March 2022 #107

SURVEYING + SPATIAL Magazine

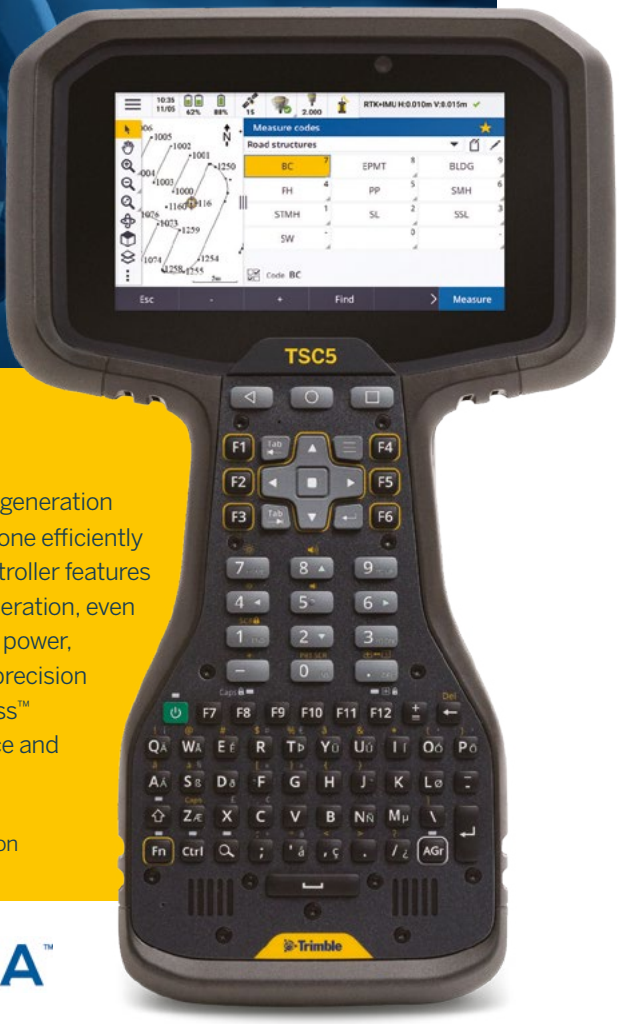
UPSKILLING YOUR FUTURE

STAYING AHEAD WITH CPD IN THE PROFESSIONAL SECTOR

UPSKILLING WITH UAV TECHNOLOGY

Education and Professional Development

TSC5 CONTROLLER



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Focusing on Education and Professional Development

With the New Zealand labour market moving rapidly in recent months, now is an ideal time to consider pursuing new educational opportunities and developing professional skills to add to and build on existing skill sets.

In this first edition for 2022, we are taking a look at upskilling through tertiary education providers and professional development training, with a particular focus on those who are considering taking a new direction from their current role or looking to embark on a new qualification within the survey and spatial industries.

Keeping up to date with professional skills, emerging technologies and applications has never been more important as demand for specialised skills in New Zealand's survey and spatial sectors continues to increase.

The global pandemic has changed how many New Zealand businesses operate and border closures have compounded the skills shortages already experienced around the country. Skills constraints have meant many organisations have had to make changes and adapt their staff resourcing strategies by upskilling their existing workforce and providing attractive career opportunities for new recruits and graduates.

According to the latest New Zealand statistics, more than 30 per cent of students are now over the age of 40, and increasingly more people are seeking life-long learning opportunities to keep their skills relevant to meet current expectations within the employment market.

There are numerous opportunities to advance your skills within your current profession, and increasingly there are more options for learning outside of lecture room settings and studying within your personal timetable.

While there are many new innovations and work technologies developing in the survey and spatial sectors, there are also other opportunities that can assist with increasing your professional skills base, from improving your digital skills, communication skills and business management, mentorships, free online learning courses and volunteering.

In our *Focus on education and professional development* theme this edition, tertiary education providers at the University of Otago, Toi Ohomai and the University of Canterbury present a variety of learning pathways on offer to develop your knowledge base, as well as profiles on student learning experiences.

With the job market buoyant and eagerly looking for new candidates, 84 Recruitment consultant Lexi Jones examines some of the motivating factors for staff moving to new roles and why good career progression and staff retention are so important right now.

Woods Managing Director Daniel Williams discusses the importance of continuing professional development in the private sector and the numerous avenues for continuing education and skills development in your career path.

With an increasing use of UAV technology in business operations, Ferntech's Tom Goodwin takes a look at how survey and spatial professionals can upskill to become independent and confident UAV pilots within their own organisations.

Continuing with our theme of education and professional development, Mitchell Singh looks at upskilling and specialist legal requirements such as resource management in our legal column this edition.

And back after a two-year break, *S+SNZ* magazine presents the winners of the 2021 Spatial Excellence Awards from the recent Wellington awards ceremony in February. ●

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Survey and Spatial New Zealand
TĀTAI WHENUA

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VOLATILE, UNCERTAIN, COMPLEX AND AMBIGUOUS

Staying ahead in an uncertain world

Daniel Williams, Managing Director, Woods

Increasingly we find ourselves living in a volatile, uncertain, complex and ambiguous world or as described in management speak a VUCA world. This is a situation of constant, unpredictable change that is now the norm in certain industries (definitely in our sector of the economy) and areas of the business world.

VUCA demands you avoid traditional, outdated approaches to management and leadership and day-to-day working.

Thinking about the above, what is the purpose of continuing professional development (CPD)?

The benefits of CPD to an employee has been described as:

- Keeping knowledge and skills up to date
- Professional standard of qualifications and registrations are maintained
- Provides a professional sense of direction
- Confidence and credibility are built and enhanced
- The ability to showcase their achievements with a recognised qualification
- Equips employees with the tools to cope positively with change
- Promotes the advancement in career progression.

The Benefits of CPD for employers has been described as:

- Company standards are kept high and consistent
- By providing CPD training opportunities, work engagement and commitment is increased throughout the workforce
- Having a variety of employees undertake CPD allows the sharing of best practices
- Staff potential is maximised, while also improving morale
- CPD courses can be used as a benchmark for appraisals or any other staff progression.

The benefits of CPD accrue to both the employer and the employee and I believe CPD should be treated as a win-win situation for all involved.

Why is CPD important to spatial professionals and what is best for us?

The benefits of CPD accrue to both the employer and the employee and I believe CPD should be treated as a win-win situation for all involved.

CPD is important because it does allow us to stay current in our practice areas, to be introduced to new ideas and learn new skills.

At various stages of our careers, we require different types of ongoing development: early career training may focus on industry-specific training leading to licensing or registration; the focus in mid-career typically focuses on soft skills such as communication; leadership and general business skills; and the last stage of ongoing learning is a much broader range of skill development and can be a combination of advanced skill development, new skills and general focus areas.

Here at Woods, we have recognised the importance that CPD plays in the culture of an organisation and have focused on CPD as a way to improve the standard of work that we undertake.

We have formalised training programmes for all our survey graduates which support them from when they start to when they obtain licensing; similar programmes exist for graduates in other disciplines.

For staff working in areas that don't have formal professional requirements, we encourage them to look for workshops or courses in the areas that interest them. All staff are then encouraged to participate in training that supports other areas such as report writing, leadership, contract management and dispute resolution.

CPD takes many forms and I often hear comments that people don't have the time to undertake training, that it is too expensive or they don't need to do it, that CPD is only easy if you are in a big organisation or urban area.

I disagree with those comments because CPD can take many forms and can be obtained from a variety of different providers.

Survey and Spatial NZ provides a CPD programme that supports some elements of training that spatial professionals require. This is a combination of survey-related training and other skills such as report writing, public speaking and the uses of new technologies.

However, many other organisations provide courses in the areas that you may be interested in. These include NZPI, Engineering NZ, RMLA, etc, and you shouldn't limit your CPD to just one organisation.

Another way that training can be obtained is by asking allied professionals to come to your office and give a talk on the areas that they work in. We have arrangements with other consultants where their staff come and talk to our staff about what they do and new developments in what they do; and our staff go to talk to them about what we do.

This is a simple way of increasing your professional knowledge as well as extending your skills. Want to extend your planning knowledge? Ask one of the local planners that you may work with to come and talk about developments in the planning area; similarly, with any other allied professional you work with, it all counts as CPD.

For the development of other skills, I encourage staff to join organisations such as Rotary, school boards or other volunteer organisations. Through participating in these organisations, skills such as leadership, governance and perseverance can be developed. This also has the benefit of extending your network as well as doing some good in your community.

The final thing that many people ignore is self-directed learning or research – making 30 minutes available twice a week to look up areas of interest will get you into the habit of thinking about what you do more critically, hopefully encouraging you to look for new ways to stay current in your practice area.

I would encourage employees and employers to look at these types of arrangements with an open mind. Employers should have clearly defined expectations for both themselves and staff and have appropriate budgets to enable training to occur, and employees should be aware of the types of training available, and the budget that is available to them.

I also think employees should look at training opportunities that they can undertake in their own time – after all this is also an investment in their ongoing career.

This year we are seeing an increased amount of regulatory change at a national level, Local government reform, Three Waters reform, and RMA reform. If as a profession we want to stay relevant we need to be continually learning, being informed about the changes that are happening.

The only way that can occur is if we collectively make the effort to commit to ongoing CPD in these areas to ensure the advice we give to clients is appropriate.

I think we are living in uncertain times and the pace of change is beyond anything that we may have previously seen. To stay relevant, we need to ensure we have relevant knowledge, that we undertake ongoing professional development, that we have the skills necessary to contribute to our communities.

Otago postgraduate programmes are led, taught and supervised by leading researchers. (Associate Professor Pascal Sirguey, remote sensing and photogrammetry).

EXCITING POSTGRADUATE OPTIONS AT OTAGO

University of Otago

The National School of Surveying at the University of Otago offers postgraduate and research courses designed to satisfy different needs and accommodate students from diverse academic backgrounds. Entry into these degrees varies according to the quality and level of a student's previous tertiary study.

Diploma for Graduates (DipGrad)

This is a one-year course specifically designed for mature students who want to upskill in a particular discipline or move into a different avenue of study. Provided that the programme of study is cohesive and has the appropriate number of 200-level and 300-level points, it is entirely flexible and can be tailored to the student's needs. A candidate must have a first degree or an appropriate technical qualification and experience to gain entry. Candidates who excel in their DipGrad may be admitted directly to a Postgraduate Diploma in Science or Applied Science.

Postgraduate Diploma in Science (PGDipSci) and Postgraduate Diploma in Applied Science (PGDipAppSc)

The school offers a PGDipSci in Surveying and a PGDipAppSc in Geographic Information Systems (GIS). These one-year courses, which consist of graduate-level papers and a research project, are flexible and can be tailored to the needs and interests of a particular student. They

The University of Otago offers coursework and research-based postgraduate degrees and diplomas in surveying and geographic information systems (GIS).

are excellent options for BSc or BSurv graduates who want to specialise in a specific subject in a single year of postgraduate study. Entry is restricted to students with an appropriate undergraduate degree (or equivalent).

Coursework master's degrees

The Master of Applied Science in Geographical Information Systems (GIS) is a coursework master's degree that provides geospatial and analytical skills required to conduct socially and physically relevant research and be part of the key growth industries of the 21st century in business, government and the built and natural environment. When you learn to think and work in four dimensions, you become part of the solution to problems that span many orders of magnitude, from your hometown to the world.

Key information about the degree:

- 15-month duration
- Seven taught papers plus either a project or a work placement
- Applicants normally require a B+ average (at 300 level) in an appropriate undergraduate degree
- Applicants with relevant practical experience may also be considered.

