

Processer vedrørende fast ejendom serviceret af en klynge-enterprise

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Erik Stubkjær: The Cluster Enterprise of Real Property Business

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In order to apply the potential of available web technology, business processes must be described in a coherent way across organizational boundaries. Business processes include geographical data in the context of constructions, as well as environmental affairs and real property transactions, among others. The paper regards the domain of real property transactions. Drawing on research of European scope, it analyzes the framework of business processes in order to facilitate adoption of service oriented architectures. The paper motivates the notion of a 'cluster enterprise' and identifies further steps towards a standardization of real estate business.

Key words: New Institutional Economics (NIE), Real property transactions, Service Oriented Architecture (SOA), Unified Modeling Language (UML)

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Introduction

Management in industry and government is facing challenges due to the expanding potential of information and communication technology (ICT). Web technology allows for the combination of data sets and services provided by a number of servers, both in-house servers and servers managed by other organizations. The technical term is Service Oriented Architecture (SOA). In order to profit from this potential, managers have to combine their concern for ICT use within their organization and their concern for the business processes which constitute the core of their interaction with their environment: customers, suppliers, service providers, etc. This state of affairs applies not only to industry, but also to government, where customers may be replaced with citizens and suppliers with other governmental units. Efforts to introduce or adopt a Service Oriented Architecture by setting up coordinating committees, discussion forums, etc. may now be seen in a number of countries.

In the domain of geographical data, we find a cluster of business processes related to the provision and maintenance of constructions and technical infrastructure. Another

cluster of business processes relates to real property transactions, and a further one to environmental affairs, including agriculture and extraction industry. All of these clusters have got increased attention due to the European Union's INSPIRE efforts, recently culminating in the issuing of a Directive on establishing an Infrastructure for Spatial Information in the European Community [15]. We will investigate here the cluster regarding business processes related to real property transactions.

Units of real property have a geographical component consisting of one or more parcels and also the buildings and other fixtures on the parcel(s). However, buildings and parts of a building may also count as units of real property, depending on national legislation. Together with administrative districts and street addresses with the corresponding road segments, building entrances, and apartments, the property units constitute a group of socio-economic, spatial units [1]. This group of spatial units differs from the group of visible objects depicted on topographic maps, as illustrated by Figure 1.

The above specification and structure of geographical data provides a spatial context

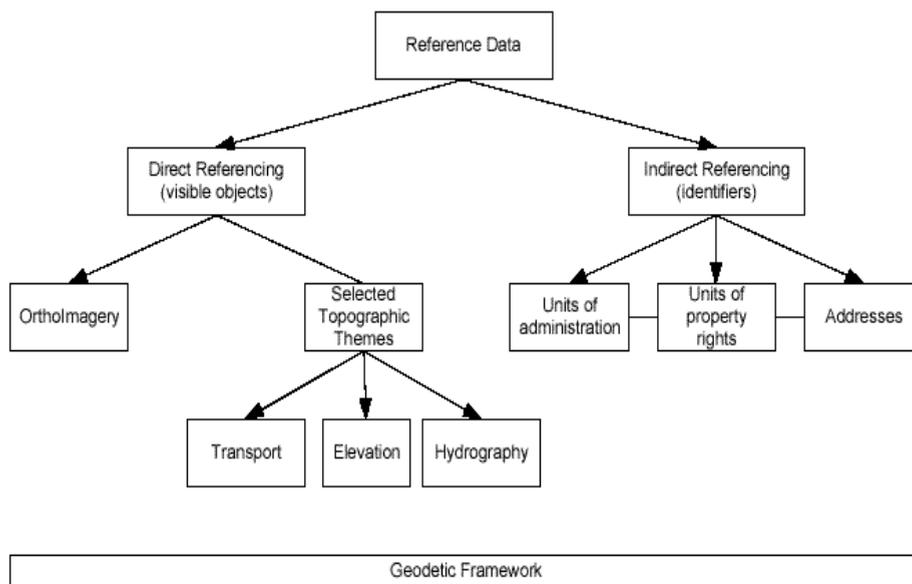


Fig. 1. Reference data components. *ETeMII Reference Data White Paper, July 2001, page 9.*[14]

and structure for everyone involved with geographic information. This structure provides a basis for the abovementioned INSPIRE activities.

