

THE EDUCATION AND PROFESSION OF LAND SURVEYORS IN WESTERN EUROPE

THE SWEDISH LAND SURVEYOR FROM A HISTORICAL PERSPECTIVE

The birth of the Swedish land surveyor is put at 1628, when Anders Bure was instructed to appoint land surveyors to map the villages of Sweden, so as to provide a sounder basis for tax assessment. Later, in the mid-18th century, the land surveyors inaugurated large-scale land consolidation projects (*skiften*) corresponding to England's enclosure movement. These projects continued into the 20th century.

Initially, the professional skills of the land surveyor comprised measurement and mapping. Land consolidation required him to plan new, rational working units for agriculture and forestry, the aim being to gather different landowners' fragmented holdings into one or a few parcels. The land surveyor also had to comply with statutory provisions, i.e. be learned in the law. In addition, he had to be capable of valuing the productive capacity of land, so as to estimate the value of the land both taken from, and allotted to, landowners.

In the 20th century, Sweden was increasingly divided up into independent property units, at the same time as there was a growing need for coping with other encumbrances. Subdivision, reallocation, amalgamation etc. all required an extensive knowledge of law, especially as, under the Swedish system, the land surveyor had extensive powers of decision-making. The need for valuation skills grew steadily as the land surveyor acquired more and more professional responsibility for valuations of a quasi-expropriatory character.

Knowledge of land legislation and property valuation made him, in municipal development offices, suitably qualified to take charge of municipal housing supplies and of municipal land supply. This responsibility came to the fore during the major housing construction programmes in and around 1970 when previous planning expertise in connection with agriculture and forestry was increasingly superseded by an expertise in urban development.

Swedish land surveyors have been trained at university level since 1932, when a School of Surveying was established at the Royal Institute of Technology (KTH). Two professorships were instituted to begin with, one in geodesy and the other in real estate planning. Professorships in agricultural hydrotechnics, (later renamed land and water resources), pho-

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 SO IT IS INTERESTING TO COMPARE
 THE PROFILES OF EDUCATION
 PROGRAMMES AND PROFESSIONS IN
 THE VARIOUS COUNTRIES. IN THIS
 ARTICLE A COMPARISON OF WES-
 TERN EUROPEAN LAND SURVEYORS
 IS ATTEMPTED. THE COMPARISON IS
 BASED ON THE HISTORY OF THE
 SWEDISH LAND SURVEYOR, THIS
 BEING THE HISTORY WITH WHICH
 THE AUTHOR IS MOST FAMILIAR,
 AND ON PROFESSOR ALLAN'S
 REPORT (1996).**

togrammetry, real estate economics, land law and GIS-technology followed subsequently. The economics chair made it possible for economic studies to become more advanced and also expand so as to include real estate management. As a result, young land surveyors could now enter the property sector, adding yet another field of activity to those already in existence.

Thus the development of the profession in Sweden can be summed up in a simple arrow diagram; (see Fig.1). Similarities and dissimilarities in the education and activities of Western European land surveyors will be analysed with reference to the skills indicated in this diagram. The basic data for the analysis comes from Professor A. L. Allan's report "The Education and Practice of the Geodetic Surveyor in Western Europe" (1996). The report will be commented on as an introduction to the analyses in the article.

ALLAN'S REPORT

Professor A. L. Allan, University College, London, collated information on the education and professional duties of land surveyors in the EU and also in Norway and Switzerland.

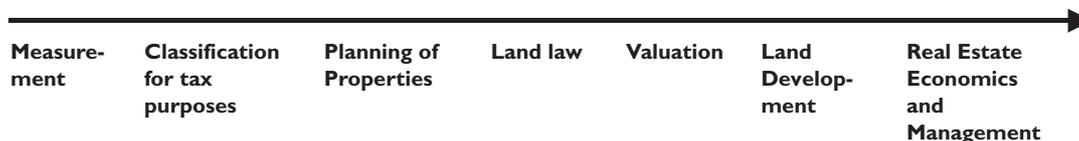
His research method was to ask informed representatives from each country to complete charts of the skills conferred by the university study programmes. The respondents were also asked to judge whether skills in a range of subjects were elementary/non-existent, core or advanced, using a scale from 0 to 3. In the present paper, this rating has been articulated by means of a white/grey/black scale (see Fig. 2).

