Modelling Real Property Transactions

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Key words: Cadastre, COST G9, real property rights, subdivision, transaction costs.

ABSTRACT

Steudler et al. report on the performance of cadastral systems internationally in Benchmarking Cadastral Systems (1997). The authors met serious difficulties comparing data from different countries, suggesting that more progress had to be made in the definition of concepts and terminology. This concern is reflected among the recommendations of the Bathurst Declaration: "Recognising the difficulties in interpretation of the many land administration related terms, develop a readily accessible thesaurus […] to facilitate a better understanding of the terminology used." (FIG, 1999; no. 14).

The need for more elaborated concept sets - for a theoretical basis - was among the motives for proposing a concerted research project: Modelling Real Property Transactions. Researchers from 11 European countries co-operate in the project that gained status as a COST action as of March 1st 2001. The majority of researchers relate to surveying studies, and hence to the FIG.

The main objective of the 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 transaction. The developed models and a subsequent comparative analysis can be used for improving the efficiency of the procedures. Furthermore, the COST action will support Ph.D.-studies by providing a much-needed international research framework and a basis for Ph.D.-level courses.

The paper develops on the multi-disciplinary approach of the project and presents initial findings.

RÉSUMÉ

Plusieurs travaux de recherche scientifique menés ces dernières années à propos des systèmes cadastraux à travers le monde ont conduit à l'adoption par la FIG de la déclaration de Bathurst (Australie) en 1999. Face aux sérieuses difficultés rencontrées dans l'interprétation comparée des notions et du vocabulaire employés dans les administrations foncières, on y recommandait de développer un thésaurus mieux compréhensible de la terminologie en usage afin qu'elle soit plus généralement accessible (FIG,1999; n° 14).

Ce besoin d'une base théorique plus élaborée et mieux intégrée a motivé le lancement, le 1er mars 2001, d'un projet de recherche concertée, intitulé: Modélisation des transactions foncièe-

res. Cette «action» reconnue par le programme européen COST rassemble des chercheurs de 11 pays, oeuvrant surtout en arpentage et en études foncières et cadastrales.

Le but en est de rendre les marchés immobiliers plus transparents tout en réduisant les coûts des transactions foncières. Les modèles en élaboration s'avéreront utiles dans les administrations publiques ainsi que pour la formation universitaire jusqu'au niveau doctoral.

Cet article élabore sur l'approche multi-disciplinaire de ce projet de recherche internationale et en présente les tout premiers résultats, tant attendus.

ZUSAMMENFASSUNG

1997 berichteten Steudler und andere über die Leistungsfähigkeit von internationalen Katastersystemen. Beim Vergleichen der Daten von verschiedenen Ländern hatten die Autoren grosse Schwierigkeiten und schlugen vor, dass mehr Fortschritt in der Definition der Konzepte und Terminologie erfolgen müssten. Diese Bekümmerung ist auch in der Bathurst Erklärung der FIG enthalten (Nr. 14, 1999). Die Notwendigkeit für Konzepte auf theoretischer Grundlage war auch das Motiv für ein gemeinsames Forschungsprojekt über die Modellierung der Transaktion von Grundeigentum. Forscher von 11 europäischen Ländern kooperieren in dem Projekt, welches seit dem 1. März 2001 den Status einer COST Aktivität trägt. Die Mehrheit der Forscher beziehen sich auf Studien im Vermessungswesen und damit auf FIG.

Das Hauptziel der COST Aktivität ist die Verbesserung der Transparenz des Marktes für das Grundeigentum sowie die Bereitstellung einer besseren Grundlage für die Kostenreduktion. Die entwickelten Modelle und das Ergebnis einer Vergleichsanalyse kann für die Verbesserung der Leistungsfähigkeit der Prozeduren benutzt werden als auch einer Grundlage für Lehrgänge.

Der Beitrag ist auf der multidisziplinären Vorgehensweise im Projekt entwickelt worden und präsentiert erste Erkenntnisse.