Research master's degrees

The school also offers research-led master's degrees: a Master of Science in Surveying or GIS and a Master of Surveying. Research opportunities are available in the school's areas of expertise (see below for an overview of these areas). The MSurv and MSc are generally two-year programmes. Papers taken in Year 1 are similar to those taken by postgraduate diploma students. Progression to the second year (thesis) is normally restricted to students who obtain a B+ average (or better) in Year 1.

Entry to the MSurv is available to students with a four-year undergraduate surveying degree (or equivalent). A student who obtains a BSurv with distinction, a BSurv(Hons) 1st class, or equivalent, may be admitted directly to the thesis year of the degree.

Doctor of Philosophy (PhD)

The PhD is open to applicants with a bachelor's degree with first-class or upper second-class honours, a master's degree, or appropriate research experience. It consists of an original research project embodied in a thesis on a topic of personal choice. It requires a minimum of two and a half years of full-time study or four years part-time. However, it is typical for a PhD degree to take at least three years to complete.

Otago postgraduates have undertaken experimental work in the field (and in the lab) in places such as Antarctica, Southeast Asia, Europe and Africa, as well as Australasia.

School of Surveying research fields

Research in **Antarctic Science** covers the fields of Antarctic Glaciology, Sea Ice Physics and Remote Sensing. Research projects feature both field observations and numerical model simulations.

Geospatial Science covers the fields of Geographical Information Systems (GIS), Remote Sensing, and Photogrammetry. Research projects feature both theoretical and applied approaches. **Geodetic and Surveying Science** encompasses the fields of earth or crustal deformation, geoid computation and long-term sea-level change.

Hydrographic Surveying researches acoustic measurement, high-resolution bathymetric mapping of the seabed, inland rivers and lakes and legacy hydrographic data.

Research in **Land Tenure and Cadastral Studies** looks at New Zealand and international land tenure, land registration issues, aboriginal title, public-private property rights, boundary issues and land law.

Research in **Land Engineering and Urban Development** covers the fields of Environmental Modelling and Urban Development Processes.

For any postgraduate enquiries, please contact:

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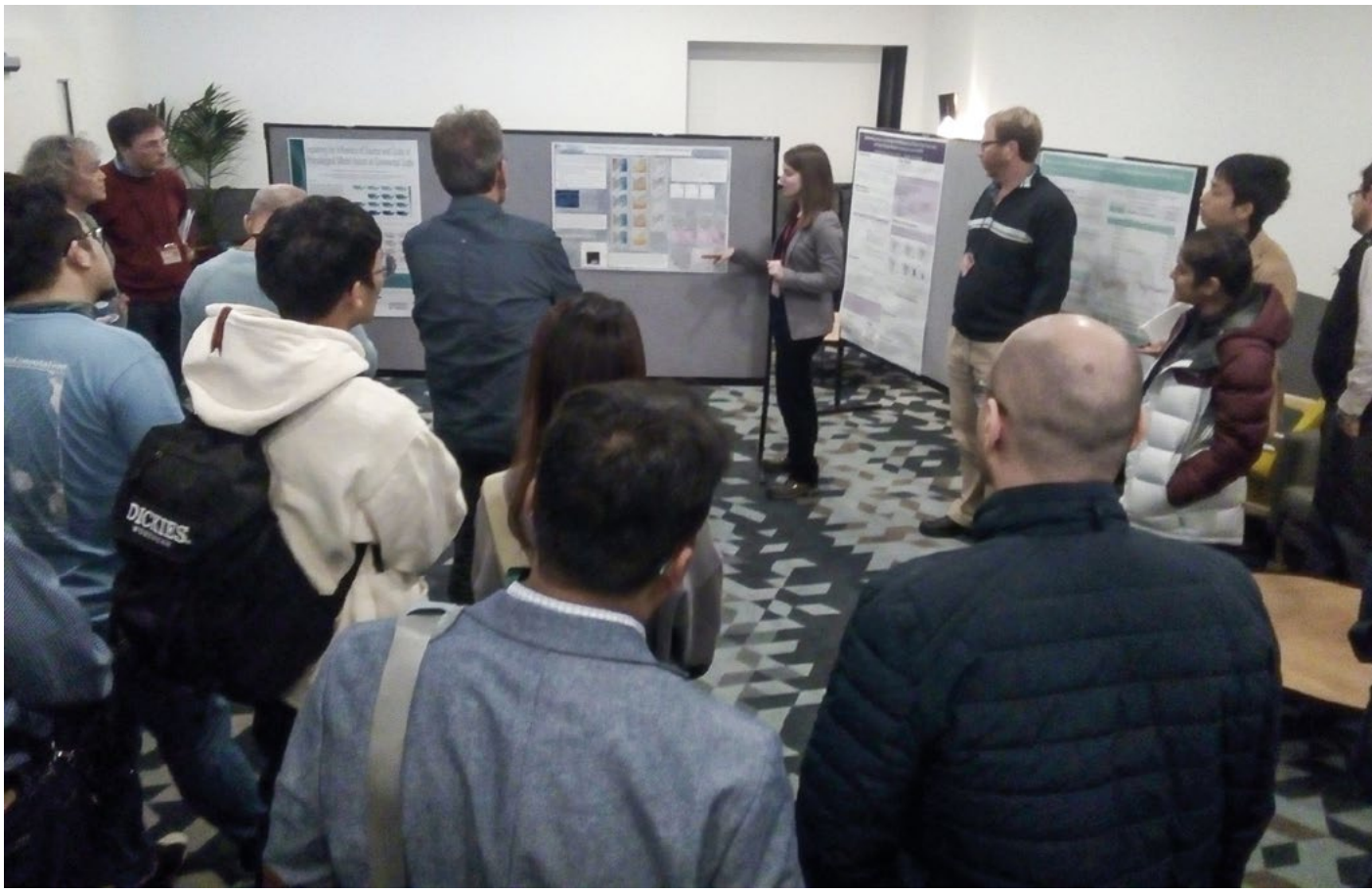

Otago postgraduates work in a surveying or spatial topic area they are passionate about, reporting on their research through journal articles and conferences (Clare Lewis, MSc GIS candidate, presenting at the international GeoComputation conference).

STUDYING AT TOI OHOMAI

Surveyors are in high demand, but for many already in the industry they need the opportunity to upskill, which is where the New Zealand Diploma in Surveying at Toi Ohomai Institute of Technology comes in.

The NZ Diploma in Surveying, which is available at the institute's Tauranga campus, is specifically designed for people already working in the industry.

Tutor Henrique Dias Goncalves says the idea is that the students upskill while working so they don't have to quit work to study full-time to obtain a qualification.

"This goes hand in hand with the tradition of learning on the job, which is common in the land survey industry. This also allows the employers to actively contribute to the students' learning experience."

The NZ Diploma in Surveying enables students to become proficient in the three main disciplines of land surveying: cadastral surveying, engineering surveying and topographical surveying.

"The way the course is designed allows the employers to follow the evolution of their employees and reward them accordingly. We have several examples of successful graduates, some of them reaching management level and even starting their own business," Henrique says.

As with many qualifications, the diploma requires a high level of commitment from the students in order to successfully complete the course.

"The students have to consolidate work, study and personal life, so it's safe to say that our graduates are hardworking individuals committed to their professional development."

At Toi Ohomai, students are taught by expert tutors including Henrique who studied geography in Sao Paulo, Brazil, before moving to New Zealand.

"I started working in the land surveying industry here in New Zealand. I worked for different survey practices as survey assistant and survey technician and eventually joined the NDS, National Diploma in Surveying, here at Toi Ohomai where I graduated in 2017.

"I've worked in several small and large scale land development projects while working for different consultancies in Tauranga until I joined Toi Ohomai as a tutor in land surveying in 2020."

If you want to upskill but can't attend class in person, Toi Ohomai Institute of Technology has an online version of the New Zealand Diploma in Surveying.

Tutor Hamish McKenzie says the online delivery of the diploma course acknowledges that students are learning essential skills while at work.

"That allows us to relax the amount of required tutor contact time meaning students are available to work more and gather real world experience faster."

Classes are run through weekly online meetings for two hours in the evenings and a full day class every second Friday.

"The classes are aimed towards giving context to the students everyday work activities as well as explaining important surveying theories. Individual papers are delivered concurrently meaning students complete a paper before starting on the next one. This creates a strong scaffolding system for students with minimum experience starting in February, however we are happy to look into enrolling more experienced students throughout the year."

Hamish says the Recognition of Prior Learning system can be used to credit some papers, provided students have sufficient experience in the subject.

"This enables people who have been in the profession for a while to graduate sooner. We primarily use a combination Microsoft Teams and OneNote to deliver content and assess student work, although we have the full office 365 suite at our disposal.

"This means students can be located anywhere in the country with a reliable internet connection. Tutors are often available after hours and on weekends to provide support for students when they're most likely to be working on their assessment."

Hamish says the surveying profession has been understaffed for the past 15 years and the current land development boom has only highlighted the lack of skilled survey technicians available.

"It's at the point where firms will take anyone who walks through the door and look at getting them trained up as fast as possible, finding a job right now is pretty much as easy as asking for one."

For more information about the New Zealand Diploma in Surveying, visit www.toiohomai.ac.nz/study/course/new-zealand-diploma-surveying-level-6.

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TAKE 5 WITH WHO'S WHO IN SPATIAL

Jasmin Callosa-Tarr, S+SNZ Spatial Stream

In this edition we feature a new series profiling spatial professionals and their careers. For our education and professional development theme this edition, Jasmin Callosa-Tarr talks to Mairéad de Róiste, Associate Professor/ Reader in Geographic Information Science (GIS)/Ahonuku School of Geography, Environment, and Earth Sciences (SGEES)/Te Kura Tātai Aro Whenua, Victoria University of Wellington/ Te Herenga Waka.

What was your journey like as a professor in spatial?

I came to New Zealand in 2007. I'm from Ireland originally and completed my honours degree in geography and economics at Trinity College Dublin. I did a PhD in geography looking at how geographic information was being presented on government websites as part of the planning process and how public participation was being facilitated or restricted by the choices of technology to communicate local and district plans.

A year in and I realised I wanted to lecture in GIS but needed to bulk up my GIS skills. So, I took a year out to complete a master's in GIS in Leicester and then returned to Trinity to finish my PhD. I started applying for jobs before the end of my thesis and thought New Zealand sounded exotic. I wanted to travel. And I have, but also managed to stay in place and I've been working at Vic [Victoria University of Wellington] for over 15 years.

What is one of the highlights of your career so far?

A lecturer is a little bit of a split role: you spend a lot of time teaching and it's the most visible part of the job but the rest of the time, you research. On the research side, a real highlight of my career has been doing participatory work with different communities.

I worked with a family on the East Coast to map some of their property and helped them make a case for a reserve on the land. It was surreal to see a line I'd drawn casually on a map have such significant real-world consequences when I went back to visit a year later. I wasn't there for the cutting, sawing, carting and hard work so the sudden presence of a tall, well maintained reserve fence felt magical.

On the teaching side, it's seeing the light go on and students 'get' it. GIS just starts to click and they understand the software is there to support something greater than just clicking buttons to get a pretty picture.

What advice would you give to people to starting out in their career in spatial?

New Zealand is a fairly small country and the best way to enter the industry is to network. Luckily, the geospatial industry is a friendly bunch and there's lots of low-cost networking opportunities: MapTime, Women in Spatial, Emerging Spatial Professionals and the like. Asking someone to coffee to pick their brains is also really worthwhile – but it can be hard to put yourself out there.

Is there something that you would like to do more of in the future?

