

Modelling Real Estate Business for Governance and Learning

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Key words: Cadastral development, institutional economics, modelling, ontology, real property, transaction costs, university networks

SUMMARY

The challenges, which are addressed by the organisers of this workshop, demand cooperation among representatives of industry, government, and academia. The present paper assumes that university departments and their staff hold a key position to address the mentioned challenges and thus to promote the FIG profession(s) at European scope. A recent EU Communication, COM(2005) 152, calls for university networks, which meet criteria of critical mass; interdisciplinary teaching; a strong European dimension; backing from regional/national authorities and direct involvement of industry; as well as identified and declared areas of excellence.

Within the above context, the paper refers to outcomes and experiences from the research action: *Modelling Real Property Transactions* (2001-2005). Among others, processes related to real estate (purchase, subdivision) were modelled and corresponding ontologies were drafted. Also, a follow-up action is in process of approval: Rearrangement of Property Rights for Rural and Urban Areas.

A short study programme on Cadastral Development is proposed, which might enhance university networking with clusters of the micro-enterprises, which provide technical services in geodetic surveying and spatial planning, as well as with mapping and cadastral agencies. Referring to existing UNIGIS and EEGECS university networks, the proposed study programme answers a request for extending the knowledge profile of the geodetic surveyor within the field of land management, and thus contribute towards meeting the criteria mentioned above.

1. INTRODUCTION

1.1 The context: Real estate business within geospatial information

The field of real estate and cadastre was put into wider perspective through investigations made by the European Territorial Management Information Infrastructure project. The ETeMII project introduces the notion of territorial or geospatial *reference data*, which comprise both visible geographical features, which are depicted on topographic maps and orthophoto imagery, as well as named geographical objects in terms of units of property rights, i.e. cadastral parcels, administrative districts, and post addresses, se Figure 1 below.

The ETeMII-project was adopted as base for further investigations in the context of the INSPIRE initiative, and later adopted by the joint organization for European mapping agencies, EuroGeographics (Luzet, 2003). Interestingly, the ETeMII reporting includes an Annex C with economic information, which may render a gross estimate on the relative economic weight of the diverse data sets.

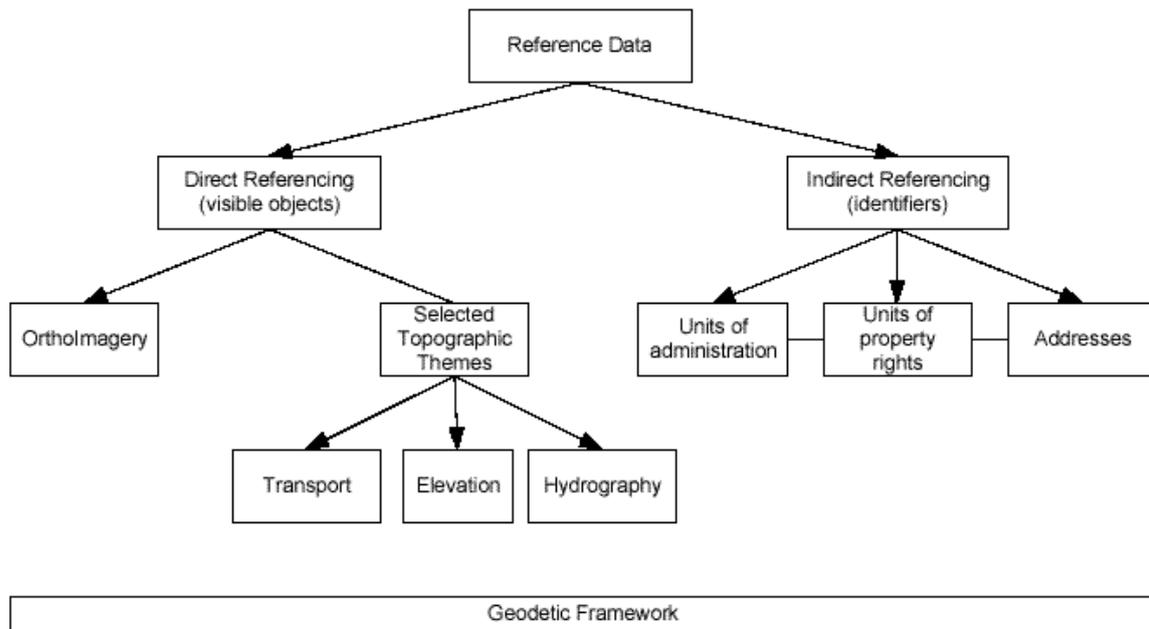


Figure 1: Structure of geospatial data.

Source : ETeMII Reference Data White Paper (Version 1.0, July 2001; Chapter 1, page 9).

The numbers of Table 1 below provide the relative magnitude of production cost, attributed to the various geographical categories. The economic information is adapted to the structure of Figure 1 above.