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1. INTRODUCTION

Already in 1985, Dale drew attention to the fact that "sub-disciplines of surveying such as geodesy held and still hold greater excitement and have attracted substantial research. Cadastre has not. With few exceptions it was not until the 1970's that any serious attempt was made to […] carry out further research and place the study of cadastre on a more respectable intellectual footing". In the last decade there has been a growing pace of contributions to a theory for cadastre. The International Federation of Surveyors (FIG) has promoted important reflection work, specially on the principles to be followed in order to create efficient cadastral systems, which has resulted in a set of reference documents: "The FIG Statement on the cadastre" (FIG, 1995), "The Bogor Declaration" (UNIMEC, 1996), "The Bathurst Declaration" (FIG, 1999) and "Cadastre 2014" (Kaufmann & Steudler, 1998). Last, but not least, Commission 7 of FIG carried out, between 1994 and 1998, a benchmarking project to compare the performance of cadastral systems internationally. The authors met considerable difficulties when comparing data from different countries (Steudler, Williamson, Kaufmann & Grant, 1997) and therefore initiated a process of standardisation of definitions. One conclusion was that more progress has to be made in the definition of concepts and terminology, so that it will be possible to develop appropriate indicators of performance of cadastral systems.

During the same period, the present author surveyed established academic disciplines, looking for concepts and theory elements that would make sense in a cadastral context (Stubkjær, 1992; 1994, 1999, 2001), and made initial suggestions for a theoretical frame for cadastal development (1996). In 1999, these efforts matured into a proposal for an international research project. Researchers from about 10 universities in Europe and North America supported the project proposal and eventually, in March 2001, it gained status as a COST *action*: Modelling Real Property Transactions.

The paper describes the organisation of this research effort and relates it to other European research of relevance for the FIG community (section 2). The research so far includes a description of the subdivision process in three countries: Slovenia, Finland and Denmark. Initial findings of a comparative analysis are presented, as well as the general objectives of the project and its expected outcome (section 3). A conclusion closes the paper.

2. THE COST ACTION G9: MODELLING REAL PROPERTY TRANSACTIONS

2.1 Participation and Organisation of Research

The research project: Modelling Real Property Transactions, is based on the commitment by university staff to provide a certain amount of research within the frames of the project. The

following 10 university departments are all concerned with FIG-related education and research, and are formally related to the project:

- Dept. of Geodesy, *Delft* University of Technology
- Department of Building and Surveying, Napier University, *Edinburgh*
- Institute of Real Estate Studies, Dept. of Surveying, *Helsinki* University of Technology
- Geodetic Department, University of *Ljubljana*, Slovenia
- Land Reform Research Unit, School of Surveying, University of East *London*
- Professor group of Geodesy and Cartography, *Riga* Technical University, Latvia.
- Div. of Real Estate Planning and Land Law, Royal Institute of Technology, *Stockholm*
- Dept. of Geoinformatics, College of Surveying and Land Management, The University of West Hungary, *Szekesfehervar*
- Department of Geoinformation, Technical University of *Vienna*
- Department of Development and Planning, *Aalborg* University

The following 4 departments are formally related to the project as well. They represent expertise in computer science and economics, respectively:

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

In addition, other researchers contribute to the project by presenting their research at the seminars of the project. The invited expert to a seminar in Bremen, November 2001, was Dr. Barry Smith, NCGIA, University at Buffalo, New York. He is a philosopher, who has made pioneering studies designed to show that philosophical methods and theories can be applied to information science. He participated in the preparatory phase of the project as well.

2.1.1 Organisation of Research

The project is established through the Ministry of Foreign Affairs of the participating countries. The formal instrument for this international co-operation is a document entitled: Memorandum of Understanding for the implementation of a European Concerted Research Action designated as COST Action G9 "Modelling Real Property Transactions" (COST 328/00, 2001). It came into force March 1st, when the first five countries signed the Memorandum. It is stipulated to continue to 2005.

The research is outlined in an 18-page document, a Technical Annex to the Memorandum of Understanding, which is available at the official website of COST. It follows a prescribed structure with the following headlines:

- Background

- Objectives and benefits
- Scientific programme: State of the art; The research issue; Methodological considerations
- Organisation and timetable
- Economic dimension: assessed to 1.4 Mio. EUR

The research is largely financed by the participating countries, that is by nationally supported research or - more often - by participating researchers, who pool (part of) their research time into the project. The COST scheme supports this co-operation by covering some co-ordination costs.

