Exploring Role Transition and Professional Identity in ICT

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of an institution of higher learning.

Jamie Vaughan 26 September 2018

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Publications included in this Thesis

Vaughan, Jamie and Mann, Samuel. *Continuing Professional Development: Returning to Study through Work-Based Learning*. Paper Presented at ITx/CITRENZ 2018

Author	Jamie Vaughan	Samuel Mann
Approximate Contribution %	80%	20%
Contribution Description	Narrative and Autoethnographic Action Research; structure, editing and writing	MPP Overview, Heutagogical theory, academic standards and editing

Vaughan, Jamie; Mann, Samuel and Scott, Geoff. *Learning Frameworks: Practical Use of Self-Assessment Tools*. Paper Presented at ITx/CITRENZ 2018

Author	Jamie Vaughan	Samuel Mann	Geoff Scott
Approximate Contribution %	85%	10%	5%
Contribution Description	Narrative, benefits of exploration and adaptation of frameworks; structure, editing and writing	'Case Study' formatting, academic standards and editing	Flipcurric framework, discussions on approach

Vaughan, Jamie; Mann, Samuel and Clear, Alison. *Mapping Changing Professional Identity during Graduate IT Education*. Paper submitted for consideration, ACM SIGCSE 2019

Author	Jamie Vaughan	Samuel Mann	Alison Clear
Approximate Contribution %	75%	20%	5%
Contribution Description	Narrative and Autoethnographic Action Research; structure, editing and writing	MPP Overview, Heutagogical theory, academic standards and editing	Critical peer review, advice regarding target audience

Abstract

In completion of the Master of Professional Practice (MProfPrac) Degree, this thesis aims to demonstrate the series of significant positive changes undertaken by the practitioner during the programme, within the context of the Professional and Aspirational Frameworks of Practice. Initially motivated by a career transition from ICT Consulting to ICT Management, the changes described were guided by the MProfPrac programme as the practitioner came to challenge the limited personal and professional awareness that had characterised his actions prior to the transition. While many MProfPrac candidates submit a thesis detailing attempts at systemic change within an established role or industry, this thesis focuses on the learning opportunities both inspired and despite the career transition, and the subsequent impacts on both the practitioner and the employer. Through the process of Autoethnographic Action Research, an in-work project based on corporate cybersecurity practices and accompanying professional development provided a platform for the practitioner to observe changes within his own actions and attitudes, concluding that his resulting Professional Framework of Practice remains within a State of Flux, guided by a series of Mission Statements with a focus on technological literacy and education. Through ongoing engagement and education, it is intended that these developments continue to positively affect personal growth, influence the ICT strategy of the employer, contribute to the various technology-based communities and provide a precedent for future CapableNZ and SIGNAL ICT Grad School candidates.

Executive Summary

Through the MProfPrac programme, this Practitioner Thesis recounts the exploration of the role, responsibilities and development of a newly-transitioned ICT Manager within a legal services firm. The expected outcomes of the Learning Agreement were as follows:

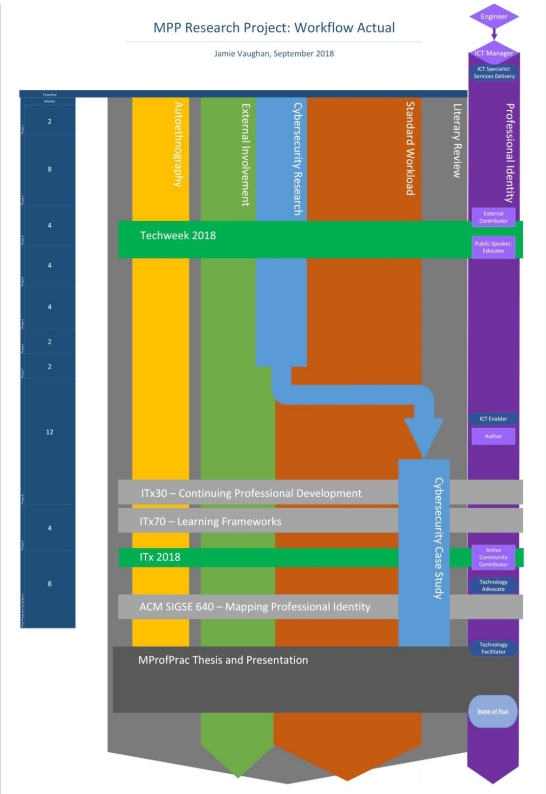
- Reconciliation of IT Operations and IT Strategy role requirements
- Professional expertise in matters of Cybersecurity
- Development of Project Management and Research Skills
- Development of Leadership and Accountability

Through a corporate cybersecurity project and the process of Autoethnographic Action Research, several key practice changes resulting from my learning path were noted:

- Continued learning through professional and relevant literature
- Continued self-assessment
- Contribution to Technology, Education and wider communities
- Public speaking and community engagement
- Collaboration with external organisations and causes
- Two professional cybersecurity case studies

Each of these shifts in practice represent an evolution of professional awareness, moving away from the technically-focused Systems Engineer role and towards the broadened requirements and responsibilities of ICT Management. Initially, my primary vehicle to observe these changes was the in-work project, envisioned as series of smaller cybersecurity projects chosen and informed by the results of ongoing research and model testing. This vision fell apart when the real-world technology and security requirements of the firm forced immediate action, unable to wait for its ICT resource to research and decide the best approach. Security concerns that were ear-marked for these projects were instead resolved out of necessity while performing my normal duties. Contributions to Techweek and ITx also blurred the lines

between personal and professional effort through appearance at external events representing both myself and Gallaway Cook Allan. Taking this into account, my in-work project plan has been recreated to more accurately portray these efforts and how they interact with one another.



On reflection, my Professional Identity is broad and highly varied, continually developing across internal and external roles. Rather than define this with a single comprehensive term, I define my Framework of Practice as remaining in a State of Flux, recognising that I expect development as an ICT Contributor, Advisor, Manager and Leader to continue long after the MProfPrac has ended.