Topographic objects: 33%	Socio-economic units: 29%
<ul style="list-style-type: none"> • Transport: 5 % • Elevation: 7 % • Hydrography: 5 % • Other environmental: 16 % 	<ul style="list-style-type: none"> • Units of administration: 2 % • Units of property rights: 27 % • Addresses: ?
Geodetic framework: 4 %; Utilities 19 %; Maritime mapping: 15 %;	

Table 1: Geospatial data sets and their relative economic weight (in % of production costs).

Source: ANZLIC Benefit Study, 1995, as quoted in ETeMII, 2001, Annex C, Table 2

The relative economic importance of the cadastral and other administrative data is remarkable. This is further corroborated by shifting the view from production cost to use: the fact

that socio-economic data may be used for taxation and mortgaging and thereby increase its importance for society by a factor of 5 or 10, suggests more attention be granted to the socio-economic segment of geospatial data.

1.2 Knowledge profiles related to geospatial information

In Europe, the handling of geospatial information was traditionally the province of the geodetic surveyor. The knowledge profile of the geodetic surveyor was coined more than a century ago, as indicated by the seminal works of F R Helmert (1872, 1880). The social science component of the profile was marked much later by P Dale and J McLaughlin (1988, 1999) and G Larsson (1996, 1997). A present trend is indicated by the following statement:

The existing [Slovenian] socioeconomic system and different perceptions of space, land and real estate, dealing with land as economic resource, enable and request a changed role of surveyors, which should be found not only in surveying. The importance of land as an economic resource...calls for a consideration of a whole new role of surveying in land management (Rezek, 2005).

The paper addresses this call in line with the approach taken originally by Helmert: To support society through profession by relating basic theory to the everyday problems.

Now, it is no simple task to imitate the approach of Helmert and others, already because the present generation of surveyors is brought up within the tradition of applied natural science. We have to leave our 'scientific home' and 'go hunting' in the foreign territory of social sciences, and when we present our trophies, reactions may be as mixed as in the Hans Christian Andersen tale of Clumsy Hans (1855). A further problem in sifting out relevant social science knowledge is that so far, the theory based directions for development appear not to have the same long life as the principle of least squares. The sad consequences of this is that with few exceptions, poorer are getting poorer, in spite of the decades of development schemes and projects (Oxfam, 2004). How then can the problem of adapting the profile of the profession be approached? The paper presents an attempt at answering that question: The careful analysis of current practices regarding transactions in land addresses the empirical side of social science, while a reflection of the institution of real property rights and how it came into being addresses the theoretical side. Both sides were investigated through the research of the *Modelling Real Property Transaction*-project, further described in section 2. The experiences gained motivate the proposal, in the subsequent section 3, for a 6 months study program, which aims at relating basic theory to the everyday problems, to provide consolidated knowledge to the next generation of surveyors, and to contribute towards European university networking.

2. THE RESEARCH *action*: MODELLING REAL PROPERTY TRANSACTIONS

The research action *Modelling Real Property Transactions* took place 2001-2005 within the framework of the European CO-ordination in the field of Scientific and Technical Research, COST. G9 is an action identifier. The terms of reference, called a *Technical Annex*, as well as the activities and their outcomes are documented at the website of the action:

costg9.plan.aau.dk, and more specifically through an Evaluation Report in process (COST G9, 2005). At the outset of the action, the state-of-the-art was described in a book (Stuckenschmidt, et al., 2003). In December 2004, an international conference was organised in Bamberg, Germany, in cooperation with FIG Commission 7, and during the action period participating researchers documented their findings in a variety of scientific journals and reports, as listed at the website (COST G9 Publications, 2005). A book is in preparation to summarise main findings. The research was performed in cooperation with economists and knowledge engineers, thus extending the knowledge scope of geodetic surveying.

2.1 Comparing administrative processes across countries

The sale of a unit of real property requires a number of steps. In addition to the parties concerned each step involves various advisors, companies, e.g. banks, and agencies, e.g. the Land Registry. This social activity may be described from different theoretical perspectives. One approach would see the activities as the fulfilment of legal demands set out in statutory laws and ordinances (the cadastral and land law approach). Another approach would conceive the activities as information flows, updating real property databases (the land information systems approach). However, the approach actually applied was rooted in economics, in the branch called *new institutional economics*, of which Douglass C North is a prominent representative (1990). Briefly, this branch claims that reasoning on market behaviour needs to include not only supply and demand, but also the costs, which occur when assets are exchanged or *transacted*, which is the preferred technical term. The sale of a house against money or a combination of money and loans is a complex and costly affair. In order to analyse the process, you first have to model the details of such real property transactions. This is precisely what the G9 action was about and real property transactions for several European countries have in fact been modelled as complex sequences of activities.

The modelling effort applied at the outset the verbal and tabular Use Case Template, proposed by A. Cockburn (Stubkjær, 2002). Efforts at standardising on a specific modelling tool did not realise, likely due to the costs in monetary and learning terms, and thus a creative variety of presentation formats may be observed. The most systematic use of the Universal Modelling Language (UML) formalism was applied for describing the processes in Slovenia and Greece (Sumrada, 2005; 2005; Arvanitis, et al, 2005). The Nordic national mapping and cadastral agencies have initiated a similar modelling of real property transactions. Here standardisation is achieved in terms of a common 'swimlane' format, which groups activities of one actor within a column. For subdivision, the following actors apply: owners, surveyor, cadastral agency, land registry, municipality, and 'others'. Terminology issues were addressed (Auzins, 2003; Tiainen, 2004), but await a more complete treatment.