The challenge of managing or influencing ICT use outside of one’s own organizational boundaries raises the question of how to define the boundaries of the wider body of shared interests which in SOA terminology is called an ‘enterprise’. Should the economists’ subdivision of society into sectors provide the frame? Or should various commercial branches, e.g. as defined by NACE [16], define the boundary lines? Governmental subdivision into ministries might also provide an alternative approach. So far, no definite answer to this question has emerged. Consequently, the management of affairs within such an undetermined boundary is burdened with substantial uncertainties. These include the risk that efforts may be made in vain due to overruling influences from the outside. The governmental prerogative of issuing acts and other binding norms tends to be insufficient to address this situation, as international agreements and global market players may combine in unpredictable constellations.

Managerial risks can be reduced to some extent by systematizing geographical data as illustrated in Figure 1. These risks can be further reduced by using various analyses of real property transactions, as reviewed in a European and wider scope in section 2. One of these analyses, the European research action ‘Modelling Real Property Transactions,’ is particularly relevant. This paper draws mainly on the outcome of this research. Section 3 provides an introductory, technical description of the SOA framework, where the concept of ‘enterprise’ is further detailed. This provides the setting for a quasi-formal description, a conceptual model, of the ‘real property enterprise’ in terms of a basic use case and mutual interplay among the actors of the real property enterprise (section 4). The outcome is discussed and further steps outlined in section 5. Conclusions are drawn at the end of the paper.

Real property transactions investigated for higher efficiency

Five investigations into business processes regarding real property will be presented briefly here. They are all from this century,

motivated in part by the development of the European Union, insights from New Institutional Economics which gained momentum during the 1990s, and the work of Nobel laureate Douglass C. North [8], among others.

The research action 'Modelling Real Property Transactions' was carried out 2001–2005 by research staff of about a dozen university departments in Europe, including Greece, Hungary, and Slovenia [17]. The theoretical base of the research was New Institutional Economics, which allows legal and organizational issues to be addressed unbounded by national legal and organizational settings. The concept of real property rights and the complex of legal, and professional structures underpinning it, could be analyzed drawing on methodology from research in information systems and knowledge engineering. This research developed in dialogue with ongoing standardization efforts, e.g. the development of the ISO 191xx-family of standards, and specifically the proposal for a Cadastral Core Domain Model [2]. One of the comments made in the formal evaluation of the research action is that «[t]he researchers have developed a methodology for fruitful comparative analysis across countries and jurisdictions and over time. They have made useful contributions to the application of institutional theory and transaction-cost theory. They have stimulated the formation of an 'invisible faculty' from many scattered disciplines and pockets of research.» [3]

The European University Institute in Florence hosts a project on 'Real Property Law and Procedure in the European Union.' The study takes a legal approach and focuses on conveyance, mortgaging and related questions of land registration as well as European law influences. Comparative reports have been drafted on the current legal situation in a number of EU Member States and candidate countries. The reports have been structured around a questionnaire containing precise questions and cases to be resolved by the reporters according to their national laws. These national descriptions and specific solutions to representative real property law problems are expected to provide legal practitioners with directly operational information. The results are summarized in a

'General Report' [4] which also includes comments on the European Land Information Service (EULIS) project.

Starting in 2002, mapping and cadastral agencies from about ten European countries co-operated in the EULIS project to set up a prototype portal which provides access to land and property information from national agencies. The national information is supplemented by a basic description of legal concepts, description of routines for registration of real property conveyance and mortgaging and their effects, as well as contact information to the authorities involved in real property transactions. A 'EULIS demonstrator' was in operation from 2004, providing access to national data. In 2006–2007, a validation project assessed national conditions in five Central European countries in light of their possible future connection to the EULIS service [5].

In Germany, business processes related to acquisition of home ownership were investigated through commissioned research published in 2006 [6]. Economic theory was the basis for assessing the influence of transaction costs, as in the previously mentioned research on modelling real property transactions. Interesting in the present context is the statement that «[t]he countries analyzed in this study do not vary in the logical structure of the acquisition and conveyance process. However, there are significant differences in the allocation of responsibilities and division of labour between them.» [6, page 4].

The last study we will mention here was prepared by the Nordic mapping and cadastral agencies in cooperation with university staff [7]. Following an agreed, common structure, the study describes property registration and the processes of formation of real property units and sale of real estate in each of the five Nordic countries. The study adopted methods from the European modelling project and modified them to arrive at systematic descriptions using figures and texts in the Scandinavian languages.

