

Perspectives on the Challenges of Delivering a Sustainable Survey Technician Training Programme in New Zealand

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SUMMARY

Technician Surveyors in New Zealand are a vital component of a profession that has a well known history and long standing reputation in the country for high quality work undertaken with integrity. Surveying is a profession that is experiencing considerable change that brings not only new challenges but also opportunities, and Unitec Institute of Technology is focused on the building the capacity to deliver sustainable long-term technician training in New Zealand. Unitec, along with the University of Otago are the only providers of conventional survey education in New Zealand. The National Diploma in Surveying (NDS) was successfully delivered by Unitec for the first time in 1999 after replacing the New Zealand Certificate in Land Surveying (NZCLS). The ongoing challenge for Unitec has been to maintain the viability of a programme with only approximately 50 equivalent full time students (EFTS). Ten years on the NDS continues to operate with a steady number of students, however, to increase the sustainability of the programme it is proposed to integrate the first year of study with a New Zealand Diploma in Engineering (Civil) programme with a number of common courses and also specialist land survey papers. In 2011 the updated programme will still be called the National Diploma in Surveying (NDS) and will utilise the latest Version 5 Unit Standards from the New Zealand Qualifications Authority (NZQA).

The next phase of the challenge is to consult with all the interested parties to ensure the needs of students, industry and Unitec are met. The review throughout 2010 will assess a number of other options including maintaining the status quo (NDS), changing the name to a New Zealand Diploma in Surveying (NZDS) or a New Zealand Diploma in Engineering (Surveying). For all options grade based assessment, (e.g. A, B, C) will be utilised and not competency based, (e.g. Pass or Incomplete). Both will include an increased focus on engineering surveying whilst maintaining a cadastral component. This paper details both the challenges and opportunities, and how capacity can be built to provide long-term sustainable technician training for New Zealand. It also will discuss the suitability for international students from countries with similar educational and professional profiles, and opportunities for a 3 year Bachelors degree in Land or Engineering Surveying.

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1. ABSTRACT

The National Diploma in Surveying (NDS) was successfully delivered by Unitec for the first time in 1999 after replacing the New Zealand Certificate in Land Surveying (NZCLS). The ongoing challenge for Unitec has been to maintain the viability of a programme with only 50 equivalent full time students. Ten years on the NDS continues to operate with a steady number of students, however, to increase the sustainability of the programme it is proposed to integrate the first year of study with a New Zealand Diploma in Engineering (Civil) programme with a number of common courses and also specialist land survey papers. In 2011 the updated programme will still be called the National Diploma in Surveying (NDS) and will utilise the latest Version 5 Unit Standards from the New Zealand Qualifications Authority (NZQA). The next phase of the review will assess a number of other options including maintaining the status quo, changing the name to a New Zealand Diploma in Surveying (NZDS) or a New Zealand Diploma in Engineering (Surveying), but for all grade based assessment, (e.g. A, B, C) will be utilised and not competency based, (e.g. Pass or Incomplete). Both will include an increased focus on engineering surveying whilst maintaining a cadastral component. This paper details both the challenges and opportunities, and how capacity can be built to provide long-term sustainable technician training for New Zealand. It also will discuss the suitability for international students from countries with similar educational and professional profiles, and opportunities for a 3 year Bachelors degree in Land or Engineering Surveying.

2. INTRODUCTION

Technician Surveyors in New Zealand are a vital component of a profession that has a well known history and long standing reputation in the country for high quality work undertaken with integrity. Surveying is a profession that is experiencing considerable change that brings not only new challenges but also opportunities (Moulton, 1998), and Unitec Institute of Technology is focused on the building the capacity to deliver sustainable long-term technician training in New Zealand. Leaver et al. (1998) commented that the continuing change in the surveying profession raises questions about the future role and skills that surveyors need to encompass, and that training requirements need to be led by the profession. Surveyors not only collect data, but are managers of both spatial information and the associated planning systems. Sustainable urban planning, infrastructure services, engineering surveying and dynamic data management via Geographic Information Systems (GIS) all hold tremendous

opportunities (Leaver, 1999), and continues to do so past 2010 with the advent of new methods such Low Impact Design.

