the 'English Model Farm' in which the landowner applied technical innovations to the improvement of their estates, the well-being of their tenants, and to the enhancement of the social standing of agricultural interests. These ideals included the maintenance of hedgerow boundaries for the protection of game and to provide 'challenging jumps' for both individual horsemen and packs of hounds. Wholesale redesigning of the landscape, based upon the philosophy of 'beauty and reality', blurred the line between 'aesthetic park' and 'functional landscape' (Martins, 2002).

The relationship between landowner and tenant was one that evolved in England and Wales both in the way the land was held and in the way in which the rural landscape developed. This led to a more formalised provision of capital in which the landowner provided the fixed capital for the buildings and structure, whilst the tenant provided the capital for the working of the farm and the maintenance of the buildings and infrastructure. Throughout the eighteenth century (the primary period of agricultural improvements), the relationship between landowners and tenants changed from customary tenants to leasehold, in which the majority of farms were held on fixed-term leases that specified the way in which the land was to be farmed. Most common rights were eliminated and many of the communal common lands were enclosed and assigned to private ownership. This change gained impetus during the nineteenth century, as agriculture became more commercial in

response to the growing urbanisation of England and Wales, and the industrial revolution. It was, in particular, aided by three factors (Martins, 2002):

- the decline in customary tenancy in favour of leasehold;
- the establishment of private property rights replacing communal systems;
- the development of individualistic commercial farming.

These factors increased the influence and control of the landowner over his tenants and provided him with a financial incentive for improvement.

During the eighteenth century, this was reinforced by the institutional procedures of Parliamentary Enclosure (Turner, 1980, 1984; Mingay, 1997). Following the General Enclosure Act 1836, landowners who owned the majority of land in a township (generally 75%) could apply for a Parliamentary Act through a special process known as a Private Bill. The heyday of Private Bills is reported at around 1840 when about six or seven hundred such acts, many containing several clauses – primarily for massive railway infrastructure developments – were passed through Parliament in a single session [CEM, 1975: 9]). Once the act had been passed, the land was surveyed and allocated according to an Enclosure Award.

The process of enclosure, including the establishment of new farms and buildings in the enclosed areas, was expensive but had almost immediate benefits concerning the productivity of the land and inevitably resulted in an increase in land rents. An additional benefit of enclosure was that the landscape could be made more attractive and aesthetically pleasing and whilst increasing the landowner's power over the farming system, it also increased the tenant's independence from the constraints of a communal system. The process of enclosure was concentrated in peaks that coincided with external events, such as the wars with France between 1793 and 1815. In northern England, there was an additional peak that occurred in the mid-eighteenth century to cater for the needs of a growing, industrialised area (Collier, 1991). However, Mitchell (1994) considered that the enclosure movement and the accompanying dispossession of the English peasantry were, in effect, an internal colonisation in the home country.

As cereal prices declined during the 1870s, landowning ceased to become a wealth-producer, whilst simultaneously, the social and political influence of the landowning families decreased. The introduction of the Agricultural Holdings Act 1885 established a legal basis for tenants' rights and gradually the domination of the landowner declined in rural areas.

The processes of the parliamentary enclosure movement and its relationship between boundaries in the landscape and property ownership are exemplified by the situation in northwest England. The group of landowners taking leading roles in the parliamentary movement that swept this area between 1750 and 1830 were largely the customary tenants (Searle, 1993). By the mid-eighteenth century, the growth of cattle droving (moving cattle southwards

to the urban markets) was causing overgrazing of the commons. This placed unsustainable pressures upon the commons and wastes of the region to a point where the system of collective regulation (i.e. the manorial courts) was almost completely undermined. As a result, both small and large landowners accepted that the enclosure of the commons would provide greater control over their 'shares'. Throughout the region, the once strong cohesion of the manors and groups of customary tenants concluded that it would be in their best interests to become absolute owners of their hitherto communal lands.

Upland parliamentary enclosure tended to occur during the nineteenth century – during the latter stages of the movement for two reasons. Firstly, the potential value of the land was low and the problems of enclosing and reclaiming the land were quite high (Chapman, 1987). Secondly, the movement spread from its core in the east Midlands and thus the process reached the upland areas relatively late (Chapman, 2004). Although enclosure of common had taken place since medieval times, the principal difference between the earlier enclosure process and that carried out from the eighteenth century onwards was the scale of the process and the way in which it was carried out. Between the fifteenth and nineteenth centuries, local people and incomers had gradually enclosed small, irregularly sized fields from the commons and wastes, and these are still very much in evidence in many valleys of upland England (Denyer, 1991). They would frequently take the form of oval enclosures on hillsides, or approximately parallel boundaries that opened up as they reached higher ground (Winchester, 2000a; Whyte, 2003).

Of some 7.25 million acres (2.94 million ha) in England that were enclosed through Parliamentary Acts, about 2.3 million acres (0.93 million ha) were either common land or waste (Whyte, 2005) and much of this was in the upland areas of northern England. Wild and remote upland areas were surveyed and carefully subdivided into enclosures, with long straight boundaries (often constructed of stone). This was the final stage of the Parliamentary enclosure movement, which commenced in the lower, more fertile regions of England (Buchanan, 1982). More positive reasons for enclosure in the region included:

- the improvement of land to increase grain production for an urbanised workforce;
- the encroachment by workers in the new, industrialised towns for the construction of cottages (Broadbent, 1997);
- the potential of making profits by selling off land for villa development around potential leisure areas (Whyte, 2005).

The boundaries of upland enclosures were characterised by wide straight roads and rectilinear enclosures that could run up hillsides, regardless of topography and physical features. Awards could specify the height and width of the boundary, which were carefully demarcated by surveyors and rigorously

checked once built. A standard parliamentary enclosure wall would require 13 tons of stone for each rood (area of $\frac{1}{4}$ acre, equivalent to 1011.68 m²). Also associated with the process of parliamentary enclosure was the construction of new farmsteads, particularly when the new consolidated lands lay some distance from the nearest settlement. It was more usual to construct barns or outbuildings for storage or the shelter of livestock within the newly enclosed land, because of the cost of farmsteads' construction, estimated by White (1997) to be in the order of £1,000 at the beginning of the nineteenth century.

