Where are we Heading?
The Crisis in Surveying Education and a Changing Profession.

Rob MAHONEY and Frances PLIMMER, United Kingdom, John HANNAH, New Zealand and James KAVANAGH, United Kingdom

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SUMMARY

It has been clear for some time, at least from the evidence presented at a number of FIG events, that the surveying profession is heading for a global crisis. The profession is changing and the number of competencies in which surveyors are actively involved is over 200.

Different parts of the world report a range of major problems, including low student numbers, closure of surveying courses, an aging teaching profession, inadequate job opportunities in some locations with an insufficient supply of graduates to fill the vacancies in others. There are challenges of new technologies within both education content and delivery and, most damaging of all, the risks attached to non-specialist data uses.

Overarching these is the lack of any clear international recognition of a 21st century definition of the profession of "surveyors" (as defined by FIG) and thus a failure to promote, at a global level, the full range of surveying skills to both our clients base and to the broader public, thereby constricting both the supply of and demand for surveyors. Indeed, there is evidence that some surveying skills which are recognized and valued in some countries are not considered in the same light in others.

This is a major issue which underpins who we are and what we do. It is not an issue for Commission 2 alone – it is an issue for the whole of FIG – our future is at stake, as the market in which surveyors operate finds itself under dynamic change. The challenge is for the profession to respond or be left behind, as others take advantage of the opportunities we ignore.

This paper identifies and discusses these issues, and challenges the whole of FIG to contribute to developing a range of global solutions to ensure the survival and future of our profession.

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1. INTRODUCTION

As the surveying profession moves into the 21st Century, it does so facing a number of fundamental challenges. New technologies and new opportunities have enabled surveyors to broaden their skills and competencies, such that they may be involved in such diverse activities as estate management, digital image processing, boundary demarcation, engineering design, planning, and satellite orbit analysis. Indeed, the number of competencies in which surveyors might claim to be proficient now number over 200. While such breadth perhaps suggests that surveyors have developed into multi-talented professional people, it may also point towards a profession that has difficulty in defining exactly what constitutes its core expertise. Indeed, there is very good evidence to suggest that a competency seen as part of the surveying profession in one jurisdiction may be part of an entirely different profession in another jurisdiction. This has huge implications, both for the way the profession defines, educates and markets itself and also for the way the rest of the world (our clients, governments and the general public who need and benefit from our skills).

In addition, there has been a fundamental shift in the role of 'professionals' that affects surveyors, and how they manage their professional activities, their clients and the new risks involved. Threats and challenges emerge in the form of an increasingly litigious and consumer-aware society, and in particular, the information revolution which has introduced significant technical enhancements and, a vast array of, in some cases previously confidential data, into the public domain. A few years ago both the technology and the data required professional knowledge for its interpretation but this is now no longer the case. Professionalism has been diminished in value and increasingly subject to challenge, both from deregulation and from legal challenges from society, as traditional values of integrity succumb to commercial pressures. This is reflected too in the evolution of the professional skills required of surveyors, who are increasingly delivering more commercial advice. (RICS, 2004) This leads to a number of questions being raised:

- What will constitute the core skills of professional surveyors in the medium to long term?
- What does the profession need to do not only to retain its position of expertise within the professional community and in society but also to enhance it?
- How should education develop to meet the challenges of a changing profession?
- How should the profession respond to the medium to longer term impact of globalisation on the profession?

To avoid these questions or to leave these questions unanswered threatens the survival of the surveying profession. Given the supreme importance and value of land to the survival of the

human race, the range of threats and challenges now facing the physical world, and our expertise in collecting and managing spatial data, we have a huge responsibility to ensure that we are seen to be the profession to provide the necessary expertise to deal with these threats and challenges. At present, this is not the case.