The research is directed by a *Management Committee*, which is made up by representatives of the participating countries. National research bodies nominate one or two researchers as members of the MC, who in turn selects a chairperson and a deputy chairperson. The research is further organised into three working groups, on Ontology, Law, and Economics, respectively.

2.2 What is COST?

COST (European Co-operation in the Field of Scientific and Technical Research) supports the co-ordination and networking of existing research activities, but it does not fund research itself. Rather, COST funding covers the co-ordination expenses of each *action* (scientific secretariat, contribution to workshops and conferences, publications, short-term scientific missions etc).

Characteristics of COST *actions* or networking activities are that they are flexible, "bottom-up" and can be truly pan-European as not only EU countries, but also accession countries may participate. Participation in any Action is à la carte. Following a favourable peer review, a Committee of Senior Officials may approve a draft MoU for a new COST *action*, before it is opened for signing. Signatures from 5 COST countries are required to start an *action*. A number and a title identify each COST *action*, e.g. G9 "Modelling Real Property Transactions".

In contrast to EU research programmes, this form of collaboration does not require an agreed overall research policy. Thus, COST can acts as a forum for ideas and research issues, which are not addressed by the established academic disciplines, nor part of the EU's priorities for research and development. A COST *action* may, however, identify areas of future co-operative research endeavour within the context of the *European Research Area* (EU Commission, 2000), and the priorities and structure of the next Framework programme 2002-2006, or within the European Science Foundation.

2.3 The Initiation of the COST action G9: Modelling Real Property Transactions

Many research issues within the scope of FIG's scientific commissions are not sufficiently addressed by the university establishment, nor part of the EU's priorities for research and development. The COST scheme may be a relevant frame for co-operation on such research

issues. The following review is meant as an inspiration for the initiation of subsequent COST actions. What is needed?

2.3.1 An Existing Research Network

Within established disciplines like geodesy and cartography, networks among university staffs and departments have been in operation for long. Within other fields, like cadastre, stable and formalised networks are sparser. For example, Nordic university staffs concerned with real estate and cadastre have met about every second year since 1980s to rather informal seminars.

The EU's TEMPUS scheme funded a Joint European Project: Education in Land Information Systems. From 1991 to 1997, this project provided the frame for yearly seminars. The participants came from several Central European accession countries, and from the following EU countries: Netherlands (the co-ordinator of the network), Denmark, and occasionally Finland, Austria, and Greece (see, for example Gazdciki & Bogaerts, 1996).

From 1996 to 1999 a further TEMPUS project focused on the geodetic study programme of Slovenia (Sumrada & Stubkjær, 2000). Through about two meetings a year, colleagues from Austria, Denmark (co-ordinator), Finland, Netherlands and Sweden met with Slovenian colleagues. The project concluded with the establishing of a revised and formally approved study program that better reflected the needs of the more market oriented Slovenian society. Besides, it established a group that was prepared to embark on a new research project, and also able to perform the needed research.

Other networks may have a different development history. Important is to catch the opportunities for financing improved co-operation on research related activities.

2.3.2 A Well Founded research Issue

A research issue may be well founded in three aspects that complement one another: One is that the research project is described according to best practises in project management, e.g. applying the *logical framework matrix* tool, where *activities* leads to verifiable *results* that supports *overall objectives*.

The second aspect regards the essence of research: to provide new and proven knowledge. Many FIG-related issues are multidisciplinary, and it is indeed hard to separate proven knowledge from the flux of new mainstream practises. Precisely this is, however, the challenge of university staffs. A possible approach is to shape the research issue in a way that it attracts interest by researchers from disciplines with stronger research traditions, e.g. economics or informatics. The feedback from these researchers will assist in making a research design that brings about *a favourable peer review*, cf. the presentation of the COST scheme above. The proposal for the COST action G9 could benefit from stated co-operation with renowned philosopher, knowledge engineers and economists, respectively.

The third aspect regards the purpose of research: Is it to provide a technology push, demonstrating the potential of new inventions? Is it to reduce costs? Then who will benefit from it? The problem oriented educational practise of Aalborg University focuses - in its ideal form - on the needs or problems of a group of people in the society. This concern for those in need may well serve both as a source of inspiration for the research and also assist in the attraction of the necessary resources for research.