Following the enclosure of the commons and wastes of England and Wales, the boundaries and the patterns of land ownership that currently exist largely remained unchanged. This has been a process of gradual evolution, with many of the physical boundaries that exist in the landscape having been in place for over five hundred years. Furthermore, many of the boundaries that exist in rural areas are wide and complicated in nature, often consisting of a combination of a physical barrier together with an adjacent ditch. Whilst these boundaries are perfectly adequate in a rural environment, they have formed the basis of boundaries in more urban areas, in which the concept of a boundary between residential properties, for example, remains identical to that used to prevent livestock from straying between two adjacent fields. Furthermore, it has not been possible for the national mapping agency to differentiate between the two types and function of boundaries in England and Wales.

11.5 The role of the ordnance survey

During the latter part of the eighteenth century, official mapping had fallen behind that of other European countries and even parts of the Empire such as India. The late introduction of the British Government to official land mapping may essentially be due to the fact that Britain considered itself to be a maritime rather than land-based nation, but also because land mapping needs were largely satisfied by the range and quality of commercially available maps and surveys (Seymour, 1980:1). The formation of the Ordnance Survey began with an 1841 Parliamentary Act to:

...authorize and facilitate the Completion of a Survey of Great Britain, Berwick upon Tweed, and the Isle of Man. [VR, 1841: p. 285]

This coincided with a period of great improvement in Britain, all of which required accurate maps, including the Enclosure Movement, the construction of roads and canals, and massive urban development brought about by the industrial revolution. The final impetus for the evolution of the Ordnance Survey as a national mapping body came with the military need to counter the

threat of invasion from France in the late eighteenth century. This, for a large part, dictated the nature and the content of Ordnance Survey maps until the latter part of the twentieth century. Close (1926) considered that at the formation of the Ordnance Survey and in particular when the surveys began to be conducted for the large-scale maps, it was accepted that it was a:

...good, practical rule, not, in general, to show invisible boundaries, and it has resulted from this rule that property boundaries, as such, are not shown at all. But since property boundaries depend on fences, walls, hedges and similar visible objects, there is no difficulty in using Ordnance maps as property maps, indeed they are universally used for this purpose; although the hedge or fence may not be a boundary proper, which often, indeed usually, run few feet distant from, and parallel to, it. (Close, 1926: p. 113)

The original scale chosen for Ordnance Survey maps was one mile to the inch (1:63,360), which was later supplemented by the six inches to one mile (1:10,560). By the mid-nineteenth century disputes within the Ordnance Survey, supported by engineers and agriculturalists, centred on the requirement for a larger scale map than the 1:10,560 (Seymour, 1980: p. 169). Winterbotham (1934: p. 15) considered that 90% of its advocates based their arguments on its use for land registration, conveyancing, land valuations, and ratings (local land taxes). However, this proposal proved a dichotomy – it had to remain the Ordnance Survey's base source of topographic mapping whilst adequately providing for cadastral surveying. In short, the proposal failed since it failed to satisfy the rigorous requirements of a cadastre within Britain.

The various acts relating to Land Registration within the jurisdictions of the UK are discussed by Dixon-Gough and Deakin (2003). However, one particular act is of relevance to the role of the Ordnance Survey as a potential cadastral mapping organisation. The Land Register Act 1875 made the provision that the Land Registry should be based upon a public map to which private maps could be related. Furthermore, the Ordnance Survey 1:2,500 map, where available, was specified as the public map. In addition, this Act also introduced the concept of the general boundary and removed the insistence that the division between two properties should be precisely defined. In this context, a Select Committee of the House of Commons sat in 1878 and recommended that the 'completion of the Cadastral Survey of England and Wales' be completed 'immediately' (Seymour, 1980: p. 178).

However, one of the problems of utilising the Ordnance Survey large-scale maps as cadastral maps rested on two significant matters of substance. Firstly, there was the ability of the Ordnance Survey with its multiplicity of tasks to produce up-to-date maps when required by the Land Registry. Secondly, there was the inability of the military-trained surveyors to understand the requirements of the Land Registry and, in particular, to interpret deeds on

the ground. Both matters could have been resolved, but the concept of the integration of a Land Registry Map Department within the Ordnance Survey foundered largely as a result of inter-departmental rivalry but also because adequate funding was never made available by the government (Seymour, 1980: p. 199).

This is, at present, how the situation still stands. Despite the fact that all large-scale Ordnance Survey plans are now fully digitised and, thus, all parcels recorded on the plans are recorded in the form of National Grid coordinates, the maps may still only be used to record general boundaries.

However, with the Land Registration Act 2002 that came into force in October 2003, it is now possible for owners (with the agreement of their neighbours) to have their mutual boundaries determined to within a few centimetres at the Land Registry (Powell, 2005a). This is referred to as Determined Boundaries and will be recorded as such on the title documents of the properties.

11.6 Conclusion

Within the jurisdictions of the British Isles in general and England and Wales in particular, physical boundaries, largely for agrarian functions, have developed over a continuous period of some 5,000 years. However, since the development of those boundaries was essentially for agrarian purposes, the most important defining element was the ownership of land rather than the precise nature of the boundary. Certainly, for almost the entire period of the existence of boundaries within the British Isles, land ownership was the true measure of power and of wealth. Furthermore, this concept of a boundary as being a physical division between adjacent properties rather than a legally defined boundary persisted through the processes of urbanisation, particularly in the case of the jurisdiction of England and Wales.

Over the past 200 years, there have been attempts to formalise the boundaries but these have foundered largely through a lack of will by the government to make a legal definition of a boundary, and through the lack of funds that have prevented the Ordnance Survey and the Land Registry from developing a true cadastral map. Currently, it is estimated that the land in England and Wales is split into about 21 million land parcels. A 2005 estimate of the cost for providing all these with precisely coordinated legal boundaries was £42,000,000 (Powell, 2005b). Although the status quo appears to be deadlock, it is conceivable that this might change sometime in the twenty-first century, through the current developments of e-conveyancing technology and future European Union legislation.

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12 Pre-emption rights compared

Netherlands, Slovenia and Sweden

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12.1 Introduction

Property rights in land and buildings, as defined in private law, do not give the right holder the (total) control that is sometimes assumed. In the general interest of society (or at least of the administration) the control of the right holder over his property is limited in many ways. One of the ways in which the control of a right holder can be limited is through a limitation in the right of 'disposal' through a pre-emption right.

