Mind the Gap: IT skills shortage - could cadets make the jump?

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ABSTRACT

Hard skills, soft skills, and industry experience are all important factors for employers when seeking to fill new Information Technology (IT) positions. However, many IT graduates do not necessarily possess all three factors and employers often face difficulties recruiting talent with the right skill sets. In the past, in disciplines such as engineering, the industry and education institutions have formed partnerships to provide workplace based opportunities such as cadetships as one way to address and bridge skills gaps. While it is common for New Zealand IT degree programmes to contain an industry placement/capstone paper in their third year to assist students in gaining industry experience and growing both their technical and professional practice skills, the concept of a longer term cadetship in the IT industry is fairly new. This paper will discuss the IT skills shortage gap and investigate different cadetship models successfully used in other sectors in Australia and New Zealand.

Keywords: hard skills, soft skills, cadetships, IT skill shortage

1. INTRODUCTION

One of the biggest issues currently facing IT employers is the worldwide skills shortage. This paper firstly describes the issues and challenges that IT employers are facing in the recruitment of tech workers within New Zealand, not only due to the limited talent pool, but also due to finding candidates with the right mix of both hard and soft skills. One way to meet the IT industry's challenge of finding suitable candidates is to consider the uptake of cadetship programmes to help develop work ready students. Cadetships appear to have been successful in disciplines such as engineering, accounting and to a lesser extent in IT. The paper investigates the potential for IT cadetships as a strategy to meet the skills shortage and reviews cadetship programmes that are currently being offered in New Zealand and Australia.
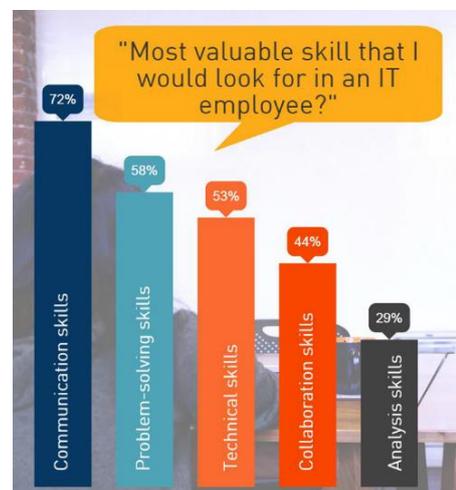
2. BACKGROUND

With technology increasingly becoming the critical component behind all industries and workplaces, the need for staff with a multifaceted mix of technical and soft skills is in huge demand. With the growth of all things being connected and online at all times, having a workforce who have knowledge of often quite complex technologies, while also being able to communicate well and understand business processes, is vital to the IT industry.

Employers and organisations are placing a high value on hiring staff with the right mix of skills, and indicate that it is becoming progressively more difficult to find these skill sets from the New Zealand based talent pool. And it is not just the current skills shortage that is of concern, with projections of future requirements and the growth of IT in all sectors, the shortfall in available and suitable staff will amplify and increase exponentially. In an article by Coulson (2014), organisations such as Xero and Orion Health are reporting that they are struggling to find the skills needed for their New Zealand based roles onshore, even with their preference to hire locally, they often cannot.
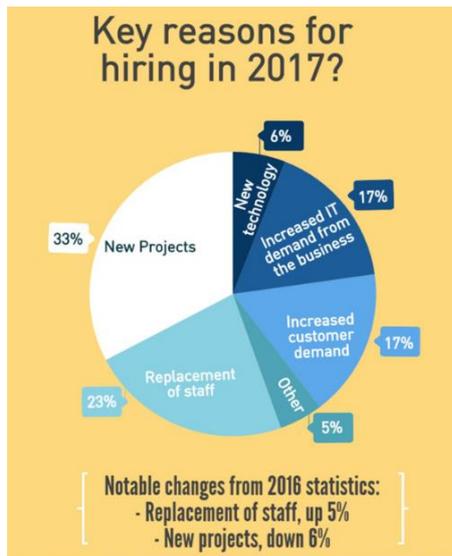
Research undertaken by the Ministry of Business, Innovation and Employment (MBIE) in 2013 suggests that the issues organisations are facing are not just the limited talent pool but also the quality and mix of the skills that potential employees possess (Coulson, 2014).

In an article by Lew (2017), Graeme Muller, CEO from NZTech suggests that it is essential for tech companies to work with local government and education institutions to promote and showcase the IT industry as a career path and the roles available. As represented in Figures 1 and 2, along with a shortfall in technical skills, results of an employer report carried out in March 2017 by Absolute IT indicated that soft skills were also rated as some of the most valuable skills when looking for new and emerging IT staff, and when asked for the key reasons for hiring new staff, the highest percentage was towards new projects.