Generally, it may be concluded that the methodologies available at the outset of the action did not fit the task at hand: The UML-based methodologies fitted the modelling of information flows and structures from the perspective of a single organisation, but the task at hand compares to the modelling of the domain of an industry, in case: the real estate business. The modelling of a domain, rather than the information system of an organisation,

is a research issue within informatics, so apparently the G9 research relates to the research frontier.

2.2 Applying knowledge engineering tools for formal comparison of transactions

The use of knowledge engineering methodology and tools was emphasized from the outset of the G9 action. However, a long period of preparation was needed until a breakthrough was eventually established in 2005 (Hess, 2005). A formal comparison ensures that only such elements of national processes are compared, which represent the transaction at the same level of detail. Some processes appear at a rather general level to be 'identical', but do in fact hide notable differences, when they are compared on the basis of a more detailed representation. An ontology-based methodology was applied to analyse the already existing, quasi-formal models of national processes. First, a 'top-level ontology' was specified, i.e., a formal description of the basic categories used for describing the processes and their relations. Next, each of the processes to be compared was described within that formalism, as far as possible. Subsequently, the processes were compared by a software tool, an 'ontological reasoner' and iterations made in which the ontological process model was refined on the basis of the relationships computed. Finally, differences and similarities were analysed.

For example, a Danish 'SaleContractSigning' may compare to a 'SaleContractSigning' in England and Wales, but the assumed correspondence appears to be incorrect. In Denmark, a sale contract is legally binding as soon as it is signed by both involved parties, i.e., after signing the sale contract, the involved parties cannot withdraw from the property transfer (in principle, as always, exceptions exist). In England and Wales however, the sale contracts signed by seller and buyer must be exchanged via the seller's and the buyer's solicitor in order to become legally binding. As a first iteration, the EW 'SalesContractSigning' was split up into two activities:

- ConfirmingWillToTransferPropertyRights and
- MakeSaleContractLegallyBinding.

Now the rendering is correct, but a drawback is that the reasoner cannot any more compute a relationship. A subsequent iteration would call upon domain experts to rephrase the two processes so that correspondences can again be established where they correctly apply.

The example suffices to demonstrate how the use of formal methodology and tools assist in the scrutinising and comparing of property transactions. The G9 research performed has provided a framework for master- and PhD-level research, which did not exist before and which is highly needed, taken the economic weight of the domain into consideration, as mentioned in section 1.

2.3 The costs of property transactions

The costs of property transactions may be compared by counting the honoraries, fees and duties occurring during a sale or a subdivision or other process. A careful definition of costs is necessary to be able to identify and especially to explain the national differences. The G9 action noted substantial differences related to taxes that were levied on the real property transaction. Differences were further found in what part of public planning procedures and

related costs were borne by the parties of a real estate transaction. Furthermore, it has been revealed that general policy issues influence considerably the non-monetary costs of a transaction; most important here are pre-emption rights. The question whether holders of a pre-emption right (a municipality or a neighbour) is going to take over the property or not, creates uncertainties, which have to be seen as hidden costs.

In order to establish an acknowledged frame for such complicated analyses, the action investigated the internationally applied System of National Accounts. This elaborated set of standards regard mostly national statistics in monetary terms, but the so called 'satellite accounts' seems to apply well to the domain of real estate, as it counts the related spending in the relevant sectors (both public and private) as the base for comparison. This approach was tentatively applied for two countries, Denmark and Slovenia, and related to concepts like 'Total cost of ownership' (For references, please consult COST G9 Publications, 2005).

2.4 Economic theory on development

The approach taken in the G9 action may be compared to research carried out under the direction of Hernando de Soto and described in his widely quoted book (2000). Focus in both research efforts was the systematic description of institutionalised behaviour of people. The process of marriage is institutionalised behaviour as is the mundane exchange of certain pieces of paper called money against goods or services. In the Continental European tradition, institutions often are assumed to be defined largely through statutory legislation. This is, however, a gross simplification, which is based on the implicit and invalid assumption that statutory legislation determines social behaviour in the same way as the laws of nature determines physical processes. Now, institutions do restrict the way people behaves, there is some regularising efforts or mechanisms at work and, furthermore, these mechanisms can be changed. De Soto thus points to "the legal property system, [which] became the staircase that took these nations from the universe of assets in their natural state to the conceptual universe of capital, where assets can be viewed in their full potential" (2000, p. 43-44). Less appreciated is his observation that "[t]he Western nations have so successfully integrated their poor into their economies that they have lost even the memory of how it was done, how the creation of capital began". The formalization of the legal property system emerged slowly and without scientific reflection during some hundred years. As a consequence, de Soto requests: "That history must be recovered" (2000, p. 8, 9). Now, this is not the place to dwell into the details of that history, it suffices to ask: What kind of society triggered the development of cadastres about a century before cadastral agencies were discussed in the English language? Seeking an answer to that question brings us right into an ongoing debate between the presently hegemonic neoclassical economy and the opposing 'institutional economics', see for a recent account (Jomo, Reinert, 2005, especially Reinert, 2005, p. 50ff). The focus of institutional economics goes beyond economics' usual concentration on markets; it looks more closely at human-made institutions, and views markets as a result of the complex interaction of these various institutions: social norms, states, firms, etc. The G9 research methodology allows for formulating critical questions to examine the historically grown present-day systems. The change of present property systems, in Europe as elsewhere, demands a better understanding of the logic of development than has been at work so far.