2. SUPPLY AND DEMAND

Surveyors are also facing crucial supply and demand problems. Williamson (1997) demonstrates that the future for traditional surveying skills within an environment of traditional professional education cannot be sustained. In Australasia, and North America anecdotal evidence suggests a critical shortage of surveyors. In sub-Saharan Africa, a combination of circumstances has led to widespread closure of university departments across the region, as well as to severe shortage of surveyors for public sector work. In the United Kingdom, however, skills shortages are found in specialisms rather than across the broad spectrum of the profession. New Zealand graduates moving to the UK for overseas work experience report high demand for surveyors with four-year surveying degrees from Australasian universities. Typically they will find work in either construction surveying, Geographic Information Systems (GIS) or hydrographic surveying.

In the UK, there is evidence (RICS, 2004) that within the Land Consultancy Group, there is difficulty in recruiting staff, and, because the RICS qualification is not mandatory for the work, "*there were a variety of qualifications or degree courses, not recognised by the RICS, which produced better skilled employees.*" What is also curious is that the paucity of Chartered Surveyors does not increase the fees for those who remain in the market, because the fees go to the 'unqualified' and to competing professionals, many of which benefit from the perception of a higher status, better public profile and increased remuneration. This situation is exacerbated by the absence of a protected market for surveying services in the UK and the fact that the RICS does not recognise the academic qualifications gained from the majority of UK universities, thereby limiting the market for recruits. There is also a poor record of conversion rates from RICS student membership to professional members.

In addition, there are major implications for surveying services given the lack of surveying technicians and this is clear both within the UK and New Zealand. Their technical expertise and breadth of specialisation across the range of skills is a major problem, which affects the service offered particularly for certain specialisms within the profession. To some extent, this paucity of skills stems from the withdrawal by educational establishments from sub-degree level professional education and the failure of professional associations to market technical qualifications in a sufficiently attractive manner.

Associated with this demand for surveyors is the problem faced in many countries, namely, how to attract the very best students, into the surveying profession. The public perception of surveyors is varied, and the reality is that we have an extremely low public profile when compared to other professions, except in a very few surveying specialisms. Having attracted students, the challenge then becomes one of providing an educational programme that not

only retains the interest of these Generation Y[1] young people, but also encourages them to become skilled and resourceful professional practitioners. For over a decade, almost every surveying degree programme in Australia has struggled to attract its full quota of students.

Mills et al (2005) suggest that attracting students is also a problem in the UK. This problem, however, is exacerbated by the relatively high average age of those in the profession – where will their replacements come from in the next decade when retirement beckons? This is a particular problem within academia, where it is clear that, compared to the UK surveying profession as a whole, there is an aging profile of those in education. This is exacerbated by the finding that "*nearly half of staff under the age of 45 are seriously considering a career outside higher education.*" (RICS, 2006) and where the conditions of service including remuneration compare badly with those available within the private sector. It could also be argued that a "greying" faculty is a very visible barrier to attracting young people into University surveying education.

3. A FUNDAMENTAL PROBLEM

In seeking to determine a path ahead for the surveying profession, FIG faces a fundamental problem, namely, arriving at a definition of what it means to be a 'surveyor'. In the global context, for example, the skills, competencies and learning required of a surveyor vary greatly between countries. Plimmer (2001) demonstrated the variations of competencies (based on the FIG definition of "surveyor") which comprises the profession of "surveying" in 16 European countries. What may be considered to be the field of expertise of a surveyor in one country may be considered to be the expertise of some other professional or technical specialism in another country, because the professions have developed in isolation in different jurisdictions to reflect the needs of their markets. In the absence of an external driver to force commonality within the profession, traditional structures are retained and these may no longer be appropriate for the 21st century challenges. According to Williamson, (1997), "*The surveying profession is currently struggling for an identity in both the developed and developing worlds.*" Yet without a clear, coherent and relevant identity, and without strong professional structures the profession will struggle to survive. There is evidence that the profession is facing serious problems already in various parts of the world.

