

The Profession of Surveying: where do we stand?

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Cadastre

SUMMARY

Abstract

Land surveyors have long considered their occupation a profession. They enjoyed rank and status at least as early as Egyptian and Roman societies. The boundaries between professions, and their related academic disciplines, become blurred as knowledge of the world increases exponentially in depth and breadth. Professional practice consequently requires an ever greater specialisation. Professionally many aspects of land surveying are closely associated with engineering. Academically land surveying is closely associated with geography. The field of geographical information systems is creating tensions in some countries as it looks to establish itself as a vocation, a discipline and as a profession in its own right. As the profession of land surveying undergoes technological revolution, particularly with respect to the digital environment and the acquisition and management of data, it is an appropriate time to re-examine professional and academic relationships and definitions that determine the connections between the related endeavours of engineering, surveying and geography.

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1. INTRODUCTION

“Surveying is an engineering discipline . . .” (Loeffel 2007) is the opening statement in a volume recording the history of the School of Surveying and Spatial Information Systems at the University of New South Wales. Some would dispute that the relationship between the profession of Surveying and the profession of Engineering is quite so close. That is, that Surveying is a sub-set of Engineering as this quote seems to suggest. Nor that all of which is encompassed by the discipline of Surveying is rightly included in a definition of Engineering. That there is overlap is without question. But overlaps between professions are not uncommon. Although some work of the land surveyor concerns the law, it cannot be concluded that land surveying is therefore a subset of the legal profession, nor similarly of the planning discipline. Neither is the planning profession a subset of land surveying.

2. A CASE OF SEMANTICS

What is the difference between a profession, a discipline and a vocation? A vocation may be considered to be an occupation for which a practitioner feels a particular aptitude, and in which they engage in order to meet their employment needs. It will doubtless include the acquisition of the appropriate skills required to develop the aptitude into a marketable occupation from which to earn a livelihood.

There is ample literature about what criteria any field of endeavour is required to meet in order for it to be regarded as a profession (Coutts, 2013). These criteria are largely common to all professions, the point of difference that defines a particular profession being the body of knowledge required to be gathered and proven in order to gain membership of a that profession. This is likely to require the study of a discipline or a number of disciplines at a tertiary level.

A discipline, by contrast, may be viewed as a body of knowledge that at some point may be applied in a profession, a vocation, a craft or a trade, but may also be pursued for its own sake, such as a branch of the arts or a science. In this way it can be a “pure” discipline or an “applied” discipline, the distinction being largely dependent on its use by a practitioner rather than anything inherent in the activity itself. The location of these bodies of knowledge is to be found in technical colleges, polytechnics and universities.

In this paper we are more interested in the distinction between and overlapping areas of professions and disciplines, rather than in the particular requirements for either to become a profession or vocation for any individual. In particular the relationship between engineering, surveying and geography is a matter of interest as geospatial practitioners impinge on the demarcation of vocational and professional boundaries.

3. ENGINEERING

3.1 Definition

What is engineering? The Concise Oxford Dictionary English (COED) defines engineering as follows:

- “1. the branch of science and technology concerned with the design, building, and use of engines, machines, and structures. The practical application of scientific ideas and principles.
2. a field of study or activity concerned with modification or development in a particular area” (Anonymous 2004) p472-3.

The first sentence of Item 1 of this dictionary definition is likely to be a definition with which anyone with a passing knowledge of engineering could agree. The second sentence of Item 1, however, is likely to elicit some questions. Engineering is hardly the only profession, discipline or vocation that could be construed to practically apply scientific ideas and principles unless it sets out to embrace weather forecasting (climate engineering?), economics (social engineering?) and possibly medicine (health engineering?).

Item 2 of the definition comes closer to what engineering might generally be agreed to be, and could also embrace a part of what is included in the land surveying profession. But again, the definition is vague, and could be applied in a variety of contexts that do not relate to what the general public would consider to be the engineering profession, such as house renovations. What might be concluded from this definition from a dictionary meaning is that engineering is a broad term. In the professional context requires qualification or identification by a further word or words, for example, civil engineering or electrical engineering. The term engineer alone, or engineering, is insufficiently precise to be of use as a designation of a vocation or a profession unless it is qualified by a descriptor that identifies the brand, discipline or sub-discipline of its claimant.

3.2 Discipline

The COED 2004 p408 defines a discipline as “2. A branch of knowledge, especially one studied in higher education”. The field of engineering is identifiable as a discipline on that basis in many universities and throughout the world. While there are many branches of engineering, a number of them are taught as disciplines within universities. These disciplines commonly lead to meeting the academic requirements for entry into a branch of engineering at a professional level. However, while some branches of engineering are disciplines by this definition, some are not such as when it is used to describe trade qualified metal workers.