2.5 Continuation of the research effort

Dr. Robert Dixon Gough, University of East London, and Prof. Dr.-Ing. Joachim Thomas, University of Applied Sciences, Bochum, is proposing a new COST action within the ESF/COST scheme. The new action is called 'Rearrangement of Property Rights for Rural and Urban Areas'. The proposal applies knowledge gained through the G9 action for a comparative analysis of land rearrangement approaches in Europe. Researchers from almost 25 countries from the EU and neighbouring countries, e.g. Russia, Turkey, and Ukraine have supported the proposal, thus indicating the wide interest in the modelling of property rights. The COST scheme supports the arrangements of Training schools. This option was successfully applied within the G9 frame in terms of the PhD course Cadastral Development - The Contribution of Scientific Enquiry (cf section 3.1.3 below), and efforts will be made to continue the experiences gained.

3. A NEW STUDY PROGRAMME IN CADASTRAL DEVELOPMENT

3.1 The need for programmes in the field of land management and administration

3.1.1 Social science issues are already addressed under various headings

As mentioned in section 1. Introduction, the core of geodetic surveying programmes is of a predominantly technical nature. However, the present surveying programmes of European universities does include topics of a social science nature, including land use planning and cadastral law. Furthermore, the management of geographical information - be it in central or local government, or in private companies or bodies of civil society - needs a good understanding of organizational and legal issues, and these social science issues may be addressed in existing geo-information courses as well. The emphasis of the present paper on social science issues does not intend to query the balance of the present university programmes across Europe, because for most geodesy students, the local teaching in the mentioned fields is sufficient. However, some would like to focus on the social and managerial aspects of the surveying trade. The proposed programme is intended for them, especially if they consider continuing their studies with the objective of attaining a PhD. The need for scientific staff and for specialists with understanding of institutional issues, e.g. at mapping and cadastral agencies, is not large enough to provide such formal education in each of the small and medium-sized countries of Europe. Therefore, it is appropriate that a few universities offer in-depth courses and programmes in these non-technical fields.

Interestingly, projects have been performed within the context of the UNIGIS International network of universities, which aims at providing knowledge in land administration. Mentioning is made of the OLLO TEMPUS project 1995 – 1998 by the then Székesfehérvár College of Surveying and Land Management (now the West Hungarian University College of Geoinformatics), which provided open learning materials and courses in Land Information Management. Later projects on Staff Development in Land Administration, SDiLA 1999-2001, and Land Information Management for Executives, LIME 1999-2001, indicate the recurrent need for education in this field.

3.1.2 The need of research in society's use of geospatial data

The concern for geospatial data is related to an array of 'institutional, organizational, technological, human, and economic resources', and to 'governments, institutions, customs, laws..'. "The term Geospatial Data Infrastructure encompasses the sources, systems, network linkages, standards and institutional issues involved in delivering geospatially related information from many different sources to the widest possible group of potential users" (Groot, McLaughlin, 2000: 5, 20, 269-270). For each of the terms quoted, there are further research findings to be studied, sifted, and applied. Again, this may be done at individual university departments, but the initial learning costs are high and therefore again, specialization among European departments is appropriate.

There is, however, a deeper need to learn how to reflect on the societal purpose, organisation, and use of real property data. This is due to the fact that after the 1980s, the political-administrative values in Europe have changed substantially. Somehow simplified, you may say that during most of previous century, Europe preferred a strong state, not only to maintain law and order, but to develop agriculture, forestry, industry, and trade with a view of improving living conditions 'for all'. After the 1980s, another way of thinking took over, which requested 'less state and more market'. This thinking appears from the so called Copenhagen criteria of accession to the European Union. The criteria includes the well known demands that

The legal system, including the regulation of property rights, is in place;
laws and contracts can be enforced

However, the overriding context of the demands seems to be foreign direct investment, as indicated by the title of the concerned chapter: 4. *Free movement of capital* (see Stubkjær, 2003, for references). Now, contract enforcement and property rights were not developed in Denmark, nor likely in any other European country, to enhance free movement of capital. Rather, they developed due to a perspective of law and order and national development. Perhaps, this new setting of values and preferences does well. Anyhow, it is a notable change of a century-long political culture, and therefore its consequences for land management, planning and cadastre need to be reflected scientifically.