Allan also prepared similar charts for the professional fields of qualified land surveyors, using the same information-gathering technique as for the education programmes. In this present study the professional profiles are treated in the same way as the education profiles, i.e. articulated by means of the white/grey/black colour scale (see Fig. 4). It is worth noting that the fields of activity and the degrees of skill in Allan's report are not the same for the profession as for the universities (cf. Figs 2 and 4).

However, when comparing countries, the lack of any objective methods of measurement makes it very difficult to determine exactly what is represented by Allan's data on education and practice. It is reasonable to assume that the opinions and ratings of the respondents were based largely on knowledge of the situation in their own countries, rather than on what existed elsewhere. There is thus a risk that what was regarded as superficial knowledge in one country could have been considered advanced in another, even though the context was the same in both cases. The same objections can be made about the assessments of professional profiles.

However, despite these drawbacks, it is possible to use Allan's report as the basis for attempting to create a profile, or more correctly, a number of profiles, for the Western European land surveyor in respect of both education and profession. First, though, the material in the report requires further comment.

In a number of countries, land surveyor education programmes have been diversified to such an extent that two or three main specialities have been created. This is true of Norway and Finland, both of which have two main specialities, and of Sweden and Denmark, which have three. These main specialities are identified in Fig. 2, since they provide interesting aspects of education and profession. The Danish planning speciality, however,



**FIGURE 1. HISTORIC EVOLUTION OF SWEDISH
 LAND SURVEYOR COMPETENCE.**

has been excluded, because its profile is virtually identical with that of land management.

According to Allan's report, students in Germany are able to take options, i.e. not alternative specialities, rather variants in the end profile. The profile including urban development and valuation has been chosen as representative of Germany. The other option leads to higher geodesy. If, instead, in Fig. 2, this technical variant was to be chosen as representing Germany, it would have the effect of moving Germany slightly to the left in the figure. Options are probably available in other countries too, even though this is not apparent from Allan's report.

In his 1996 report, Allan excluded the large group of General Surveyors with specialist knowledge of real estate economics and law, as well as five other groups of British surveyors affiliated to the RICS (Royal Institute of Chartered Surveyors). The reason, presumably, is that they did not fit in with the definition of land surveyor in which the CLGE (the European Council of Geodetic Surveyors) is interested. This is perhaps only to be expected since Allan's report was published in association with the CLGE.

Finally it should be mentioned that Allan's report deals with conditions in the mid-1990s, which is a drawback as new conditions may have supervened since then.

LAND SURVEYOR EDUCATION PROGRAMMES

If, as a first step, the curricular subjects in Allan's report are grouped into main subject areas, essentially complying with the description given earlier of the historical development of the skills of the Swedish land surveyor, this gives us a tool for analysing national education profiles. The main subject areas

are:

- Measurement
- Maps and GIS
- Law
- Planning and Development
- Valuation
- Economic Real Estate Management
- Construction and Cost Control.

The next step is to produce an educational profile using the main subject groupings in such a way that the black diagonal in Fig. 2 shows the primary focus of different national education programmes.

Two categories of country appear in Fig. 2. Firstly, there are countries with only one core study programme, and then there are the Nordic countries, where studies are divided. The Nordic divisions can be taken as an indication that the duties of the land surveying profession have expanded to such a degree, as previously happened in the UK, that the basic mass of knowledge required for the practising land surveyor can no longer be held together in one and the same educational profile.

If attention is confined to countries with one main profile, the following pattern emerges. The study programmes may be purely technical (Ireland and Portugal), technical with a greater or lesser element of law, presumably related to property formation (the UK, Greece, Spain and Austria), technical, with strong elements of law and some knowledge of planning and development (Switzerland, the Netherlands, Germany and France) and, finally, disparate study programmes with no particularly strong profile in any respect (Italy and Belgium).

Turning next to consider the Nordic countries, where study programmes have been divided into several main profiles, the following pattern emerges. One of the main profi-

les places heavy emphasis on technique so that other subjects are largely supplementary. The other main profile focuses on law and on planning and development, with a reduced quota of technical skills. Even though the second profile is typical of the Nordic countries, one can see that Switzerland, the Netherlands, Germany and France are not far from it.

Another profile appears among the divided study programmes, namely the economics profile in Sweden and Finland. This profile also includes certain elements of construction subjects. The element of measurement and mapping subjects has been reduced.