3.3 Profession

There is much literature on the nature of and criteria for any vocation or discipline to qualify for the status of a profession. The branches of the engineering disciplines resident and taught in universities are commonly supported by professional associations. Such associations generally have codes of ethics and in so doing comply with the commonly accepted criteria required for professional status.

4. SURVEYING

4.1 Definition

The term surveyor derives from the French *sur* meaning over and *voir* to see (Linklater 2002). As an officer serving a feudal nobleman in the oversight of his property, the surveyor was a person of some importance. The title attaches currently and particularly, and often without further qualification, to what would now be referred to as a land surveyor. As with engineering, however, there has evolved a variety of other types of surveyor, though in most cases, their task still requires an element of, or have at their core, some degree of oversight.

Quantity surveyors oversee construction contracts having originally calculated the quantities of materials required. The term is more commonly used to describe people who measure something, as quantity surveyors do, and as do valuation surveyors. The term surveyor extends even further to marine surveyors, who oversee ships for seaworthiness, and vehicle surveyors, who oversee vehicles for roadworthiness. The people who gather views and comments for opinion polls carry out surveys and could also be called surveyors. It is a little harder to connect the idea of overseers to these people, except in the most general sense, although they are gathering data for the purpose of “measuring” public opinion.

The International Federation of Surveyors (FIG) has a definition of surveying for its own purposes, but it is too extensive to repeat here (Anonymous 1991). It does, however, embrace a broad range of what may be referred to as disciplines, or sub-disciplines. As the term “surveying” is not used in a uniformly consistent way throughout the world, what is a “discipline” in one country may be a sub-discipline in another.

Past definitions of land surveying have tended to concentrate on measurement as the focus or nucleus of the activity, with its application being particularly related to the relationship of natural and physical features. The terms “location” and “place” feature significantly in describing the functions of land surveyors. Often these words are used interchangeably and within the COED are cross-referenced to each other. Elsewhere this author has developed a definition for land surveying from first principles that states land surveying is “*to look carefully and thoroughly at a place in order to examine and record its features so as to construct a representation or description of it*” (Coutts, unpublished).

4.2 Discipline

In addressing the question of whether surveying is a discipline, it is possible to recognise that particularly in land surveying, the branch this paper is primarily concerned with, it would begin to qualify as a discipline at least in the 1950s, if not earlier. While in some parts of the world tertiary level of education was within universities, in others examinations were conducted by statutory bodies while teaching was carried out through distance learning, technical colleges and private on-the-job indenturing or mentoring. Professional bodies, and individual qualified surveyors, were also involved.

Publications such as those produced by the Commonwealth Association of Surveying and land Economy (CASLE) (Keith 1992) and by FIG (Krakiwsky, Rais et al. 1987), which detail university courses throughout the Commonwealth and the world respectively, provide clear

evidence that by the 1990s tertiary courses in land surveying were well and widely embedded in universities, both at under graduate and post graduate levels. As an academic discipline, surveying was being quite widely accepted.

4.3 Profession

The activity of land surveying has been shown to meet the criteria required to be considered a profession (Coutts 2013). While other branches of surveying are expected to meet these criteria, for example quantity surveying, literature searches have not exposed any specific examples of such proof being investigated and the status established. Conventional wisdom suggests that such an exercise would not be difficult.

5. GEOGRAPHY

5.1 Definition

The COED defines geography as “1 The study of the physical features of the earth and of human activity as it relates to these. 2 the relative arrangement of of places and physical features” COED (2004 p.595). The first part of this definition suggests an integration of the physical and social sciences. The author’s observation is that, while appearing to integrate the two, it more often appears that geographers tend to separate themselves into either physical or human geographers. Integration of the two is less common.

The second part of the definition raises significant issues when it is compared with the definition of surveying. There appears to be not just significant overlap, but the suggestion of an almost congruence of activity.

5.2 Discipline

As an academic discipline, geography is a relatively recent arrival, although the activity has long been practiced, its name being at least 2000 years old. Its origins are in Greek from “*geo*” meaning earth and “*graphien*” meaning writing. The combination suggests that geography is the activity of preparing written descriptions of the natural and physical features of the earth that is, “earth writing” or “earth description”. However, these written descriptions have, for several millennia, been supported by drawings to illustrate the descriptions and the relationships of the features. Such drawings are maps, or sometimes plans depending on the purpose and the scale, but can be traced back to the 2nd century AD. In his work *Guide to Geography*” Ptolemy described geography as “a representation in pictures of the whole known world together with the phenomena which are contained therein” (Encyclopedia Britannica, website. www.britannica.com/EBchecked/topic/229637/geography. Accessed 3 April, 2014). The practice of geography from the earliest times has also, in common with land surveying, had close links with astronomy, cartography and navigation.