One of my current research projects is working with Ngāti Kahungunu ki Wairarapa to create a virtual reality app to capture the stories of Wairarapa Moana. Working with Ngāti Kahungunu and some really enthusiastic research assistants has been so rewarding.

I've had to step outside my comfort zone and into digital storytelling. I'm far more comfortable with data and coding. This is a new environment. I'm really looking forward to user testing the application we built to make sure it meets the needs of the iwi and making sure the stories we capture can be used in the future in other technologies and not just become a VR relic. I like to keep learning.

What's your favourite spot in New Zealand?

I'm not sure I have just one favourite spot in New Zealand. There's too many to choose from. The wilds of the West Coast of the South Island take my breath away, while the thermal landscapes of Rotorua and especially Wai-O-Tapu are so enticingly unusual. Closer to home, Petone Beach is a good walking spot – I'm a sucker for sea views.

HAVE YOU THOUGHT ABOUT STUDYING GEOGRAPHIC INFORMATION SCIENCE (GIS)?

Land Information New Zealand

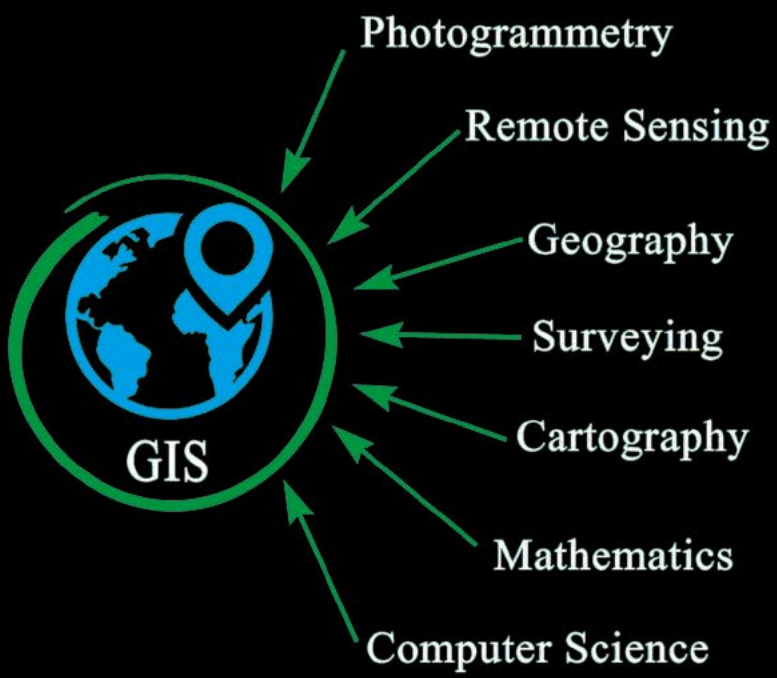
Add the location factor to your qualification! Geospatial information, also known as location information, tells us where features and places are, how they relate to one another, and how they can change over time. It ranges from the physical features on, above or below the earth's surface to information about property boundaries, traffic and people, weather, health issues and hazards. Location information is being used increasingly by businesses and government to improve their analysis and decision making. By adding GIS papers to your tertiary qualification, you can open up a whole world of career opportunities.

What is GIS?

GIS stands for Geographic Information Systems - information systems that work with spatial data, ranging from nationwide databases of property boundaries to the location-based services on your mobile phone. These information systems capture, store, manage, analyse and visualise spatial data in a software environment. GIS also means Geographic Information Science, the science that underlies Geographic Information Systems and their use.

Are there job opportunities?

Globally, there is a shortage of skilled GIS professionals. According to a report commissioned by Google, geospatial services are growing by 30% per annum globally. There are good job opportunities for GIS graduates in New Zealand, with positions across the business sector, central and local government and iwi. www.careers.govt.nz (search 'geospatial') has more information on the sorts of jobs available, and how to ensure you have the right qualifications.



Where can I study GIS?

GIS papers are taught across New Zealand – from Whangarei to Invercargill. A full list of GIS courses and qualifications is available at *www.linz.govt.nz/studying-gis*. Check out scholarship options for New Zealand tertiary GIS studies at *https://bit.ly/3JzkKtc*.

Follow us at *facebook.com/growgisnz*

Chloe Samaratunga

Chloe Samaratunga is studying for a Bachelor of Advanced Science with Auckland University of Technology (AUT).

- **Qualification and GIS component studying for:** Bachelor of Advanced Science, Specialising in Geospatial Science
- **Tertiary Institute:** Auckland University of Technology (AUT)
- **What Year 13 school subjects did you take:** English, Statistics, Biology, Chemistry and Geography
- **What Secondary School did you attend:** Avondale College

Why have you chosen to study GIS?

I was at a complete loss when it came to deciding what I wanted to study further and pursue as a career. I knew that I really enjoyed geography and the science subjects at school and wanted to continue my studies along those lines. I ended up initially deciding to study a Bachelor of Science double majoring in Geospatial Science and Environmental Science. When I started my degree, I did not have a complete understanding of what GIS was, but I felt that this pathway would be suitable as it would incorporate mapping, science, and research all into one degree.

As I progressed through my degree and started understanding what GIS is, I switched my study pathway into a Bachelor of Advanced Science specialising in Geospatial Science. I chose to study GIS more exclusively as I love the creative aspects of the field. Being able to create visual outputs and use my creativity in conjunction with science and research was something I really enjoyed doing. I also found working with spatial data very exciting which has made my studies lot more pleasant as I am genuinely interested and engaged with the data and assignments.

How important is GIS for your future career options, and why?

Pursuing a career that enables me to take raw data and create a visual output that is creative and informative is something I really value. Working with GIS will provide me with opportunities to be able to do this so ultimately working within the GIS industry is my career goal. GIS can be used across many different professions in many different forms and applications. Currently, I am particularly interested in working in the fields of geohazards and environmental sustainability. I think using GIS innovation in these fields is important and would be extremely beneficial as GIS analyses can extract so much new information from raw data and provide an easy form of data presentation that can make important data accessible to the wider public.

How has studying GIS shaped your career goals?

Immensely. As a first year uni student I had no clear career in mind but as I progressed through the undergraduate part of my degree and started learning more about GIS, I realised it was something I really enjoyed and wanted to pursue. Through my studies, I was able to narrow down my list of potential careers to specifically a career within the GIS field.

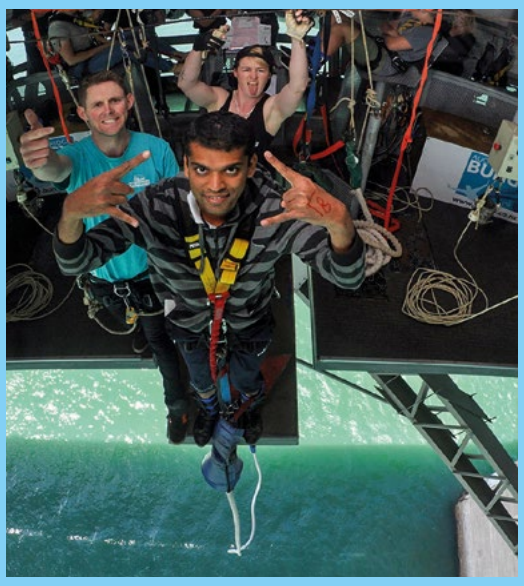
What advice would you give to future students considering adding a GIS component to their studies?

I would definitely encourage future students to consider adding a GIS component to their studies. I feel that the demand for GIS analyses is getting larger as the industry grows and more people become aware of the capabilities and results GIS can produce. It is a skill that employers would value and therefore having GIS in your skillset would be extremely beneficial and would make new graduates more employable.

GIS is also such a versatile skill to have, there is so many applications for it in many different industries. Even if you do have a change of heart in what specific field you want to enter in as a career, studying GIS would not be waste of time as it can be applied in so many different forms and fields. GIS can be used everywhere from engineering, environmental, geology, urban planning, historical, the list goes on.

Another piece of advice I would offer to future students

Amit Kokje



Amit is a Senior Specialist (Geospatial Platform and Support) at Auckland Council.

- **Qualification and GIS component:** PhD in Geography (research in land cover mapping using GIS data fusion techniques), PG Dip in GeoInformatics, MSc Environment Science (GIS papers)
- **Tertiary Institute:** The University of Auckland
- **Work role**: Senior Specialist (Geospatial Platform and Support) at Auckland Council. Previously Senior GIS Analyst at Auckland Transport; GIS Analyst at Tauranga City Council

Why did you choose to study GIS?

I came across GIS as an introductory paper while studying for my Masters in Environmental Science in India, and became interested in the tremendous analytical capabilities of GIS. I decided to pursue my interest in GIS further, and I studied for an advanced diploma in Geoinformatics in India. By then I realised that GIS offers a broad range of employment opportunities in corporate, research or academics.

What are some of the benefits you've experienced from studying GIS?

I think that an understanding of GIS provides you with a unique spatial perspective in understanding various real life problems. From a study and work perspective, I've been really interested in how the application of GIS can vastly alter the way information is presented to people – for example location enabled smartphones apply various GIS techniques such as location analytics for house hunting, or travel time and routing concepts for finding out best possible route to take. I'm excited to be a part of it.

How important is GIS for your existing and future career options, and why?

I started learning GIS to help my work in Environment Science, but the enormous scope of GIS changed my focus from core environment science to GIS applications. With the evolution of mobile, internet and cloud technology, the face of GIS is rapidly changing and it is positively impacting our lives. I think this trend is likely to accelerate in future as the boundaries of core GIS, location based services and other applications merge.

I believe there are huge opportunities in the geospatial industry in the future, so developing my skills in GIS continues to be a career goal for me. I'm currently working on expanding my skills and knowledge base for web and cloud based GIS solutions and 3D mapping.

What advice would you give to future students considering adding a GIS component to their studies?

Taking some GIS papers at an early stage in your studies provides great exposure to the variety of information resources available in GIS. It's a vast applied field with many components including cartography, analysis, programming, web mapping, database management and many more. I'd encourage anyone to take some GIS papers and broaden the focus of their studies.

would be to not get scared by the idea of GIS. At first it was quite overwhelming getting thrown into the middle of all this software that I had never worked with or heard of before. But if you are patient, and take your time learning and understanding the basics, you will find that once you know your way around the tools everything will feel a lot easier, and you will enjoy it too.

Last year you applied successfully for a LINZ external tertiary GIS scholarship. What difference has this made to you and your GIS study courses?

Receiving the LINZ tertiary scholarship was a major booster in motivating me to continue studying at a postgraduate level. At the end of last year, I had completed the 3 year long undergraduate section of my 4-year degree. I was over studying and keen on getting out into the industry and putting my foot in the door but receiving this scholarship really encouraged me to keep on grinding and graduate this year with Honours. I am so glad I continued studying at postgraduate level as I am expanding my skillset and knowledge and will be much better equipped to enter the industry. Thank you LINZ for the motivation!

A long-standing partnership

Since 2005 we've been understanding what sets businesses apart, what makes them tick, and what makes them grow. Woods & Partners is one of those businesses. And our knowledge of the work they began undertaking with drones allowed us to write one of the first policies in New Zealand designed to specifically protect surveyors and engineers for the particular risks they face each time they use one.

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PROFESSIONAL EDUCATION AND DEVELOPMENT IN THE LEGAL INDUSTRY

Mitchell Singh, Partner, Glaister Ennor

In keeping with this edition's theme of 'Professional Education and Development', I thought I would take the opportunity to give you an insight into how this applies in the legal industry.

The law, and the society that it serves, is constantly evolving. Whether as a result of changes in legislation, developments in case law from the courts, or even broader challenges brought on by Covid-19, the competent practice of law involves a commitment to ongoing development long after university. This occurs in broadly two ways.