The COST action G9 has the long-term objective of improving the transparency of real property markets. Whether this transparency will benefit globally operating capital or young families looking for an appropriate house remains to be seen.

2.3.3 Luck, e.g. in Finding 'the Right Door'

The multidisciplinary nature of many of the research issues that are addressed by FIG commissions makes it difficult to find the right entrance to the units of the research establishment and its resources. A field like the *cadastre* could relate to science and technology, because of its heavy use of information technology and the location of most study programmes of geodetic surveying within the broad field of engineering. However, important issues related to the cadastre are addressed by social sciences, e.g. law, political science, and economics.

A call by the Danish research board of social sciences triggered the submission of the proposal for the project: *Modelling Real Property Transactions*. The project was reviewed within the auspices of the Social Science-committee structure of COST, but was finally adopted as belonging to the group: *Miscellaneous*.

3. THE RESEARCH EFFORT

3.1 The Purpose of COST Action G9: Modelling Real Property Transactions

"The main objective of the 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" (COST 328/00, 2001).

The terms 'transaction' and 'transaction costs' are technical terms within economics, more specifically *New Institutional Economics*. They relate to the fact that the cost of a commodity in a market reflects not only the price paid. The cost includes the efforts of searching for the relevant commodity and of assessing the quality of the product, as well as the costs of legal protection of property rights, including the institutionalised paperwork and enforcement measures.

In order to assess the transaction costs and the economic efficiency of selected markets in real estate, the project takes its point of departure in a detailed description of the procedures in which each unique transaction is embedded. The subdivision of a unit of real estate is one example of the procedures studied. Others include the conveyance of title, and mortgaging.

The conceptual formalisms used for the description include the *Unified Modelling Language*.

The said procedures are mapped out through legislation, administrative prescripts, and professional norms. These norms of behaviour vary across countries. In order to compare such national rule sets, the terms and concepts that are used for the description of procedures are to be carefully defined. The expected outcome of the research is what in the field of knowledge engineering is called an *ontology*, that is a consistent specification of the concepts used within a universe of discourse. Comparison of activities across countries becomes feasible through the ontology.

A following major step will be the assessing of the costs that are related to the most frequent of the studied activities, and more specifically the transaction cost that are related to, e.g. the delicate procedures related to the conveyance of title. High values are at play, and because of the needed recording at the Land Registry and different from the trading of jewels, you cannot immediately exchange assets for money.

A comparative assessment of transaction costs in different countries is a necessary, but not sufficient basis for cost reductions. Real property transactions are embedded in *institutional structures* that vary across countries (more precisely: jurisdictions). The conception of real property rights is not the same within the different *legal systems*: Continental European Law (with subsystems), Common Law, Islamic Law, etc. Also, the division of work varies between units of public administration and between the diverse professions: lawyers, notaries, real estate valuars, and of course geodetic surveyors. Within New Institutional Economics, reference has been made to the fact that typewriter keyboards are standardised with a layout (QWERTY..) that is not optimal (David, 1985, as quoted by North, 1996: 93). Similarly, in the present case it is to be expected that the institutional structures related to real property rights will not be changed just because of new evidence, even if such evidence was sufficiently validated. What can be achieved, however, is a better understanding of the *path of institutional change* (North, 1996: 92ff) that is, the long-term changing pattern of co-operation (or lack of so) among governmental units and diverse professions in the domain of real estate. Furthermore, a consolidated body of general and detailed knowledge on real property will be established. This is needed among others for the education of the next generation of professionals and others agents in the markets of real estate.

3.2 Initial Findings: Comparing the subdivision Process of Three Countries

The following is based on yet unpublished manuscripts prepared by Rados Sumrada, Slovenia, Arvo Vitikainen, Finland, and the present author. The manuscripts include descriptions of the ordinary subdivision process in terms of so-called 'Use Cases' (Sumrada, 2001). The specific template applied here is borrowed from Cockburn (1998). The complexity of the template and of the original descriptions has been carefully reduced in order to be able to present the three subdivision processes on one page. The different style of authors is largely left as in the original; reductions are made primarily to pack the information into one page (at end of paper).