The pre-emption right can be described as the right in which a beneficiary has a right but not an obligation to buy a specific real property at a certain price. Pre-emption right is the privilege to take priority over others in claiming title to a real property that is subjected to pre-emption. The exact extent of the right differs between laws, but some more precise general definitions for pre-emption right are as follows:

- a right of claiming or purchasing before or in preference to others (*Webster's Encyclopedic Unabridged Dictionary of the English Language*);
- a privilege to take priority over others in claiming property. It is the right to buy before others (*Black's Law Dictionary*);
- a potential buyer's right to have the first opportunity to buy, at a specified price, if the seller chooses to sell (*Black's Law Dictionary*).

The pre-emption right is a typical latent right, which lays silently on a property. Only when the present owner (or right holder) decides that he is interested in selling the property does the right wake up. The pre-emption right holder as such has no means of forcing the present owner to take this decision to sell. Of course it could be that in certain cases where the pre-emption right applies, other land development instruments can also be applied, such as compulsory purchase (including expropriation).

In this article we will first describe the different types of sources, beneficiaries and ways of effectuating of pre-emption rights in general. Then an overview is given of pre-emption rights in the Netherlands, Slovenia and Sweden. A comparison is made, which emphasises the burdens and benefits of pre-emption rights as such, and indicates which of the different types described in the general part seem to be the least disruptive to real property transactions. We do not concentrate on the objectives the pre-emption rights are supposed to meet, nor on alternative tools with which these objectives could also be met (like compulsory purchase).

12.2 Sources of pre-emption rights

There are several ways in which a pre-emption right can come to rest on a property. These types are by law, declaration or contract.

- Type 1 - The first two sources of pre-emption rights are based on special legal stipulations, which introduce that under certain circumstances a certain beneficiary is awarded the pre-emption right. These circumstances are defined by present or planned land use type, and related to that, a class of beneficiaries is named. In the case of a pre-emption right by law the pre-emption right exists *ex lege* for all properties to which the defined circumstances apply. The appropriate person (either the seller of the property, or the authority that enforces the pre-emption right) has to realise its application based on the presence of these circumstances.
- Type 2 - In the case of pre-emption right by declaration it is the beneficiary who actively has to create his pre-emption right. Even when the criteria for establishing the pre-emption right are met, it does not come into effect automatically in this case. The fact that the criteria are in place only allows the beneficiary to declare that he wants to create the pre-emption right. This could be done by individual letter informing the present owner, or by a wider decision that describes (in a rather detailed way) the area over which the pre-emption right is vested. The procedure could include publicising the declaration in certain newspapers (and/or the official gazette), as well as recording them in the land registry or the cadastre.
- Type 3 - A pre-emption right by contract is not typically a limitation in the general interest, since it is the present owner (or one of his predecessors) who has granted this right by contract to the beneficiary. This could be part of the contract under which he became the owner (perhaps the previous owner wishes to retain some control over the person to whom the property passes on later), or through a special contract to introduce a pre-emption right, usually called 'an option'. This type of contract is sometimes associated with land speculation.

12.3 Beneficiaries of pre-emption rights

The beneficiary of the pre-emption right, he who can purchase before others, can also be of different types. Essentially, any type of natural or juridical person can be a beneficiary, although the category of possible beneficiaries differs between different types of pre-emption rights. For legal pre-emption rights this could be local or national authorities (municipalities = M or the State = S). But it can be a certain class of private person as well (like a (neighbouring or tenant) farmer = F or an apartment user (or an association of apartment users) = A). One would not necessarily expect private persons as

beneficiary of legal pre-emption rights that are created in the 'general interest of society'. However societies are often inclined to give such a right to certain types of users of properties. For contractual pre-emption rights any beneficiary would be possible, but in most cases it is a developer (company or investor).

12.4 Ways of effectuating the pre-emption right

With regard to the way the beneficiary gets the chance to effectuate his pre-emption right and actually purchase the property, we can distinguish between two rather different types.

- **Type I - Mandatory offering** - The present owner, after deciding he wishes to sell his property, must offer it first to the beneficiary. In this way the beneficiary has the 'right of first refusal'. The beneficiary has to decide whether he wants to purchase the property or forsake his pre-emption right. To make this decision he needs to know the price to pay for the property. In some cases the seller can set the price (but cannot sell it at a lower price to someone else if the beneficiary forsakes his right), and in other cases the price has to be determined by the seller and buyer together. This is not a normal, free market negotiation, and thus special procedures are needed in case buyer and seller do not agree on what the price would be for this property. Often the price should equal the compensation under expropriation, and thus the ultimate remedy might be a court decision. In the event that a property over which a pre-emption right exists is sold to someone other than the beneficiary, a formal check has to be made at the end of the transaction process (just before final registration) to ascertain whether the beneficiary's rights have been respected during the process.
- **Type II - Taking over the agreed contract** - The present owner as seller and an interested buyer will start to go through the normal process. The buyer will investigate the property and items related to it, and he and the seller will negotiate a price. When they have finalised their contract, but before the transfer of the property is completed, the beneficiary receives a copy of the contract, and has the right to step in. Normally the land registry will send the contract to the beneficiary after receiving the application for registration. Based on his interest in the property and the contents of the contract, the beneficiary decides whether he wants to take over the contract as it stands, including the agreed price and any special stipulations. The beneficiary then becomes the owner of the property and the buyer is left with nothing. Normally he will be compensated for the necessary costs made on collecting information on the property and use of experts. The time he invested in the process is, however, not compensated.

12.5 Pre-emption rights in the Netherlands

Contractual pre-emption right; option

Contractual pre-emption rights in the Netherlands as such are treated as normal contracts, for which no specific regulations apply. If someone buys a property without giving the beneficiary the chance to buy it first, the contractual pre-emption right beneficiary is not much protected. The beneficiary can, of course, claim for damages from the seller for breach of contract, but can only sue a buyer who is not in good faith. Since from the point of view of civil law, personal rights (like options) cannot be registered, the stricter interpretation of good faith for registered information does not apply (in 2003 registration of sales agreements with certain legal effects was introduced). In case law there are examples where the beneficiary could prove that the buyer knowingly ignored the beneficiary's pre-emption right, and where the compensation awarded included the transfer of the property from the buyer to the beneficiary.