First, there is informal education, which underpins our expertise in an area and our ability to advise clients on any given issue. A lawyer cannot assist clients with navigating the latest changes to the Resource Management Act 1991 without first being familiar with precisely what those changes are, and how they could impact on a particular issue. Or, where a restrictive covenant is in issue for example, a lawyer would look to the latest decisions out of the courts in search of similar cases in order to advise on what the likely outcome might be.

The formal aspect of a lawyer's professional education is known as continuing professional development (CPD). Since 1 April 2014, lawyers must complete a minimum of 10 formal CPD hours a year to satisfy the New Zealand Law Society's requirements for holding a practising certificate.

This is easily achieved. A vast array of programmes are organised by the Auckland and New Zealand Law Societies, as well as private providers, with seminars on technical skills such as 'Drafting Contracts in a Digital World' and 'Microsoft Outlook for Lawyers' to workshops on topics such as 'Residential Property Transactions' and 'GST Implications'.

There are also annual conferences aimed at particular areas of law, such as in the areas of property law, employment law and resource management. These conferences aim to bring practitioners up to speed on latest developments, provide a forum for the exchange of ideas, and offer excellent networking opportunities in an increasingly digital and remote working environment.

Many law firms also provide in-house training that meets the New Zealand Law Society's requirements. At Glaister Ennor, for example, our partners are regularly invited by course providers to present on topics within their area of expertise. A 'warm up' in-house seminar offers a valuable opportunity for not only a practice run, but also for the sharing of knowledge and exchange of ideas with members of the firm working in other practice areas.

Although Covid-19 restrictions have resulted in fewer opportunities for in-person seminars and conferences, the formal CPD providers have been well set up to meet the challenges brought about by the pandemic by way of virtual seminars. Many of these providers also offer recordings of previous seminars 'on demand', allowing lawyers to conveniently fit their ongoing CPD requirements into their busy practices.

ART + SCIENCE = SPATIAL DATA SCIENCE

University of Canterbury

Spatial Data Science is a rapidly emerging field that combines art and science to explore geographical data through visual technologies.

A wide range of industries use Geographic Information Science (GIS) to give alternative analysis of data through digital cartography, geomapping, and other visual data interfaces, which help us to see long-term or real-time effects on the world around us, or to predict potential outcomes.

This major will give you foundational skills in data capture, GIS, computational modelling, and practical experience applying these to real-world applications.

- Practical learning in this major will see you using state-of-the-art computer and software labs and conducting fieldwork at UC's field stations in Cass and Kawatiri Westport, or climate stations in Kā Tiritiri-o-te-moana Southern Alps and throughout Te Waipounamu South Island.
- There are a number of research centres at UC that utilise spatial data sciences, with specialist centres including **Toi Hangarau | Geospatial Research Institute, Te Taiwhenua o te Hauora | GeoHealth Laboratory, Te Pokapū Pūhanga Wāhi | Spatial Engineering Research Centre,** and **Te Pokapū Rū | UC Quake Centre**.

Spatial Data Science major

For the major in the **Bachelor of Data Science**, complete the following courses:

100-level

- **GISC101 Introduction to Spatial Data Science**
- **GEOG106 Global Environmental Change** OR **GEOG110 People, Places and Environments**

200-level

- **GEOG205 Introduction to Geographic Information Systems and Science**
- **GEOG208 Remote Sensing for Geospatial Analysis**
- One **200-level GEOG course**

300-level

- **GISC309 Spatial Data Science Capstone Project**
- **GEOG323 Geospatial Analysis in the Social and Environmental Sciences**
- **GEOG324 Web GIS and Geoinformatics**

Plus another two courses chosen from **these options**.

University of Canterbury prepares student for a career full of solving spatial problems

Samuel Wong is in his second year studying towards a Bachelor of Data Science at Te Whare Wānanga o Waitaha the University of Canterbury (UC). Data is used by organisations of all sizes to make better decisions and the Bachelor of Data Science at UC teaches students how to analyse and interpret data to inform decision-making and forecast trends. In semester two last year, one of Samuel's papers was an Introduction to Spatial Data Science (GISC101), which is a required paper for the degree and has been one highlight of his experience at the University so far.

Why did you choose to study towards a Bachelor of Data Science at UC?

It sounded exciting. Having loved geography during high school and being introduced to computer science at UC, this seemed like the right decision. The degree is comprised of geography, computer science and statistics, which I enjoy.

How did you find the GISC101 paper?

This paper was great for preparing me with methods and techniques that would help me solve spatial problems. These are just some of the things I learned: a strong understanding of the computer language R, cartographic methods, and the differences between raster and vector data.

What were some highlights of the paper?

I found the assignments were fun; for example, one of our assignments challenged us to map parks and, using R, calculate the number of people within certain walking distances of these parks.

It gave me a glimpse into the potential of how GIS can help people. A couple of academics at UC have made the experience here so valuable. My GISC101 lecturer Dr Lucas Marek gave me a lot of support and Associate Professor Malcolm Campbell first introduced GIS to me in his geography lectures, which sparked my interest. He was great in helping to set me on the right path.

What are you looking forward to next within your degree?

I received a Toitū Te Whenua Land Information NZ external tertiary GIS Scholarship, which will support me in studying two papers (GEOG205 and GEOG208) this year. So that's been a highlight and adds to the excitement of being part of those classes. I'm particularly looking forward to studying GEOG208, which focuses on satellite data.

Where do you hope to work once you finish your study?

Anywhere I can make a positive impact on people's lives.

This major will give you foundational skills in data capture, GIS, computational modelling, and practical experience applying these to real-world applications.

WHY YOU NEED A PILOT ON YOUR TEAM

Upskilling with UAV technology

Tom Goodwin, General Manager, Ferntech

Over the past five years, drone technology has become commonplace in surveying operations. Although local companies have been quick to embrace the new technology, most have relied on outsourcing pilots to operate the UAV (unmanned aerial vehicle), which can be costly and inflexible.

However, as more surveyors see the benefits of integrating drones into their projects, companies are now looking to train their team to take the controls themselves. Upskilling has never been easier with a breadth of new courses specifically designed to turn surveyors into competent and confident drone pilots.


Ferntech
COMMERCIAL AERIAL SOLUTIONS

we saw the benefits we'd gain, we were quick to say, 'Let's give that a go'."

Bowler took part in the UAS Remote Pilot Certificate Part 101 and Advanced UAS Remote Pilot Certificate, and now attends regular refresher courses. Gaia, which completes work for Waka Kotahi and KiwiRail, recognised that becoming compliant under Part 102 was essential for both safety and efficiency.

"We started adopting UAVs to scan and model highwalls within quarries and mines for structural defects. We take a high-density point cloud of the structure defects to determine where failures may occur.

"The scanning of a rock face would previously have been done by a team of geologists using a compass and notebooks, and take several days, or even weeks, to fully map. Now it takes a few hours. As mines are inherently high-risk environments, using a UAV allows us to remove personal from standing beneath a steep rock face or on a haul road."

Through the course, Bowler and the team learnt about operating restrictions that are crucial for flying a UAV in high-risk environments. Those learnings are shared with the Gaia team, including "non-pilot staff", in regular discussions on UAV safety and operating procedures.

Alongside the Part 101 and 102 course, Ferntech has also partnered with DroneMate to offer an application-specific Drone Surveying Workshop. This three-day

course, provides the knowledge and understanding on how to operate the drone for the desired data capture as well as how the processing works through photogrammetry software.

Starting in the classroom with theory and training, participants then venture into the field to experience the full process of data collection and analysis. The course is held regularly in Auckland and Christchurch for surveyors and will ensure that attendees leave with the knowledge to use drones to increase productivity, and with the confidence to enjoy the benefits this technology brings.

Having recently purchased three DJI Matrice 300 RTK drones plus three DJI Phantom 4 trainer drones, Paterson Pitts Group asked Ferntech to customise this course specifically for its needs.

"We have a few staff with prior drone experience, however that did not fulfil our need to have competent drone operators able to fly the Matrice 300, or to fly everywhere we potentially needed. Our priority was to train staff from each of our branch offices in the real-time operation of the purchased drones," Lindsay says.

The Ferntech team flew to Queenstown to take the PPG team through the process of piloting the UAV and processing the captured data.

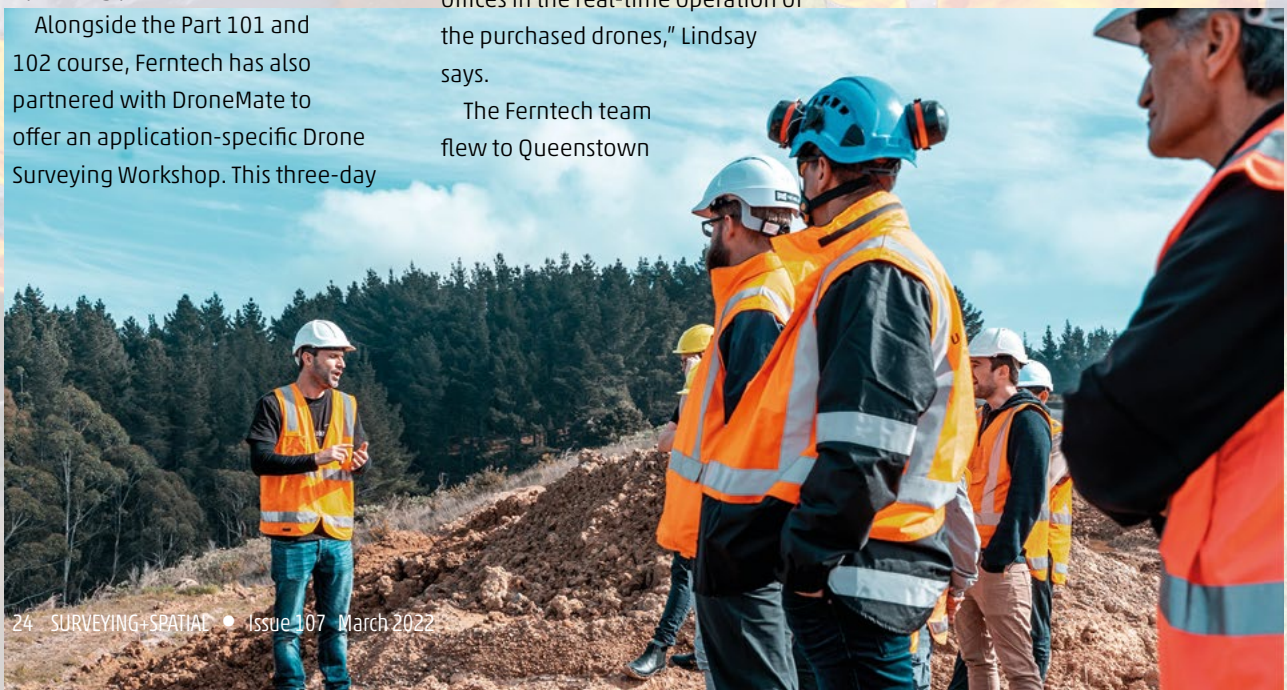
"It is a testament to the Ferntech training course that we were confident to program and operate these advanced drones on day two of the course. There is still much to learn about post-flight data processing, but we feel we are now able to perform flights safely and legally.

"Even the experienced PPG staff who had a background in drones were very impressed with the new Matrice 300. It has every feature they wished its predecessor had, making flights easier and safer while introducing more functionality," Lindsay says.