A striking difference appears between the Danish and the Finnish procedures. In Finland, subdivision is part of the process of purchasing a parcel of a unit of real estate. The Land Registry triggers subdivision when the legal formalities are settled. In Denmark contrarily, subdivision is requested by the owner and precedes registration of title in the Land Registry. The Slovenian case seems to be somewhere between these two extremes, but further investigations are needed to identify similarities and differences.

Another difference appears between the Danish case on one side, and the Finnish and Slovenian case on the other. The two countries prescribe a report to be made, and in the Finnish case the reports refers to a formal meeting with the parties in the field. The Danish provisions are less formal: a formal meeting is normally not demanded and although needed documentation is specified in detail, no report is mentioned.

However, an analysis at the level of individual attestations, etc. of the three countries may well reveal that there is a high degree of similarity. This is because the objective of the three subdivision cases most likely is the same. Tentatively, the functional objectives may be described as to:

- establish systematically identified plots of land, and
- reorganise the rights in the plot and its surroundings at the wish of the parties,
- without compromising the rights of passive (and active) holders of rights,
- in compliance with spatial, environmental and agricultural legislation, etc, and
- maintaining the clarity and efficiency of registration.

The approach illustrated, focusing on UseCase-templates rather than the national legislation and prescripts, has provided a basis for comparisons that are functionally structured. It will be a challenge to develop a mutually agreed set of functional objectives, and develop a formalism that relate the individual attestations and other data sets to the functional objectives in a consistent way.

4. CONCLUSION

The call for improved definitions and for the development of consistent sets of concepts regarding cadastre and real estate is addressed by the project: *Modelling Real Property Transactions*. The project and it status as a COST action was presented with the view of inspiring other researchers within the FIG-universe to apply the COST scheme for research co-operation. Three complementary aspects of co-ordinated research: project management, scientific strength, and societal relevance was introduced as criteria for a favourable peer review.

Subdivision procedures of three countries: Denmark, Finland and Slovenia were synoptically presented, and differences and similarities discussed. The discussion contributed to the performance of further research by suggesting functional objectives for subdivision procedures. Other foreseen research activities within the frame of COST action G9: Modelling Real Property Transactions, was presented as well.