In summary, a substantial amount of European research and development work has been recently conducted to describe business processes concerning units of property rights. The descriptions have been compara-

tive across European countries and are mostly based on economic theory. This allows for a guarded optimism regarding development of a general and valid conceptual framework for this domain.

A Service Oriented Architecture and the notion of 'enterprise'

The Internet provides a technical infrastructure which allows an organizational unit to provide certain services, e.g. a set of real property data, to all users with Internet access. The mentioned unit can also act as a user of other services and combine the foreign data sets and related functionality with their own components. The combined service may be offered in such a way that the end user does not realize the origin of the various components of the service.

Figure 2 below illustrates the technology behind such architecture. Property data are maintained by a number of organizations by means of their mainframes, databases and servers. These operational resources previously provide pre-programmed information

to business processes in-house or to business processes of external end-users who through contracts or licenses were bound to the individual organization.

Web technology has made it possible to specify and implement 'components' which in various ways are packaged into 'business services.' Smooth packaging presupposes, however, that 'components' are specified in a standardized way within the domain concerned.

While the underlying technology seems well developed, the task of managing the various options and their business implications is only partially structured. As mentioned in the introductory sections, the boundary of a domain is an open issue. This can be illustrated using the example in section 2. The text related to Figure 1 suggests a distinction made between the data group for street addresses and the neighbouring data group for units of real property. Although the two groups may be treated independently, an analysis of business processes is likely to result in a request for combined use of the two groups.

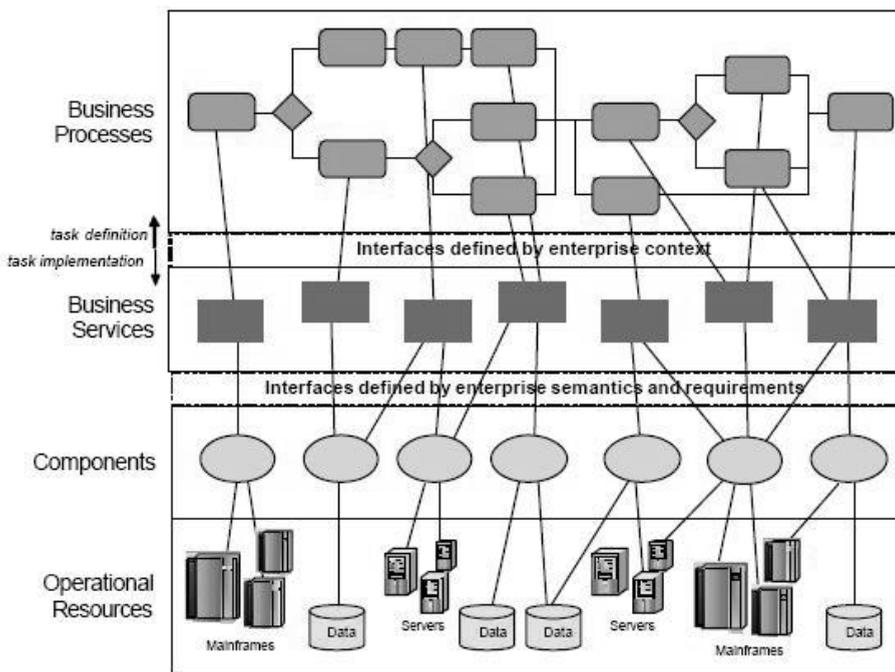


Fig. 2: A Service Oriented Architecture. Source: Mike Rosen (2006) [13] *BPM and SOA. Where Does One End and the Other Begin.* BPTrends.

The challenge is thus to specify components and business services which allow for reuse and avoid duplication. The XML family of standards, including schemas and corresponding namespaces, is well suited for the specification task, but does not solve the management task. The notion of 'enterprise architecture' may be helpful in management.

Figure 2 refers to 'enterprise semantics and requirements' and the 'enterprise context.' We will further detail the 'enterprise' concept here, starting with the notion of the enterprise as an organization. The 'enterprise architecture' reflects the efforts by an organization to align its resources, mainly the ICT resources, to the overall business strategy of the organization. It specifies the business, information, applications, and technology in a coherent and development-oriented way [9]. We can also further detail the 'business' concept as consisting of business strategies, business processes (which compares to the business processes of Figure 2), and business requirements for the systems and data management. The 'applications' considered in this paper can be compared to the 'components' and 'services' of Figure 2. Similarly 'technology' is comparable to 'operational resources' (see [9] for further details). The terminology in this field seems to be underspecified, so for the time being no definite statements can be made.