The available courses are:

- UAS Remote Pilot Certificate Part 101 – Ferntech & ASMS
- Advanced UAS Remote Pilot Certificate (Part 102) – Ferntech & ASMS
- Drone Surveying Course – Ferntech & DroneMate
- Customised Drone Surveying Course – Ferntech & DroneMate

For more information on the courses, visit *ferntechcommercial.co.nz/training*, or contact the Ferntech Commercial team on 09 399 2084 or at *commercial@ferntech.co.nz*.



Drone Surveying Course

Gain essential skills and knowledge for Aerial Surveying

Course Details

Upskill your team to be competent and confident drone pilots with Ferntech's Drone Surveying Course. Designed specifically for New Zealand surveyors, the three day course simulates real-time surveying projects by integrating application-specific software with the latest drone technology. Under the guidance of our specialist team, participants will venture from the classroom to the field to undertake the full process of a successful aerial survey.

Locations: Auckland, Christchurch.

Date: Auckland - 6-8 April & 20-22 July.
Christchurch - 25-27 May & 14-16 September.

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What We Cover

- Pre-flight training and theory
- Equipment set-up and flight planning
- Safety and efficiencies
- Infield flight instruction
- Real-time data collection
- Processing data
- Review of conducted survey
- Application-specific frameworks and processes

Testimonial

"This course went beyond my expectations. I went in with a single purpose and came out with the knowledge to achieve that purpose. However (additionally), it has sparked genuine interest in several other drone applications"
S.Glass Nov-20

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5 differences between a good recruiter — and a cowboy...

Here are 5 tell-tale signs to help you discern a kick-ass recruiter from a drop-kick...

1. Good recruiters will meet you face to face
Clever recruiters have deep insights of the companies they represent so they'll meet you In real life to get an understanding of your personality. This will help them decide whether you'll be a good cultural fit for a business or not, which contributes massively to how much you'll enjoy working at your new company.

2. Good recruiters have in-depth knowledge of the industry
The best recruiters usually work with a specific industry and have in-depth knowledge of that industry. Amateur recruiters "dabble" in multiple industries. Good recruiters have built exceptional relationships with the decision-makers in their chosen industry and have access to those jobs that don't even get advertised — often the best roles...

3. Good recruiters keep you updated
If you find yourself desperately emailing your recruiter, pleading for progress, move on. A good recruiter will happily (but metaphorically) hold your hand through the process — they won't leave you feeling needy, like a bad recruiter will.

4. Good recruiters respect your career goals
If you're ever involved in a conversation where the recruiter's trying to persuade you to accept a role that you're not really interested in and it makes you feel undervalued, despite you being clear about what you want? Hang up as soon as you can.

5. Good recruiters focus on long-term relationships, bad recruiters on one-night stands
Bad recruiters dump your CV into the recruitment pipeline and only contact you if there's good news. Maybe they hate to be the bearers of bad news, or maybe they're just emotionless pimps. Either way, it's no good for a candidate or a business. A good recruiter walks the extra mile to ensure their clients and candidates achieve what they want.

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Survey and Spatial New Zealand Diamond Partner

OUR CANDIDATES TOLD US WHY THEY'RE CONSIDERING RESIGNING

Lexi Jones – Recruitment Consultant, 84 Recruitment

We've all seen the headlines: New Zealand employers are experiencing what has become colloquially known as the 'great resignation'.

A recent Kiwi survey by HR company Employment Hero showed us that "48% of workers are planning to change jobs in the next year, while 40% of workers are planning to search for a new job within the next six months". These are hugely significant figures for staff turnover.

So what's really fuelling the great exodus, and is there anything employers can do to retain their best people?

As I worked through our 2022 salary review responses from our network candidates earlier this year, I asked this all-important question: what could your employer be doing better?

Of course, the usual "more money" and "more flexibility" came up plenty of times, but there were a few common answers that we need to be paying attention to.

1. "I feel like I'm doing the jobs of three people."

Feeling stressed, burnt out, and exhausted has become the norm for a lot of employees since COVID hit. To quote one of our candidates that captured this sentiment perfectly, "I feel like I'm doing the jobs of three people."

Perhaps someone on your team has left and you haven't managed to hire a replacement yet, or you're trying to make ends meet and navigate your budget – whatever the reason, your people are feeling it. Pulling the weight of multiple people has such a profound effect on stress levels – most people can handle that kind of pressure for only a short time.

It causes burnout quickly, and people get so exasperated and stressed that they look for a different job that isn't going to make them feel that way.

If your employees are feeling overwhelmed, it's extremely important to support them, even if that's simply hiring administrative support or getting someone in on a temporary contract part-time. It might cost you up-front but losing that skilled person who already knows the job, combined with the cost of onboarding and training someone, means that more often than not it's worth hiring help.

2. "There's no career progression."

Having a good culture alone won't do the trick. Ask yourself, are your employees' full potential being realised and are you providing them opportunities to grow? When was the last time you actually sat down with them and asked them about their goals?

There are a lot of businesses that have a layered organisational

structure; there are also newer businesses that have flatter structures. But one thing that universally causes staff turnover is when people feel like they've hit a ceiling in terms of career progression. It can be easy to fall into this trap, especially in the flatter structures.

As an employer, when we see someone doing well in their role, we might be inclined to try to keep them there. While it's true that some people might be happy to sit in one role for a long period of time, when it comes to up-and-coming talent, they often want to see a clear pathway of where their career is going. They want to know, "If I hit this milestone, this is the development my company will put towards me reaching my long-term goal."

Not only is having well-defined pathways good for growth from a business perspective, but it's also good for your employees too. You'll not only encourage them to strive for greatness, but it can be a tool for reviews and provide a basis for accountability.

I'll say it louder for the people in the back: **Strong career progression pathways = retention!**

3. "I'm pigeonholed and want a wider variety of work."

Again, this comes down to career progression. Are you allowing your staff to stretch their skillset or giving them new challenges? Or are they performing the same tasks day in and day out?

This can be quite tricky in some areas like surveying, construction and engineering where large projects span over two to three-year periods, and employees are going to be doing the same thing for that time. That said, there are employees with a growth mindset who will want to learn all the facets of the job and get exposure in different areas of the project or with new technology to make their lives easier.

If employees can't continue to grow and start to feel stagnant, they will leave. A good example of this I heard recently in the survey industry was where an employee was placed in a cadastral role but expressed interest in a more engineering-based role. In situations like this, companies sometimes promise that they'll move the employee into the area they're interested in, but never actually do.

Show integrity, look for ways to keep your employees engaged and their skillsets growing, and you'll increase your chances of retaining your top people. If that role truly doesn't exist right now, what else can they drive forward? Could it be exploring new technology, sourcing new equipment, coaching younger people - key thing is **ask them**, what do they want – empower them to contribute. You don't always need to have the answers yourself.

4. "I never get to see my kids."

We all make sacrifices for our careers at some point, but an increasing number of our clients are updating their policies regarding family time. The needle has shifted, and people are less willing to give up those important moments to celebrate milestones and be with their families – and they don't have to any more.

Companies that show understanding and actively encourage their employees to make time for their families are shooting ahead. I'd encourage every employer to ask themselves if they have the capacity to encourage their employees to take the time to do the things that make them happy and create a 'nothing too big or too small' culture.

I'm not just talking about the usual work from home benefit either. The job market is so competitive now that everyone offers a large salary and benefits like cars, phones and laptops, so standing out is no longer about the tangible things. What sets you apart is caring that your employees have families and lives outside of work and making sure that people feel well looked after.

If you don't, your people will jump ship to somewhere that will.

It's not about choosing candidates, it's about candidates choosing you.

The reality we are facing right now is that it's so incredibly hard to hire good people. We still have limited international immigrants coming to New Zealand to fill the gaps, despite the borders slowly starting to open so it's more important than ever to invest in our local talent.

Staff retention has never been so important. If you're an employer who has felt the sting of the 'great resignation', it's in your best interest to ask the tough questions around why, and look at the opportunity cost of someone leaving. It costs a lot of money to hire new people, especially when it comes to training and the time that is put into that. Not to mention that new people will likely come in at a higher salary than the people you've lost because of the market.

Hiring is no longer about choosing the right candidate, it's about candidates choosing you.

With that in mind, feel free to give one of the team at Eight4 a call for a confidential discussion about where your salaries and benefits fit in and to discuss creative people strategies. There's no time like the present.

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3 ISSUES FACING PROFESSIONAL SERVICES FIRMS ... AND HOW TO OVERCOME THEM

Edward O'Leary, Abtrac

It's easy to count inventory and track sales when you're making or selling items of stock. How do you manage selling time and expertise in a professional services firm?

The thing with professional services firms is they don't make stuff. They don't sell stuff either. They sell expertise. That's their business, trying month by month like all businesses, to survive in the margin between total outgoings and total receipts. Working in this ecosystem requires business practices that inventory-based systems simply don't support. They're not built for it.

Issue One

When I left one of the big accounting firms to start Abtrac, I was adamant I'd never fill out another timesheet. "That's too corporate for me. I don't need all that palaver." But by the time we had 12 staff I realised at each month end I was lacking the details of what staff had actually done, and thus what to invoice was at times a 'best guess'. I realised if anyone queried an invoice, this particular business weakness could have been exposed.

Even though a lot of our work was on fixed fee contracts, I had to swallow my self-righteous pride and concede that having everyone keep up-to-date timesheets was the only way forward. I needed to know more about what was happening.

I then realised "If you measure it, you can manage it", was a real pearl of wisdom. It mightn't always be true in all facets of management. Sometimes you have to rely on intuition, comparatives, and broad ranging 'assessment tests' or personal feedback and opinion. But if you want to justify why you're invoicing a client a certain fee value, you need some hard data to back it up. If you need to know how far through a project stage you've come and how far you still have to go, you also need hard data.

Confidence is not enough.

The biggest issue facing professional services firms of all sizes comes from not correctly measuring what has been done. In my former employment, we'd all joke about doing our weekly lie-sheet. It's no joke to me now. Every week I hear from others who've started a business or taken over the management of a business to realise they simply aren't on top of what is happening day by day and from one month to the next. They call us when they realise that keeping up-to-date timesheets is the only way forward.

Issue Two

"Second verse, same as the first!" (And by the way I'd love to know how many of you know where that sentence comes from – without first asking Google!).

A fee of $50,000 is earned by putting in hundreds of hours of work in a typical professional services business. Nobody can manage a fee of that size unless they break it up into smaller chunks. Converting each chunk into 'things to be done' also means converting dollars into hours per chunk. Without being obsessive about it, (OK maybe I am, but it's from experience), you don't suddenly run over budget on a fee of $50,000. It happens gradually, literally hour by hour. You want to come in pretty close to your $50,000. That's the budget. To achieve that you have to measure how each person on the team is performing vis-à-vis who is supposed to be doing what and when. Few chunks of work should be 40 hours or more. Much more than that and you'll lose it. Many might be less than 4 hours.

Every day imagine you're climbing Everest. Every step has to be planned, because every step counts towards the end goal. The success of the outcome is in the planning, and then keeping on top of how you're going versus your budget for each bit of work. Planned time is as important as actual time.

Honestly, the quality doesn't cost any more. In fact, it doesn't cost at all. It saves! It could save you thousands of dollars on one job alone, and it'll make a huge difference across all the jobs in your office.

Issue Three

As projects progress, sometimes the client changes their mind. And sometimes other parties or external factors force a change to the scope of work. The result is often "extras" or "variations". You have an agreement and a planned fee for service. As the scope of work changes, signal this to the client ASAP. Agree on how each change affects the original fee. Changes are a fact of life and while the client may have relied on your professional knowledge to foresee the unforeseen, the longer you leave each variation as it arises, the more difficult it is to raise the topic and discuss the additional costs involved. I'm a bit of a sucker myself and we try to keep our clients as happy as possible. But a hard-nosed friend once told me "Generosity breeds greed, not gratitude". Whether that's correct or not I'm never sure. Either way, there's never any harm in raising the issue of 'extras' with a client and asking the question about payment.