Learning Outcomes	Achieved?	Change in Practice
Operations vs Strategy	Yes	Strategic matters are well in hand, however as the firm changes, operations will require constant monitoring and adjustment to maintain balance
Cybersecurity Expertise	Yes	Greater awareness of methods and concepts within cybersecurity, particularly penetration testing, informing Strategy
Project and Research skills	Yes	Project Sponsor during multiple ICT projects, Researcher and Project Manager during in-work project and conference papers
Leadership and Accountability	Yes	Acceptance of autonomy, responsibility, importance of decision-making and building working relationships

I have outlined and adopted 3 ICT Mission Statements to describe my current Framework of Practice and to guide my Continued Professional Development.

1. **To Enable and Advise**, providing ICT support and guidance to the best of my ability
2. **To Educate**, encouraging development of technological literacy and continued contribution to the ICT and Education communities
3. **To Collaborate**, continuing to assist and contribute to other individuals, organisations and causes for mutual benefit, both for the firm and for myself.

At the end of the MProfPrac course, I have found that my current Professional Identity within this context not only amounts to a confident, highly capable ICT practitioner, but also one that will continue to adapt to the constant change and innovation of technological trends and welcome the future challenges that come with them.

1 Introduction

Through the process of autoethnographic action research, this Practitioner Thesis demonstrates a series of significant positive changes I have undertaken, both within and resulting from ongoing evolution of my Professional Framework of Practice, particularly in relation to an emerging approach and professional philosophy towards improving technological literacy and education. This Practitioner Thesis describes how a sustained transformative period of professional education and engagement has stimulated positive personal growth, influenced the IT strategy of my employer, contributed to the various technology-based communities and provided a precedent for future CapableNZ and SIGNAL ICT Grad School candidates.

In a corporate context, the terms ICT and computing have come to describe the systems and services in which ongoing technological advances have been implemented by essentially every industry to aid the human workforce, with all its human flaws, to be as consistent, productive and therefore profitable as possible. The last decade or thereabouts has seen the rise of these systems as ‘disruptors’, the highly-publicised shift in corporate practices by companies such as Uber, Airbnb and Netflix, amongst many others, using technology to rewrite the rulebook of their respective industries and create an undeniable advantage over their traditional competition. In this time of constant change, argued by some to be an industrial revolution of greater scale, scope and complexity than any previous historical period (Schwab, 2016), the use of ICT and technological components are an inextricable part of the operating overheads of any business venture, in many cases potentially meaning the difference between success and failure. While these systems are getting smarter and more reliable all the time, there is still a human aspect required to design, implement and maintain them, with players such as Chief Information Officers, Chief Technology Officers, Managers, Consultants,

Engineers, Developers and countless other ICT practitioners of various skill-sets and job titles involved in all industries.

Comparable to other professional service providers such as lawyers and accountants, ICT is still in its infancy as a profession and almost completely unregulated. There is no equivalent to the bar or Law Society with a practice model incorporating mandatory membership, nor are practitioner job titles moderated by an authoritative policy requiring a tertiary degree, as is the standard practice for accountants; in a nutshell, the job titles associated with ICT Professionals can be whatever they or their employer like, potentially with little or no relation to their relevant level of skill. Someone with a smattering of computer knowledge and no qualifications can use the common title of Systems Engineer, as I initially did myself, whereas other firms might use this title for team members with comparatively higher skill or experience. When combined with the constant shifting and evolution of technology and the knowledge needed to support it, it can be challenging when attempting to define a fully formed Professional Identity within the context of the ICT industry. This Professional Identity is rooted in the perception of the individual by self and others, based on attributes, beliefs, values, motives, and experiences; in turn providing both projected and realised credibility as a professional practitioner, particularly for those experiencing a transitive stage in their career (Ibarra, 1999).

These concepts of perception and credibility describe my initial motivation when beginning the MProfPrac, as I began building both internal and external images of credibility within my transitioning role. As a technically-uncertified long-term Engineer[1] moving into a position of management, I sought to validate my status and existing skills as an ICT Professional while justifying my suitability for my new-found role; completion of a level nine tertiary qualification that integrates with my workload was an ideal solution. This thesis is intended as an exploration of these concepts surrounding development of Professional Identity, specifically

[1] Capital-E Engineer to differentiate between the Professional Identity and the role itself

how my mindset, motivations and behaviours have shifted through the combined processes of ongoing introspective reflection and evolution of my emergent Professional Framework of Practice.

Immediately prior to beginning my MProfPrac study, my career was subject to abrupt change, shifting from Consulting and Managed Services into Systems Administration. My existing professional skill-set and experience matched the initial job profile, see Appendix 1:, however the role itself was a recent addition for my new employer, brought about from the operational need for dedicated ICT resource but relatively unexplored beyond the basics of its duties and requirements. As such, my own adaptation to the unfamiliar aspects and added responsibilities of my new role were also reflected by the role itself, each attempting to find where we best fit within the firm and meet the demands of the changing technological environment. My personal and professional development resulting from this exploration has been guided by the MProfPrac process, allowing me to move past any inhibitions I had previously felt towards tertiary and industry education and providing a form of support for my emerging self-awareness and Framework of Practice throughout a period of sustained change.