A Service Oriented Architecture is not limited to a single organization, but rather has a potential to serve a group of organizations, possibly from both industry and government. The notion of 'enterprise' consequently has to be extended from referring to a single organization to a group of organizations which cooperate. Stated more precisely, the «enterprise» concept is extended from a single organization to a cluster of organizations which are dependent on one another to achieve their individual objectives. This type of enterprise is here called a 'cluster enterprise.' The research referred to in section 2 above addresses an example of such a cluster enterprise, namely the organizations involved in real property business.

The real property cluster enterprise is loosely structured. In some countries a coordinating body may be present, but generally

there is no appropriate, single authority with mandate and resources as would be found in an individual organization. A cluster enterprise may be established through the logic of the market, e.g. to defend the interest of an industrial sector relative to competing sectors. Governmental involvement seems to be needed when substantial parts of the cluster are also part of public administration. Nordic governments are in fact heavily involved [10]. To find durable solutions, there is also an apparent need for additional theory-based research.

Section 4 will introduce the real property cluster of organizations and presents their objectives and the requirements they make of the underlying information system.

Needs, basic use case, and roles within the real property cluster

Further analysis of the cluster enterprise of real property organizations is needed if the enterprise is to benefit from the potential of available technology. Below we state the user needs and exemplify this with a basic use case. Rather than developing further details, the mutual interaction in the cluster is then investigated.

User needs and functional objectives

What are the needs of the end-users of the market in real estate? New Institutional Economics informs us that in order to acquire a unit of real property, we have not only to pay the market price, but also cover costs of:

- surveying of the market for appropriate purchase objects
- assessing the attributes of the object
- establishing sufficient trust in the other party and negotiating the purchase conditions
- providing the financial means and the safe exchange of assets, and
- establishing means of enforcement in case of default.

Assessment of the attributes of the object includes not only the physical properties of the unit in case (the size of parcel and building,

and the quality of roof, etc.). The quality of the seller's title to the house in case is much more critical. Is the person who appears as the owner in fact entitled to sell the house? The same applies to rights and encumbrances in the property. Is the information provided by the apparent owner about mortgages in the house complete? Or is there a risk that another party will appear after the sale with well documented claims?

It appears that conveyance of title to real property is troubled with what economists call 'information asymmetry'. The seller is in a much better position to know about the quality and especially the legal details than the buyer. The general solution to this situation is documentation and public records of real property attributes. Leaving aside details and the historical aspect, we may formulate a list of the overall objectives for the real property cluster enterprise, which is parallel to the overall business strategy of an individual enterprise. Specifying user needs in terms of the following functional objectives which must be met within a jurisdiction, cf. [11] will reduce information asymmetries and transaction costs.

- Property units are identified and located, and shape and size attributes are recorded.
- Rights in property units are categorized within the jurisdiction, adjudicated, and recorded.
- Skilful transaction officers are available to reorganise the rights in a real property unit and its surroundings at the wish of the parties, without compromising the claims of other holders of rights, in compliance with spatial, environmental and agricultural legislation, etc.
- Skilful registrars verify of the powers of the disposer, safeguard the interests of other holders of rights, and monitor further rules compliance.
- Involved agencies and professions offer compensation in case of occasional errors, and improve where possible the correctness and consistency of the recordings and the efficiency and transparency of business processes within the cluster enterprise.

4.2 The basic use case

The basic use case of real property transactions may be depicted as follows, cf. Figure 3.

The transaction is triggered by the Asset Holder which refers both to the seller, whose asset is the title in the property unit, and to the purchaser, whose asset is the money for which the property is bought. Other holders of rights in land also belong to the class of Asset Holders.

Transaction Officer is a general term for the various professional individuals who assist the Asset Holders and in most countries in fact perform the transaction at the request of their clients. Main sub-classes of the class of Transaction Officer are Legal Advisors, Notaries, Real Estate Agents, Geodetic Surveyors, and Construction Engineers. In some countries, the task of advancing the transaction is left to buyer or seller, who then acts as a Transaction Officer. As they are usually not educated for such tasks, the functional objectives can hardly be met.

Financial Institutions (banks, etc.) facilitate the transfer of money from buyer to seller and also offer or mediate the mortgages and other loans needed to provide the purchase sum. The bank may take on the role of Transaction Officer, as when a mortgage is mediated by a Financial Institution specializing in mortgage loans. The actor 'Financial Institution' may also represent a general Service Provider, who offers a service without being involved in the transaction process. An example would be the Construction Engineer who provides a building survey to assess the physical attributes of the property in a qualified way.