“It is only since 1945, while retaining its focus on people, places, and environments, the discipline has expanded and changed considerably” (Encyclopedia Britannica, 2013). Indeed the first lecturer in Geography at the University of Otago, Ron Lister, was appointed in 1952, and subsequently was appointed to the first Chair of Geography, which was established in 1965, at the University.

Geography as a discipline, however, has developed considerably, even from the 1950s. Fred Schaefer described it as “the science concerned with the formulation of laws governing the spatial distribution of certain features on the surface of the earth” (Schaefer, 1959). In contrast, Kenzer defines geography as being “. . . concerned with the location or spatial variation in both physical and human phenomena at the earth’s surface” (Kenzer, 1989). The website of the Department of Geography at the University of Otago describes geography as: “. . . an environmental science concerned with the causes and organisation of natural and human phenomena across the globe” (University of Otago, website, 2014). This description moves a little away from a focus on description to a focus on cause. Geographers have long used the tools of land surveying to assist their understanding of the physical world, particularly levels and staves and the photogrammetric equipment such as aerial photographs and stereoscopes. However, this is generally at a very basic level.

It is clear that the discipline is well embedded in tertiary institutions, but also that it has expanded its ambit from mapping and locational matters, to the integration of a number of other disciplines and a holistic view of people and environmental issues.

5.3 Profession

The question of whether geography can be considered a profession is significantly more complex. One must differentiate between the professional geographer, one using geographical skills to earn a living, and geography itself being defined as a profession. The latter requires the discipline to meet some reasonably recognised criteria to qualify as a profession. The Royal Geographical Society (RGS) has a process that awards the title Chartered Geographer to those of its Fellows who meet specified requirements. It is worthy of note that of the last 45 admissions to this status 25 claimed geographical information systems (GIS) as their specialism, 6 teaching, one geomorphology, while the balance (13) claimed no area of speciality. According to the RGS website there are more than 450 Chartered Geographers amongst its members, of which more than 10% are resident outside Great Britain (RGS website, 2014).

While the recent successful applicants represent a relatively small sample of those qualified, it is telling that more than half the successful applicants are GIS specialists. The next most common specialty is teaching. While it is clear that there are professional (as opposed to amateur) geographers, and that the RGS, at least in the United Kingdom, is providing a home for such qualified people, it remains to be seen if this is the beginnings of the development of a new profession. That many base their claim of the expertise on the ability to work with geographic information may be a signal of a new profession in its infancy.

6. DISCUSSION

Where, then, is the professional home for the discipline of geography? While surveying has long established itself as a profession, probably ahead of its status as a discipline, it cannot be denied that particular parts of the land surveying profession overlap with the wider discipline of engineering and in particular with the profession of civil engineering. However, in some

parts of the world, there has been a greater overlap developing between the profession of land surveying and the discipline of geography, especially through the connection with town planning and land development, and particularly in the countries that underwent British colonization in the 18th and 19th centuries. During that period the land surveyors were amongst the first to arrive in the new colonies, with the task of physically dividing up the land for the settlers based on plans they brought with them, and mapping and defining new and unexplored regions. As populations grew, in the absence of other professions and disciplines in those early development times, land surveyors expanded their ambit to include such skills as the new communities required but that were otherwise unavailable. Municipal engineering is a particular example.

With the advent of the development of the digital environment, as exemplified by such tools as digital terrain models and more recently digital mapping and laser scanning, the boundaries between the discipline of geography and the profession of land surveying and the discipline of geography have become further blurred. As the number of people train and become expert in the development and use of geographic information systems (GIS), and desire the recognition of a profession, there is an increasing tension between the traditional mappers, the land surveyors, and the digital mappers.

Land surveyors and geographic information managers in Australia and New Zealand have been struggling for some years to reach an accord that defines the relationship between their respective disciplines. The need for or aspiration to the status of a profession for GIS practitioners has promoted considerable debate over a significant number of years, and has not yet reached a satisfactory conclusion. It does seem clear, however, that the land surveying profession is likely to provide the logical home for the digital spatial practitioners. No other existing profession appears to have an interest or a desire to accommodate this new area of specialty. Based on the history of the service provided, that seems a natural outcome, as suggested in the caption of a recent article in the Australian publication “Landmark”, “Geospatial tech is old hat to mapmakers”.