In examining my former baseline Framework of Practice as an ICT Engineer, my professional skills were utilised for a variety of ICT support scenarios, ranging from the basic day-to-day through to the intermediate requirements for multiple unique clients and their respective infrastructures. Workflow was governed by prioritising and assigning job tickets via the consulting practice management system, their priority determined according to urgency, capacity and service level agreements, in my experience this is standard practice for technology consulting services. In shifting my career to in-house ICT, I left most of those considerations regarding workflow behind. Given I was supporting one system instead of many following my change in role, the need to manage services delivery became a responsibility of the role: to prioritise any ICT considerations as they arose and manage them accordingly, granting considerable, yet unfamiliar, autonomy to get the job done. As the previously

unknown requirements of Systems Administration became apparent and shifted into that of ICT Management, my responsibilities came to include aspects of vendor management, researching technology options and ICT strategy, all of which required thinking at levels that my former role was simply not exposed to. As an Engineer, I would occasionally advise a client at a fundamental level, such as the best software or workstation to invest in, while the more senior team members, typically referred to as System Architects, would advise and plan out entire systems or solutions; my own involvement in the advanced proposals would be to assist in their implementation. In contrast to this, as a Manager[2] my responsibilities included advising the firm on technological matters, such as improvement, replacement and best practice; above all, it was also my responsibility to resolve any ICT issues that may arise. In situations where my own skill set is not enough, part of my role is finding the solution from another vendor or source. Through these significant and occasionally subtle changes in practice, my overview of business ICT practice and responsibility had expanded to include a technological sphere of influence far greater than anything I had previously been prepared for.

In undertaking the MProfPrac, the ongoing literature review, in-work project, Review of Learning and Learning Agreement, see Appendix 2, all contributed to developing my skill sets, further informing my reasoning and decision-making skills and assisting my Framework of Practice as it naturally adjusted to the continually-shifting requirements of my professional environment. Part of this greater awareness has also provided insight into other possibilities that extend beyond the context of my current employment. Though my job title is ICT Manager, I have also involved myself professionally with other organisations, such as the Institute of ICT Professionals (ITPNZ) and Techweek NZ, utilising my developing credibility to contribute to other communities. This has included several instances of public speaking and sharing my

[2] Like Engineer, Capital-M Manager to differentiate between the Professional Identity and the role itself

expertise; this type of involvement is not something I would have remotely considered in my previous role.

The impacts of these changes in practice have been widely felt, at both personal and professional levels. For me individually, I have become far more confident in my capabilities and more comfortable with where I fit within the broad ICT spectrum. My research and the insights from it have dispelled many of the doubts and anxieties I once suffered as a practitioner, that many of the development paths I once considered beyond my abilities are well within the realms of possibility. Simultaneously, such revelations motivate me further to continue my education and enable others to do the same. Within my employer, the impacts have been broadly felt; some are the natural result of an experienced practitioner being given free reign, such as stabilising previously unreliable aging systems through hardware upgrades and resolution of chronic software problems, while many others have been due to continued professional development, such as the added value to business strategy when exploring ICT solutions and continued integration of existing systems. In many respects, these impacts will be ongoing; the in-work project will direct the cybersecurity efforts within my role for several years following completion of the MProfPrac, as will my efforts to encourage ICT-related topics as a regular part of our internal Continued Professional Development programme. Similarly, I also expect to continue working with external organisations, assisting ITPNZ, volunteering for Techweek and sharing my experience with others. These too have value to me, not only in the experience gained from doing so, but also in the exposure to other communities, both for myself as well as my employer.

Coming to the end of the MProfPrac process, I have reflected heavily on both my Professional and Aspirational Framework of Practice, currently this is perhaps best described by terms such as Technological Facilitator or Advocate, among many other possibilities. In taking a step back from reaching this type of denomination, we can analyse what key concerns and questions have been addressed in undertaking the MProfPrac programme. Firstly, in what

ways has the perception of my professional identity changed throughout this process? This includes self-perception as well as the image projected to those I interact with, both internal and external to my employer. Secondly, to what extent has my motivations as an ICT professional changed, concurrently and contributing to my professional identity? This relates mostly to the awareness, mindset and supporting philosophies that have further developed through my period of professional introspection. Lastly, if only within the context of the MProfPrac how has attempting to answer the two preceding questions affected my Aspirational Framework of Practice and long-term plans for professional development?

As the terms Facilitator and Advocate imply, my primary considerations within this framework concern the enabling and advising on the technological capabilities and development of the organisations I work with, encouraging the ongoing education of its users so that they can maximise the benefit gained from their systems. This definition also applies to areas outside my employment, in that this form of facilitation also incorporates my contributions to external organisations and the wider ICT community. Having said that, these terms are extremely broad, and can be replaced my many other titles, as I have in previous documents. In my Learning Agreement, see Appendix 2, I used a long-winded description of an ICT specialist, replaced in my first ITx paper, detailed in section 3 of this thesis, with the term ICT Enabler, and again in the paper for ACM SIGCSE 2019, detailed in section 5, to ICT Advocate. The same applies to my job description of ICT Manager, or some arbitrarily chosen term such as ICT Advisor. Thinking further afield, descriptions from common personality tests could also be relevant, such as the Protagonist archetype of the Myers-Briggs test (16personalities, 2018). Similarly, definitions of Professional Practice itself can be interpreted several different ways, such as practising within a profession, in my case ICT support of legal services, or treating professionalism and enacting professional attitudes as a practice in its own right. There are also connotations to the term Professional that imply greater moral and ethical standards, and, perhaps most importantly, the distinction between a professional

practitioner and an amateur one (Green, 2009), each of these definitions contributing in their own way to my reflection on Professional Identity. Regardless, in some sense or interpretation, any or all of these terms could be considered accurate. Taking these thoughts relating to definitive practitioner terms into account, the only conclusion I can comfortably reach is that these terms become interchangeable, meaningless labels for the same or similar collection of duties that cannot comprehensively describe the entirety of my portfolio of professional capability. As such, the articulation of my Professional Framework of Practice is that it is currently in a state of flux, constantly adjusting and evolving with environmental requirements; instead, I have opted to define my practice within the scope of a broad leadership vision, through the use of a series of ICT Mission Statements in lieu of a specific title (Bennis & Nanus,1985; Mintzberg et al, 1998; High, 2014):

Mission 1: To Enable and Advise. This includes a broad spectrum of duties, from ensuring the firm and any others I support are operational on a day-to-day basis, to providing a high standard of department management and advising the wider management team regarding critical ICT functions and implications, including ICT Strategy.