3.1.3 Ongoing programmes and courses

In Europe, the need for a deeper social science approach seems to have emerged at the geomatics departments in the Netherlands, Germany, and Sweden, which support cooperation schemes with developing countries. The following three institutions and programmes may be mentioned:

- International Institute for Geoinformation Science and Earth Observation, ITC, Enschede, NL: Master and Master of Science (MSc) degree courses
<http://www.itc.nl/education/default.aspx>
- Institute of Geodesy, GIS and Land Management, TU Munich: Master's Program in Land Management and Land Tenure <http://www.landentwicklung-muenchen.de/master/index.html>

- Department of Real Estate Planning and Land Law, Royal Institute of Technology, Stockholm: Master's Programme in Land Management
<http://www.infra.kth.se/FV/lm.html>

In addition to the full master programmes, two courses may be mentioned. One is lectured in English for Finnish students during one month every second year since 1999, with 27 attendants in 2005. The other is lectured during one week for PhD students in 2003 and in 2005 with 11 participants from Scandinavia (4), further EU (4), and Russia (1) and Ukraine (2).

- Institute of Real Estate Studies, Helsinki University of Technology: MSc course International Land Management
<http://www.tkk.fi/Yksikot/Kiinteisto/opinnot/kurssit/maa20375/maa20375.htm>
- Department of Development and Planning, Aalborg University: PhD course Cadastral Development - The Contribution of Scientific Enquiry
<http://www.plan.aau.dk/~est/Undervisning/PhDcourse2005/Web/default.html>

Both courses relate to the institutional economics approach of the *Modelling Real Property Transaction* project and draw on basic findings of the social sciences.

3.1.4 The Thematic Network: European Education in Geodetic Engineering, Cartography and Surveying

The EEGECS project started in 2002 (EEGECS, 2006). It aims at supporting collaboration and co-operation of higher education institutions, which offer studies within geodetic engineering, cartography and surveying, to meet the objectives and recommendations of the Bologna and Prague Declaration of the Ministers of Education in Europe. From the information collected by the project it appears that the issues addressed by the present paper are mentioned under headings such as -Land management and planning, -Cadastre and land law, -Business administration/Economics, respectively (WG1) and -Cadastre, and -GIS, Land management and classification, -Databases and conceptual models, and -History, respectively (WG2). The mentioned working groups regard Undergraduate education (WG1) and Research (WG2). The proposal of a study element at masters level will thus supplement, rather than conflict with the valuable EEGECS coordination initiative.

WG2 Research has made a proposal for extending an existing GEOMED Doctoral consortium. At the moment, the GEOMED exist as a federation of the existing doctorates of Politecnico di Milano, Universidad Politecnica de Valencia, Aristoteles University of Thessaloniki, and Universidade de Lisboa. It delivers a European title on top of the national degrees. The federation rules request among others that students have to go 3 months abroad; furthermore, that theses are written and defended in English, that a thesis is reviewed by two referees from different countries, and that one judge from a different country is member of the commission awarding the title. The mentioned federation compares to the "cotutelle de thèse" of German and French institutions of higher education. The existing cooperation among universities is indeed to be extended, while the proposed scheme may be too ambitious for the time being.

3.2 An outline of the purpose and content of the proposed study programme

Based on the above experiences, the purpose of the programme is to make the students reason on cadastral development: the causes and mechanisms which tend to enhance or restrict a certain path of development. The emphasis is thus on analysing elements and hypotheses on the functional and causal relations among them. Thus, graduates shall know how to

- Prepare plan for developing a domain D_{now} towards some better state D_{better} ; based on
- Explanatory reconstruction of history, why D developed as it is now; derived from
- Investigation on, how previous plan(s) were implemented, and with what outcome; derived from a
- Description of details, a formal modelling, of domain D as it is now

The details of the domain are set out in the study element: *The cadastral components*, see further details in section 5.4 below. Next, *Country and cultural studies* teaches the student how investigate the components in the nation-specific context of social power and local technology. To compare across countries, formal modelling is needed. The techniques are taught through the course *Modelling the domain*. The concepts needed for analysing *Institutions and their change* processes are lectured during a subsequent element. The first part of the programme includes project work on empirical case analysis of past changes within the cadastral domain, largely restricting the scope to national actors. The second part introduces to *Development economics*, to address questions as ‘Why rich countries got rich’, and make students take a stance on the international development discourse. Finally, students write a *Position paper* on a negotiated subject matter, which might be used for their final thesis, to be prepared at the home university. Summarising, the proposed programme offers a multi-disciplinary cluster of courses in the defined thematic area of Cadastral Development.

The programme is conceived as a full day study, mostly with contact lessons. However, it should nevertheless draw upon eLearning technology in order to structure communication between teachers at the sending and hosting universities and to enable student and teacher to be in contact during likely home visits in the middle of the term. Furthermore, the application of eLearning technology would allow for drawing on educational resources, which would not otherwise be available and provide experiences, which could inform whether a distant learning version, e.g. addressed to mature officials and consultants would be feasible.