Thus three main groups of educational profiles emerge:

1. The *technical land surveyor*, often, though not always, with a good knowledge of law and sometimes also of planning and development. The emphasis of the skills profile, however, is on geodesy, measurement and mapping subjects, GIS techniques included. Geomatics or geoinformatics is probably an appropriate collective term to cover the curricular subjects included.
2. The *land management surveyor*, with an extensive knowledge of law, planning and development. A certain amount of valuation is included, compensatory valuation especially. The technical skills have been reduced. The main "land management" reflects the aim of the land surveyor in helping to clarify legal rights where land and development are concerned.
3. The *real economics surveyor* (general practice in UK) with a high level of theoretical competence in economic subjects. The legal element is conspicuous. Property or real estate management is the main focus of this education, and its main purpose is

Specialization	IRL POR		NOR SWE FIN DEN					AUT SUI NED GER FRA					DEN SWENOR			SWE FIN		ITA BEL			
	UK	(SM)	GRE	(SM)	(SM)	ESP	(SM)	(LM)	(LM)	(LM)	(Ec)	(Ec)	(Ec)	(Ec)	(Ec)	(Ec)	(Ec)				
Geodesy	2,5	3	3	3	3	2,5	2,5	2,5	3	2,5	3	2	2,5	2	1,5	1	1,5	1,5	1,5	2	
Instruments	2	2	2	3	2,5	2,5	2,5	2,5	3	2,5	2,5	3	2,5	3	2	1,5	2	1,5	1	1,5	2
Mining/Engineering Surveying	2	1	2	1	2,5	3	3	2,5	2	2	1	2	2	0	0	1	0	1	1	1	
Maps and GIS	2,5	2,5	2	3	3	3	3	2,5	3	3	3	3	2,5	2	1,5	2	1,5	1,5	2	3	
Law	0	1	2	2	2	1,5	2	2	2	3	2,5	3	3	3	3	3	3	3	1	3	
Planning	1	1	1	1	2	1	0	1	2	1	2	2	2	2	2	3	3	1,5	1,5	1	2
Urban Development	0	1	0	0	0	0	0	1	2	1	1,5	2	2	2	3	3	2	1,5	1,5	1,5	1,5
Rural Development	0	1	1	1	1	0	0	0	2	1	0	2	2	3	3	2	3	0	1	2	1
Valuation	0	2	0	0	0	1	0	0	1	1	0	0	2	2	1	2	2	3	3	2	2
Finance and Taxation	0	0	0	1	0	0	0	1	1	0	1	0	1	0	1	0	1	3	3	0	2
Building Economics and Management	0	0	0	1	0	1	0	0	0	1	1	0	1	0	0	1	1	3	2	1	1
Marketing	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	1,5	1,5	0	1
Land and Farm Management	0	1	0	1	1	1	0	0	0	1	0	0	1	2	0	1	2	1	1	2	0
Building Design	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	1	2	3
Construction Technology	1	0	0	1	1	1,5	1	2	0	1	2,5	0	1	1	0	1,5	1	2	1	2	2
Building Quantities	0	0	0	1	1	0	0	2	0	0	1	0	1	0	0	0	0	0	2	2	1
Cost Control	0	1	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	1,5	1,5	2	1

SM=Mapping and Surveying/Geodesy specialization

LM=Land Management, Land Development and Cadaster specialization

Ec=Economic specialization

Advanced knowledge (2,5-3)

Core knowledge (1,5-2)

Elementary knowledge or non-existent (0-1)

FIGURE 2. PROFILES OF SURVEYING EDUCATION IN WESTERN EUROPE.