3.1 National and Regional Variations

In Australia, for example, the Institution of Surveyors Australia (ISA) has sought to join three other professional bodies and merge into a much broader Spatial Sciences Institute (SSI). This initiative, which has been the subject of heated and often acrimonious debate, is still not fully consummated. The collective "fire-power" of the SSI, both in terms of membership numbers and in political influence, considerably outweighs that of the ISA alone. Much of the debate in this merger has centred on loss of identity, educational standards and professional entry criteria.

[1] defined in www.dictionary.com as "The generation following Generation x, especially people born in the United States and Canada from the early 1980s to the late 1990s."

In the wider Australasian context surveyors are typically defined as specialists in spatial measurement and boundary demarcation. To be issued a cadastral surveyor's license or to be "registered" as a cadastral surveyor, a candidate must have an appropriate four-year undergraduate degree (or equivalent) and show a defined level of competency in spatial measurement, land law, land boundary definition, planning, and municipal engineering. In this context, land surveyors are not considered to be estate agents, they are not specialists in building construction nor are they land valuers – these are all distinctly different industry groups, typically with a lower level of education and skills such that they would not meet the membership requirements of the local surveying profession. In the Australasian (and Singaporean) context, these other groups are not considered to be "surveyors". However, the structure of the Royal Institution of Chartered Surveyors (RICS), makes it clear that a much wider range of specialisms are incorporated into, what is arguably, a United Kingdom centric model, despite its increasingly global membership.

However, even within Australasia, where reciprocal registration/licensing arrangements exist between all the Australian states and New Zealand, and where the cadastral systems are essentially the same, different professional flavours have emerged over the last 30 years. While all parties to the reciprocal agreement consider land law, spatial measurement and the definition of cadastral boundaries to be the essential body of knowledge for a surveyor, surveyors in New South Wales and New Zealand tend to place added emphasis on municipal engineering. In these particular jurisdictions, the surveyor has traditionally been the designer of urban subdivisions, including all its engineering services.

By way of contrast, in the United States municipal engineering is strictly the domain of the professional engineer and certainly not that of the surveyor. There the surveyor tends to specialises in spatial measurement and land boundary definition. In Canada the surveyors (or geomaticians) typically have a stronger measurement science/geodesy emphasis to their degrees than would be true in New Zealand. There are also issues affecting divisions between surveyors and professional practice in some jurisdictions. For example, some of the specialisms of building surveyors are the sole preserve of architects within certain countries of the European Union; similarly, the functions undertaken by quantity surveyors are not usual in practice in some EU countries; professional valuers in the UK often combine the roles of valuation advice and estate agency, but this is traditionally unacceptable to professional valuers in some EU countries. (Gronow & Plimmer, 1992)

3.2 International Perception

At the other end of the spectrum, within the international community, there are documents which categorise the range of occupational and activity-based data often used to appoint appropriate people or organisations to undertake work. Two of these documents which show how surveyors and their professional skills are represented to the international community are two UN documents - The International Standard Classification of Occupations (ISCO) and the International Standard Industrial Classification (ISIC Rev. 3).

The International Standard Classification of Occupations (which was adopted in 1988 by the International Conference of Labour Statisticians as ISCO-88) provides a system for classifying and aggregating occupational information obtained by means of statistical surveys and is one of the standards of international labour statistics. Within ISCO-88, ten separate classifications for ”surveyors” are listed, which do not cover the range of competencies recognised by FIG. Thus, “surveyors” are shown as having a fragmented and disparate range of activities with no cohesion, focus or single identity. It is also relevant to note that these classifications were agreed in 1988 and our profession has developed significantly since then. Thus, ’surveying’ is not identified as a single profession, the full range of surveyors’ activities are not currently described in the existing text, nor are surveyors identified as having the appropriate skills to deal with other relevant activities listed. This is a serious omission which has huge implications for how the international community perceives (or fails to perceive) us.