Forget Your Spreadsheets!

To support all of this you need a quality business support system. It doesn't have to be the most expensive. For more details on what to look for, check out this earlier blog: *www.abtrac.com/blog/7-Things-to-Expect-in-your-Project-Management-Time-&-Cost-Software*. It doesn't have to be the most expensive, but it should tick all of the boxes above. I love Excel. But running a project on it is asking for trouble and running your whole business on it and then also invoicing from it is not only risky, but it's totally unnecessary.

A good software package will enable significantly more sharing of information. The data in it will be up to date and everyone has access to whatever they need to access, be it simply entering their timesheet for the morning's work, adjusting forward their schedule of planned time, or running their favourite project management report. You don't want to find out at month end that you blew your budget 3 weeks ago. And you don't want to spend hours of your time nursing custom spreadsheets to figure out what to invoice when a commercial system brings the value of input from thousands of people in businesses like yours.

Survey and Spatial New Zealand PRESENT THE 2021 SPATIAL EXCELLENCE AWARDS

SPATIAL EXCELLENCE IN NZ SHOWCASED AGAIN

The 2021 Spatial Excellence Awards have been announced

After a two-year break, Survey and Spatial NZ was delighted with the response to the 2021 Spatial Excellence Awards. Hosted by the Asia Pacific Spatial Excellence Awards (APSEA) and delivered by S+SNZ, the awards were announced at a cocktail function held in Wellington on 10 February.

Congratulations to all the outstanding winners and thanks again to our generous sponsors who have all contributed to the success of the new awards. All the New Zealand award recipients are automatic entries in the APSEA Awards.

Stantec Award for Community Impact

Duane Wilkins and Jan Pierce accepting the Award for Community Impact from Kat Salm

This award recognises unique contributions that the spatial industry has had on communities.

Awarded to: Ngā Poutama Matawhenua/ Practical Maori GIS Mapping Wānanga – Toitū Te Whenua Land Information New Zealand, Journey GIS Ltd and Te Kāhui Manu Hōkai, the Māori GIS Association

This was a collaboration between Toitū Te Whenua Land Information New Zealand (LINZ) and Te Kāhui Manu Hōkai, the Māori GIS Association, with support from Journey GIS Ltd. The result is a programme of online mapping wānanga tailored for indigenous knowledge workers within iwi, hapū, Māori trusts and environmental groups. Geospatial information has the potential to transform the way land is viewed and understood. By showcasing the geospatial tools and resources available, Ngā Poutama Matawhenua empowers participants to practically apply what they learn to support a wide range of kaupapa related to whenua and tāiao.

Celebrating Covid Red style

PRESENT THE

2021

SPATIAL EXCELLENCE AWARDS

Harrison Grierson Award for Environment and Sustainability

Tony Elson, GBS and Amanda MacDonald-Creevey, Auckland Council

The Environment and Sustainability award recognises products and projects that help to resolve issues in an environmental context.

Awarded to: Ruru – Conservation Information System – Auckland Council and Geographic Business Solutions

Ruru – Conservation Information System was developed by Auckland Council to address the fragmented and siloed nature of conservation and environmental data across the organisation. The comprehensive spatial management system contains almost 80 datasets across a variety of disciplines including native species management/restoration, pest plant/animal control, tree pathogen (kauri dieback) mitigation, and community engagement. Automated spatial analysis and connectivity with external datasets provide more context and allow better operational decision-making to meet desired environmental outcomes. Centralised information ensures that high-level strategies (Auckland Plan, Indigenous Biodiversity Strategy and Regional Pest Management Plan), and programme level targets are being achieved and delivered effectively.

Eagle Technology Award for Innovation – Medium to Large Business

The Innovation Award recognises a unique delivery of a project, product or service based on a new idea, method, technology, process or application resulting in significant social, environmental and/or economic benefits.

Awarded to: Asset Assessment Intervention Framework – Christchurch City Council

Michael Galambos accepting the Award for Innovation

Now more than ever, we need better and more robust asset management processes that decision-makers understand and trust, to ensure funding goes to the right projects at the right time. Asset Assessment Intervention Framework (AAIF) was developed to provide fast, auditable and repeatable renewal planning prioritisation for Christchurch City Council's three waters reticulation assets. Supporting the adoption of the New Zealand Asset Management Metadata Standard, the AAIF uses complex spatial analysis to identify the investment required within the three waters portfolio. It has the potential to set a new benchmark in infrastructure asset management.

Toitū Te Whenua Land Information New Zealand Award for Innovation – Small Business

The Innovation Award recognises a unique delivery of a project, product or service based on a new idea, method, technology, process or application resulting in significant social, environmental and/or economic benefits.

Awarded to: Tasman District River Surveys – Fox and Associates

Fox and Associates (FOX) is a small consultancy based in Christchurch that continually adapts and evolves, responds to niche market needs, thereby being involved with some of the more exciting projects in the profession. Councils for years have relied upon sparse datasets comprising river cross-sections up to 1 kilometre apart, with little knowledge of what happens in between. This presents a problem for river management both for flood modelling and gravel management. The ability to integrate advanced technologies and develop new methodologies convinced the Tasman District Council to engage FOX to fully 3D map 29km of rivers encompassing 9 square kilometres.

Jacobs Award for Spatial Enablement

The Award for Spatial Enablement recognises products or projects in which the application of spatial information, methodology and/or tools has greatly improved the outcomes of a non-spatial project, process or product.

Awarded to: Asset Resilience Management Tool – Stantec and Tauranga City Council

Knowing where to invest is critical for resiliency. Cities want to be diligent and avoid investing in assets that may not be worth the investment long term. But how does a city do this responsibly? Tauranga City Council has figured this out and Stantec helped them do it responsibly and efficiently.

Charlotte Dawson, left, accepting the Spatial Enablement Award, with Leader of the Year recipient Louisa Bloomer.

Toitū Te Whenua Land Information New Zealand Award for Technical Excellence

The Technical Excellence Award recognises surveying and spatial projects that apply existing technology and methodologies to an exceptionally high technical standard, overcoming significant technical challenges, and delivering outstanding results for the client.

Awarded to: SwitchMyFleet – Critchlow Geospatial

SwitchMyFleet is a free online evaluation tool for businesses considering switching their commercial vehicle fleet to electric power. Using authoritative New Zealand road network data from NationalMap (*www.nationalmap.co.nz*) and the user's own real-world fleet configuration and route inputs, SwitchMyFleet calculates the metrics that businesses need to build their case to transition.

Steve Critchlow with the Award for Technical Excellence

Stantec winners Maddie Giles, Charlotte Dawson, Louisa Bloomer and Lina Le

PRESENT THE
2021
SPATIAL EXCELLENCE AWARDS

INDIVIDUAL AWARDS

NZ ESRI Users Group Postgraduate Student Award

Omid Khazaeian

Awarded to: Omid Khazaeian

As a PhD researcher in GIS, Omid wanted to share his experience of unleashing the potential of survey and spatial data for a deeper insight in spatial mobility through taking a multidisciplinary approach and using models from outside spatial research. His research introduces a spatial econometrics approach and how this approach helps leveraging data from the New Zealand Household Travel Survey and many existing spatial datasets for a profound understanding of urban transportation. The research, providing empirical evidence for transportation planning and policy has been used by Wellington City Council for the proposed district plan's transport chapter review.

Harrison Grierson Professional of the Year Award

Awarded to: Stuart Caie

After 16 years working as a hydrographic surveyor in the UK, Stuart joined the New Zealand Hydrographic Authority within Toitū Te Whenua Land Information New Zealand in May 2006. Since then, he has demonstrated strong technical expertise and leadership and is a well-respected and committed survey professional within both the national and international hydrographic community. As Manager Hydrographic Surveys, Stuart is responsible for managing New Zealand's multimillion-dollar hydrographic survey programme. His leadership in the international context is demonstrated by the successful delivery of a multi-year international project to improve navigation and hydrographic capability in the Pacific region.

Stuart Caie with S+SNZ President Kat Salm

Synergy Positioning Leader of the Year Award

Awarded to: Claire Buxton and Louisa Bloomer

Claire has an extraordinary passion for, and dedication to, the surveying and spatial industry. Hours of her personal time is spent on creating opportunities for other young professionals to grow, lead and contribute their skills to a greater cause. Her leadership is recognised internationally in her role as the FIG Young Surveyors' Volunteer Community Surveyor Program Team Lead. She was instrumental in building a global team and scaling the program, overcoming challenges of a global pandemic, and deploying young surveyors from around the world to areas of need.

The second winner of this award, Louisa, provides inspiring leadership as Stantec's Asia Pacific Digital Practice Leader, on the Women in Spatial Committee, as a mentor, and on significant projects across New Zealand, Australia and the UK. She leads a team of 24 data, GIS and innovation staff to deliver significant industry projects; she provides strategic direction and leadership for a community of 225; and drives innovation and new ways of working across Stantec globally by supporting incubation of new ideas, and as an innovation coach and mentor. She grows spatial and data practice organisation-wide as the founder and chair of Stantec's ANZ Digital Governance Board.

NEW CERTIFICATION FRAMEWORK WELL ON ITS WAY

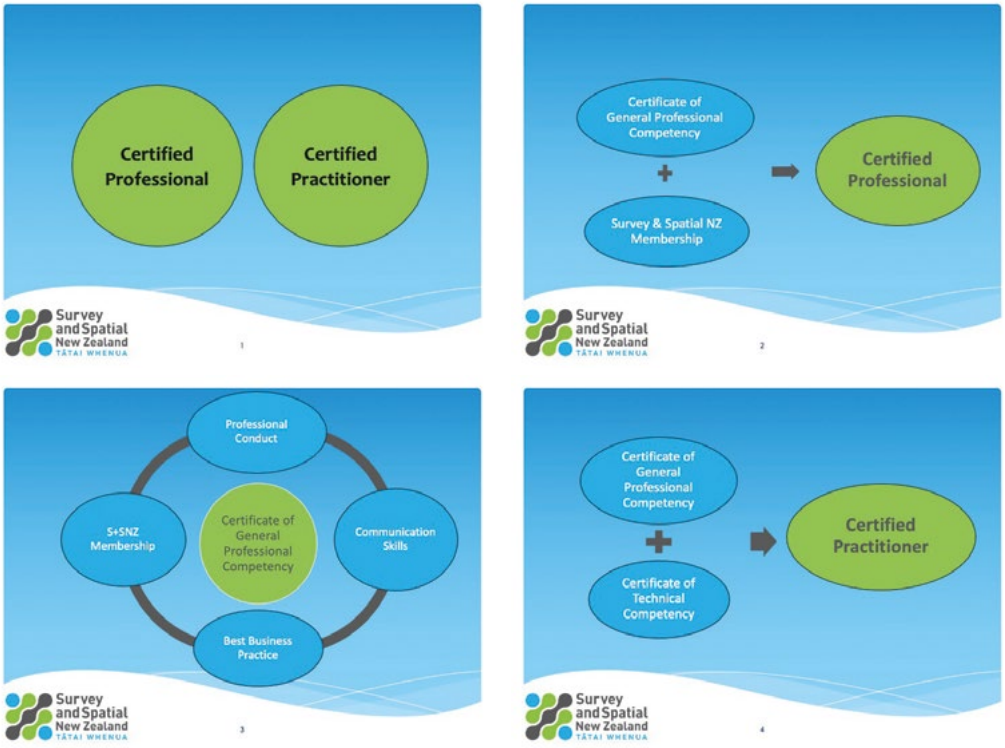
With an ever-increasing focus of local government and other organisations on quality and the certification of practitioners, it is timely that an audacious project started by S+SNZ in 2020 has now reached an important and exciting milestone. The piloting and testing of a new *Certification Framework and Assessment Process* is about to begin.