It may be surprising to see Government involved in a general transaction process, as European markets in real estate are supposed to operate without government interference. Government interference is especially evident for agricultural holdings and when transactions involve a change in the shape or use of the property unit.

The Registrar is the actor in charge of maintaining consistency of property records. In many countries, responsibility for property registration is divided between Land Registries within the judiciary branch and the Cadastre within the Ministry of Environ-

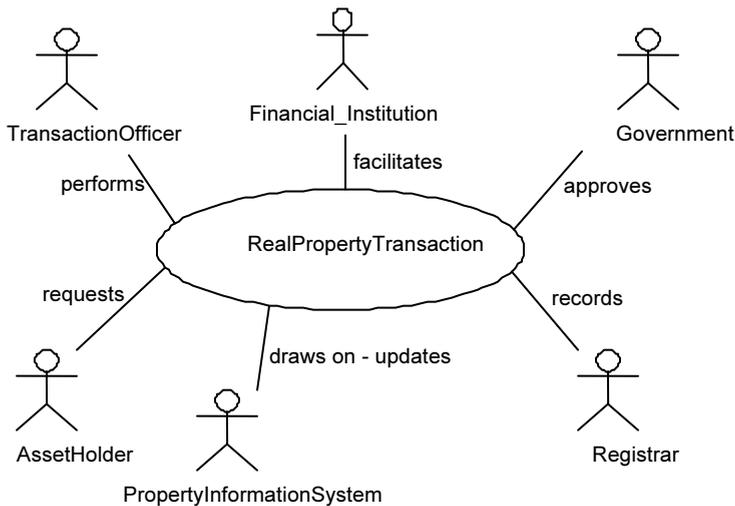


Fig. 3: The basic use case of real property transactions

ment, or similar bodies. The term Registrar refers to a super-class comprising both registration functions. In some countries, boundary surveying is performed by staff of the cadastral agency. The staff may act as a subclass of Service Provider or as a Transaction Officer, depending on how they are involved in advancing the process in question.

The Property Information System is the idealized combination of property registers which support the transaction process. In the initial phases of a transaction, the parties draw upon recorded information. In the latter phase, information generated by the transaction process is used to update the recorded information.

An example: The business process of establishing an easement

The above basic use case needs to be refined by developing use cases for various types of transactions such as sale with and without mortgaging, sale with and without change of property boundaries, etc. These use cases should then be further detailed in terms of activity diagrams, and related to the components and business services mentioned in section 3.

In the following we provide an example of how this can be done by focusing on the establishment of an easement. We were motivated to select this area of specialization by

the fact that Danish land registration is being centralized to one office and digitalized. Previously each district court had its own registry. The new system is scheduled to become operational in March 2008. The new system implies that documents to be registered have to be submitted in digital form. Some documents, especially easements, refer to map sheets with cadastral information. These annexed map documents have to be digitized as well. This calls for an analysis of the business processes, as shown in the upper layer in Figure 2. The following analysis was developed to identify business services which support the provision of digital easement documents.

An easement is a legal construct. Due to the Danish dependence on the European and global context, the proposed solution should be based on general concepts and standards as far as possible. We refer to the research outlined in section 2, especially [4], for the basis for assessing the Danish tradition in a European context, an issue not addressed in the following analysis.

Figure 4, below, is a modification of the basic use case of property transactions. The model has been adapted to fit the case of establishment of an easement.

The Transaction Officer is replaced by a Land Surveyor. This is possible because the National Survey and Cadastre and the Asso-