(Absolute IT, 2017).

Key reasons for hiring in 2017?

- New technology 6%
- Increased IT demand from the business 17%
- Increased customer demand 17%
- Other 5%
- Replacement of staff 23%
- New Projects 33%

Notable changes from 2016 statistics:
- Replacement of staff, up 5%
- New projects, down 6%

(Absolute IT, 2017).

Organisations are now trying to use innovative ways to attract talent from overseas in an attempt to fill the skills shortage within New Zealand. Coulson (2014) notes that over the five year period from 2009 to 2014, an average of 1700 skilled migrant visas were approved per year for people entering New Zealand in IT based roles. One recent example of attracting talent from offshore is from local government – the LookSee Wellington (2017) campaign ran in conjunction with NZTech, WorkHere and the Wellington Regional Economic Development Agency (WREDA). The campaign promoted Wellington as an emerging 'Tech' capital with a host of innovative tech companies, and provided a listing of the numerous roles that are currently required in New Zealand in an attempt to attract talent from offshore. The campaign offered 100 candidates the opportunity to fly to Wellington for a week of city exploration and interviews with potential employers.

New Zealand's Digital Future Manifesto, states that "the IT industry continues to experience a significant shortage of individuals with specialist skills and expertise in New Zealand. This is the largest impediment to growth in our sector and is a significant issue for the economy as a whole, and that the prosperity of New Zealand is inextricably linked to how we embrace our future as a digital nation" (New Zealand's Digital Future Manifesto, 2017).

In order to address this skills shortage, it is imperative to the IT industry that new ways are explored to increase the number of young talent who are choosing IT as a career path. Cadetships are a potential way to address this skills gap.

Historically, the term 'cadet' has been associated with the armed forces, uniformed services, and farming. The Collins English Dictionary offers the following definition of a cadet:

- "a young person undergoing preliminary training, usually before full entry to the uniformed services, police, etc, esp for officer status
- a school pupil receiving elementary military training in a school corps
- a gentleman (in England and in France before 1789), usually a younger son, who entered the army to prepare for a commission
- a person (in New Zealand) learning sheep farming on a sheep station" (Collins English Dictionary, n.d.).

Cadetships have now moved from the narrow definition provided above to include a range of professional careers such as accounting, engineering and IT. In New Zealand, civil engineering was one of the first cadetship schemes to be set up by the Public Works Department in 1894. From this time until the 1980s, the public sector recruited 300 to 400 engineering cadets per year. Due to international economic upheaval, as well as economic reform in New Zealand in the late 1980s, the scheme collapsed and was not revived again until 2000 when Opus trialed a cadetship with only two cadets. The initial trial was a failure due to the small scale of the scheme and the isolation experienced by the cadets from studying solely via distance and only having each other for peer support. In 2005 Opus began a new and revised scheme with 25 cadets from across New Zealand, with the success of this scheme since spreading to other engineering companies such as AECOM, Aurecon, Beca, Downer, Fulton Hogan, Higgins, MWH and Windsor Engineering. While the schemes vary, a company will usually support a student to study towards a diploma or degree while working and generally includes full pay, with time off to study and attend courses. Cadets are often bonded for one or two years after graduating (Engineering e2e, 2014).

Fast forward to 2017 and cadetships have emerged in the IT industry in an effort to attract and retain young talent. As is the case with the engineering sector, the IT cadetship programmes offered vary from company to company, with the term 'cadetship' sometimes used synonymously with terms such as 'industry placements', 'work experience', 'internships', 'industry based project work'. With industry placements and work experience, it is typical for students to undertake short term training or work experience with an employer to satisfy academic requirements. Internships are usually offered to students upon graduating or are available either as summer jobs or between semester breaks. Internships sometimes come with remuneration or an allowance but in some cases, they are unpaid. There is a plethora of organisations offering internships to IT graduates, or to those who are in their second or third year of study. Industry based project work is a short-term project ranging from 400 to 500 hours of work over one semester. This is usually unpaid but provides the student with industry experience prior to completing their degree.

While these work experience arrangements have similarities with cadetships, the focus of this paper is on the longer-term relationship formed by a cadetship, which provides the student with exposure and experience in the work place, as well as remuneration, for the duration of their qualification.