The International Standard Industrial Classification of All Economic Activities (ISIC) is a basic tool for fostering international comparability of data and for promoting the development of sound national statistical systems. ISIC is used in a wide range of statistics, including demographic and social statistics for labour and employment analysis, which need detailed data classified by the kind of activity involved. It is hard to identify clearly those categories in which the activities of surveyors should most appropriately appear. Since all of these “economic activities” require the use of land and buildings, it could be argued that surveying should underpin them all. However, the classifications (e.g. manufacturing; electricity gas and water supply, public administration and defence, wholesale and retail trade, financial intermediation) are not helpful to indicate the role of surveyors, with only ’agriculture, hunting and forestry’, ’construction’ and ’real estate, renting and business activities’ providing any clear land-based linkage. Explanatory notes give more guidance as to what is and what is not included within each class. They are important, as much for the activities which are not mentioned as for those which are mentioned (as being included within the class or classified elsewhere), and it is within these explanatory notes that the activities of surveyors are best identified - both by their inclusion and their omission. This document too is somewhat dated, being produced in 1990.

These documents are both in the process of being revised and it is vital for the survival of the profession that the expertise of the surveying profession is appropriately presented. Failure to achieve this will result in the surveying profession being seen as increasingly irrelevant to the issues facing society; our expertise will be overlooked at an international level and, unless it is protected within national legislation, surveying work could be awarded to professions with inappropriate expertise, our role as influencers of policy eroded and the risks of significant and damaging errors hugely increased.

The surveying profession has, therefore, a major identity crisis – at least as far as the rest of the world is concerned, because, when viewed from a global perspective, the surveying profession not only has a wide range of competencies, but also significant variations both in how these specialisms are grouped as a profession and also variations within professional practice. It could be argued that the current FIG definition of a “surveyor”, if taken in its totality, is probably not appropriate in any one country. As a profession we tend not to

exploit our ability to act as 'professional facilitator', but there are pockets of change The Marrakech Declaration (FIG 33 2004) is intended to "*support politicians, senior managers, professional organizations and decision makers in their efforts to enable a balanced coexistence of a sustainable nature and a liveable habitat*". We need to exploit our professional abilities on the world and national stage.

If this is the case, how can the profession possibly present the globally coherent marketing message necessary to attract international clients and also young people into an increasingly aged and apparently fragmented profession?

Indeed, its failure to do just this, may well serve as the root cause of a number of other problems such as, poor public recognition, poor student numbers, poor understanding of the surveyor's skills and expertise and, in some cases poor remuneration. Furthermore, even within the same general jurisdiction there may be significant variances in professional practice. It is also clear that there is huge ignorance within the profession about its nature, structure, education and regulation which occurs in different countries. While there may be international standards in professional practice, national professional associations which regulate professional education and qualifications operate largely in isolation from one another, or achieve a degree of co-operation at regional level and it is only through the global influence of an organisation such as FIG that the forum to discuss and share ideas and experience is available.

4. KNOWLEDGE SOCIETY

Despite the increasing availability of information to the general public, it is in the role of data interpretation and management that the future of the profession lies. We must recognise that the traditional professional whose position in society was secured by the implicit integrity and trust which attached to that position no longer exists. The increase in general education and consumer legislation, mandatory Professional Indemnity Insurance (PII) cover and an increasing litigious culture are combining to erode the traditional status of the professional. (Dabson, et al. 2007)

Professionals are emerging into facilitators who rely not only on their own knowledge base, but also on the expert in-put from clients, who in their turn rely on the expert evaluation of the surveyor. (Matzdorf et al., 1996) Until recently much of the surveying profession was based broadly upon high-end technology. Today, many in the profession are essentially working as part of the knowledge society, where careers are made through the provision of value added services. (Mahoney & Kavanagh, 2006) The knowledge society of which the profession is a major player provides fundamental, well-trusted and quality controlled data sets upon which society is built. We are therefore becoming 'knowledge workers' and need to recognise such a shift in order to be able to adapt and benefit accordingly.