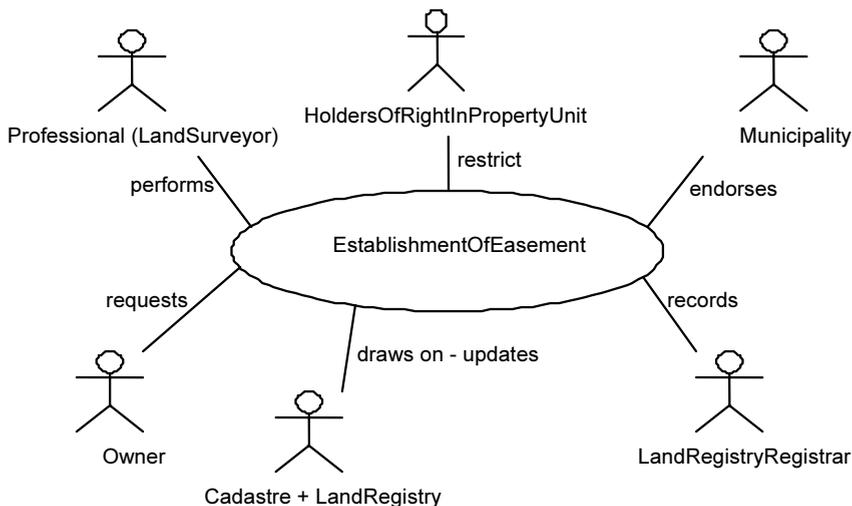


Fig. 4: The use case of establishment of an easement

ciation of Chartered Surveyors have a long tradition of effective cooperation and as a result cadastral casework is now largely computerized. This partially defines the role of the surveyor in the process of easement establishment. As no buyer or vendor is present, the Asset Holder is replaced by the Owner. As we shall see detailed in the following, the establishment of a new encumbrance, the easement, has to be accommodated within other rights in the property unit. This fulfils the

functional objective «reorganising the rights... without compromising the rights of other holders of right», found at the end of section 4.1. Easements are often established to fulfil a precondition for the municipality or another local authority to approve a change.

Figure 5, below, shows interactions among the actors. The UML format is the Collaboration Diagram, but the interaction is conceived from a social point of view rather than from the point of view of information ex-

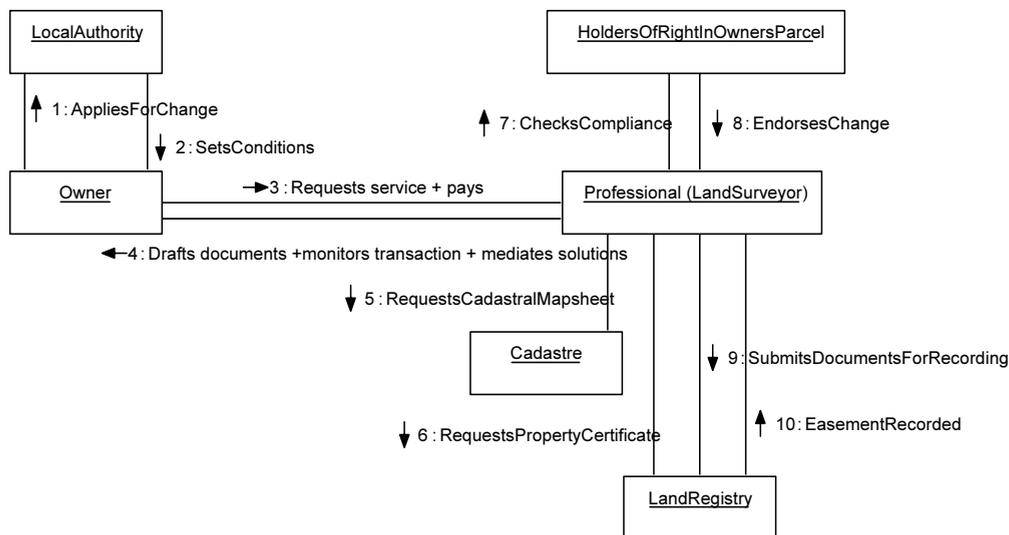


Fig. 5: Actor collaboration in the context of establishment of an easement

change. The relationship between Owner and Local Authority is bound by statutory legislation that requires the Owner to apply for changes (e.g. a subdivision of the property unit) and grants the Local Authority the power to specify conditions (e.g. that an easement be established).

The relation between Owner and Professional is one of exchange: pay for requested service. However, it should be noted that in the professional's code of conduct in welfare societies such as the Nordic, the request of the Owner has to be professionally reflected. This means that it is not just the literal request, but also the owner's wishes that are accommodated as far as possible, as in the functional objective mentioned above.

The relationships between the Professional and the Cadastre and Land Registry, respectively, are described in a more conventional way as information exchange. In fact, fees occur in both relations.

Figure 6 largely describes the business process at the level of detail required for specifying web services. The first branch in the process flow is when the Local Authority states whether an easement is needed or not. The next branch refers to a Danish special condition. According to the planning law, section 42, the Municipality has to add a statement to the easement document that no detailed plan is needed. The intention of this requirement is to prevent misuse of easements for planning purposes.