Municipal pre-emption right

One very important pre-emption right in the Netherlands gives municipalities the right to declare their interest in certain areas which are needed for urban expansion or urban renewal. The Municipal Pre-emption Rights Act (WVG) has been a politically contested item since its beginnings in 1981. In particular, around the turn of the millennium several changes were made to expand the categories of urban expansion to which the right can be applied, as well as curtailing ways to elope the pre-emption right (for instance through recorded options).

The municipal pre-emption right is created by declaration in the form of a decision of the municipal council, but the proposal of the municipal executive to take such a decision can already bring with it the same legal effect when it is published in the prescribed way. The decision can be made based on several types of spatial plans. For some types the pre-emption right is valid for a maximum period of two years; for other types it remains in force as long as the actual and planned use are different.

The decision must contain a detailed description of the property, as well as its cadastral size and the name of the owner, including reference to an attached cadastral map. The decision is published by making the decision and the cadastral map available for public inspection in the municipal offices and by publishing a notice in the Government Newspaper and one or more local newspapers. The pre-emption right is created the day after this notice has appeared in the Government Newspaper (unless the proposal has already been published in the same way). Notice of the decision is sent to all owners mentioned in the decision. Finally, a copy of the decision and the cadastral map is sent to the Netherlands' Cadastre, Land Registry and Mapping Agency

(Kadaster) for registration. Since it is possible that the right is already created before its existence can be seen in the cadastre and land registry system, the notarial professional organisation (KNB) keeps a daily updated online list of published announcements.

If the owner of a property over which the municipality has the pre-emption right wishes to sell his property he must offer it first to the municipality. The law contains a number of exemptions to this, for instance if the sale is to a close relative or another public authority. A further exemption is made for sales to someone who has a contractual right to acquire the property (completion of a sales agreement or an option). This only holds when the contract was registered before the pre-emption right came into effect (the day after publication of the notice). This rule of public law has made it possible since 1996 to register certain personal rights in the public registers (contrary to the traditional civil law principle that only property rights can be registered, and well before the more general rule for sales agreements that was introduced in 2003). Since 2002 the transfer has to be finalized within six months after the pre-emption right has been created. This avoids long-term uncertainty about the position of the property (especially when the potential buyer is a developer, which influences the possibilities to use other land development tools like expropriation and division of costs for public space).

When the owner has offered the property to the municipality, the municipality has eight weeks to decide whether it is interested in buying the property. If the municipality informs the owner that it is not interested, or fails to reply within eight weeks, the owner is free to sell the property within the next three years. If the municipality has informed the owner of its interest, the owner has four weeks to appeal to the provincial executive to be exempted from its obligation to negotiate with the municipality. If no such appeal is made, or the appeal is rejected, negotiations start. The owner can demand that the municipality ask the court to appoint experts to give advice with regard to the price. The experts apply the rules from the expropriation law in determining the price. Based on the advice, the municipality can decide to agree on the proposed price, ask the court to rule on the price, or inform the owner that it is no longer interested in buying the property. If the municipality has agreed on the proposed price, the owner can decide to ask the court to rule on the price, accept the proposed price or decide not to sell his property after all. If the owner goes for the first option, the municipality can inform him that it is no longer interested in buying. If the court gets involved, a judge, the court secretary and experts will investigate the property on site. After a hearing the court will rule on the price, applying the rules of the expropriation law. No appeal is possible. All reasonable costs of the procedure have to be paid by the municipality, unless the court decides differently. The owner can demand within three months of the ruling that the municipality completes the transfer.

The procedure is quite complicated and when the municipality does not respond within the set time for any of the steps, it loses its pre-emption right, and the owner can freely sell within the next three years. To make sure that the pre-emption right is not bypassed by owners, the notary—who has a mandatory role in the completion of the transfer in the Netherlands— must include a declaration under every transfer deed either that the pre-emption right did not apply to this property, or that the transfer is not contradictory to the provisions of the law (and thus falls under an exception or that the municipality has forfeited its right during the procedure). The registrar must check that such a declaration is included under every transfer deed that is presented for registration, unless a municipality is the acquirer.

Little use was made of the right during the first 15 years, but its use has increased with the changes to the cases in which it could be applied. On 1 January 2000 the pre-emption right was registered with 25,000 parcels, which is less than 1% of all parcels. About one third of the municipalities applied it at that time. The pre-emption right was used to some extent for large urban expansion projects ('Vinex-locatie'). For most projects one or more properties were acquired with it, and in some cases as many as 20. Today numbers are most likely higher due to the changes in the law allowing for a wider application of the pre-emption right.

Pre-emption right for certain rural areas

A similar pre-emption right for agricultural land that has been assigned as a nature reserve or is part of a land consolidation scheme, with the national land development authority as its beneficiary, is contained in the Law on Agricultural Land Conveyance. However, the law has been only partly enacted, and it is disputed if the pre-emption right could be applied at present. The declaration of the areas to which the pre-emption right applies must be done by the Minister of Agriculture, Nature and Food Quality.

Tenant's pre-emption right

Another pre-emption right exists with regard to agricultural land that is used under a tenancy agreement (*pacht*). This pre-emption right follows directly from the law (*ex lege*) and has the tenant as the beneficiary in the case that the owner wants to sell the property the tenant is using. This pre-emption right is one of several legal provisions that is meant to secure the position and livelihood of tenant farmers. Although tenancy is in principle a personal right, a change of landlord does not affect the tenancy agreement, and the law also contains several provisions for close relatives of the tenant who wish to continue farming after his death or retirement, replacing him as the tenant. Land under tenancy should be mainly seen as a safe investment. Nevertheless, one could buy the land with the intention to farm it oneself in the future. The law gives rules for such a buyer to end the tenancy contract after a

number of years. Because this affects the farm of the tenant, he has the right of first refusal when the owner wants to sell the land.

Exemptions exist and include sale to a close relative, to an authority or to anybody who plans to use the land for an allowed, non-agricultural purpose.

Large financial interests are involved, since the price of land under a tenancy agreement is often 40%–50% lower than for land that is free for use by the buyer, and the tenant can buy the land at this reduced price. Therefore the law provides in a rule to let the original owner share in the difference if the tenant who bought it sells it off soon after he acquired it. The share is 100% in the first year and is reduced by 10% for each year after the original transaction.