Mission 2: To Educate. ICT and Computing technology is not only constantly changing, but it is doing so extremely rapidly, in some cases leaving users behind as systems and interfaces change beyond recognition. Technological literacy is a problem faced by all demographics, regardless of age, occupation or any other reason.

Mission 3: **To Collaborate**. Collaborative efforts with other organisations can be highly rewarding, resulting in mutual benefit to all organisations and communities involved; contribution outside the firm has become a fulfilling aspect of my ongoing Professional Framework of Practice and development.

I am aware that ‘a state of flux’ is not a clear definition, for example I cannot point to a specific category in the SFIA Framework, explored further in section 7.1, that comprehensively defines all that I do (SFIA Foundation, 2018), which. Nonetheless, I am at ease with this conclusion given that I expect to continue to learn, grow and develop as a professional long after my MProfPrac studies are complete. This mindset constitutes an observable change of practice, in that without formal qualifications or productive sense of self-awareness, my former Engineer identity was dependent upon the job title of Engineer for perception of credibility, as much for myself as for others. Through the introspective mechanisms of the MProfPrac, my levels of awareness and emotional intelligence have been lifted far beyond my formerly narrow frame of thinking, to the point that the emotive link between job title and credibility prevalent in my previous role is no longer relevant. This mindset has been integrated into my actions as much as it has my thoughts, as will be demonstrated and evidenced in this thesis.

2 Methodology

The Methodology employed throughout my MProfPrac process has remained constant, recording and reflecting upon my own thoughts and actions via autoethnographic action research while my work practice has evolved. Performing this type of cultural anthropology of my own professional identity has facilitated the observation and analysis of developmental trends and significant shifts within my personal and professional awareness during this time, as my emergent identity was frequently subject to review and change of direction as new and previously unthought of options became apparent. This section describes the most significant of the experienced changes within my emergent practices.

2.1 Approach to Literature Review

Rather than having an isolated "Literature Review" as a noun – a section in the thesis – I have taken the approach of treating my literature review as a verb – an ongoing process of critical and curious reading that has informed everything I have done on my MProfPrac journey. Despite being a strong reader at an early age and continuing this habit through primary and secondary school, my inclination to read recreationally appeared to sharply decline since leaving University in 2005, other than the occasional novel and the countless number of ICT forums when some problem or another needed external research to resolve. The only non-fiction books read, albeit reluctantly, during my previous role were primers in preparation for the Microsoft Certified Solutions Associate examination; on reflection it appeared that the act of educational reading was not a high priority for my Engineer identity, I have little doubt this is a main contributing factor to the slow rate of professional development during this time. Since beginning the MProfPrac, Literature Review has come to represent one of the most notable changes in practice: learning via reading has become a regular part of my work and personal lives.

As my duties and interests in the ICT sector have expanded, so too has my interest in the breadth of relevant content across all forms of media, though particularly non-fiction books relating to technology, strategy, business skills and personal development. Part of this change has included an entirely new practice to me in notating books and highlighting the parts that I believe are most relevant to me, making notes as needed. The difference between this and my previous attempts to study is night and day, in actively notating what I read, I have found the information retained is immeasurably greater. This alone has been valuable enough, however as my library grew, so too did the number of relevant ideas, arguments and conclusions drawn by different authors on similar subjects; I have found a great deal of enjoyment in finding the links between different works by different authors, occasionally even across different genres, and how their conclusions complement or diverge from one another. For example, the enthralling *Sapiens* by Yuval Harari details theories regarding the evolution of the human brain and how the environmental conditioning of our evolutionary precursors has had lasting psychological effects on their forebears, such as our current susceptibility to anxiety arising from a relatively rapid escalation to the status of apex predator without appropriate supporting instincts or evolutionary preparation (Harari, 2011). Similar, if simplified, concepts were discussed in Michael Nicholas' *Little Black Book of Decision Making*, noting that the 'fight or flight' response, portrayed within the context of management and decision-making scenarios, relates to neurological nuances left over from earlier evolutionary iterations, in which our base emotions can have significant effect over our higher cognitive functions, impeding our ability to think rationally (Nicholas, 2017). Prior to reading these works, I had little interest in human evolutionary theory, but in approaching them with an open and receptive mind, I found the subject fascinating and genuinely entertaining.

Consequently, these arguments relating to emotional response informed my work during Techweek. In discussing Online Safety, these concepts were presented as identifying the workings of a scam: triggering the anxiety of the target via deception and forcing a fight or

flight response that benefits the scammer. Including these ideas within my own presentations also lead to another habit that I was not consciously aware of at the time: fact and source checking. Despite finding the books in my reading list highly interesting, when it came time to present some of this information in support of my own message, it seemed the right way to go about it was to be relatively certain that the information was accurate and that sources are valid, even if it was just a quick google search. It is now almost second-nature to, at the very least, check the references and origins used in a given work and note those that would be worth reading myself, facilitating ongoing Literature Review. Given I am not comfortable with writing on a new book, notation in this manner has given rise to a new hobby of perusing used book stores, looking for old copies of professional development staples to notate and fill the small bookcase I keep behind my desk. Interestingly, it also demonstrates technological disruption, in that my previously under-utilised Kindle has seen almost daily use as I notate my digital copies to my heart's content. Regardless, the Literature Review aspect of my MProfPrac efforts has encouraged a very healthy attitude and appreciation for relevant literature in Continued Professional Development.

While my in-work project focused on cybersecurity, my MProfPrac efforts came to explore a broad variety of subject matter, which is reflected in my Literature Review, including the papers referenced within the conference papers encapsulated in this Thesis. Relating to cybersecurity, I have relied upon the works of notable authorities such as Bruce Schneier and Kevin Mitnick, with multiple books from each author providing context to the behaviours adopted by my Engineer identity, explaining a great deal about the security practices I was taught over a nine-year period but did not fully appreciate at the time.