Conclusion

One factor hampering the introduction of service oriented architectures (SOAs) is difficulty in defining the boundaries for shared solutions. However, recent research in real property transactions is helpful in identifying a reasonably stable and well defined domain. Studies of 'enterprise architectures' are generalized to describe a 'cluster enterprise' made up of actors in the domain of real property. Functional objectives for the architectures of the cluster enterprise are stated, and the mutual roles of actors and their involvement in business processes are specified in some detail. Finally, we introduce digital easements to illustrate how the analyses can be used.

References

- [1] Frank, A., Raper, J., Cheylan, J. P. (Eds) (2001) *Life and Motion of Socio-Economic Units: GIS-DATA 8*. Taylor and Francis, London.
- [2] Lemmen, C., Molen, P. v. d., Oosterom, P. v., Ploeger, H., Quak, W., Stoter, J. and Zevenbergen, J. (2003) A modular standard for the Cadastral Domain. The 3rd International Symposium on Digital Earth, Brno, Czech Republic
- [3] COST Domain Committee Individuals, Societies, Cultures and Health (ISCH) COST Action G9 Modelling Real Property Transactions 2001–2005 FINAL EVALUATION REPORT http://www.cost.esf.org/typo3conf/ext/bzb_securelink/pushFile.php?cuid=253&file=fileadmin/domain_files/Others/Action_G9/final_report/final_report-G9.pdf
- [4] Schmid, Christoph U. and Christian Hertel (2005) Real Property Law and Procedure in the European Union General Report. 103 p. <http://www.iue.it/LAW/ResearchTeaching/EuropeanPrivateLaw/Projects/Real%20Property%20Law%20Project/GeneralReport.pdf>
- [5] Gustafsson, S, Drewniak, A (2007) EULIS-European Land Information Service FIG Working Week 2007, Hong Kong SAR, China 13-17 May 2007 http://www.fig.net/pub/fig2007/papers/ts_6g/ts06g_03_gustafsson_drewniak_1364.pdf
- [6] Internationaler Vergleich von Kosten und Dienstleistungseffizienz bei der Transaktion von Wohneigentum – Optionen für Deutschland (International Comparison of Transaction Cost of Proprietary). Forschungen, Heft 120, Hrsg.: BMVBS/BBR, Bonn 2006 – Issue 120 http://www.bbr.bund.de/cln_007/nn_23494/DE/Veroeffentlichungen/Forschungen/Heft120_DL,templateId=raw,property=publicationFile.pdf/Heft120_DL.pdf
- [7] Ejendomsregistrering i de nordiske lande (Real Property Information Systems in Nordic Countries). Kort og Matrikelstyrelsen, 2006. 340 sider. Dannelse og transaktioner vedrørende fast ejendom i de nordiske lande (Real Property Transactions in Nordic Countries). Kort og Matrikelstyrelsen, 2006. 588 sider.
- [8] North, Douglass C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge University Press, Cambridge, UK. 2002, 152 p.