It could be argued that the area is not, in fact a new area of specialty, but a development of a very old one, but which utilises the power of the latest technology in an exponentially expanding technological capability. That ancient craft is cartography, well recognised as a natural and essential extension of a branch of the work done by land surveyors. In many cases in the past this has been done by individuals with specific craft-level skills in utilising the data acquired by surveyors, such as specialised draughtsmen and draughtswomen and photogrammetric stereoplotter operators. The arrival the digital age has changed the nature of the operations of such people, but has also extended the range, usefulness and accuracy of the final outcomes - maps. It has also enabled an unprecedented level of customisation to meet client needs. However, the outputs still remain contained by the same overall definition. They are maps.

7. CONCLUSION

With the rise of the professions in the 18th and 19th centuries demarcations arose between what represented the area of expertise of one profession and that of another. There were also

recognisable overlaps or commonalities in some areas of knowledge between professions. Traditionally, the profession of land surveying has developed and been recognised as largely, though not entirely, having a close relationship with civil engineering and more especially with the specialisation of the location and measurement of engineering structures. It has also had, however, a long traditional association with the activity of mapping, the depiction of the location in space of features on the land and on and beneath the sea. Often navigators, explorers, charters and mappers, have also been described as surveyors.

The application of global navigational systems, remote sensing imagery and digital and information technologies have changed the nature of the acquisition and manipulation of data for mapping purposes. Aspects of land surveying have therefore become more aligned with the disciplines of information technology and geography than in previous times. The practitioners in this new area of expertise may choose to be defined, as they have been in the past, by the profession of land surveying and perceive themselves as surveyors. A converse view may be that a new profession is emerging that combines the tools of information science, surveying and geography and will “professionalise” through the development of a defining a body of knowledge and by forming a professional body or bodies to set and maintain standards of education and define and promote ethical codes.

So far in Australia and New Zealand attempts to integrate the traditional bodies of professional surveyors with the growing number of academically qualified and experienced practitioners specialising in what has been referred to in the recent past as GIS, into a professional geospatial community has proven difficult, despite efforts over an extended period. The New Zealand professional surveying community has embarked on a similar course, the outcome of which remains to be seen, and the details of which will be presented elsewhere during this Working Week.

REFERENCES

- Anonymous (1991). Definition of a surveyor. Helsinki, International Federation of Surveyors (FIG). Publication No 2: 18.
- Anonymous (2004). Concise Oxford English Dictionary. C. Soanes and A. Stevenson. Oxford, England, Oxford University Press: 1708.
- Anonymous (2013). Landmark 48:4.
- Coutts, B. J. (2013). Surveying: the Profession. Celebrating the Past - Redefining the future, Dunedin, New Zealand, New Zealand Institute of Surveyors.
- Coutts, B. J. Unpublished. The Changing Role of the Land Surveyor: has there been a paradigm shift. Draft thesis. University of Otago)
- Keith, S. (1992). The CASLE guide to courses available in surveying and land economy. London, Commonwealth Association of Surveying and Land Economy.
- Kenzer, M. S. (Ed.). (1989). *Applied geography: issues, questions, and concerns* (Vol. 15). Kluwer Academic Publishers.
- Krakiwsky, E. J., J. Rais, L. White, W. Welsch, G. Alpar, A. Leick and J. B. and Lugnani (1987). A Catalogue of Undergraduate Programmes in Surveying and Mapping in the World, International Association of Geodesy.
- Linklater, A. (2002). Measuring America. London, HarperCollins.
- Loeffel, R. (2007). The History of the UNSW School of Surveying and Spatial Information Systems 1949-2007. Sydney, The University of New South Wales.
- Royal Geographical Society. 2014. www.rgs.org/OurWork/Charteredgeographer/Chartered+geographers.htm.

Accessed 04 April 2014.

Schaefer, Fred K. 1953. Exceptionalism in Geography: A Methodological Examination. *Annals of the Association of American Geographers*. Vol. 43, No. 3. (Sep., 1953), pp. 226-249

University of Otago. 2014. Webpage www.geography.otago.ac.nz. Accessed 04April, 2014).

BIOGRAPHICAL NOTES

Brian Coutts, a Senior Lecturer at the New Zealand National School of Surveying, is a professionally qualified surveyor and planner. He is a former President of the New Zealand Institute of Surveyors (NZIS), President of the Commonwealth Association of Surveying and Land Economy (CASLE), Chair of the Cadastral Surveyors Licensing Board of New Zealand (CSLB) and Deputy Head of School of Surveying in New Zealand. He was Chair of the FIG Working Group on Voting Rights and is, at present, Chair-elect of FIG Commission 1. His current research interest is focused on the breadth and depth of the changing role of the land surveyor over the last half century.

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