Unitec, along with the University of Otago are the only providers of conventional survey education in New Zealand (Figure 1). The challenge of sustainability for survey technician training in New Zealand can be found in the relationship between the profession and educational facilities (Phillips, 2000). At present, this relationship is a very healthy one with strong interaction between the New Zealand Institute of Surveyors Education Committee and the Department of Civil Engineering at Unitec. A member of the Unitec Land Surveying staff is a member and regular contributor to the committee which provides a conduit between the two parties. This factor is one of many ‘challenges’ which exist to ‘harmonize’ the different strands of – efficient delivery by the provider, needs of local employers and industry, and requirements of two sets of professional bodies.



Figure 1: Unitec survey students in the field (Source: Taylor, 2009).

Buckeridge (1996), in a paper titled “Technician Surveyors in New Zealand: an endangered species?” held the view that for survey technician training to remain viable in New Zealand the survey programme must be taught in conjunction with engineering courses. In an ever changing environment with government funding likely to change in the future from current levels it would appear even more important that the training is undertaken in a combined

manner to make the Student Staff Ratios (SSR's) for the programme sustainable in the long-term.

2.1 Background and History

The National Diploma in Surveying (NDS) was successfully delivered by Unitec for the first time in 1999, to a total of 75 students, after replacing the existing New Zealand Certificate in Land Surveying (NZCLS). This equated to 40 equivalent full-time students (EFTS) which includes full time students and those attending part-time whilst working in the survey profession. These numbers of students were considered by both Unitec and the survey profession as being very satisfactory at the time (Phillips, 2000). In 2010 the student numbers are approximately 47 EFTS which shows an increase from 2000, but not of any significant proportion. This number could potentially be increased with the delivery of distance learning or block courses, however with industry based training and assessment available throughout the country the uptake of this option is difficult to gauge. Remote learning was provided in 2000 as a precursor to full distance learning being provided, but it did not generate the interest that had been signaled in questionnaires by the New Zealand Institute of Surveyors (NZIS) (Miller, 1999), and was subsequently ceased in the following years.

2.2 Current National Diploma in Surveying (NDS)

The New Zealand Qualifications Authority (NZQA)(2008) describes the Level 6 (Version 5) National Diploma in Surveying as recognising the skills and knowledge required by the New Zealand Institute of Surveyors for survey technicians working in construction and land development contexts. The holder of the qualification is able to undertake field and office work associated with land surveying. The compulsory section of the programme recognizes safe working in a surveying workplace; generic skills in communications, computing, and trigonometry; knowledge of land administration; and core technical skills in geodetic surveying, land administration, subdivision design, and survey practice. The elective section enables candidates to select surveying and related skills appropriate to their workplace or specialty area.

Holders of the NDS qualification meet the educational criteria for admission as a technical associate of The New Zealand Institute of Surveyors Inc. Other categories of NZIS membership may be available to holders of this qualification subject to compliance with NZIS Rules (NZQA, 2008). Entry requirements include a minimum of 48 NCEA Level 2 credits in four subjects including 20 credits in trigonometry, geometry, and algebra, and credits in English, graphics and design, computing, and/or physics, or demonstrate equivalent knowledge and skills.

Unitec has not been delivering the most up to date Version 5 of the NDS whilst an assessment was undertaken as to the best future method of delivering the programme. This assessment is continuing in 2010, however, it has been decided by the Civil Engineering Department management team which administers the NDS to deliver Version 5 in 2011. Implementation

of this is currently underway in conjunction with the overall assessment of the most efficient and sustainable method of delivery and course assessment.

Phillips (2000) describes how diploma students are attracted to surveying by lifestyle images such as that of someone standing outdoors by a tripod. This image, enhanced by modern surveying technology prove a drawcard to the profession for potential survey technicians although it is a very niche market. The NDS is still managing to deliver the skills necessary for the technician to participate in the science of measurement but is also broadening their scope and skills to enhance their participation in the workplace with the continuing inclusion of topics such as geology and soil properties, hydrology and subdivision services design, Maori land issues and the Resource Management Act (the over-arching planning legislation in NZ).