As considerations relating to ICT Strategy and Business Awareness became prevalent, *Implementing World Class IT Strategy* by Peter High and *The Little Black Book of Decision Making* by Michael Nicholas have been of great benefit, supported by Schwab's *The Fourth Industrial Revolution* and Mintzberg et al with *Strategy Safari*; future reading is planned with

Senge's *The Fifth Discipline* and the works of Malcolm Gladwell, John Kay and Herminia Ibarra.

Herminia Ibarra is cited often in this thesis relating to Professional Identity, given her work that accurately describes parallels to my own experiences, primarily her 1999 paper *Provisional Selves*. This is supported by a paper by Douglas T Hall, alongside several papers that are included within the references of the included conference papers, such as works by Reed Stevens et al, a paper by Sfard and Prusak and a response to Sfard and Prusak by Juzwik and the resulting dialogue.

Several books relating to educational and personal development were also included in my reading list, with the intention of keeping my thought processes grounded rather than lost in a haze on unexplored potential. *The Subtle Art of Not Giving A Fuck* by Mark Manson was highly entertaining and insightful, as was *Sapiens* by Yuval Harari, with future reading planned for Harari's *Homo Deus* and *21 Rules for the 21st Century*. These works have prompted discussion with several of my colleagues and, cliché though it may be, I genuinely hope this discussion leads to the formation of an informal book club within the organisation.

Finally, the Heutagogical theory behind Autoethnographic Action Research itself was informed by several papers, such as *From Andragogy to* Heutagogy by Hase and Kenyon, *Heutagogy and Lifelong Learning* by Blaschke and *Designing for Heutagogy* by Mann et al. *Executive development through insider action research* by Coghlan et al appears as a reference in the conference papers as well.

2.2 Autoethnographic Action Research

As the primary vehicle for practitioner research within the MProfPrac programme, Autoethnography has been a constant companion throughout my work over the last twelve months. Defined in three cited papers, Autoethnographic Action Research is the heutagogical approach to adult learning, in which the learner operates largely autonomously on a self-

determined learning path. This process is guided by a facilitator rather than a traditional authoritative instructor-student learning structure, enabling the learner to become their own primary educational motivator through introspective analysis of their thoughts, actions and experiences (Hase & Kenyon, 2000; Blaschke, 2012; Mann et al, 2017). Within the context of the MProfPrac, this is initiated by separate stages that formally define the learning objective and relevant graduate profile, followed by a period of ongoing introspection and reflection on thoughts, attitudes and behaviours of the learner, collectively referred to as the Framework of Practice, in the natural course of their employment. In concluding this period of reflection, the learning opportunities and outcomes are expected to align with the professional development of the learner, as demonstrated by the observable change in their Framework of Practice.

My own approach to Autoethnographic Action Research loosely follows the precedent set by Douglas T Hall, who, through the medium of first-person narrative recounting his experiences, describes the challenges faced following his temporary appointment as acting Dean of an academic institute. Through this narrative, Hall details how his professional practice adjusted to cope with the additional expectations and responsibilities of his interim role, alongside concerns relating to the internal political implications within his department that resulted from his placement at its head (Hall, 1995). Like Hall, following my role transition to ICT Manager, I found myself in a position of far greater responsibility than I had expected, with the operation of infrastructure supporting a multi-million dollar business now resting squarely on my shoulders. Fortunately for Hall, his scenario was set to a limited time, the requirement that he stand aside when a replacement was found was firmly founded at the outset of his appointment. In my case, I have no such time limit; my professional practice has come to be defined, at least in part, by constant improvement both of myself and the systems and users I support, with the expectation of even greater responsibility as this development continues.

At the outset of my employment with Gallaway Cook Allan, my own Framework of Practice began as a Systems Administrator, providing basic technical support and advice to

a moderately-sized legal services firm, This evolved into ICT Management almost immediately given that I was the sole ICT resource and responsible for the operation of our ICT infrastructure, my reflection of this time is described in papers written for the ITx 2018 and ACM SIGCSE 2019 conferences, detailed in sections 3 and 5 of this thesis. While both papers focus on change in practices, the first paper, written for ITx, focuses primarily on exploring the initial stages of the MProfPrac and how they have directly influenced personal and professional development, while the second, intended for the ACM SIGCSE conference in 2019, has been informed by further reflection throughout the final stage of the MProfPrac and focuses on the development and expectations of emerging Professional Identities. While these papers stand on their own as contributions to the discourse regarding andragogy and heutagogy within the educational sector, they also served a more personal function in that the narrative within them captures my thought processes, reflection and epiphanies, or which there were many, in turn providing evidence of personal growth during a time of life-altering change.

2.3 Techweek 2018

The Techweek festival began in 2012 as a week-long festival in Auckland, celebrating and promoting tech industries and innovation. Arranged via the advocacy organisation NZTech, the success of the festival lead to the formation of Techweek in 2017, as described on their website:

> "A nationwide initiative with a curated programme focused on 'finding local answers to global questions'" (Techweek.co.nz, 2017)

I remember a vague awareness of the events in 2017, though I did not participate, likely due to the events coinciding with my MProfPrac efforts beginning during the same month. The discussion regarding Gallaway Cook Allan making some contribution to the 2018 events were mentioned in passing in the last weeks of 2017 by Kylie Jackson of SIGNAL ICT Grad School,

in her role as co-ordinator of the Dunedin Techweek events. My work on the Learning Agreement and exploration of the potential areas of growth within my role had touched on the possibilities of collaboration with other organisations, though at the time other organisations meant, at least in my head, ITPNZ. Despite my own uncertainty of what I could bring to the table, Techweek piqued my curiosity and I expressed my interest in assisting where I could. In early 2018, I joined the Dunedin Techweek committee with the expectation of being another head and set of hands to help as required.