A comprehensive review carried out in 2020 showed that the current certification model was no longer fit for purpose for many members. As a result, a new certification framework was developed, one that would be fit for purpose, scalable and provide a quality benchmark across all disciplines in the sector.

Development of the *Certification Framework and Assessment Process* has been under way for over a year. It will detail the certification, application and assessment processes along with descriptions of the competencies associated with the initial two disciplines we are developing certification for – these are engineering surveying and land development engineering. Other disciplines including urban design and spatial will also be added as the Certification Pathway is developed.

The framework includes pathways to become a Certified Professional and/or a Certified Practitioner after achieving a Certificate of General Professional Competency and/or a Certificate of Technical Competency.

The next stages of the project, once the testing and pilot are completed, will be consultation with S+SNZ members and various stakeholders. It is expected this work will begin in the second quarter of 2022.



Diagrams showing the components of a Certificate of Professional Competency

STRONG VOICES FOR THE SPATIAL INDUSTRY

Meet the new team of enthusiastic and talented Geospatial professionals to engage with our members and be a voice to the spatial industry.

Jasmin Callosa-Tarr – Spatial Stream Chair

Jasmin is a geospatial professional with more than 25 years of experience working in New Zealand, South Africa, Lesotho, Eswatini, Philippines and other South-East Asian countries. Her passion is in the field of participatory GIS and resilience.

Jasmin is also a committee member of the NZ Esri Users Group and the Secretary for the NZ GIS in Conservation.

Jasmin works for a global consulting firm and is based in Wellington as the APAC Technical Leader for Project GIS as well as the NZ Spatial Lead.

She enjoys problem solving, talking to clients, taking care of the team and contributing and adding value to society. She is most happy when she sees that her work is being using for community improvements and welfare.

Jasmin hopes to contribute to the Spatial Stream by leading the committee and driving the promotion of the interests of the spatial professionals in New Zealand. She is also very passionate in enhancing the inclusion and diversity and mentoring agenda for the industry.

Anya Duxfield – Committee Member

Anya has worked in oil and gas exploration industry in the United Kingdom; as a geologist in a research organisation in New Zealand and worked in academic research in New Brunswick, Canada.

In Canada, Anya also worked for 9 years as a Support Manager and Support Product Manager for Fledermaus software suite which is a hydrographic processing and 4D visualization software.

She returned home to New Zealand late in 2014. Initially, working as a geospatial administrator for local government authority and running her own consultancy.

Anya's professional passions are geology, hydrography, oceanography, and geospatial data analysis. Time in the field as a researcher and surveyor has given Anya a real appreciation for where the data comes from, how it was gathered, what hardware and

software actually gather the data. Of late Anya's passion is taking that raw or processed data and providing insight through geospatial analysis and visualization.

Anya feels that the contribution she can make to the Spatial Stream of Survey and Spatial is being able to be more aware of the surveying professionals skills and involved process and the need for precision and accuracy in data acquisition, just as much as in the processing and analysis stages of using the data as a geospatial analyst.

Campbell Fleury – Committee Member

Cambell was Introduced to GIS through supporting a field data capture project back in 2011 with the Animal Health Board. When Animal Health Board merged with NAIT Limited (National Animal Identification and Tracing) and formed OSPRI, I moved into a full time GIS Analyst role. This moved to GIS Development and expanded into Data Analysis and Engineering.

Campbell is now a Manager of Data and Information Products at OSPRI. My team is divided into the GIS, Data Engineering, and Analysis/Reporting practices and we're responsible for all data movements within OSPRI.

His current role grants me a large amount of impact and influence within OSPRI but also within the wider Primary Industry sector. This allows the team to make changes/improvement that will genuinely improve Biosecurity within NZ and hopefully make farmers jobs easier.

Campbell had previously Chaired the Emerging Spatial Professionals committee following Josie Hawkey. This gave had given him insights into the varied job descriptions and gaps within the field. He brings a strong Data focus to his work and see an overlap of the Spatial and Data fields as necessary to really expand the uptake of Spatial.

Jeremy Clark – Emerging Leader

With over 10 years working on both commercial and government projects in New Zealand and internationally, my background is in designing and delivering innovative solutions based

on the ArcGIS Enterprise Platform to allow organisations to make better decisions using their spatial data. Currently I am working in the agriculture sector, designing solutions to support the agri-tech industry and farmers to address the frequent challenges that arise within the industry, such as regulatory change and climate change.

Jeremy is a problem solver at heart, so being presented with a particularly difficult challenge to address is what gets him up in the morning! Fortunately, spatial problems tend to require a bit of creativity, so he feels lucky enough to spend a lot of my day using this skillset.

As the Emerging Leadership representative on the Spatial Stream Committee, Jeremy brings with him a diverse understanding of the many aspects of use, design and delivery of spatial systems to support the growth of our members.

THE CANTERBURY PEG

The Canterbury Peg is awarded to those in the survey community who have shown outstanding performance and contribution to the industry over a number of years.

S+SNZ is lucky to have people who have made such a contribution and, in the case of this year's recipient, that contribution extends over decades.

Maurice Perwick is a well-known and respected member of S+SNZ, and this citation by S+SNZ Fellow Warren Haynes describes Maurice's career and achievements.

Maurice William Perwick

Citation of Professional Excellence Award, Canterbury Branch, S+SNZ

Maurice William Perwick hails from Gore in Southland and went to Otago University in 1970 at the age of 16 to become a surveyor after encouragement from his maths teacher at Gore High School. He was always known for seeking an alternate solution for getting things done.

His Diploma of Surveying took a longer path than usual as he had some growing up to do among his older peers but this allowed him to pursue maths and chemistry before being accepted into the School of Surveying where even that was a challenge.

His return to Gore to work for Neil Clark was rewarding, especially to be in a firm looking towards technology – Munroe 1880 and HP 4805 distance measurement.

He then found employment with Barry Greig at Davis Ogilvie in Christchurch and worked towards his survey registration projects.

He joined Eliot Sinclair in 1980 and gained much experience and encouragement from both Marton and Bruce Sinclair.

He was NZIS branch treasurer and treasurer for a period of time and was convenor of the 1995 NZIS annual conference – *People the Resource*.

In 1996 he became a partner/director of Eliot Sinclair and joined CSNZ to learn the business and responsibilities of ownership of a survey engineering consultancy.

He has promoted graduates getting proper training and experience before presenting to registration and licensing boards. He chaired a workshop session discussing responsibilities to graduates and staff training.

He made great efforts to mentor his staff and other members of the profession to be the 'best they can' with an emphasis of getting things right by planning a task well and providing support and technology to achieve that goal.

He has been on the governance and working teams for the NZ Diploma of Land Surveying and Diploma of Hydrographic Surveying.

He gained his Level 1 hydrographic surveyor status in 2002 and was conference convenor in Christchurch for the International HYDRO 2003 promoting surveying, Christchurch and New Zealand to the international delegates.

He joined the Hydrographic Professional Steam at the outset and has only recently retired from that group though is providing seminar support for an upcoming event in Wellington should Covid allow.

The earthquakes of 2010 and 2011 provided an opportunity to respond to the recovery of the Lyttelton port and to support Christchurch surveyors with an additional CORS station on loan from Trimble at the Wigram Tower.

Eliot Sinclair was able to provide LINZ with a local reference receiver in the heart of the city but well connected to their network.

In 2016 Maurice took a team of surveyors to South Bay in Kaikōura to investigate the status of the navigability of the Whale Watch Marina for the support of the local townsfolk using the latest technology, setting up a CORS to support the ongoing survey operation from the tunnels in the south to Waipapa Bay in the north.

Photogrammetry and scanning and geodetic connections saw the re-establishment of the vertical tidal datum in the area and the process of recovery begin.

Maurice and a seven-man team from Eliot Sinclair developed a method of surveying the inhospitable coastal reefs using a heavy lift drone and a 'lead line'. This has been well documented at conferences and in publications and on YouTube and was a finalist at NZSEA for innovation.

Maurice has appreciated the support of the Canterbury

and national members of NZIS, S+SNZ over his years in the profession and tried to give as much encouragement for others to offer their time, knowledge and expertise to the profession and the public.

– S+SNZ Fellow, Warren Haynes

CADASTRAL STREAM NEWS

2022 brings two new members to the cadastral stream committee; Genevieve Abrey and Sheldon McGuire; who join us as part of the Emerging Leaders programme. We would like to say a big warm welcome to these two. Karl Wilton remains cadastral representative on Council, Hannah Reader remains chair, and Matt Ryder, Trent Gulliver, Toni Hill, Richard Hemi, Rita Clark and Andrew Blackman remain on the committee also.

Last year as a committee a major focus was in assisting members with the transition to the Cadastral Survey Rules 2021. A highlight of this would be the fieldnotes seminar that was organised by Andrew Blackman as part of the ongoing discussion as to how we, as cadastral surveyors, are best to comply with the new Rule 71(e) which requires field information to be submitted as part of a cadastral survey dataset. We hope that members found this helpful.

In 2022, with the Cadastral Survey Rules 2021 now in force, while we plan on still liaising with LINZ to get information out which will help members with compliance, the items on our work agenda include the Good Survey Practice guidance material being developed in conjunction with the Institute of Cadastral Surveying Incorporated, and the QA checklist initiative. We also are wanting to look into how we can provide resources and assistance for graduates getting their License which will put them in good stead for continuing their careers as cadastral surveyors. Our usual role of assisting with conference organisation and having input into the awards presented there will also continue.

Another item on the agenda for the committee this year is our communication with our stream members. We want to get the forum on the S+SNZ website up and running better than it has been so that it can be more useful for members. We are always after feedback on issues that our stream members would like advocacy on, ideas people have for topics for seminars, cadastral corner etc. and would like the forum to be used for this in the future. Also, if there is information people would like to share that would be useful to other members we, hope the forum can be utilised for this too.

Hannah Reader, Cadastral Stream Chair

Richard Hemi

This is a very opportune moment for Survey and Spatial NZ to be considering the role of education and professional development, as it comes at the same time as the Reciprocating Surveyors' Boards of Australia and New Zealand (CRSBANZ) begins a review of the national standard of competency for licensed/registered surveyors in New Zealand and in the states of Australia.

An Issues and Opportunities paper has been produced by the council: *https://sssi.org.au/SSSI/files/cd/cd23dc86-4c86-49f1-9a4b-36af69fb1916.pdf* which provides a background to the intended review process and objectives. This paper is worth a read for members interested in this topic, with feedback expected by mid-March.

The review, and its proposed development of a national standard of competency across these jurisdictions will push the Australasian survey industry to consider some very important questions as we move forward, such as the broad range of work and modes of practice that we engage in, changing needs and trends in surveying, risks to the industry, expected graduate competencies and postgraduate training needs. A broader question that continues to be posed, but which will hopefully be informed by the review, is workforce recruitment and supply chain.

Some readers may be surprised to know that New Zealand and the eight states or territories of Australia have had a system of mutual recognition of professional qualifications in surveying since the late 19th century. The review document states: "This commitment was established at the initial conference of Reciprocating Surveying Boards in 1892 and subsequently embodied in the survey legislation of all jurisdictions to ensure cadastral surveying qualification requirements in each jurisdiction to remain broadly compatible."