Knowledge workers access their employment, specialism and social position through formal education, combining this with high manual skills. Thus, a neurosurgeon's ability relies on a combination of formal education and theoretical knowledge and is interpreted through manual

skills. Different knowledge work will require different levels and kinds of formal knowledge, the source of which is institutional learning. Thus, the quality of teaching and learning is fundamental, but it is opined that, while basic traditional schooling will be important, increasingly knowledge will be acquired later in life, through continuing education (or life long learning).

According to Druker (1994) *'Knowledge workers . . . give the emerging knowledge society its character, its leadership, its central challenges and its social profile. They may not be the ruling class of the knowledge society, but they already are its leading class. In their characteristics, their social positions, their values and their expectations, they differ fundamentally from any group in history that has ever occupied the leading, let along the dominant position.*

Thus, there will be a need to redefine an 'educated person' as someone who has learned how to learn, and will throughout an entire lifetime continue to learn, in and out of formal education. It will be necessary to recognise and value formal qualifications, performance capacity and wisdom.

A number of major changes within engineering, land administration, cadastral systems, GIS, planning, environmental impact and strategic assessments and even marine projects are occurring with the result that multi-professional groupings are being created to generate holistic complete life cycles solutions, of which the surveying profession can form an integral component. These may even demand a 'root and branch' restructuring of the professional specialisms and therefore both professional education and professional qualifications, because if these opportunities are not embraced by the surveying profession, and collaborative working becomes a major outlet for the provision of value added services, professional commercial competitors will move into the marketplace previously dominated by the surveying profession.

5. POSSIBLE SOLUTIONS

If, indeed, the surveying profession is to survive, what solutions might exist? The following are suggested as avenues for action.

5.1 Reviewing the Definition of the word "Surveyor"

FIG (1991) recognizes a range of skills as being within the competence of a 'surveyor'. However, it is not usual for all, or at least a large number of eclectic surveying skills to be embodied in one individual. In the UK, there are recognized educational and qualification routes for different surveying specialisms. In other countries, certain specialisms are considered to be separate professional activities. Is the complexity of the profession an advantage or a hindrance, both to the recruitment of students into universities and the public's perception what a surveyors does and how they are valued by other professions? For some professions, such as doctors, dentists and, perhaps, accountants, there is a relatively clear public understanding of what these involve, although it may be necessary to establish in what

area of specialism a doctor, for example, may practice. This is certainly not true for surveyors. Public perception is fundamental because it affects both the recruitment of the next generation (and its intellectual calibre), and the employment of the practitioners. Public perception must, therefore, reflect the reality. Clearly a review is warranted.

In undertaking such a review, we pose the question: "Is there a core competency or set of competencies that at a global level are expected of a surveyor?" If so, then these might be identified as existing core competencies. As a starting point for discussion, a set of core competencies might perhaps be those of spatial data collection, spatial measurement, boundary demarcation and land tenure arrangements. Whatever core competencies are identified, it then becomes important to decide whether, regardless of history, this is an appropriate competency or set of competencies for the future. If not, then a new and more appropriate set of competencies will require definition. It is important to emphasise here that the intent of such an exercise is not limit or constrain the activities of the profession in its different jurisdictions, but rather to provide a measure of focus and coherency for the profession world-wide – qualities that are essential to any global marketing initiatives that might be undertaken. Within individual countries, the surveyors' expertise would then be defined by these core competencies plus any other necessary competencies that might be country or region specific.

5.2 Identifying Successes and Failures

Within the FIG surveying community, some have taken initiatives which have led to real success in gaining public recognition, in attracting students, in improving incomes, and in providing strong stable professional structures and we need to evaluate those and consider how they can be adapted and applied more widely. Equally, some initiatives have proven to be failures and their lessons need to be learned. The following observations can be made.