3. DISCUSSION
3.1 Cadetship Models

As discussed above, a cadetship programme will vary depending on the organisation and the model they wish to offer. Some examples of the different structures used are provided below:

- Full time work with part time study
- Full time study and part time work
- Full time study integrated with periods of full time work
- An alternative structure such as six months full time study in the first half of a year, following by six months full time work in the second half of the year.
- Integration of study and work may change during the course of the cadetship. Mostly this will be negotiated between the student and the organisation depending on work flows and deadlines at different times of the year
- Often cadets will change roles on a cyclical basis during their cadetship, providing them with exposure to different team roles and job functions within the organization.

Outlined below are examples of how some New Zealand and Australian based organisations are running their cadetship programmes. Some of these examples use the term 'internships', but have been included due to the longer term relationship being more closely aligned to a cadetship:

- Westpac Group Technology Cadet Programme

    As part of the Westpac Group Technology Programme in Australia, cadets spend six months of the year at university and six months working full-time at Westpac. During the full-time work placement, cadets can choose to complete one or two subjects at university simultaneously, making use of the flexibility offered at Westpac. On each rotation, cadets gain experience in a different role and team, with exposure to areas such as project management, business analysis, process re-engineering, change management and data mining and modelling. Applicants for the cadet programme are selected from year 12 secondary school students and are required to demonstrate that they are sound communicators, highly-motivated, effective team players, have leadership potential, and have achieved well academically (Professional Cadetships Australia, 2016).

- Macquarie Technology Cadet Programme

    Technology cadets at Macquarie (Australia) undertake full time study in Semester One and work full time in the second half of the year. They can choose three different six-month rotations and gain work experience across a number of different fields before they graduate. They gain exposure to areas such as: Business Analyst/ Project Manager; Data Scientist/ Technologist; Computer Programmer/ Software Engineer; Penetration tester/Systems Analyst; DevOps/ Design Architect. Applicants for the Macquaurie programme are selected from year 12 secondary school students need to demonstrate a drive for innovation, creative ideas, and a passion for technology (Professional Cadetships Australia, 2016).

- Summer of Tech

    Summer of Tech (SoT) was founded in Wellington 2006, initially called Summer of Code. Its focus was on internships over the summer for people who wrote code, however, in 2010, it changed its name to reflect the evolving nature of the students and employers. SoT has now grown to include many more areas of technology and innovation. Internships are full time, paid entry level IT and design roles usually running from mid-November to mid-February. Students are supported by bootcamps, hackfests, speed interviews, and meet and greet industry networking events. In 2017, SoT launched a new programme beyond summer and are matching students with part-time, short-term, and full-time roles throughout the year (Summer of Tech, 2017).

- Fronde

    Fronde is an IT services and cloud solutions provider with offices in Wellington, Auckland, Melbourne and Sydney. Fronde began offering Technology Cadetships in conjunction with WelTec in 2007, awarding participating students with a $2500 scholarship and paid employment throughout their studies (WelTec, 2010; Fronde Systems, 2008). Fronde now offers ten-week full time paid internships during the summer break for students in their second year of study, or third year of a four year degree. Interns work together in a project team supported by a Project Sponsor and Technical Mentors. The top intern receives a $2,500 scholarship towards future study costs and is then considered for full time employment upon graduation (Fronde, 2017).

- Wintec and Waikato District Council (Civil engineering)

    Wintec and Waikato District Council are launching a cadetship programme in 2018 to assist in creating employment opportunities for civil engineering students and to help the council fulfil their needs for a highly skilled and qualified workforce. The cadetship scheme allows students studying the civil elements of the New Zealand Diploma in Engineering and the Bachelor of Engineering Technology to work and study part-time for two years before completing one year of bonded employment with Waikato District Council. Waikato District Council will recruit cadets from Wintec year one and two students during 2017, in order to launch the scheme for the 2018 study year. Within two years, they aim to have 12-14 Wintec student placements with Waikato District Council (Wintec, 2017).

- KPMG Cadetship Programme

    KPMG recruits Year 12 students for its cadetship programme in Sydney and Brisbane. The programme is available to students intending to study for a commerce or business degree majoring in accounting or information systems. The cadetship programme provides students with the opportunity to combine paid work and study. The structure of the cadetship programme has students working full-time and studying part-time in the first and second year of their degree, then in the third and fourth year, students study full-time and work during vacations (Unity College, 2014).