2.4 Techweek Committee

The committee meetings were somewhat bewildering at first, with many ideas being discussed such as hack-a-thons, industry conferences and debates, many of which apparently relying on a wish-list of prominent local and national public figures to host and attend; given my former tendency to keep to myself, naturally I recognised very few names on this list. Nonetheless, the excitement of the other committee members was contagious, over the course of three months and many meetings, the ideas we discussed moved closer to reality, often driven by the sheer tenacity and dedication of Kylie and her lieutenants, facing off against the usual Dunedin tendency towards complacency and last-minute scheduling that has been known to kill many local events before they even start. Through these discussions, I also learnt a great deal about the local technology and business communities, such as who the main players are and how they work in with everyone else, many of which being individuals or organisations with varying degrees of association to the firm. Other than providing a helping hand, my contributions to Techweek came to include PowerPoint and technical assistance during a discussion panel, facilitating a presentation about digital distribution of New Zealand music and running five presentations of my own regarding the importance of Online Safety. While the concept of professional networking was not new to me, experienced on a smaller scale during networking events hosted by the firm, the Techweek committee was my first

glimpse at how sustained collaboration towards common goals can result in both meaningful contributions to a community of my peers and a highly fulfilling experience for myself.

2.5 Online Safety Presentations

One of the possible ideas from the committee brainstorm was a Techweek session aimed at the under-represented senior citizen demographic. The 'Tech for Seniors' session caught my eye mainly due to the small number of personal 'clients' that I have informally provided ICT advice to in the past, a motley group made up of family friends, friends of friends and staff members of the companies I have worked with in my official capacity as an Engineer. Most of this group match the 'senior citizen' description, as such I felt I had some experience and prior knowledge of the concerns and questions that a Tech for Seniors session could address and volunteered to organise a relevant event. Given my focus on cybersecurity through the in-work project, described in more detail in section 6, the subject of Online Safety was decided upon and a presentation informed by my experience and ongoing research was created, aimed at a technologically literate but non-technical audience. In writing the presentation and supporting pamphlet (Figure 1, Appendix 3), my intent was to create something interesting and informative, but above all else I was determined to provide a positive experience for my audience that left them feeling like they had learnt something useful. A concern that arose in creating this positive content was the nature of Online Safety itself; discussions relating to computer malware, scam attempts, and unknown threats do not normally make for upbeat conversation. The purpose of the presentations was to dispel anxiety, to help others use their best judgement to make decisions appropriate to their preferred technology; resorting to fear tactics would only achieve the opposite with panic and indecision leading to poor choices (Schneier, 2003; Mitnick & Simon, 2005; Nicholas, 2017). Schneier's *Beyond Fear* articulated a key message positively and effectively, in that security of any form must be approached as a trade-off; usually security measures provide function in exchange for monetary cost, however in cybersecurity this leads to other considerations such as the impact an anti-malware

application may have on system resources, or the inconvenience factor of using additional authentication methods to remotely access production systems.

Another aspect of security explored in these presentations was the fight or flight response, demonstrating through several email and browser-based examples of attempts to deceive an unwitting user, the scammer using false statements and illusion of authority to cause a negative emotional reaction in their target, immediately followed by a means of resolution of the negative emotion. An example is that of a false virus warning, where a pop-up window will alert the user to a virus, then direct them to a phone number to contact friendly operators that can assist in its removal. However, no virus exists, and the friendly call centre will happily take a credit card payment in exchange for doing nothing, whether the user knows it or not. Rather than focus on the scare tactics used in the examples I presented, I focused on how to recognise these situations as a ruse and identify the tell-tale signs that an alert or email is far from genuine; for example, URLs or email addresses supposedly from vendors such as Microsoft or Apple that do not match the domain of the website or email alerting the user. I also attempted to promote a healthy attitude towards seeking help, that ICT professionals understand that these things can be confusing, and that no one should be scared to ask for assistance.

The feedback following the presentations was overwhelmingly positive, I am confident that many audience members left knowing at least a little bit more than they did before they entered, even more so for those that took a copy of the pamphlet I had written to accompany my talks, see Figure 1 and Appendix 3. In relation to my own Framework of Practice, the act of engaging with the community was extremely enlightening (Otago Daily Times, 2018). Not only did I feel a sense of fulfilment in making an impact of some kind for others, but in my audiences, I noted very similar attitudes and concerns about technology and security to that of my colleagues in Gallaway Cook Allan. Adding to this notion was a growing realisation that the information regarding safety practices with consumer-level technology was just as relevant

to those operating in a corporate environment, even with the many added business cybersecurity solutions and overlapping layers of protection. These revelations would later be reflected upon and used to further inform the cybersecurity case study, detailed in section 6 of this thesis.

Attackers count on emotional reaction!

If the worst happens, don't panic!

- Use common sense
- Stop and think about what is really going on and why
- If in doubt, turn the device off and seek advice

There are many service providers available, find one and build a trusting relationship with them, just as you would with a doctor, hairdresser or mechanic. For many issues, a quick google may be all you need.

Above all else, your technology is here to help, we need not be anxious to use it! While it pays to be mindful of the concerns discussed in this session, do not let them stop you from using your technology to have fun and do wonderful things.

techweek.co.nz/whats-on

tech-week 2018 OFFICIAL EVENT

Tech for Everyone:

A Guide to Online Safety

Tech Week, 19 -26 May 2018

Presented by Jamie Vaughan, MIITP

ICT Manager for Gallaway Cook Allan

GALLAWAY COOK ALLAN LAWYERS

Remember your Security ABCs:

A: Antivirus or Antimalware

- Paid products are generally low-maintenance
- Free products pay for themselves through advertising
- Many brands but all do the same general thing, don't overthink it!
- All will use space and resources on your system

B: Backups

- Same Paid vs Free situation as with Antivirus software
- Many brands doing the same thing
- Usually built in to an operating system or bundled with Antivirus
- Removable options are likely the best for most scenarios

C: Critical Updates

- Always built-in, often neglected
- Do not interrupt updates once they have started
- Updates will stop when a system goes end-of-life

Why do these attacks happen?