After the owner has offered the tenant the property, the tenant has one month to respond. If he forfeits his right, the owner can sell the property within one year. If the tenant indicates his interest in becoming owner, negotiations on the price will start. If no agreement is reached, the owner can ask the relevant authority (*grondkamer*) to value the property. If the owner is willing to sell at the valued price (or lower) he will inform the tenant of this. If the tenant does not let the owner know within a month that he wants to buy at this price, the owner can sell within one year (at this price or a higher one).

If the owner sells the property without offering it to the tenant first or sells it at a lower price than it was first offered for to the tenant (who declined that offer), the original owner must pay one year's contract payment as a fine to the tenant. The tenant can also sue for further compensation.

In the second half of the 1990s the national administration as landlord sold large tracts of its land to sitting tenants, totaling 29,000 ha between 1995 and 1999 (mainly to generate money to buy land for nature reserves).

12.6 Pre-emption rights in Slovenia

The pre-emption right in Slovenia can be exercised according to the procedure provided for in the Code of Obligation (Official Gazette of the Republic of Slovenia, 89/1999). Pre-emption rights can be established regarding this act through a contract or by law.

Pre-emption rights established through a contract

Through the contract between the owner and the third person (beneficiary), the owner of the property undertakes to notify the beneficiary of the intended sale of the property and the conditions of the sale. The beneficiary must, within thirty days of receipt of the owner's notice of the intended sale, duly notify the seller about his decision of whether he will exercise the pre-emption right or not. He must pay the purchase price established in the owner's notification about the intended sale when concluding the contract of sale. If the seller refuses to accept the payment, the beneficiary must within the re-

quired time deposit the funds at the Court of Justice. If a contract of sale does not provide for immediate payment of the purchase price, the beneficiary has the right to demand the same condition, valid with respect to the third person. In this case it is required that the beneficiary provide security. The pre-emption rights cannot be alienated or inherited, unless otherwise provided for by other acts.

At compulsory public auction the beneficiary cannot appeal that he has the pre-emption right but can buy the property based upon the last achieved price. However, the beneficiary whose pre-emptive right is entered into the land register can lodge a request for the annulment of the auction if he has not been specifically invited to the public auction.

The pre-emptive right expires as of the date defined in the contract. The maximum defined time is thirty years. If the time of duration is not defined, the pre-emption rights expire within five years of the conclusion of the contract.

Some special cases are important for the seller and buyer of the property under the pre-emption right:

- a. When the seller sells the property but does not notify the beneficiary of the purchase. If the buyer knows about the pre-emption right, the beneficiary can, in six months of the day on which he has found out about the sales agreement, request an annulment of the contract, and the property should be sold to him under the same conditions.
- b. If the seller incorrectly notifies the beneficiary about the sale conditions of the property, and the beneficiary finds out about the new conditions, then the six-month period to void the contract runs from the day on which the beneficiary finds out the real contractual conditions. The property should be sold under the same conditions to him.

Pre-emption rights established by law

In the case that the pre-emption right is established by means of a special law, the duration of the pre-emption right is not time-restricted. The following pre-emption rights can be established by law:

- pre-emption rights for the municipality (Spatial Planning Act);
- pre-emption rights for agricultural land and forest land (Agricultural Land Act, Forest Act);
- pre-emption rights for water areas (Water Act);
- pre-emption rights for apartments (Law of Property Act);
- pre-emption rights for cultural heritage (Cultural Heritage Protection Act); and
- pre-emption rights for protected areas (Nature Conservation Act).

Pre-emption rights for the municipality

In order to facilitate the acquisition by the municipality of land for urban de-

velopment a number of legal tools were introduced, including two types of pre-emption rights:

- pre-emption rights of municipalities to acquire land for urban development;
- pre-emption rights of municipalities for residential houses intended for rental purposes.

Of importance are the pre-emption rights that represent an instrument that allows the municipality to execute spatial policy in the public and private interest. To perform a spatial policy, the municipality must prepare a special decree. The legal bases for such a decree are the adopted municipal spatial planning documents. Within the defined area the municipality can, according to the Spatial Planning Act, establish pre-emption rights on the desired areas which may comprise one or more plots or even the whole territory of the municipality. Areas under the pre-emption rights must be defined with such accuracy that the boundary can be established in the natural environment and later also in the planning documents and land cadastre maps.

Pre-emption rights for agricultural and forest land

The right of pre-emption may be claimed in the purchase of agricultural or forest land by beneficiaries in the following order:

1. the co-owner;
2. the farmer whose land in his/her ownership is adjacent to the land to be sold;
3. the hirer of the land to be sold;
4. another farmer;
5. agricultural organisation or a self-employed person that requires land or a farm holding to perform their agricultural and/or forestry activities; and
6. the National Farm Land and Forest Fund of the Republic of Slovenia.

Information regarding the selling of an agricultural parcel must be announced on the notice board at the Administrative Office of Agriculture for thirty days. Among farmers ranked together under the same conditions, the farmer whose agricultural activity is the sole or main activity shall have the pre-emption right, followed by the farmer who merely cultivates land, and the farmer designated by the seller. The Administrative Office of Agriculture assembles all interested potential buyers with pertaining information and arranges them in pre-emption right order. The first in line may purchase the property or give up this right to the next buyer. If the beneficiary does not exercise his/her right, the notice must stay on the notice board at the administrative office for another thirty days. If nobody is interested in buying the agricultural land, then the land should be sold to other buyers. If none of the beneficiaries exercises the pre-emption right, the seller may sell the agricultural land to any person who accepts the offer in time and is approved by the administrative unit.

Pre-emption rights for forest land

The Republic of Slovenia has pre-emption rights regarding the purchase of protected forest land. Protected forest land is land which protects itself or lower lying agricultural land and forests. If the state is not interested in the purchase of protected forest land, the local municipality on whose territory the forest is situated is the second beneficiary. In special cases the Republic of Slovenia or local municipality must, upon the request of the owner, redeem the forest land. The redemption price is the market price of the forest land. If the parties do not agree on the market price, the court appraiser defines the price.