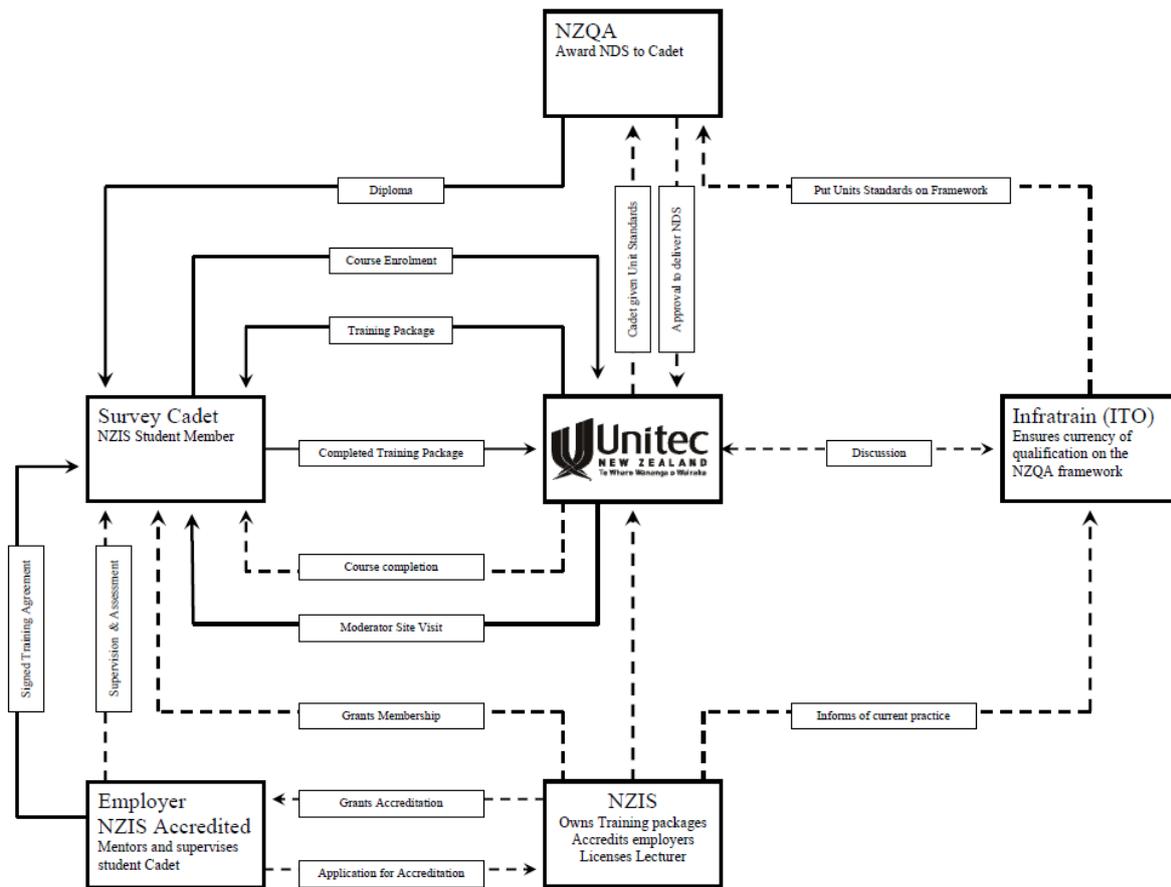


Figure 2: The parties involved in the awarding of a survey technician qualification in New Zealand involving Unitec as a provider.

3. INTERESTED PARTIES

A number of parties are involved in the development and governance for the National Diploma in Surveying (Figure 2). This includes NZQA, Infracrain which is an Industry

Training Organization (ITO), New Zealand Institute of Surveyors (NZIS), industry employers and Unitec. The qualification is registered on the NZQA framework and currency and review is undertaken by Infratraining. Unitec has begun consulting with all the interested parties in the review it is undertaking, and has already informed groups of its intention to offer Version 5 of the NDS in 2011 and they have provided positive feedback in response to this proposal.

4. NEW DIPLOMA IN SURVEYING

To gain a recognised qualification in land surveying there are three routes in NZ:

1. A four-year Bachelor in Surveying degree at Otago University;
2. A two-year National Diploma in Surveying at Unitec;
3. A National Diploma in Surveying via work-based experience and assessment.

Unitec's current National Diploma is based on unit standards managed by the *Infratraining* Industry Training Organisation (ITO) who have responsibility for work-based qualifications in surveying. The unit standards have been revised and the Unitec programme needs to phase out the earlier versions of the unit standards. This change coincides with Unitec reviewing the options for providing a programme in Land Surveying that will be more versatile for students and have a good fit with Unitec's approaches to teaching and learning (McMullan, 2010a).

The option selected is for Unitec to offer a two-year programme for a Diploma in Land Surveying linked to the New Zealand Diploma in Engineering (Civil). The NZDE is endorsed by civil engineering industry and institutions, and is run by an experienced national Consortium of Polytechnics. This option has been explored for a number of years and is expected to find broad acceptance by institutions and employers. At present a total of 80 credits can be used by candidates of the NDS from subject passes from the Consortium of Polytechnics Diploma in Engineering (Civil)(NZQA, 2008). This demonstrates that a relationship already exists between the two programmes.