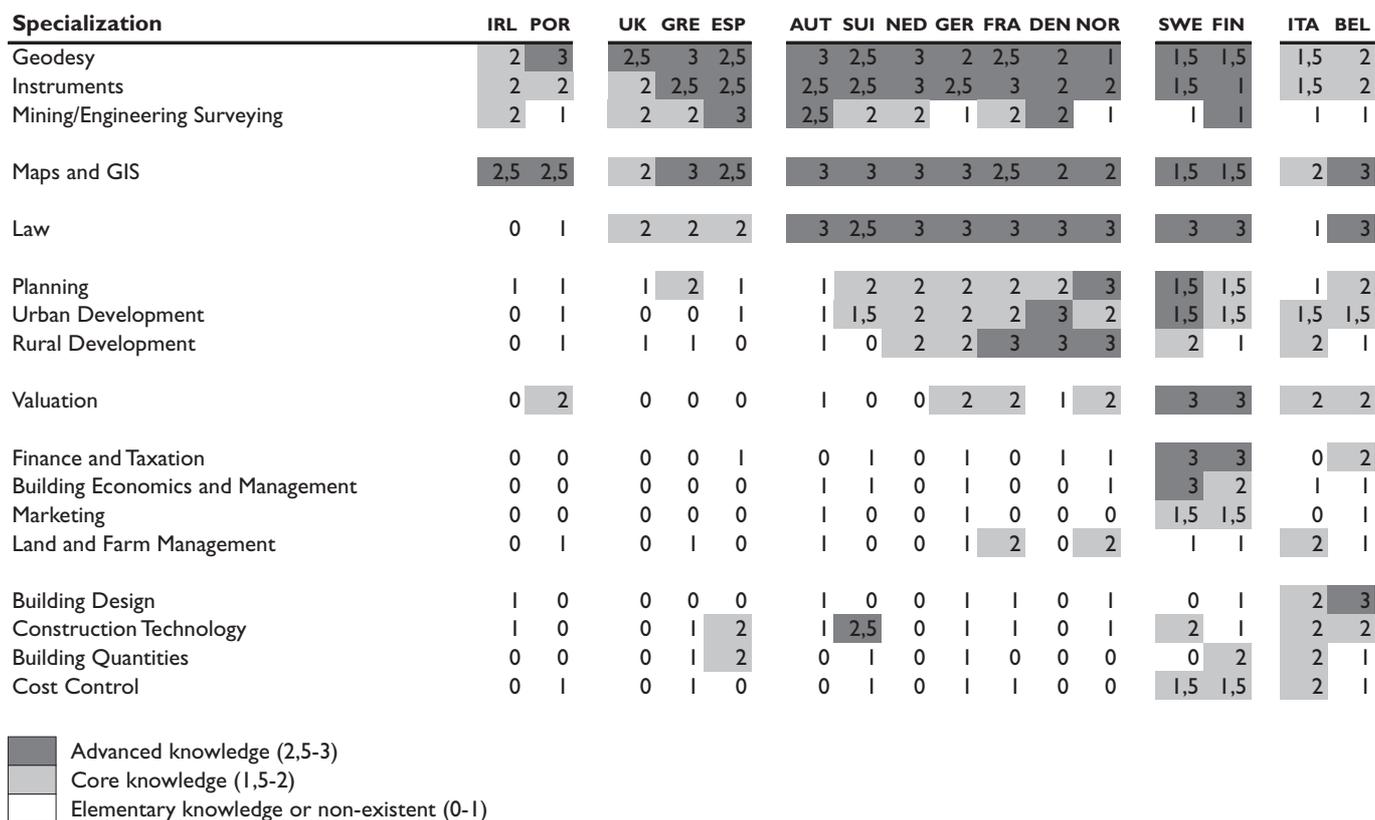


FIGURE 3. AMALGAMATED EDUCATION PROFILES.

to confer a knowledge of economic real estate management.

It is difficult to speculate as to why country profiles can be so different, but one explanation can perhaps be found in the responsibility of land surveyors for complicated property formation activities. In countries with palpable responsibility of this kind, the land surveyor has been forced to cope with law and sometimes also with valuation in order to achieve property formation, especially in complicated situations. Land consolidation in the Nordic countries, *Umlegung* and *Flurbereinigung* in Germany and *remembrement* in France are examples of this kind of advanced activity. The same knowledge has then been put to more general use in land development activities.

The move towards a predominance of economic subjects is a recent occurrence, which may be why it has happened in so few countries. In the UK it has resulted in such a wide divergence between subjects taught that economic study programmes have been completely separated from measuring and mapping. A similar tension can be observed in Sweden and Finland, even though economic programmes there still include measurement and mapping subjects.

In certain countries, then, the study programmes have acquired such breadth as to be divided into different educational profiles. The aggregate educational profile of each country has been worked out in Fig. 3; that is to say, the profiles in Fig. 2 have been added together in countries with more than one study programme, with the most advanced university education being representative of the educational profile of land surveyors. This aggregate profile will later be compared with the profes-

sional profiles of the land surveyors.

THE PROFESSIONAL PROFILES OF THE LAND SURVEYOR

In order to make more manageable the mass of information on professional duties contained in Allan's charts, the activity fields of land surveyors have been classified into main groups corresponding to the main groups of the study programmes. These main groups are as follows:

- Measurement and mapping
- Cadastre and Remembrement
- Planning and Development
- Valuation
- Property Management
- Building and Construction.