Pre-emption rights for water areas

The state is the only beneficiary regarding the purchase of water areas. The landowner must inform the Ministry of Environment and Space of the intended sale and submit all data about the water area (identification, price and terms of payment). If the state refuses to buy the offered land, the next beneficiary is determined according to the Agricultural Land Act.

Pre-emption rights for apartments

The Property Act and the Housing Act establish the following pre-emption rights:

1. When the house or apartment in co-ownership is sold, the seller (co-owner) is obliged to first offer his share to the other co-owners.
2. When the owners intend to sell a rental property, they are obliged to submit the offer to the tenants, so that they can purchase the property for the price a buyer should pay. They have two months to reach a decision.
3. The owner of an apartment in a small dwelling is obliged to submit the offer to other owners in this dwelling so that they can purchase the property. The law defines a small dwelling as:
 - a house with no more than 5 apartments; and
 - at least two or more owners.

Pre-emption rights for cultural heritage

The state or the local municipality in whose area a cultural heritage site is located has the pre-emptive right to purchase the cultural heritage site. Owners of monuments must notify the beneficiaries of the intended sale and its conditions.

When the sale concerns a cultural heritage site of national importance, the state must within sixty days notify the owner about the intended purchase. If the state does not accept the offer, the local community is the next beneficiary and shall in thirty days decide on the intended purchase.

If the sale of a cultural heritage site is of local importance, the local community shall, within thirty days, notify the owner as to whether it accepts the sale offer.

Pre-emption rights for protected areas

The state has the pre-emption right if the property is located in protected areas for which it has itself adopted the instrument of protection, notwithstanding the provisions of other acts that regulate the pre-emption right. Local municipalities have the pre-emption right regarding the property located in the protected area for which they have themselves adopted the instrument of protection. The owner of the property shall, by sending an offer to the manager of the protected area (the ministry or local municipality) inform them of the intended sale. If the state or local municipality accepts the offer, it must notify the owner within sixty days of receiving notification. If they do not exercise this pre-emption right, the beneficiary at a later time may still exercise one of the other pre-emption rights for agricultural, forest, water or building land (depending on the nature of the protected area). When no beneficiary exercises the pre-emption right, the seller may sell the property to another buyer who has accepted the offer in time and in the manner laid down by the regulations on agricultural and forest land.

12.7 Pre-emption rights in Sweden

In Sweden there are three pre-emption situations which are of interest. One of them entitles municipalities to intervene and take over a completed property purchase. This happens when the buyer applies to the land registration authority to have the purchase registered. The second situation entitles a lessee to purchase an agricultural property that is up for sale, and the third entitles rental housing tenants in a multi-family dwelling to purchase their rented house if the property is put on the market. All three instances are subject to a number of conditions, the main points of which will be described here.

No contractual pre-emption rights exist

It should also be mentioned that the option to purchase a property at some future date has no legal foundation, the reason being that the law will not countenance unknown agreements on conditional land ownership. Neither can the completion of a purchase be made subject to reversion clauses of more than two years' duration. Here we see the legislator's concern with making the title to real property unambiguous. Thus a pre-emptive situation cannot arise out of an option agreement.

Municipal pre-emption right

The municipal right of pre-emption means that the municipality may acquire a property on the conditions agreed in a completed transaction between seller and buyer. This legislation entered into force in 1968. The state wanted an inexpensive instrument for land policy, at a time when housing production

was growing rapidly. The aim was to make land available in good time and at reasonable prices for urban development. Negotiations for voluntary sale could be time-consuming and still end with the landowner refusing to sell or demanding a very high price. Expropriation too was time-consuming, and also procedurally expensive. Besides, the coercion that it represented was highly repellent, whereas pre-emption was felt to involve a more limited element of compulsion. Pre-emption offered an inexpensive, simple and fast alternative to ordinary purchase and expropriation.

Land included in the sale could thus be pre-empted at an early stage, which facilitated 'land banking'. In particular, agricultural land and forest land could be acquired before anticipated values connected with changing land use had arisen, which helped to curb the rise in property prices. The structure of the legislation, requiring the municipality to be notified by the land registration authority of purchases and purchase prices, kept the municipalities continuously informed of developments in local property markets.

The most important precondition for the municipality being allowed to exercise its right of pre-emption was for the real property to be needed for future urban development, but the scope of municipal pre-emption has been gradually widened. Today it also applies to the purchase of real property for refurbishment or for conversion to housing. The same goes for land and facilities for sport and outdoor recreation, and to buildings of historical or environmental interest.

At the same time a number of situations have been excluded from pre-emption, in particular single- and two-family dwellings and weekend cottages with a land area of less than 3,000 m². The only exception is that all developed real property can be pre-empted in areas where there is high demand for secondary homes development to secure permanent habitation of the area. The land sale contracts cannot be pre-empted if the state is buyer or seller. Sales between spouses or to a descendant are also excluded.

The pre-emption process operates as follows. When the buyer applies for registration of a completed purchase by the land registration authority, to protect the purchase against third parties and to acquire the possibilities of mortgaging the property, the land registration authority has to decide whether the right of pre-emption is applicable. If it is, the municipality has to be notified of the purchase and then has three months in which to decide whether or not to exercise the right. A municipality which does exercise this right will be regarded as buyer, with effect from the date when the contract of sale was signed with the original buyer. If certain contractual conditions cannot be fulfilled, they may be adjusted if there is no detriment to the seller. The municipality also has to reimburse the buyer for expenses incurred.

The original buyer, however, may contest the exercise of the right of pre-emption, in which case the municipality must refer the matter to the government for examination. The cases will then be adjudicated with reference

to the conditions defined for exercising the right of pre-emption and also with reference to a further condition, namely whether exercise of the right is oppressive with regard to the relation between buyer and seller or the conditions or circumstances of the sale.

This law seems a relic of a time when strong land policy control was needed, and it is no longer really an active tool of urban development; pre-emption nowadays is exercised barely ten times per year in the whole of Sweden. For these few cases a large administrative apparatus is necessary: the land registration authority has to judge whether the right of pre-emption is applicable, the municipal officials have to investigate whether pre-emption is an attractive proposition, and a political assembly has to decide on the exercise or waiver of the right. Some municipalities have therefore informed the land registration authority that they are uninterested in the faculty of pre-emption, either generally or in certain districts. If so, registration of ownership is granted directly, while other purchases are invariably reported to the municipality. The municipality then has to reply in writing, indicating whether or not it is interested, and if it fails to do so the right of pre-emption will lapse after three months. The decision in such matters is often delegated to municipal officials.