The main features of proposed programme are:

- Possible Qualification names (subject to agreements): *National Diploma in Surveying (e.g. maintain existing name), NZ Diploma in Engineering (Surveying) or NZ Diploma in Surveying;*
- Total credits: 240, made up of 16 courses of 15 credits each at Levels 4, 5 and 6;
- Programme content a strong match with the ITO's new unit standards and National Diploma;
- Over half of the 16 courses are shared with the NZ Diploma in Engineering (Civil);
- Some elective courses shared with the BEngTech (Civil) available at Unitec and other Polytechnics.

The advantages for students are:

- Learning in a professional tertiary environment with grade-based assessments;

- National availability of the first year of the programme;
- Potential ability to choose between surveying and civil engineering at end of first year;
- Potentially improved staircasing to the BSurv at Otago University;
- Improved staircasing to other qualifications such as the NZDE (Civil) and BEngTech degree;
- Choice of professional institutes (Institute of Professional Engineers NZ - IPENZ and NZIS);
- Broader career options and progression opportunities;
- The ability to commence at other institutions throughout NZ.

The advantages for industry are:

- More versatile programme graduates with wider abilities and perspectives;
- National availability of the first year of the programme;
- Strengthening of the NZDE (Civil) qualification;
- Although Unitec will not be using the standards-based National Diploma in Surveying, the strong match in content will allow cross-crediting between Unitec courses and unit standards.

Industry and professional acceptance

The primary mode of consultation with the surveying and national education professions will be through the Unitec Consultative Committee for Surveying, the Education Committee of the New Zealand Institute of Surveyors, NZQA and the Infracore.

5. NEW ZEALAND DIPLOMA IN ENGINEERING (CIVIL)

The structure, content and governance arrangements for a new national Diploma in Engineering are being developed as part of the IPENZ-sponsored National Engineering Education Plan (NEEP) Project. The content and assessment of this Diploma, commencing in 2011, interacts with the Unitec development of a new National Diploma in Surveying because, for viability, the two programmes need to share teaching and assessment arrangements where possible (McMullan, 2010b).

Features of the NEEP Engineering Diploma are:

- Total of 240 credits in 15 credit courses for an NZDE, accompanied by a 120 credit NZDE (Applied) which includes practical work-based components;
- Available in three disciplines (civil, electrical, mechanical) with further expansion possible;
- Assessment could be by 10-point grade system;
- The development process has been through consultation stages, is about to issue framework and curriculum (end March 2010), and aims to be approved and accredited by 31 August 2010;

- There may be some flexibility in the design of the common 15 credit papers so they are still appropriate to each discipline e.g. each discipline does two of three modules within a paper.

6. POTENTIAL REVISED PROGRAMME STRUCTURE AND ASSESSMENT

A potential revised programme structure has been developed which allows for greater integration of the NDS into the NZDE(Civil) programme (Table 1)(McMullan, 2010b). This model is an example and is not necessarily the final one. It requires only 5 courses to be undertaken with only survey students in the class which increases the viability the programme considerably. Also NZDE (Civil) may wish to undertake these papers after completing their programme to obtain an additional qualification. The specialist areas in the separate papers are Surveying Communication which includes CAD, Engineering Surveying which includes Geodetic Surveying, Cadastral Surveying which includes Land-on-Line, Land Development Engineering and Land Administration which include elements of Resource Consents.

Table 1: The potential new programme structure for the NDS

New Diploma in Surveying – Programme Structure

YEAR 1		YEAR 2	
SEMESTER 1	SEMESTER 2	SEMESTER 1	SEMESTER 2
Land Surveying L4 Common Core	Civil & Structural Drawing L5 Common Core	Civil Eng Management L6 (includes contract admin) Common Core	Civil Eng Construction L6 Common Core
Mechanics (Civil) L4 Common Core	Hydraulics (Civil) L5 Common Core	Highway Engineering 1 L5 Common Core	Land Development L6 (includes elements of Resource Consent – tba) Surveying Core
Mathematics 1 L4 (includes survey maths) Common Core	Soil Mechanics 1 L4 Common Core	Engineering Surveying 3 L6 (includes Geodetic Surveying) Surveying Core	Land Administration L6 (includes elements of Resource Consent – tba) Surveying Core
Surveying Communication L4 (includes CAD) Surveying Core	Engineering Surveying 2 L5 (includes Survey Software) Common Core	Cadastral Surveying L5 (including Land-on Line) Surveying Core	Elective L5 GIS, Other NZDE, Other BEngTech Surveying Elective
Year 1 = 120 credits		Year 2 = 120 credits	