5.2.1 Changing Names is not a Long-term Solutions

In the early-1990s it became fashionable to change names from "surveying" to "geomatics" in an attempt to provide a more integrating title for a profession that was subject to significant technological change. It was to be a new name that reflected the breadth of subject matter encompassed in the profession, that had greater appeal than the old word "surveying" (although it is recognised within the profession as an umbrella term incorporating "land surveying") and that would attract students into a profession whose new vision had become one of producing and managing spatial data (Gagnon and Bedard, 1996).

With the passage of time it has become clear that many of the supposed benefits from such a name change have not been achieved. The first indications of this failure were presented by Hannah et al (2000) who concluded that in non-French speaking countries such a name change "*was likely to add little or nothing to recruiting efforts and may actually be negative in its effects*". It is interesting to observe that in Australia, in recent years, at least one major university programme has dropped the name, "Geomatics", in favour of a return to "surveying". Another is considering a similar move. There is certainly no indication that the

use of the name "Geomatics" it has done anything to solve the problem the profession has had in attracting new entrants. Within the RICS, the term 'Geomatics' only applies to the activities of approximately 3% of its members, the remainder being engaged other activities.

5.2.2 Focused Marketing is Essential

Anecdotal evidence from the UK indicates that a relatively high proportion of surveying students are encouraged into the profession by personal contact with a practising surveyor who is either a member of the family or a close family friend. Hannah (2006) opines that the primary culprit responsible for the skills crisis facing the surveying profession in Australia is the lack of public profile associated with the surveying profession. In reviewing the success of the surveying programme at the University of Otago in attracting students, versus the difficulties experienced by the Australian universities, he concludes firstly, that it is essential to build marketing momentum, secondly, that a simple and attractive marketing message is essential (ideal inside/outside career, variety, superb career opportunities, excellent remuneration), thirdly, that it is important to use good communication tools and, finally, that target audiences must be identified and reached. With regard to this latter point, he notes that in New Zealand a surveying career typically appeals not to the highly urbanized teenager, but rather to those growing up in the smaller rural cities and rural areas. This is consistent with the indoor/outdoor marketing message promoted and also to contact with a practising surveyor at a relatively early stage in developing career choices. Surveying recruitment needs to be more focused in both its message and its target audience, and professional associations need to respond by ensuring that the very best students are attracted to professional membership.

5.2.3 Coordinated Marketing is Essential

Typically, when it comes to marketing the profession, there are at least two major interest groups, i.e., the professional bodies and the educational institutions. In the first instance, it is in the interest of the professional bodies to raise their profile thus attracting both work and members. They need an ongoing inflow of members to survive. Equally, the educational institutions need students if they are to survive. In the longer term, the aim should be to eventually see these students graduate into the professional body.

The New Zealand experience is instructive. Prior to 2002, all Registered Surveyors were required by law to be members of the NZ Institute of Surveyors (NZIS). The links between the tertiary education courses and the NZIS were close (at the University of Otago for the professional degree and at Unitec for a national diploma), with a high level of coordination and shared marketing. New legislation passed in 2002 eliminated the name "Registered Surveyor" and introduced the new name, "Licensed Cadastral Surveyor" for those with appropriate education and experience. At the same time membership of the NZIS became voluntary. Immediately, a small splinter group of former NZIS members (less than 5%) formed a new Institute known as the Institute of Licensed Cadastral Surveyors (ILCS). While the NZIS and the educational institutes have continued to work closely together with their marketing, the ILCS has made no significant contribution in this area and seems unlikely

to do so. Beneficially, however, the NZIS has introduced a new, premier grade of membership as a benefit both to the public and to its members and is moving aggressively to market this new brand to the wider public. In so doing, it is implementing the broadest ranging public relations campaign seen in its history. This marketing can only be done because of a strong professional organization and structure.