3.3 Formal and terminology aspects of the study programme

The interplay between the home or ‘sending’ university and the specialisation or ‘host’ university, e.g. Aalborg University, has to be spelled out. The visiting student is assumed to continue studies in the country of origin and taking the MSc. degree at the sending university. The academic recognition of a period of study abroad is within the discretion of the home university, which may use instruments available for such recognition, namely the ECTS rating scheme and the Mobilipass (EUinfo, 2004). The Mobilipass includes a written agreement on the content, objectives and duration of the study abroad and is acknowledged by a third party, a Europass National Agency. In essence, the Mobilipass is a document pertaining to the individual student, but here the Mobilipass is taken as the agreed paradigm

for such individual documents. The Mobilipass may include details on method of assessment and statements on language and other inter-cultural skills (OJEU, 2004). In practice, the specification of the programme and the details of the Mobilipass could be developed in parallel at the host university together with a few interested 'sending' universities.

The content and the level of abstraction of the proposed study programme assumes that participants hold a BSc. and, furthermore, that they at their home universities have had a basic introduction to scientific methodology.

As regards duration, the study programme in initial drafts was assumed to extend to a one year study period, namely "as a two term (10/12 months) MSc. study program at Aalborg University, to be lectured in English, but else adopting the Aalborg way of multi-disciplinary and problem based learning" (Stubkjær, Andersen, 2005. - In fact the 10/12 months makes up two semesters, while a study 'term' commonly refers to 4 months of study). The one year study period would fit the international usage of the term Diploma studies, which assumes a minimum of one study year. However, it appeared that such duration did not fit the Bologna model of a two year master programme, where the final semester would be restricted for thesis writing, leaving a remaining, unspecified semester at the home university. The option of developing a full two years master programme appears as risky, taking into consideration the traditional national orientation of geodesy programmes and the potential of having the support of research projects of international (European) scope and funding. As a consequence, the present proposal regards an advanced one semester programme, leading to a Postgraduate Certificate. The course qualifies as 'advanced' as it is lectured at master level, and it is relevant to qualify the certificate as 'Postgraduate' as the term certificate is commonly used for vocational educations. The programme may be considered a 'minor' subject within the 'major' master education of the sending university, cf. the Quality Assurance Agency for Higher Education, which suggests the title 'A with B' for "a major/minor combination where the minor subject accounts for at least a quarter of the programme" (2001). The sending university may thus consider the title 'XYZ with Cadastral Development' for those students, who follow the proposed programme.

3.4 Courses and other components of the study programme

The proposed programme is called Cadastral Development to emphasize its roots in the genuinely European tradition of cadastres and cadastral development. The real world scope of the programme largely coincides with that of Land Administration (Dale, McLaughlin, 1999) or Land Registration and Cadastral Systems (Larsson, 1996). However, the programme emphasizes an analytical approach, that is: it searches for a set of defined and increasingly consistent set of concepts, which are embedded in social science research. The content of the courses are detailed in Table 2 below.

Cadastral Development – An analytical approach				
Courses 10 ECTS + 5 ECTS elective subjects				
The cadastral components	Country and cultural studies	Modelling the domain	Institutions and their change	Development economics
<ul style="list-style-type: none"> • Property units, processes, and markets • Central & local administration and information systems • The professions 	<ul style="list-style-type: none"> • Perceptions of land and wealth • Distribution of power over land • Availability of technical and financial services • Transparency 	<ul style="list-style-type: none"> • IT and domain modelling • Modelling techniques and tools • The domain ontology • Standards 	<ul style="list-style-type: none"> • Organisations and institutions • Property rights as an institution • Transactions • Policy networks and institutional change 	<ul style="list-style-type: none"> • Explanations of global inequality • The Washington consensus debate • Institutional, incl. land reforms • Main donors and their policies
Project work 15 ECTS	Summarising of thesis or book	Report on past changes within a specific country, reflecting causes		Preparing a position paper

Table 2: Elements of a proposed postgraduate certificate programme

The programme and its elements needs to be further detailed in terms of articulated objectives, levels of competencies, literature and other resources, and assessment methods. Also, the weighting of course elements may be open for discussion. Here, only the elements of project work are further described. The standard practise at Aalborg University is that a group of 3-6 students prepare a report during one semester. The time allocated generally compares to 15 ECTS. However, the breaking of the semester in two or more phases is not unusual and generally, experiences of such subdivision have been positive. The proposed programme tailors this to a European audience by breaking the semester into three phases. The first task of project work: Summarising a thesis or a book, aims at developing the students' skills in reading an advanced scientific text, preferably a monograph, of 150 or more pages with understanding and reflection. The reading outcome shall be documented in 10-15 pages and presented at a seminar. The second task aims at preparing a standard problem oriented report. The country chosen could well be the home country, while the problem could be to explain a change process. This would include identification of the stakeholders of a change process, which has to be thoroughly modelled. The stakeholders' perceived costs and benefits of the change and the effects for weaker groups have to be assessed. Assessment criteria of the completed and 'defended' report include quality of empirical investigations and the validity of causes and mechanisms identified. The third phase assists the student in collecting relevant and up-to-date scientific information on a chosen subject, in phrasing research questions, and in assessing their complexity. This part could well bridge to the final thesis, to be prepared at the home university during the subsequent semester.