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Denmark: Subdivision recorded in Cadastre	Finland: Subdivision recorded in Cadastre and Land Registry	Slovenia: Subdivision recorded in Cadastre and Land registry
Context The owner sells a parcel of his unit of real estate, e.g. to allow for building construction on the parcel	**Context:** The owner sells a parcel of his unit of real estate. 1. The owner and the buyer agree upon a contract of sale 2. The appointed notary checks and verifies the contract of sale 3. The buyer pays the transaction tax to the government, and forwards the request for title registration to the land registry. 4. The Land Registry checks and records the new owner of parcel.	**Context** The owner sells a parcel to the buyer, which is a subdivided part of his unit of real estate.
Actors, active: Cadastral surveyor, owner, cadastral authority **Passive:** Holders of rights in the unit, municipality, other local authorities, land registry, neighbours	**Actors, active:** Buyer, cadastral authority, cadastral surveyor, land registry, owner. **Passive:** Holders of rights in the unit, mortgagors, neighbours, notary, municipality, other local authorities incl. Land Court.	**Actors, active:** Buyer, cadastral authority, responsible surveyor, land registry, owner **Passive:** Holders of rights in the unit, local authorities incl. municipality, mortgagors, neighbours, notary
Trigger: Owner requests the service of the cadastral surveyor	**Trigger:** The land registry sends the approval to the cadastral authority.	**Tg:** The owner or the competent authority request the subdivision from a licensed surveyor (company).
Sub-activities 1. Surveyor accepts and files the case 2. Surveyor collects and investigates data, and chooses a strategy for the specific case 3. Surveyor establishes boundaries, marks new boundaries and certain existing boundary points; measures boundaries and buildings, etc. w.r.t. national co-ordinates 4. Surveyor settles property rights that interfere with the subdivision 5. Municipality (and other local authorities as needed) approves case with respect to spatial planning, etc. 6. Surveyor submits case to cadastral authority. 7. Cadastral authority checks and approves case, and issues the case approval to surveyor, land registry, and municipality. 8. Cadastral authority sends relevant data to municipal property register and land registry 9. Surveyor completes statement on allocation of easements among new and old parcels and sends it to the land registry 10. Owner pays fee to surveyor 11. Surveyor delivers documents (cadastral map of parcel) to the owner	**Sub-activities** 1. The cadastral authority checks and files the approval of the land registry. 2. The cadastral authority appoints a cadastral surveyor to carry out the process of subdivision. 3. The surveyor informs the buyer that he has an assignment to prepare the case. 4. The surveyor collects and investigates the data on the boundaries, easements, etc. 5. The surveyor calls the interested parties (actors) to a meeting where he: - checks accordance with spatial plans, etc. - establishes, marks and measures boundaries - settles property rights interfering with the subdivision - allocates easements among to new and old parcels 6. The surveyor prepares a detailed report (minutes of the above meeting and a cadastral map of the parcel) on the subdivision. 7. The surveyor gives parties information on their right to appeal to the Land Court. 8. The surveyor sends the documents to the cadastral authority after the appeal period. 9. The cadastral authority updates the cadastral database (JAKO), sends the relevant data to the land registry, and the documents (cadastral map of parcel and report) to the owner. 10. The Land Registry updates the land register (registration of new unit of real estate). 11. Fee to the cadastral surveyor is paid.	**Sub-activities** 1. The actual owner requests the subdivision from the selected surveyor, who checks, accepts and registers it (ident, date). 2. The surveyor collects the required data 3. The surveyor submits a request for subdivision permission to the municipality unit concerned, which issues a subdivision permission. 4. The surveyor investigates data and prepares a specific strategy (workflow) for the case. 5. The surveyor establishes and marks new boundaries and certain existing boundary points; measures w.r.t. national co-ordinates 6. The surveyor prepares a detailed report (lots established and measured boundaries w.r.t national co-ordinate system, agreements etc.) and also prepares a subdivision invoice. 7. The owner (seller) pays the subdivision costs to the surveyor. 8. The surveyor delivers detailed report (documentation, cadastral map and enclosures) to the owner. 9. The owner, or at his request the surveyor, submits the subdivision case to the cadastral authority, and pays the fee for subdivision. 10. The cadastral authority checks the fulfilment of various conditions, the technical quality of the submitted case (report), including approval of definitive boundaries and their registration. 11. The cadastral authority updates the cadastral database, issues the case approval to the owner (or surveyor) and to the land registry, and sends the relevant data to the Land registry. 12. Following registration of title of new ownership, the land registry sends a decree on the approval to the cadastral authority and the new owner (or surveyor).
Related activities I. Registration of title follows subdivision. II. Municipality updates Property Register (ESR) and, if applicable, Building and Dwelling Register.		**Related activities:** Registration of title: 1. The owner and the buyer make (with possible legal assistance) a signed sale contract. 2. The buyer settles the real property sales tax to the municipality concerned. 3. The appointed notary checks and verifies the sale contract (valid, subdivision completed, tax paid, ..).

BIOGRAPHICAL NOTES

Professor, Lic. Agro. **Erik Stubkjær** is professor for Cadastral Science at the Department of Development and Planning, Aalborg University, Denmark, since 1977.

He has written numerous research articles and conference contributions with a view to articulate theoretical foundations of the European cadastres.

Interest in educational development made Erik the co-ordinator of the EU's Phare/ TEMPUS project: Improved Education on Environment and Infrastructure (1996-99). The project regarded the restructuring of the study programme of the Department of Geodesy, Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia, and resulted in a formally agreed renewal of the study programmes.

He served as the chairman of the Programme Committee for the 7th Scandinavian Research Conference on Geographical Information Science, which convened June 1999 at the Department in Aalborg. During 1999-2001, he was co-ordinator of a Nordic-Baltic Network on Land Management in Geodetic University Programmes, NorBalt.

Since November 2001, he is elected chairman of the management committee of a research project, Modelling Real Property Transactions, which co-ordinates research in 11 European countries.

Erik is member of the Danish Association of Chartered Surveyors, and of the IT-section of the Society of Danish Engineers.