Agricultural tenants' pre-emption rights

The other two pre-emption laws are based on a different principle, namely the principle that the party with a right of pre-emption must declare in advance their interest in purchasing the property should it be put up for sale.

The purpose of that legislation regarding the lessee's right of purchasing an agricultural property (effective from 1985) is to give agriculturally competent buyers who are interested in living on a farm the right of first refusal when it comes on the market. Another aim is to establish a connection between ownership and use, and for the lessee who has lived on a farm and worked it not to be ejected when it is sold.

The basic rule is that the lessee must work the property and also live on it. A lessee interested in purchasing the property should it come up for sale must notify the land registration authority to this effect, so that an entry can be made in the land register. The landowner must be informed of the entry thus made. The entry is valid for ten years and then has to be renewed, or else it will lapse. The leasehold property must then not be disposed of without the lessee first being offered the chance of buying it. There are exceptions to this rule, like family sales. If the municipality is the buyer, this overrides the right of pre-emption – naturally, since municipal purchases, like national government land purchases, often have statutory priority.

If the landowner wishes to sell his agricultural property and the lessee has given notice that he is interested in buying it, the landowner must inform the regional tenancies tribunal of the proposed terms of a contract of sale, includ-

Table 12.1 Modalities of pre-emption rights in three countries

| Type of property | the Netherlands ¹⁾ | Slovenia ¹⁾ | Sweden |
|-----------------------|-------------------------------|------------------------|--------|
| Urban land | 2 M I | 2 M I | 1 M II |
| Apartment unit | | 1 A I | |
| Apartment building | | | 2 A I |
| Recreation/sport area | 2 S I ²⁾ | | 1 M II |
| Agricultural land | 1 F I | 1 F,S I | 2 F I |
| Forest land | | 1 F,S I | |
| Water areas | | 1 S I | |
| Cultural heritage | | 1 S,M I | 1 M II |
| Protected areas | 2 S I ²⁾ | 1 S I | |

The numbers indicate the source of the non-contractual rights:

- 1 for ex lege pre-emption rights
- 2 for declaration by the beneficiary
- 3 for contractual rights (options) (These are not shown in the table, and only apply to the Netherlands and Slovenia, since they do not exist in Sweden)

The letters indicate the type of beneficiaries of the pre-emption rights:

- A apartment user or association of apartment users
- F farmer (neighbouring or tenant)
- M municipality
- S state

The roman numerals indicate that the right is executed through:

- I mandatory offering by the owner to the beneficiary
- II taking over the buyer's role in the contract by the beneficiary

1) Contractual pre-emption rights (options) can simultaneously apply, especially for urban land and apartment units.

2) Not applied in practice; it is disputed whether this part of the relevant law is in force.

ing the purchase price. This proposal is communicated to the lessee and may be neither revoked nor altered. The lessee has three months in which to give notice of his desire to purchase the property. If he does want to buy it, the proposal counts as contract of sale. If he does not, the landowner can sell the property to another party, so long as the contract of sale will not be significantly less advantageous to the landowner.

Apartment tenants' pre-emption rights

The second law (effective from 1982) conferring a right of pre-emption concerns the right of a tenant-owner association to purchase a housing property in order to convert it to tenant-ownership or cooperative rental tenure. A tenant-owner association is an association which, normally, owns one property and membership of which confers right of use in an apartment.

Tenants who also own their property are considered to have more say in the management of it, but if a rental property is being put on the market it is hard for the tenants to get organized quickly and find the necessary finance for purchasing the property. Tenants on a rental property have therefore been given the legal possibility of forming a tenant-owner association in advance with a view to taking over the property if it comes up for sale at some future date. This way they have a management organization in place and can arrange

financial contacts in time, which makes it easier for them to take over the property should the opportunity arise.

At least two thirds of the tenants on the rental property must be interested in the conversion and must also be members of the association formed. Notice of interest is lodged with the land registration authority and annotated in the land register. The entry is valid for two years, after which it lapses – unless renewed. The landlord is informed. After this, if the landlord proposes to sell the property, he must begin by making an offer, complete with terms and selling price, to the regional rent tribunal, which then notifies the tenant-owner association. Once made, an offer can be neither revoked nor altered.

If the association gives notice within three months of being interested in taking over the property on the terms offered, the offer counts as contract of sale. If the association is not interested, the landlord can transfer the property to some other party at the same or a higher price, provided the aggregate terms of the contract of sale otherwise are not prejudicial to him. The tenant-owner association's right of taking over the purchase is also subject to certain exceptions, such as acquisition by a relative, sale by executive auction and purchase of the property by the state. Pre-emption right from the three EU countries are summarized in Table 12.1.

12.8 Comparative analysis

Comparative findings

With regard to the sources of pre-emption right we can conclude that all three countries have rights which are created *ex lege* (1) as well as by declaration (2). As beneficiaries we see in all three countries local authorities (the State *de facto* only in Slovenia), as well as private citizens. The private citizens are mainly tenants in cases where the owner is selling the property they are already using under the tenancy or lease agreement (this is found in all three countries).

With regard to ways of effectuating the pre-emption right we mainly see the approach of mandatory offering (I), and only for one type of pre-emption right do we see the approach of taking over the agreed contract, and that is in Sweden (II). However, the latter is not uncommon in other countries (compare, for example, the German *Vorkaufsrecht*).

Even though most legal provisions found resemble one of the two described ways, practice is often more a mixture of the two. In the case of type I the seller might use the fact that an interested buyer has offered a certain price already to strengthen his bargaining position during the price determination process. And, in the case of type II, it is not unusual for the seller or the interested buyer to (informally) check whether the beneficiary is intending to effectuate his right, so that the buyer does not invest too much in a deal that is taken away from him.

Interestingly, combination 2-II, declaration by beneficiary with taking over of agreed contract, was not found among the three countries studied. We have the impression that such a combination would be rather odd, since it essentially means that the beneficiary has to declare his interest twice, both in principle beforehand, and again afterwards.