4. CONCLUSION

The paper set out by relating the organisers' focus on eGovernance and eLearning to the call by the Commission of the European Communities for promoting the establishment of university networks. Such network is requested to meet criteria of critical mass; interdisciplinary teaching; a strong European dimension; backing from regional/national authorities and direct involvement of industry; as well as identified and declared areas of excellence. The knowledge profile of the FIG surveyor is traditionally strong in geodesy and related disciplines. Furthermore, the UNIGIS International network on Geographical Information Systems is an established fact. However, an increased emphasis on property markets in several parts of Europe and increased research in this field could and should complement these achievements as developed in the paper.

The objective of improving the social science components of the knowledge profile of the FIG surveyor was supported partly by summarising recent research outcomes and partly through the proposal of a short study program, which draws on the mentioned research. The research was performed within the frame of the COST *action* G9: Modelling Real Property Transactions, and resulted in the development of methods for describing these transactions, for comparing the transactions across countries, and for assessing of the costs of these transactions.

The proposed study program fits the Bologna objectives, as it offers a focused 6 months interdisciplinary study, a minor, as part of the home university's 2 years master programme and provides such programmes with a stronger European dimension. In some detail it was described, how the proposal is supplementing ongoing activities in terms of university networking and study offerings. Moreover, the main content and the formalities of the programme were outlined, thereby providing a base for discussion of the organisation of the further implementation process.

REFERENCES

Andersen, Hans Christian (1855) Clumsy Hans

http://www.andersen.sdu.dk/vaerk/hersholt/ClumsyHans_e.html

Arvanitis et al (2005) The Greek National Report within the framework of COST G9

http://costg9.plan.aau.dk/NationalReports/A_Sismanidis_TheGreekNationalReportToCOSTaction%20G9.pdf

Auzins, A. (2003) Terminology Resources in Land Management: development need and possibilities. Proceedings of the International Scientific - Methodical Conference 'Baltic Surveying'03, Tartu. (unpublished) Abstract at

http://www2.fao.org/BASIS/AGRIS/Web/Cat_ja/DDW?W%3DCI+PH+IS+%27EE%27+ORDER+BY+EVERY+CC/Ascend%26M%3D11%26K%3D2003026789%26R%3DY%26U%3D1

Commission (2005) Mobilising the brainpower of Europe: Enabling universities to make their full contribution to the Lisbon Strategy COM(2005) 152 final. Brussels, 20.4.2005. 13 pages http://www.eu.int/comm/education/policies/2010/doc/comuniv2005_en.pdf

- Commission (2006)** Erasmus Mundus : Call for Proposals relating to the academic year 2007/2008 (for Actions 1, 2 and 3) and the academic year 2006 (for Action 4)
http://europa.eu.int/comm/education/programmes/mundus/call07_en.html
- COST G9 (2005)** Modelling Real Property Transactions <http://costg9.plan.aau.dk/>
- COST G9 (2005)** [Results, section 5 of Evaluation Report](http://costg9.plan.aau.dk/5Results.doc)
<http://costg9.plan.aau.dk/5Results.doc>
- COST G9 Publications (2005)**
<http://costg9.plan.aau.dk/Publications/COSTG9Publications.html>
- Dale, Peter & John McLaughlin (1988)** Land Information Management. Clarendon Press, Oxford, UK.
- Dale, Peter & John McLaughlin (1999)** Land Administration. Oxford University Press.
- De Soto, Hernando (2000)** The Mystery of Capital - Why capitalism triumphs in the West and fails everywhere else. Bantam Press, London. 243 p.
- EECEGS (2006)** Thematic Network: European Education in Geodetic Engineering, Cartography and Surveying <http://www.top.upv.es/eegecs/main.asp>
- ETeMII (2001)** Reference Data White paper, Version 1.0, 31. July 2001. A later version is available at <http://www.ec-gis.org/etemii/reports/chapter1.pdf>
- EUinfo (2004)** Recognition of studies abroad
http://europa.eu.int/comm/education/policies/rec_qual/recognition/index_en.html
- Groot, Richard and John McLaughlin (2000)** Geospatial Data Infrastructure - Concepts, Cases, and Good Practice. Oxford University Press.
- Helmert, F R (1872)** Die Ausgleichsrechnung nach der Methode der kleinsten Quadrate : mit Anwendungen auf die Geodäsie und die Theorie der Messinstrumente
- Helmert, F R (1880, 1884)** Die mathematischen und physikalischen Theorien der höheren Geodäsie.
- Hess, Claudia (2005)** Ontology Engineering for the Comparison of Cadastral Processes. Report on Short Term Scientific Mission at the Royal Institute of Technology, Stockholm COST-STSM-G9-01252.
http://costg9.plan.aau.dk/stsm/2005/HessSweden/STSM_ScientificReport_Hess.pdf
- Jomo K S and Erik S Reinert (Eds.) (2005)** The Origins of Development Economics. Zed Books, London. 165 p.
- Larsson, Gerhard (1996)** Land Registration and Cadastral Systems - Tools for land information management. Longman, Essex, UK. 175 p.
- Larsson, Gerhard (1997)** Land Management - Public Policy, Control and Participation. Byggnadsnämnden. Stockholm.
- Luzet, Claude (2003)** EuroSpec – Providing the foundations to maximize the use of GI. Paper, presented at the 9th EC GI & GIS Workshop, ESDI Serving the User, A Coruña, Spain, 25-27 June 2003. 12p. http://www.lmu.jrc.it/Workshops/9ec-gis/papers/ied_luzet.pdf
- North, Douglass C (1990)** Institutions, Institutional Change and Economic Performance. Cambridge University Press, Cambridge, UK. 2002, 152 p.
- OJEU (2004)** Official Journal of the European Union, Thursday 22 April 2004 30.4.2004 EN C 104 E/969 ANNEX II THE MOBILIPASS <http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/oj/2004/ce104/ce10420040430en09690970.pdf>
- Oxfam (2004)** The Rural Poverty Trap. Oxfam Briefing Paper 59. 25 p.
http://www.oxfam.org/en/files/bp59_unctad_rural_poverty_trap.pdf