5.2.4 High Levels of Remuneration are Attractive

One of the very clear benefits of the skills shortage in Australasia has been the marked increase in remuneration paid to surveyors at all levels. Average salaries paid to four-year BSurv graduates from the University of Otago increased from approximately $NZ 30,000 in 2001 to $NZ 46,000 in 2006. The national annual rate of inflation during this period was only between 2% and 3%. Over the same period of time increases of a similar (if not grater magnitude), have been seen throughout Australia. Remuneration packages for new graduates in the order of $A 60,000 are now not uncommon. Relativity effects have caused these to flow through the profession and, despite protestations from those practitioners who continually bleat about being unable to recover such costs, are now flowing into higher client charge-out rates. Indeed, in the New Zealand experience, those practitioners who offer a first-class professional service to their clients (as opposed to a technical service), have found the market place more than willing to pay these additional costs. Typically, a surveyors' expertise adds value to clients' project far beyond that which they have traditionally charged. High levels of remuneration are one important factor leading towards higher levels of public recognition and in New Zealand have helped lead to higher levels of recruitment.

6. CONCLUSIONS

According to Williamson, (1997) *". . . the surveying profession is fortunate [in] that it has a well developed sense of history, [and that] one of the important lessons that this historical perspective provides is that change in the profession is constant and inevitable."* So change management should not be a problem for us. However, we need a well defined sense of future direction and a clear plan as to what to change and how to manage that change. We need to reflect on how to market the profession to recruit future generations of surveyors and to adapt to the evolving marketplace for our services, before others take over traditional markets.

While a unification of our profession would seem to be an overly ambitious goal, at this time, we do advocate a review of the core competencies that one might expect of a surveyor. If agreement could be reached, this would at least allow a measure of coherency in marketing our message to national and international agencies. We need to establish mechanisms to overcome the relative ignorance about the nature, structure, education and regulation which occurs in the profession in different countries. National professional associations operate largely in isolation from one another, and it is only through the global influence of an organisation such as FIG that the forum to discuss and share ideas is available to the profession. Indeed, it is only within such an organisation that any hope to achieve a co-ordinated and cohesive profession rests. The important things is not to convince ourselves of

the importance of the services we offer but to show the world; politicians, other professions, and NGO's that our professional offerings are fundamental to the well being of society.

Given that professional recognition is a major issue and that improved marketing of the profession is needed, the sharing of marketing resources, or indeed the development of a new core set of resources may well prove to be crucial. This would certainly be true for educational institutions whose ability to attract quality students is essential to the long-term health and future of our professional institutions.

It is clear that professional remuneration is a function of skills and learning, the quality of professional service, the capacity to add value to clients, public perception and, in an open market economy, demand. For younger people, remuneration and life style is an influence on the attractiveness of a particular career option. In many countries, the existing demand for those with measurement science skills and associated skills is driving remuneration higher, thus presenting the profession with a unique opportunity to invest out of its abundance rather than out of meager returns. Now is the time to invest in new equipment and to develop smaller, more profitable client bases. Equally, now is the time for the profession to transition from technical tasks that are typically lower paying, to those that offer higher returns, and thereby secure its future.

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BIOGRAPHICAL NOTES

Rob Mahoney FRICS, FBCartS is Principal of MahGeo, an independent GI and LIS Consultancy. Rob studied Land Surveying at the Polytechnic of the South Bank, is a Fellow of The Royal Institution of Chartered Surveyors and current Chairman of the RICS' Faculties and Forums Board, a Fellow of the British Cartographic Society and an active member of FIG Commission 3. Rob has presented our 40 papers on associated topics. Rob has extensive experience in the management of land information, and land registration, together with the associated technologies and business processes. He has been engaged upon a wide variety of successful national and international projects, including the Feasibility Study for the National Land Information Service (NLIS); its Scottish equivalent, ScotLIS; and has been an advisor to the Hungarian, Isle of Man and other Governments on the computerisation of the land registration systems. He has also worked on other projects worldwide. Rob is a regular contributor at international GIS conferences and guest lecturer at many masters courses in GIS. He is also a former member of the UK Government's GI Information Panel.