With regard to the contractual pre-emption rights, these do not exist in Sweden. In Slovenia, legal restrictions apply to the length of contractual pre-emption rights (30 years), whereas they are basically unregulated in the Netherlands. These contractual pre-emption rights are often related to acquire strategic land positions, or even land speculation, and the beneficiary is often a developer (company or investor).

Impacts on real property transactions

It goes without saying that the presence of a pre-emption right burdens a possible real estate transaction with regard to the property on which the pre-emption right rests. It introduces uncertainty, it takes time and it creates extra work. All of these increase the transaction costs.

Under system I, the seller, after he has decided to sell his property, has to wait before he can put the property on the market. Under system II, the buyer runs the risk of all his efforts becoming void. The necessary costs he made for preparing the contract will be compensated, but this does not include personal time invested in the process, the more emotional side of the loss (especially when it is a house he has 'fallen in love' with), or the risk of being without a home if the 'old' house is already sold. For the beneficiary there is a burden to check every time the owner considers selling his property whether he wants to acquire the property (and against which maximum price).

Of course, pre-emption rights also have benefits. It creates a relatively easy way for beneficiaries to acquire a right in a property that is of special interest to them. Since the initiative for a transaction comes from the owner, the beneficiary does not have to pay additional compensation (like for the closing of a business or moving of family), which would be required when the initiative came from the beneficiary through compulsory purchase (including expropriation). Compared to such a mode of acquiring the infringement of a pre-emption right on the owner's property right is also limited.

Are the burdens and benefits of using pre-emption rights in balance? Should they be recommended or discontinued? In general it could be said that a pre-emption right is an efficient tool when the number of transactions where the beneficiary becomes the owner is relatively high compared to the total number of transactions in which this type of pre-emption right plays a role. This is difficult to determine, since it is possible that the owner and the beneficiary conclude a 'normal' private contract, which would not have been concluded if the pre-emption right had not coerced them (as a 'stick behind the door'). This effect is also well known from cases where a property could

be expropriated, and the owner, knowing he will ultimately lose his property anyway, is inclined to conclude the contract, whereas both parties – knowing the rules that will be used to determine the compensation by court under expropriation – have a good idea of what price should be settled for.

Procedures with least impact

We think that to properly balance the owner's and the beneficiary's interests, a system where the beneficiary has to consciously create the pre-emption right by making some kind of declaration is in general better than the *ex lege* approach (unless this type of beneficiary will always want to take this type of land).

From the potential buyer's point of view, we could conclude that the 'offer first' system is preferable over the 'take over' system. However, it depends on the question of how easy it is to determine 'a fair price' under the former system whether the benefit to the beneficiary (and even the owner) outweighs this notion or not. This is largely a question of having a generally accepted (market) valuation system in place for these types of property, not the general real estate market. It must also be mentioned that in a market where buyer and seller find advantages in not informing authorities about the effective purchase sum, the 'taking over' approach can help to coerce them into declaring the correct sum.

12.9 Conclusions

Our first conclusion is that there can be pre-emption rights that are worth keeping, and some that should be reconsidered. It is hard to see the rules for sale of rural land in Slovenia, where a multitude of beneficiaries applies to the same land, as consistent with the idea of an open land market. For the time being it may help to enlarge farms in this small new EU member with a great number of small farms and enable those enlarged farms to survive in the competitive EU market.

Swedish and Slovenian municipal pre-emption rights should be reconsidered. The facts that the Swedish municipality acquires a property in a finalised transaction between the seller and buyer (under the same conditions), and that some Slovenian municipalities have put the whole territory of the municipality under the pre-emption right (which also leads to a vast amount of administration), has placed a heavy burden on real property transactions in these countries.

The Netherlands is the only country that describes in detail the properties under municipal pre-emption right and simultaneously prescribes that the owner must be informed of the potential municipal interest. Such a clarification is suitable for both the seller and buyer. But at the same time it restricts

the present owner's opportunities to operate on the market to get the highest possible price for the property.

Another obvious difference between the Netherlands and Slovenia on one hand and Sweden on the other regards contractual pre-emption rights. Contractual pre-emption rights do not exist in Sweden, because they like to keep the register 'clean', which would be disrupted by having all kinds of contractual latent rights around. Keeping the system 'clean' also makes it much easier to have real property transactions performed without legal counsel. Such legal counsel is important in both other countries, where it is the notary who has the mandatory role of checking the contract and all other rights anyway, so options can be included without much problem.

We can conclude that pre-emption rights are part of the toolbox available for intervention in the land market to meet objectives society has defined as important. If applied with some restraint and by applying appropriate methods (as described above), it can be seen as a balanced instrument that does not put the burden solely on one of the parties, in those cases where it is actually used. On the other hand it is expensive to have such burdens, and the advantage for a small interest group should always be balanced against the overall interest in keeping transaction costs low.

This chapter is a first attempt at looking at the desirability of pre-emption in relation to efficient real property transactions. Further research is warranted. This should include the impact of the existing pre-emption rights on the objectives they are supposed to meet in relation to alternative tools, as well as the increase in transaction costs caused both by the reduction of efficiency of the real estate market and by the procedural costs they cause (also inside the administration).

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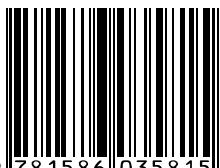
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Transactions in land and other real property differ between countries throughout Europe. The transaction procedures reflect formal rules, but they are also normalised through conventions and professional codes of conduct. This complex of technical, legal and economic issues was investigated from the point of view of transaction economics through an ESF-COST supported Action G9 'Modelling Real Property Transactions'. The research was performed between 2001 and 2005 by researchers mainly from university departments related to land surveying, real estate management, geo-information sciences and knowledge engineering. This book represents the final outcome of the study. A modelling approach was elaborated and tested on a number of countries (esp. Sweden and Slovenia, for which the models are shown in this book in the Unified Modeling Language - UML). The modelling approach leads to transparency and allows comparison. Nevertheless, the influence of the national and social contexts, and the different perspectives that can be taken, prevent a simple ranking of the studied procedures. For those planning or comparing transaction procedures or parts thereof, the book supplies a tested approach and methodology. But the book eventually warns of simplification in this field full of complex, national institutional arrangements.

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Mortgage deed issued

Registration of mortgage

Application for mortgage registration

Signing