Fig. 4 shows the results of this professional grouping. Countries are shown in the same order as in Fig. 3 with teaching content.

In all countries except Belgium, *measurement and mapping* is a core area for land surveyors. This is very much what might be expected, since, in purely historical terms, surveying, defines in one way or another, the land surveyor's profession.

In nearly all countries, professional practitioners are also influential in *cadastre and remembrement*, i.e. property formation is a central field of activity for land surveyors almost everywhere in Western Europe. Here measurement and mapping activities are combined with the formation and alteration of properties. Ireland and the UK, however, do not conform to this pattern, nor does Portugal. In these countries, land surveyors probably have only a limited responsibility for property formation.

Where other fields of activity are concern-

ed, the picture becomes more fragmented. *Planning and development* are essential tasks in France, Germany and the four Nordic countries. So too is *real estate valuation*. Also in these countries, *economic real estate management* is to some extent an important field of activity. The Danish land surveyors, however, have so far not become involved in property valuation or property management. Norwegian land surveyors are weak in the area of property management.

Building and construction is carried out in some countries, but on a relatively modest scale except in Italy.

Some conclusions can thus be drawn. Only in a few countries is a land surveyor essentially a measurement and mapping person, but almost without exception, the profession is responsible for property formation. In half the countries, however, duties are wider still and also include planning, development, valuation and property management. The extent of these activities, it is true, varies from one country to another, but the pattern is clear. To fail to take into account all these activities that occur in addition to measurement and cadastre would produce far too narrow a definition of the European profession of land surveyor.

EDUCATION AND PROFESSION

Due to the subjective nature of the respondents' ratings for both education and practice, comparisons on the basis of Allan's report are difficult to make. Nor is it clear what university qualifications are needed in order to be responsible for different areas of practice, i.e. whether black fields in the education correspond to black fields in the profession,