Almost always for financial gain, or for gathering information for other attempts to steal from yourself and others.

Typically, these are opportunistic attacks. You as an individual would not be targeted unless there was very good reason.

Things to look out for:

- Cold Calling (Microsoft calls): Companies like these will not call you in this manner
- Advance Fee Scams: there is no large sum of money that a complete stranger will send to you
- Identity Fraud: be wary of emails from trusted institutions asking for your personal information
- Extortion: blackmail attempts are generally a bluff

Email tips:

- Check the sender name and email address
- Check the context of the email
- Check the links and attachments

Keeping yourself safe

Internet tips:

- Listen to your browser and antivirus if they say something is wrong
- Check the address/URL of the site if you suspect something is wrong
- Check the address of any links that sites or emails redirect you to

Privacy concerns:

- All providers collect data!
- Be mindful of your browsing and that others may be watching
- If it is free, you are not the customer!

Harassment:

- Knowingly false assertions
- Information shared without permission
- Attacks on ethnicity, gender, sexual orientation or disability
- Indecent, obscene, grossly offensive, menacing or threatening comments and actions

Contact Police or netsafe for further advice

www.netsafe.org.nz

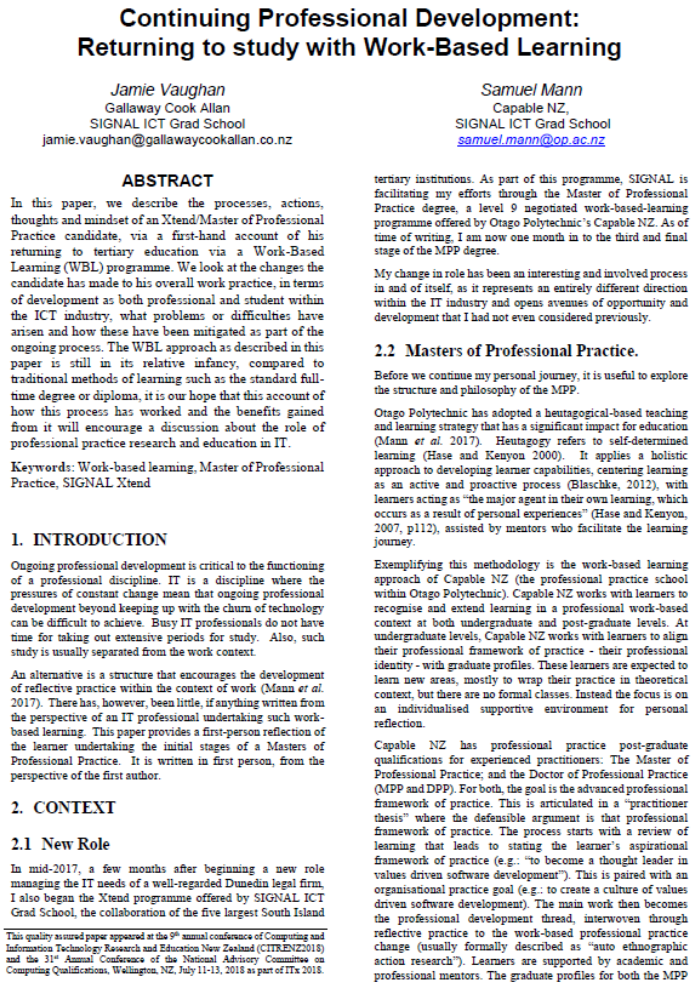
Figure 1: Online Safety Presentation Brochure

2.6 Conference Papers

An important aspect of Autoethnographic Action Research is the ability to record it in some way, any important lessons or epiphanies experienced during the process would otherwise be lost and the learner would gain nothing for it. My own experiments with capturing my reflective thoughts were mixed, dictation was suggested during my Learning Agreement, but I found the sound of my own voice was both disconcerting and distracting. A written journal worked well so long as I remembered to keep it with my laptop, which was not often. Before long I had settled on a means of recording with multiple access points and a degree of backup and redundancy, the journal function in Microsoft Outlook. This was more than effective enough at the beginning of the process, however given the direction and potential academic value of my reflection, Professor Mann suggested my efforts be channelled into something more constructive, with the upcoming ITx conference being an obvious choice. Writing a conference paper was a daunting prospect to begin with, I describe the conflicting emotive state in the Professional Identity paper included in section 5, as my former Engineer identity tried to remain within its safety zone while my new Manager identity, so intent on community involvement, was doing all it could to break out. Old habits gave way to new, leading to the creation of three papers, the first two presented at the ITx conference held in Wellington during July 2018 (ITx, 2018), the third currently under peer review for the ACM SIGCSE conference, scheduled for February-March 2019 in Minneapolis, Minnesota. The following sections include each of these papers and the benefit each had to my ongoing MProfPrac process.

3 ITx 2018: Continuing Professional Development

Co-authored by my facilitator, Professor Mann, the first attempt to write a paper was a narrative-based description of the first stages of my MPP study, supported by detailed analysis of the heutagogical concepts surrounding my narrative as referenced by Professor Mann. This paper demonstrated the thought processes and development at the time, during the formative self-discovery stages of the MPP process (Figure 2)[3].



Continuing Professional Development:
Returning to study with Work-Based Learning

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ABSTRACT

In this paper, we describe the processes, actions, thoughts and mindset of an Xtend/Master of Professional Practice candidate, via a first-hand account of his returning to tertiary education via a Work-Based Learning (WBL) programme. We look at the changes the candidate has made to his overall work practice, in terms of development as both professional and student within the ICT industry, what problems or difficulties have arisen and how these have been mitigated as part of the ongoing process. The WBL approach as described in this paper is still in its relative infancy, compared to traditional methods of learning such as the standard full-time degree or diploma, it is our hope that this account of how this process has worked and the benefits gained from it will encourage a discussion about the role of professional practice research and education in IT.