Frances Plimmer, Dip Est Man, MPhil, PhD, FRICS, IRRV, FICPD is a Chartered Valuation Surveyor who has been involved in professional education for over 25 years. She has researched into (amongst other things) valuation methodology, land taxation, professional ethics and the mutual recognition of professional qualifications and has published widely on these subjects. She is the editor of *Property Management*, an international refereed journal, a Fellow of the Institute of Continuing Professional Development, and has been active within

the RICS and FIG on matters of education, research and international qualifications. She is the UK delegate to FIG's Commission 2 (Professional Education) and headed the FIG Task Force on Mutual Recognition. In addition, she is employed half-time as Research Professor at Kingston University, and half time as a Senior Research Officer at The College of Estate Management in England both in England.

John Hannah BSc, DipSci, MSc, PhD, MNZIS, RPSurv, completed his first two degrees at the University of Otago, New Zealand. Two years later, in 1974, he became a Registered Surveyor. In 1976 he began study at The Ohio State University, completing an MSc and a PhD, both in Geodetic Science. From 1982 until 1988 he was Geodetic Scientist, and then subsequently, Chief Geodesist/Chief Research Officer with the Department of Lands and Survey, New Zealand. After a 17 month appointment to the Chair in Mapping, Charting and Geodesy at the US Naval Postgraduate School, California, he returned to New Zealand as Director of Geodesy and subsequently, Director of Photogrammetry for the Dept. of Survey and Land Information. In 1993 he joined the School of Surveying, as Professor and Head of Department, becoming its Dean in 2001. He relinquished this administrative role at the end of 2004 in favour of more teaching and research. His publications reflect his research interests in sea level change and surveying education. He is a Registered Professional surveyor is on the Council of Standards New Zealand and is currently the President of the NZ Institute of Surveyors.

James Kavanagh BSc (Hons) MRICS C.Geog MInstCES is a Chartered Land Surveyor, Chartered Geographer and graduate of DIT Bolton Street, Dublin and University of East London. He has worked on some of the largest engineering projects in Europe, including Canary Wharf and Broadgate, London and spent several years mapping refugee camps in the Middle East whilst working for the United Nations. He has broad experience of land surveying in many countries around the world, including the Seychelles, Palestime, Phillipines, Syria, Egypt and Belgium. James is currently Director of Land, within the Faculties and Forums department of The Royal Institution of Chartered Surveyors (RICS). The Land Group covers the specialist survey areas of Environment, Geomatics, Minerals and Waste Management, Rural and Planning & Development and contains over 300,000 members.

CONTACTS

Robert Mahoney,
Principal – MahGeo,
7 Pellbrook Road,
Lewes,
East Sussex, BN7 2TF
UNITED KINGDOM
Tel: + 44 7713 270 452
Email: RobMahoney@mahgeo.com
Web Site: www.mahgeo.com

Professor Dr. Frances Plimmer,
The College of Estate Management,
Whiteknights,
Reading, RG6 6AW
UNITED KINGDOM
Tel. + 44 118 921 4687
Fax + 44 118 921 4620
Email: f.a.s.plimmer@cem.ac.uk
Web site: www.cem.ac.uk

Professor John Hannah,
School of Surveying,
University of Otago,
PO Box 56,
Dunedin,
NEW ZEALAND
Tel. + 64 3 479 9010
Fax + 64 3 479 7586
Email: john_hannah1@albers.otago.ac.nz
Web site: www.surveying.otago.ac.nz

James Kavanagh,
The Royal Institution of Chartered Surveyors,
12 Great George Street,
London, SW1P 3AD
UNITED KINGDOM.
Tel. +44 207 222 7000
Fax + 44 207 334 3844
Email: jkavanagh@rics.org
Web site: www.rics.org