Notes
<ul style="list-style-type: none"> • All courses/subjects are 15 credits • 15 credits equates to a total of 150 hrs of directed and self-directed learning • Semester schedule is indicative

It is proposed to not use typical Unit Standard based assessment methods for the new survey diploma which are competency based and provides the students with a Complete or Not Complete mark, and an opportunity for re-assessment. This is considered more appropriate to assessment in the workplace environment where specific work experience can be credited for Unit Standards. Rather, the more common grade based assessment utilised in tertiary

education is proposed whereby students are given a grade (e. A, B, C, D and E) and the unit standards assigned to the course will be credited (e.g. Complete) when a student achieves an A, B or C for the course.

7. INTERNATIONALISATION

Unitec is implementing robust strategies to allow active partnerships with international institutions for the purpose of programme articulation, development and delivery together with research collaboration, consultancy and staff and student exchanges (Unitec, 2010). Unitec supports cultural understanding and equipping all students to work and live in an increasingly complex and interconnected world. As part of this strategy the NDS will be assessed for suitability for international students from countries with similar educational and professional profiles who may wish to travel to NZ to complete the diploma. Also options such as only attending for the 2nd year whilst completing the 1st year in their home country could be feasible.

8. BENGTECH (SURVEYING)

Dunlop (2000) has the view that surveyors have great credibility in terms of accurately measuring and delineating land. However, it would appear that increasingly their role in the land management and development processes is limited to these functions. There is extensive competition with engineers, landscape architects, architects, property managers and planners as advisors on the “development process” and desirable environmental outcomes. He questions whether surveyors are taking a holistic approach and contributing to and/or leading teams with a wider brief. “Questions which could be asked of surveyors include: are they embracing the sustainable management ethic to the same extent as other professions and are they contributing to the planning and design exercises that are shaping our modern environment?” (Phillips, 2000).

With respect to to these broader questions Unitec will be investigating the potential for a three year Bachelor of Technology (Surveying) degree to increase the knowledge of surveyors in areas such as sustainable urban design, GIS, Engineering Surveying and project management as some suggested courses. In 2000 Unitec initiated discussions with the surveying profession on the potential of a three year degree for students who see themselves not being registered surveyors but rather managers of land information. These initial discussions did not lead to a degree being offered but the time appears to right to re-assess this situation as three year technology degrees are becoming more common place throughout the tertiary education sector in NZ.

9. SUMMARY: CHALLENGES FOR SUSTAINABLE TECHNICIAN TRAINING

A number of issues have been detailed in this paper related to the sustainability of survey technician training in NZ including student numbers, methods of assessment, integration with

engineering courses, and a potential 3 year degree. Throughout this year Unitec will continue to undertake consultation with interested parties to provide a programme that meets the needs of students, industry and Unitec. Unitec has a logo that says 'Real World Learning' and it is the intention of the survey team at Unitec to ensure that the programme maintains this profile. In 2011 the current Version 5 Unit Standards will be delivered to students and marketing is already commencing to promote this to the public and industry.

Other future challenges in technician training also include the recruitment of women and people from Maori and Pacific Island cultures into the programme. These are minority groups both at Unitec in the surveying programme and in the profession (Phillips, 2000). As surveying is related to the land and its utilisation, it is important that, in the future Maori people become involved and play an active role in the survey profession in New Zealand. Unitec is encouraging active consultation with Iwi (Maori tribal groups) to ascertain how more Maori can be introduced to land surveying as a potential career choice.

Another significant challenge for educational institutions is to keep up with new developments in technology, and funding needs to be allocated to meet this challenge. Unitec has invested heavily in the last 2 years with over \$200,000 being spent on the latest GPS survey equipment for student usage. This is a significant cost with more significant capital investment in surveying technology required if the programme is to stay current and useful to students.

This paper has been produced to both inform the survey profession in NZ of ongoing developments of technician training and to invoke feedback from delegates. The model proposed in the paper as an example is not necessarily the final one, which will evolve through the consultation process. What is clear though is that Unitec wants to provide current up to date survey education that meets the needs of industry and continues to be sustainable in the long-term future.

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