- Matakahi Cadetships

    Ngāi Tahu Holding Corporation coupled with Te Rūnanga Group to develop this programme in 2009. The scholarships are designed for students who are entering their second year of study towards a degree in commerce, law, IT or property, and provide cadets with a broad range of learning experiences, challenges, and opportunities. Applicants are sought from students who can display a mix of personal qualities, strong academic ability and a well-rounded community connection. The Matakahi Cadetships provide annual funding towards tuition fees for up to three years, paid summer work placement within Ngāi Tahu commercial business or commercial partners, mentoring and opportunities for cultural involvement (Te Runanga o Ngāi Tahu, n.d.).

- Te Puni Kōkiri cadetships

    Te Puni Kōkiri cadetships were established in 2009 to provide Māori new to the workforce, or with low qualifications, the opportunity to gain work experience, formal qualifications, and industry networks to enhance their employment outcomes. Te Puni Kōkiri engages employers in growth industries to recruit, train, mentor and provide at least six months paid employment to Māori cadets. Te Puni Kōkiri provides funding to support the cadet's employment and development.

    In 2013, the results indicated 71% of the first intake of cadets remained in employment while 20% went on to further training and of the 2011-2012 intake, 98% of cadets remained in employment. The uptake of cadetships has gradually increased with 133 participants in 2011-2012, almost double the numbers from the first 2009 intake. As demand has risen, more placements have been made available targeting the energy, infrastructure and telecommunications sectors (Te Puni Kōkiri, 2013).

The following anecdotal reflections provide some examples of the benefits of cadetships from employers, students and tertiary providers.

3.1.1 Anecdotal reflections from employers

Tim Harty Waikato District Council's General Manager Service Delivery (as cited in Wintec, 2017) states "We're delighted to work with Wintec on this scheme and we regard this as an effective recruitment tool."

Ian Clarke, Fronde CEO (as cited in Fronde Systems, 2008) says "Cadetships allow us to provide hands-on training and mentoring to ensure that the transition from academia to work is a successful one and they get the support they need to grow into experienced professionals. At the same time these students are building solid working relationships that can form the foundation for long-term employment."

Clarion Coughlan, Silverstripe (as cited in Summer of Tech, 2017) states "We keep going back to Summer of Tech, and we're actively involved in things like Bootcamps, Hackfests and Women in Tech panels, because we care about the future of the web and helping to grow the next generation of technologists."

The above comments from employers indicate that cadetship programmes enhance opportunities for the recruitment of suitable talent, the ability to offer hands-on training and mentoring, and the development of relationship building skills.

3.1.2 Anecdotal reflections from students

"Working with Fronde was such a good introduction to the industry - they are a great company to work for and they look after their staff really well. I was pretty happy with having my fees paid for and I enjoyed working with different teams on various projects. I was really pleased to be given the opportunity to work with them and I am looking forward to working with them on a permanent basis", says Ken Dixon (as cited in Fronde Systems, 2008).

"Working for Westpac is an invaluable experience that really demonstrates the importance of IT and its rapid change - both of which can be difficult to realise while studying at university. In my first six-month rotation, I was placed in the IT certifications area which involved ensuring that IT projects met standards and policies. This allowed me to reinforce my communication, teamwork and time management skills within a professional environment while also adding value to the business. The rotation also complemented my studies favourably as I was able to apply my studies to the work I was involved with. Furthermore, I have gained a real-world, hands-on perspective of IT projects. All-in-all, a fantastic experience that will not go to waste and I am looking forward to my next rotation" Lawrence Feng - 2nd year Westpac Cadet (as cited in Professional Cadetships Australia, 2016).

"In the first rotation I was fortunate enough to be placed on a project management team responsible for integrating the Lloyd's auto-finance company with Westpac. In this team I thoroughly learned the different aspects of project management from a hands-on perspective, which has given more depth to the theory I have learned at university, each perspective helping me to better understand the other. In my second rotation I had the opportunity to work on the Environments Management Team for BT Panorama, working in an agile environment with the agile methodology in Barangaroo. This rotation gave me exposure to integral technical skills, as well as to cutting edge project management practices. I am incredibly glad to have been able to work at Westpac and learn simultaneously for two full years now, and cannot wait for my next half-year rotation" Olivia Webster, 3rd year Westpac Cadet (as cited in Professional Cadetships Australia, 2016).

The student reflections show that their experiences of cadetship programmes are extremely positive and advantageous in terms of the opportunity to reinforce communication, teamwork and time management skills and the ability to apply theory to practice. The added advantage of having their fees paid while studying is also appreciated.