The review document breaks down the assessment of competencies of a candidate hoping to become licensed or registered into three main elements: knowledge, skills and experience.

Knowledge is attained academically at a tertiary institution in the form of a degree in surveying. Skills are acquired in the workplace from professional and technical practice and can be assessed against defined standards. Experience is also acquired in professional practice over time as a candidate gets involved in different forms of work and more complex and varied survey situations.

We often say a university student may have knowledge of a surveying method and will have undertaken a method once or twice during the course of a degree, but will not carry it out in an extended or repeated manner that allows it to be considered a competent skill. There is nothing like pegging a subdivision, or setting out a construction site for weeks or months on end to ensure a graduate can undertake a skilled task with confidence.

In New Zealand we expect an undergraduate degree in surveying to satisfy a broad range of surveying and land development knowledge requirements. Measurement science, error analysis, land development engineering principles, cadastral law to name but a few. With the School of Surveying approaching its 60th year in 2023 (conference in Dunedin 2023 reminder), the knowledge outcomes for graduates are well understood. There have always been gradual modifications over time, and the school is currently in another round of curriculum review – a full academic review of papers and progression through the Bachelor of Surveying, as well as its other BSc degrees – Land Planning and Development, Survey Measurement and GIS. The CRSBANZ review is therefore very timely for the school and we are excited by the prospect of a modernised curriculum. We also look forward to working closely with the CRSBANZ on its review project.

As most degree graduates will recall, summer employment and

work experience during the period of their degrees is a course requirement. The current school requirements are for 80 working days – typically two summers' worth of employment. While the industry is busy, it is generally easy for students to find employment and most students are much better for the experience.

While the types of work, levels of responsibility and the skills attained in this summer work vary significantly, there is no doubt this experience improves student learning by having a better understanding of the context of that learning, and providing opportunity to use modern equipment and methods of surveying.

Students must work under the supervision of a qualified surveyor or engineer, and report on their work to pass this requirement, but no specific learning outcomes are required. Perhaps this might be considered as part of the council's review.

This also leads to the question of a graduate's postgraduate pathway and assessment of competency. Is this pathway as well understood and are these consistent between graduates? So much relies upon the graduate's employer, mentor and company.

If one outcome of the CRSBANZ review is that more consistent competency standards are created across the board, that should be welcomed by our industry, particularly as surveyors return to moving backward and forward across 'the Ditch' in the foreseeable future. This review will also help allow an honest appraisal of the NZ competencies expected for licensing, and our proposed S+SNZ certification model and how they compare with those of our Anzac surveying cousins. ●

OBITUARY

The School and the Ōtepoti Dunedin Surveying community lost a bright star in October with the passing of Charlene Hong Hue Phuong (5 April 1998 – 23 October 2021) in a tragic car accident.

Charlene was an inspiration to many of us, a born leader who balanced the many dimensions of her full life with both substance and her own enthusiastic style. She was a generous person who made the academic and social life of the School better—in a myriad informal ways, but also formally through participation in the Class Reps system and as 2020 President of the Otago University Surveying Students Association.

She was very well liked by her peers as per the following comments from former classmates:

"Charlene was the most caring, selfless and cheerful person that I met during my time at the University of Otago. Her perseverance was unmatched and put not only her whanau on her shoulders but the School of Surveying as our President in 2020."

"Even at such a young age, so much can be learned from Charlene's outlook on life. I've known very few people who could match Charlene's grit and determination. And the love and graciousness she shared with everyone who crossed her path is like no one I have met."

Charlene was also a devoted mother and wife. Her willpower and determination led her to overcame several obstacles to graduate from Queens High School in Dunedin and then go further on to succeed in the Bachelor of Surveying Degree. After graduation, Charlene began her professional career with Dunedin surveyors Terramark and although she only had a short period of time with the company she had already made an impression as hard working and driven surveyor, as well as a fun member of staff. She had also become involved with the local S+SNZ branch and had been already recognised as a likely future leader within the profession.

We miss Charlene, and we will miss the outstanding professional she was on the way to becoming, but we are glad to have known her. She will be remembered by all who knew her for her zest for life, a beautiful spirit, and her laughter and smile. ●

SEMUT
Christine Helliwell

Reviewed by Gordon Andreassend FNZIS and Peter Byrne Hon Fellow SSSI

Semut is the first of two volumes describing a remarkable behind-the-lines commando operation in Borneo in 1945. Books about World War 2 abound. Why would a review of this particular work be included in a surveying/spatial sciences publication?

Read on.

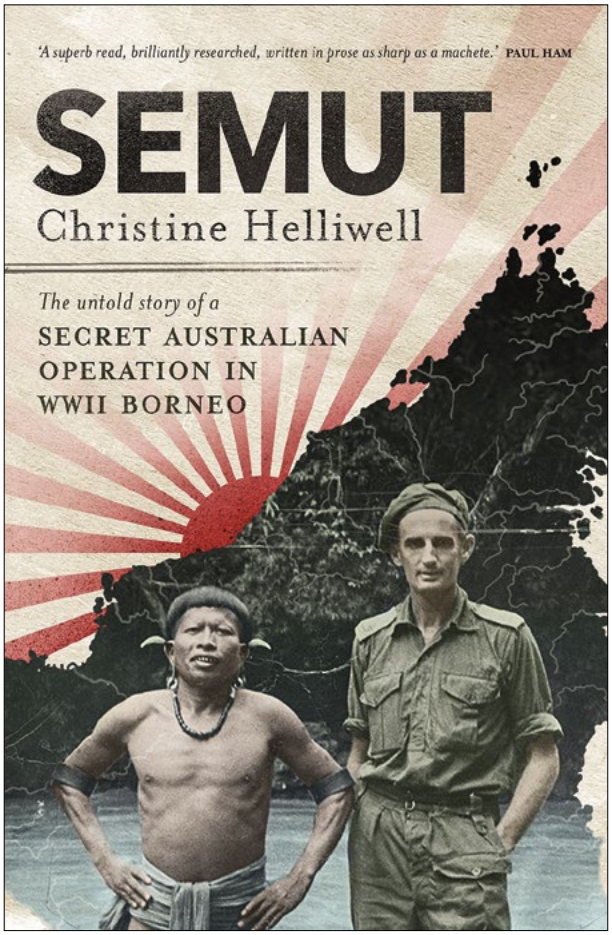
Eight Australian, New Zealand and British commandos parachuted into the highlands of Sarawak in March 1945. They did not know what awaited them. Japanese soldiers? Unwelcoming local people? Known as Dayaks, the locals' reputation as headhunters was renowned.

Eight more commandos followed in April, not knowing if the first group had survived. The mission was to gain Dayak support in 'encouraging' Japanese invaders downriver from the hinterland to the coast. This was Operation Semut – semut means ant in Bahasa Malaysia.

Two of the small band were surveyors, Gordon S. (Toby) Carter, of New Zealand, in the second group, and J.K. (Keith) Barrie, of Australia, in the first. Both went on to distinguished careers.

Christine Helliwell is an anthropologist who has spent considerable time with the people of Borneo. She heard stories from locals who had been alive in 1945 and was captivated by the Semut story which had not been comprehensively told before.

From official records, countless interviews in Borneo, written diaries and memoirs, and meeting with the few living survivors in Australia; she has pieced together the operation.



Her book is more than a history of what was done by whom. She has brought to the reader the soldiers' challenges, terrors and privations. The terrain and tropical vegetation were a constant challenge. Radio communications were sporadic.

They were alone in an alien place. Sleep, such as they had, was in ready-for-armed-action should they encounter the superior might of the Japanese whose location, at the start, was unknown. There were periods of food scarcity such that starvation threatened.

That such a small, lightly equipped and armed band could gain the support of the Dayaks comes as an astounding fact, and speaks volumes of their diplomacy and tenacity.

That observation may seem incompatible with a particular inducement to getting Dayak support – the informal abandonment of the law prohibiting the taking of heads, a practice enthusiastically taken up again.

Though explained by Helliwell as having spiritual significance to the Dayaks, and less barbaric than it may seem to an outsider, the practice of taking heads added another layer of horror for the soldiers. Frustration and fear of losing support through non-arrival of expected reinforcements and equipment was ongoing.

Semut is above all, a human story. Helliwell's research has revealed the personalities of the soldiers, who came from civilian occupations as diverse as tailor and academic. These were ordinary people doing the extraordinary in an alien environment. The soldiers and their Dayak counterparts developed admiration and fondness for each other.

The author makes great emphasis of the hundreds of unnamed Dayak

The mission was to gain Dayak support in 'encouraging' Japanese invaders downriver from the hinterland to the coast.

fighters who willingly assisted the commandos in removing an oppressive enemy from their land.

More history should be written by anthropologists.

The commandos and irregulars of Operation Semut trekked and canoed some 700 kilometres, urging the Japanese forces to move to the coast.

After many skirmishes and close calls, and the release of prisoners from a Japanese jail, the soldiers took on administrative roles to keep order until the British administration was reinstated.

The surveyors in Semut

Toby Carter trained as a surveyor in Auckland, qualifying as a registered surveyor (NZIS) in late 1933.

In 1935 he gained a position as a land surveyor in Sarawak with the Shell International Oil company. He worked in Borneo for five years, before being promoted to Chief Surveyor in 1940.

In 1943 he enlisted in the Australian Engineers with the rank of captain and served in New Guinea. He was sought out for Semut because of his familiarity with Borneo – the land, people, customs and languages. Promoted to major, he commanded Semut until it was split into three groups, one of which he led. His parachute descent into Borneo was his first.

Carter comes through in *Semut* as an effective leader and a person of sensitivity and principle. In the final stages of the operation he took vigorous issue with his command for denying requested reinforcements, and their strategy for extracting the remaining Japanese, fearing the locals would face retribution. For his impudence he was sacked.

In this account Helliwell touches on the untidy politics of war and old colonial attitudes towards 'natives'. Carter fell from grace due to the English class system. His origins were humble, his education at a New Zealand public school. He was replaced by an overbearing individual who had been to Harrow.

Nonetheless, the military authorities saw fit to award Carter the DSO in recognition of his considerable contribution to the Semut operation.

Keith Barrie spent much of his surveying cadetship in the subtropical Hastings and Manning river basins of NSW. After qualifying in 1937 he spent two years in New Guinea before joining the AIF in 1941. He transferred to the Z Special Unit in 1945 to be part of the first Semut insertion.

Semut contains many references to Barrie's memoir ***Borneo Story 1992.*** He was awarded the Military Medal for his part in the operation.

After Semut

Toby Carter returned to Sarawak in 1946 to his former post of Chief Surveyor with Shell. He later transferred to an administrative post. In 1963 Shell sent him to New Guinea to join the United Nations team assisting in the handover to Indonesia.

He returned to Wellington in 1965, and after working for an engineering firm, joined the Wellington Harbour Board, until retiring to Rotorua in 1976.

After 10 post-war years with the Malay Survey Service, Keith Barrie gained a PhD from ITC, the Netherlands, and returned to Australia to co-found Australian Aerial Mapping in 1958. (His old firm continues as the AAM Group).

He was President of the Institution of Surveyors Australia (ISA) in 1976-77 and received the ISA Medal in 1994. The Overall Excellence Award of SSSI carries his name.

Reading *Semut* can only bring pride to the surveyors of Australia and New Zealand. Apart from being an extensively researched work (450 pages of text, maps and illustrations and 100 pages of endnotes, bibliography, etc), it is also a ripping, atmospheric, and emotive story that both reviewers had difficulty in putting down once started – and both eagerly await Volume 2. ●

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