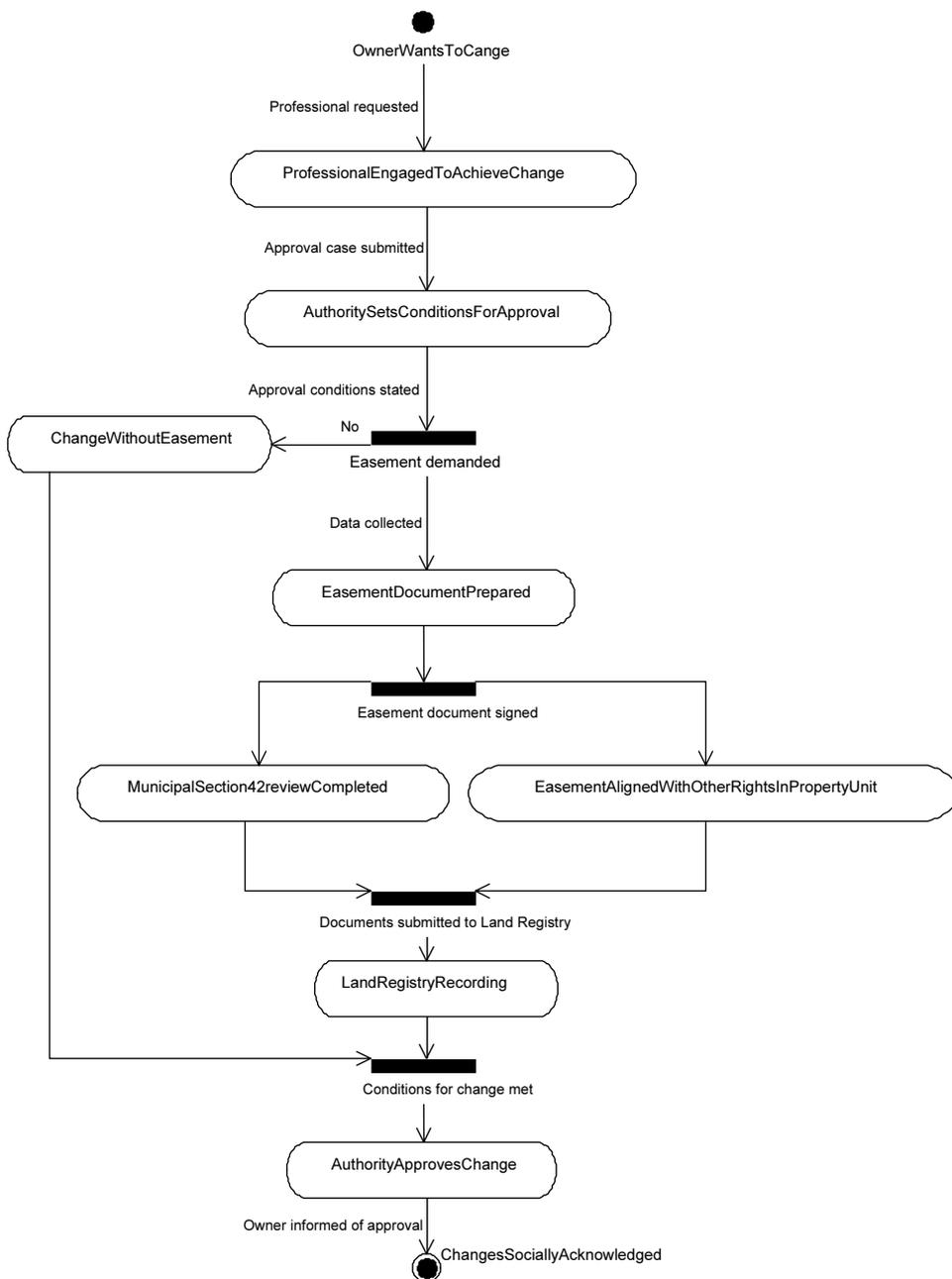


Fig. 6: Activity diagram of business processes needed to establish an easement plan is needed to the easement document. The intention of this requirement is to prevent misuse of easements for planning purposes.

- [9] Pulkkinen, Mirja (2006) Systemic Management of Architectural Decisions in Enterprise Architecture Planning. Four Dimensions and Three Abstraction Levels. Proceedings of the 39th Hawaii International Conference on System Sciences – 2006
<http://csdl2.computer.org/comp/proceedings/hicss/2006/2507/08/250780179a.pdf>
- [10] Architecture for e-Government in Denmark
<http://www.oio.dk/arkitektur/eng>
- [11] Stubkjær, E (2002) Modelling Real Property Transactions FIG XXII International Congress, Washington, D.C. USA, April 2002
www.fig.net/pub/fig_2002/Js14/JS14_stubkjaer.pdf
- [12] Stubkjær, E (2004) Cadastral Modelling – Grasping the Objectives. Joint ‘FIG Commission 7’ and ‘COST Action G9’ Workshop on Standardization in the Cadastral Domain, Bamberg, Germany, December 2004
http://www.fig.net/commission7/bamberg_2004/papers/ts_04_03_stubkjaer.pdf
- [13] Rosen, Mike (2006) BPM and SOA. Where Does One End and the Other Begin. Business Process Trends Column, January 3, 2006.
<http://www.bptrends.com/publicationfiles/01-06%20COL%20SOA%20-Where%20Does%20One%20End%20-%20Rosen.pdf>
- [14] ETeMII Reference Data White Paper (v1.0). Accompanying measure to support the setting up of a European Territorial Management Information Infrastructure, July 2001.
- [15] INSPIRE DIRECTIVE. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), published in the official Journal on the 25th April 2007.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001:0014:EN:PDF>
- [16] NACE: Nomenclature generale des Activitiés économique dans les Communautés Européennes (Statistical Classification of Economic Activities in the European Community).
http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC
- [17] ESF/COST G9 Research Action: Modelling Real Property Transactions. <http://costg9.plan.aau.dk>