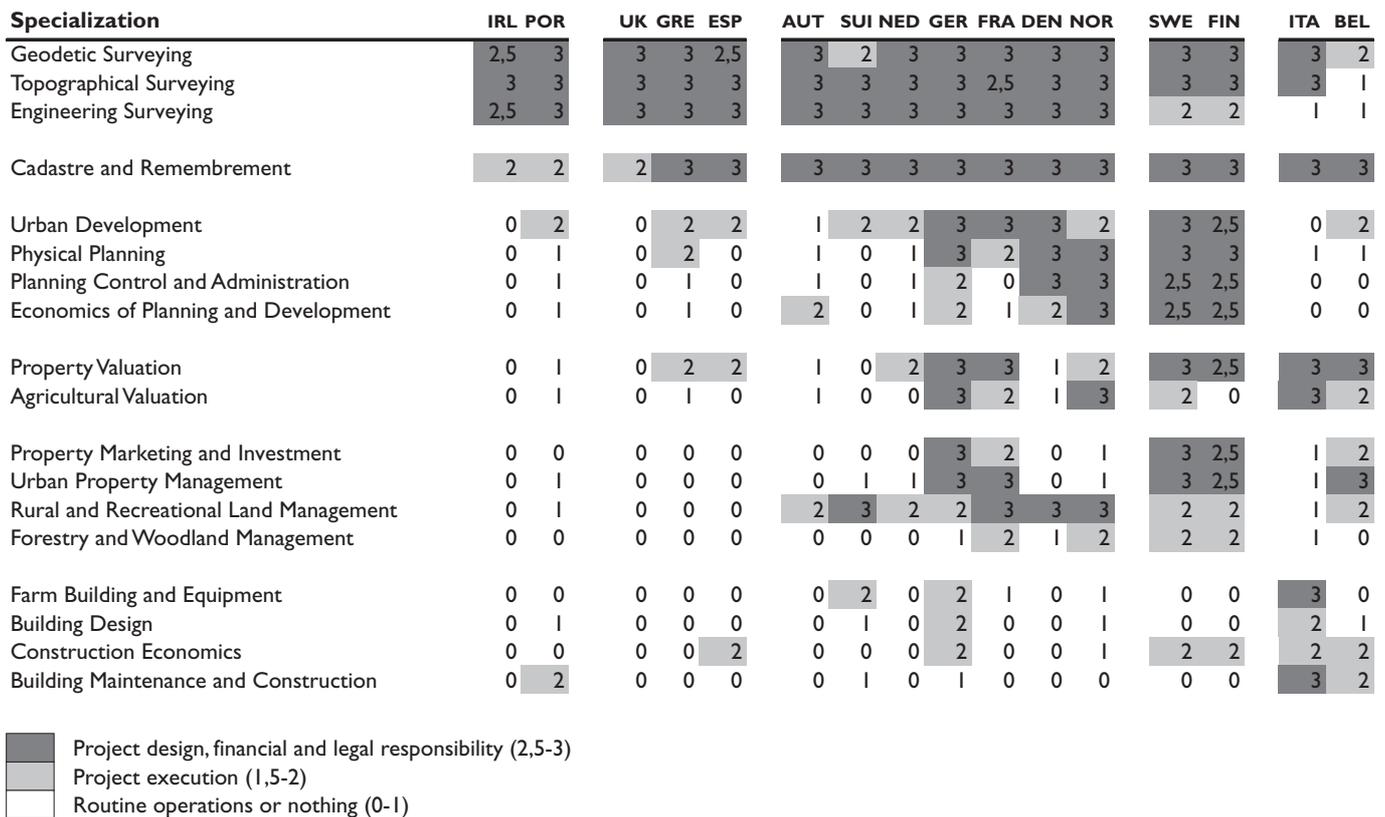


FIGURE 4. PROFESSIONAL ACTIVITIES IN WESTERN EUROPE.

and so on (Figs. 3 and 4). A comparison will, however, be attempted, if only to arouse interest in the question.

Education and professional activity are prominent in *measurement* and *mapping* in all countries. The element of university subjects in *law* corresponds to the activity field of *cadastre* and *remembrement*.

A more complicated picture emerges where *planning* and *development* are concerned. In some countries (Switzerland, the Netherlands and perhaps Belgium and Italy too), study programmes appear to be somewhat more advanced than professional practice. If so, we may ask whether this is due to the skills needed for cadastre activities or whether this is an attempt by academia to find new niches for land surveyors. In other countries (France, Germany, Denmark, Norway and Sweden), education and professional duties appear to be mutually adapted in the field of planning and development.

In *real estate valuation* there is a gulf between teaching systems and professional practice and it would seem that university study programmes fail to provide the depth of education needed by the practitioner. Sweden and Finland, with their strong emphasis on economic subjects, are exceptions.

Denmark poses an interesting question. Is the Danish weakness in economics due, for some reason, to the failure of professionals to penetrate this field, and the university therefore seeing no justification for committing itself to economics and, above all, to valuation? Or is it the unavailability of university education in economics, valuation especially, which results in Danish land surveyors having such a lack of involvement in valuation?

The gulf between education and professional activity appears to be even greater in *economic real estate management* than in valuation although Sweden and Finland are exceptions in this respect.

With *building and construction*, there is reasonable congruence between study programmes and practice.

Education and practice, then, are on the whole interconnected, as one might expect in professional study programmes and indeed it would be rather surprising if this were not the case. The universities, however, tend to have different subject priorities to those preferred by practitioners. Indeed, influential academics or administrators can ignore or downgrade the needs of practitioners or be deterred from introducing new subjects through lack of skills or resources. Then too, with the consequences of choosing one speciality as opposed to another becoming apparent only in the long term, it is very easy to misjudge the future direction of the profession. Guidance of practitioners may also be difficult because they tend to be more concerned with solving today's problems rather than tomorrow's. Thus there are a number of reasons as to why education and profession do not always share the same profiles.

Where differences occur, it is usually the universities that fail to adapt their study programmes in time to meet the needs of practitioners. Everyone is likely to lose out by this, including teachers and researchers of the existing subjects, be they scientifically advanced or otherwise. The existent subjects can be called into question if universities are not capable of establishing realistic overall priorities in their study programmes. Nevertheless,

there are countries where the universities are well abreast of events and have even moved ahead of professional practice. This ought to be the goal for all universities involved in educating professional surveyors.

There is, however, a still more important conclusion to be drawn from these comparisons, namely that a European perspective can be applied to the study programmes and the profession. Are the study programmes to be narrowed down to purely technical ones but with responsibility for property formation included (on the lines of the *least common denominator*)? Or should countries with less diversified study programmes and sometimes also narrower fields of activity learn from those which have wider fields of activity, and in this way broaden the basis of a profession necessary to society (the *expansion principle*)? If the expansion principle is accepted, a study should be made of developments in Germany, France and the Nordic countries. But at the same time it may be interesting to ponder the problems of incongruity between education and practice in Germany and France. Why are the universities failing to keep up with professional developments in the economic field as they have in Finland and Sweden? It would also be interesting to carry out a more in-depth study of the UK, where the gap between technically and economically oriented surveyors has become so wide that these two groups are now separate from each with entirely different forms of education.