3.1.3 Anecdotal reflections from tertiary providers

"Initiatives like these help our students to successfully transition from study into the workplace," says Head of WelTec's School of IT, Ian Hunter. "It's a great model for collaboration between education and industry, I only wish more companies would realise the mutual benefits of establishing cadetships" (as cited in WelTec, 2010).

Wintec Chief Executive Mark Flowers (as cited in Wintec, 2017) says "We're training students for a rapidly changing world and the practical and soft skills they learn through on the job training are critical for their success. Working with industry also means we continue to be relevant and authentic in what we deliver to meet their needs."

The reflections from the two polytechnics above suggest that cadetship programmes are successful in providing students with a smooth transition from study to the work environment and allow for the development of practical and soft skills. Both providers see cadetship arrangements as a model for collaboration between industry and education and as a way to maintain currency and relevance to the delivery of IT education.

3.2 Advantages of Cadetships

Cadetship programmes have proven to provide a successful pathway into careers such as engineering, construction,

accounting and now IT. The mix of practical hand-on training, combined with formal study ensures cadets gain the right mix of technical/hard skills, soft skills and industry experience that IT employers need. Cadetships are an excellent way to promote the development of locally based skilled tech workers, which in turn helps to address the regional skills shortage of qualified workers (Futureintech, 2014). With the potential growth in local highly skilled talent, this will go some way to reducing the need for employers to look off-shore for their future IT recruitment needs. Some organisations choose to have their cadets bonded for a two year period upon graduation in order to ensure they gain the benefits from these industry ready, hands-on experienced graduates.

Diversity in the IT sector is another challenge that cadetships can go some way to addressing. Through the promotion of cadetship opportunities in secondary schools, all student groups with additional attention given to females and Maori/Pasifika groups would receive encouragement to choose an IT cadetship as a career path. Advantages for cadets themselves include the ability to start earning as soon as they finish school while they complete their qualification, while also often being assisted by the organisation with their study costs thus avoiding large student loans (Futureintech, 2014). They are also able to see immediately if an IT career is right for them rather than waiting until graduation, and can often stay in their hometown and study via distance learning, again reducing costs while gaining a qualification.

Tertiary institutions benefit through the engagement with industry and partnerships they form with their local high schools and industry based organisations who are providers of the cadetship programmes. Many tertiary institutions strive to incorporate work integrated learning opportunities alongside theoretical teaching to provide students with experiences that allow practical application of theories to real world scenarios, as well as enhancing networking connections that can potentially lead to employment opportunities (Burns & Chopra, 2017). It is therefore advantageous for tertiary providers to form strong collaborative relationships with industry and as Chandrasekaran, Stojcevski, Littlefair and Joordens (2013) point out, efforts to improve students' analytical thinking (linking theory and practice) and their transition to industry, requires a joint venture by both the learning institution and industry partners. Such connections with industry are also key to providing an authentic and inclusive learning experience as well as maintaining currency and relevance of course content (Ferns & Moore, 2012; Hodges, 2011). Zegwaard (2014) believes that collaboration is central to facilitating academic integrity, industry credibility and the assurance of graduates with skills transferable across different contexts.

As discussed above in section 3.1.2, a study by Fleming and Eames (2005) supports the student reflections that while in the workplace, they learn a range of skills including communication, time management, reflective thinking, problem solving, and a greater understanding of the workplace and its environment.

Graduates of cadetships programmes will have increased opportunities in the IT sector due to their proven ability at being agile and industry ready. They will have experienced numerous roles with an IT organisation, gained a variety of technical skills, worked across multidisciplinary teams assisting in the growth of their soft skills, and participated in real life practical scenarios. They will have had the opportunity to grow industry networks and contacts, and gain skills from and be mentored by experienced IT professionals (Futureintech, 2014). The combination of these factors, will enable cadets to apply their knowledge and skills and contribute as high performing IT team members as soon as they graduate.

4. CONCLUSION
From a review of the cadetship programmes currently being offered in Australia and New Zealand, it appears that employers, students, and tertiary institutions all benefit greatly from the long-term relationship created. There is potential for tertiary institutions to collaborate with IT employers and secondary schools to establish cadetship programmes that will attract students to move seamlessly from school into an IT career, while being able to undertake flexible study options. As provided in the discussion, there are various options for cadetship models that employers and educational institutions can consider, with most being focussed at diploma and degree level. Cadetship programmes could provide a win-win-win situation: a win for tertiary institutions who will increase enrolments in IT programmes and the ability to promote IT careers, a win for students who will be able to earn while they learn and gain soft skills critical to the workplace, and a win for the IT industry suffering from a critical skills shortage both now and in the future.

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