Quality Assurance Agency for Higher Education (2001) The framework for higher education qualifications in England, Wales and Northern Ireland

<http://www.qaa.ac.uk/academicinfrastructure/FHEQ/EWNI/default.asp>

Reinert, Erik S (2005) German economics as development economics – From the Thirty Years' War to World War II. Pp 48 – 68 in Jomi and Reinert (eds) *The Origins of Development Economics*.

Rezek, Jurij (2005) Land management and comprehension of the role of geodesy (in Slovene language) *Geodetski Vestnik - Journal of the Association of Surveyors in Slovenia* 49 (4) 523-532

Stuckenschmidt, Heiner, Erik Stubkjær and Christoph Schlieder (2003) *The Ontology and Modelling of Real Estate Transactions*. International Land Management Series. Ashgate publishers, Aldershot, UK. ISBN: 0 7546 3287 3. 186 p.

Stubkjær, E. (2002) Modelling Real Property Transactions. Paper presented at the XXII FIG Congress, Washington, D.C. USA, April 19-26 2002,

http://www.fig.net/figtree/pub/fig_2002/Js14/JS14_stubkjaer.pdf

Stubkjær, E (2003) Modelling real property transactions, pp. 15 - 35 in Heiner Stuckenschmidt, Erik Stubkjaer and Christoph Schlieder (2003) *The Ontology and Modelling of Real Estate Transactions*.

Stubkjær, Erik and Vibeke Andersson (2005) A MSc study programme: An analytical approach to Cadastral Development. Presentation, COST 7th Workshop Programme and 8th MC meeting, June 9.-11. 2005 in Thessaloniki, Greece.

Šumrada, Radoš (2005) Property Transactions in Slovenia: UML in Use Case Modelling *GIM International* 19 (10) 12-15.

Sumrada, Rados (2005) Modeling methodology for real estate transactions.

http://costg9.plan.aau.dk/AalborgAug2005/WG2_presentations/Sumrada_Procedures.ppt

Tiainen, Esa (2004) Direction in Modeling Land Registration and Cadastre Domain – Aspects of EULIS Glossary Approach, Semantics and Information Services, in P v Oosterom et al (eds) *Proceedings, Standardization in the Cadastral Domain*, December 2004, Bamberg University, Germany. Available at

http://www.fig.net/commission7/bamberg_2004/papers/ts_03_01_tiainen.pdf

BIOGRAPHICAL NOTES

Erik Stubkjær is professor of 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. During 2001-2005, he chaired the Management Committee of the research activity *Modelling Real Property Transactions*, which co-ordinated research in 11 European countries and was supported by the EU's ESF-COST scheme as activity G9. During 1996-99, he co-ordinated an EU Phare/ TEMPUS project (S-JEP 11001-96), regarding the restructuring of the study programmes of the Department of Geodesy, Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia.

In May 2003 and again May 2005, he organised the PhD-course 'Cadastral Development – The Contribution of Scientific Enquiry' at the International Doctoral School of Aalborg University, which each attracted a good ten participants from about 8 EU and neighbouring countries. For about ten years, he lectures the course *A theoretical base for cadastral development* within the Master's Programme in Land Management at Real Estate Planning and Land Law, Royal Institute of Technology, Stockholm, and since 1999, he lectures the course *International Land Management*, Maa-20.375, at the Institute of Real Estate Studies, Helsinki University of Technology, Finland

In 2005, Helsinki University of Technology conferred the degree of D. Sc. (Tech) h.c. to Erik Stubkjær. He is a member of the Danish Association of Chartered Surveyors.

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