It may also be rewarding from a land surveyor perspective to examine the Danish educational and professional profile as everything about it is integrated and clear (Enemark 1999). However, it does seem rather inappro-

priate to have neglected property valuation in the way the Danes have done although there is undoubtedly a risk that concentrating on economic subjects could create a radical divergence in education profiles as has happened in the UK. The Finnish and Swedish study programmes, as is practice, are showing clear tendencies towards subdivision. If this happens, technical land surveying risks becoming a marginalised profession, at least in demographically small countries. Or, is it enough to rely on the increasing need for new GIS-competencies?

DEFINITION AND NAME

Lastly, it may be of interest to consider the naming of the profession, since the resolution of this issue can, just as much as education, influence development and regression. Internationally, land surveyors are represented by the FIG (International Federation of Surveyors) and in Europe to some extent by the CLGE (European Council of Geodetic Surveyors). FIG's definition of land surveyor (or surveyor) seems to show a greater awareness of the breadth of the profession than the CLGE's (FIG 1991 a, b and CLGE 1997). FIG includes all the competencies included in the arrow chart above (Fig. 1). The CLGE, by contrast, has put a surprising emphasis on measuring and mapping. It is vague, to say the least, about the other areas of work undertaken by land surveyors, although in its policy document it does state that its *geodetic surveyor* can also work with land management, valuation etc. If, then, the CLGE aspires to represent European land surveyors, it should clearly take into account (and perhaps also learn from) the 50 per cent of countries where land surveyors have more varied duties than those of the geodetic surveyors. National associations of land surveyors would then derive more benefit from their affiliation to the CLGE.

Nomenclature is also a problem. Narrowing the name down to geodetic surveyor, as the CLGE has done, seems an unwise strategy in the light of the Dutch experience, if only from the marketing viewpoint. The change from a partly misleading name (*landmeter*) to one that was completely unknown to the general public (*geodeet*) did nothing to improve the profile of a profession struggling to make itself visible in society. With this situation reflected throughout Europe, the adoption of an unknown professional designation can only be ill-advised.

The historical content of the old term *land surveyor* would seem to encompass more adequately the full breadth of knowledge possessed by surveyors. True, the name can mislead persons unfamiliar with history, but no more than the misunderstandings likely to result from the term 'geodetic surveyor'. This latter term is in fact wholly misleading in the Nordic countries and would also appear inappropriate in Germany and France, in view of the professional profiles in those countries.

The words "land" and "surveyor" are also included in several other, sometimes earlier, national names for land surveyor, namely *landmesser* (Germany), *landmeter* (the Netherlands), *lantmätare* (Sweden), *maanmittari* (Finland) and also, partly in *landinspektør* (Denmark) and *jordskifte kandidat* (Norway).

CONCLUSIONS

When we think of a land surveyor, it is easy to conclude that measurement (or surveying) is the common activity and that geodesy is perhaps the common science. However, this may not be such a good approach and even a wrong one, especially if we look at the profession over Western Europe as a whole. What we then see is that only in a few countries is measurement the one specialisation and that the work common to most European land surveyors also incorporates evaluation, land and property management in a range of different situations, and the creation of new, real property units. Furthermore, we have to acknowledge the increasing importance of geoinformatics both in the education of professionals and for the profession itself. Not only is it able to link together all the different areas of the profession but it can also help to widen it.

In most countries it is also possible to observe that there is a broad field of study activities that can be categorised under the heading of technique, law and economics or, better still, under measurement, planning, land law and land economics. However, in contemporary scientific language, perhaps the use of 'geomatics' and 'property rights' are more appropriate as these terms are almost identical in meaning to 'surveying' and 'land'.

The figures in this article, even if uncertain in detail, show us that the scope of the profession in many countries is wider than the training provided by their respective universities. The differences in university curricula could, however, provide valuable opportunities for universities to learn from each other and to expand and develop the training they offer. With communication throughout Europe being so readily accessible to all, it ought to be relatively simple, but nonetheless challenging, to develop academic teaching networks for surveying schools in parallel with professional networks.

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