Keywords: Work-based learning, Master of Professional Practice, SIGNAL Xtend

1. INTRODUCTION

Ongoing professional development is critical to the functioning of a professional discipline. IT is a discipline where the pressures of constant change mean that ongoing professional development beyond keeping up with the churn of technology can be difficult to achieve. Busy IT professionals do not have time for taking out extensive periods for study. Also, such study is usually separated from the work context.

An alternative is a structure that encourages the development of reflective practice within the context of work (Mann *et al.* 2017). There has, however, been little, if anything written from the perspective of an IT professional undertaking such work-based learning. This paper provides a first-person reflection of the learner undertaking the initial stages of a Masters of Professional Practice. It is written in first person, from the perspective of the first author.

2. CONTEXT

2.1 New Role

In mid-2017, a few months after beginning a new role managing the IT needs of a well-regarded Dunedin legal firm, I also began the Xtend programme offered by SIGNAL ICT Grad School, the collaboration of the five largest South Island tertiary institutions. As part of this programme, SIGNAL is facilitating my efforts through the Master of Professional Practice degree, a level 9 negotiated work-based-learning programme offered by Otago Polytechnic's Capable NZ. As of time of writing, I am now one month in to the third and final stage of the MPP degree.

My change in role has been an interesting and involved process in and of itself, as it represents an entirely different direction within the IT industry and opens avenues of opportunity and development that I had not even considered previously.

2.2 Masters of Professional Practice.

Before we continue my personal journey, it is useful to explore the structure and philosophy of the MPP.

Otago Polytechnic has adopted a heutagogical-based teaching and learning strategy that has a significant impact for education (Mann *et al.* 2017). Heutagogy refers to self-determined learning (Hase and Kenyon 2000). It applies a holistic approach to developing learner capabilities, centering learning as an active and proactive process (Blaschke, 2012), with learners acting as "the major agent in their own learning, which occurs as a result of personal experiences" (Hase and Kenyon, 2007, p112), assisted by mentors who facilitate the learning journey.

Exemplifying this methodology is the work-based learning approach of Capable NZ (the professional practice school within Otago Polytechnic). Capable NZ works with learners to recognise and extend learning in a professional work-based context at both undergraduate and post-graduate levels. At undergraduate levels, Capable NZ works with learners to align their professional framework of practice - their professional identity - with graduate profiles. These learners are expected to learn new areas, mostly to wrap their practice in theoretical context, but there are no formal classes. Instead the focus is on an individualised supportive environment for personal reflection.

Capable NZ has professional practice post-graduate qualifications for experienced practitioners: The Master of Professional Practice; and the Doctor of Professional Practice (MPP and DPP). For both, the goal is the advanced professional framework of practice. This is articulated in a "practitioner thesis" where the defensible argument is that professional framework of practice. The process starts with a review of learning that leads to stating the learner's aspirational framework of practice (e.g.: "to become a thought leader in values driven software development"). This is paired with an organisational practice goal (e.g.: to create a culture of values driven software development). The main work then becomes the professional development thread, interwoven through reflective practice to the work-based professional practice change (usually formally described as "auto ethnographic action research"). Learners are supported by academic and professional mentors. The graduate profiles for both the MPP

This quality assured paper appeared at the 9th annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2018) and the 31st Annual Conference of the National Advisory Committee on Computing Qualifications, Wellington, NZ, July 11-13, 2018 as part of ITx 2018.

Figure 2: The submitted version of ITx 2018 paper 30

[3] In the interests of keeping the published paper as a coherent whole, figure 2 is repeated within the encapsulated paper *Continuing Professional Development: Returning to Study with Work-Based Learning*

Figure 3: The Alison Young Best Research Paper award and its 2018 winners

This paper demonstrated my state of mind at the start of 2017, still coming to grips with balancing the responsibilities of my occupation with the possibilities of wider involvement in the ICT sector. The act of authoring a paper represents a change in practice, it had not occurred to me as an option prior to discussion with Professor Mann. With this change in practice came a new set of tools and skills with which I would need to familiarise myself, such as the EasyChair academic paper platform and the writing styles and formats that a potential reader would expect. Part of this change in practice included overcoming thoughts relating to why I would pursue this course of action, the limitations of my former role still impacting my

state of mind and creating doubts as to why my work would be of interest to anyone. These thoughts were unfounded, fortunately the strides made in self-awareness, emotional maturity as a professional and the guidance of my mentors and role models meant that these doubts could be worked through; the paper was not only accepted into the quality assured CITRENZ sub-conference at ITx, but the paper went on to win the Alison Young award for best research paper, the large trophy that now sits on my desk proving beyond a doubt that my contributions are of value in a way I had not thought was possible (Figure 3).

Like my literature review, now that I had seen first-hand what I can do and how enjoyable and beneficial the process can be, it was apparent that the exploratory aspects of my role allowed for ongoing experimentation with emerging technologies, trends and attitudes, as well as the reception it elicits from my audiences, all of which makes for interesting and potentially valuable research data; as such, it became my intention that a meaningful output of academic and white papers should be part of my ongoing Framework of Practice. This intention was immediately tested, as large portions of useful information relating to the use of Learning Frameworks was removed to adhere to the conference policies relating to paper size limitations. As such, research questions relating to the use of these frameworks could now be considered separate from the original paper, resulting in work beginning on a second accompanying paper, detailed in the following section.

Continuing Professional Development: Returning to study with Work-Based Learning

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and DPP are written in terms of higher levels of thinking in a post-disciplinary sense, rather than for specific disciplines.

Hase and Kenyon (2000) place responsibility of heutagogy with the student where they are able not only to engage in a process of knowledge creation, but also have the opportunity to determine their learning experience from the influence of their professional practice. This then, means a loop is created between the doing and the learning, whereby the reflection provides a perspective on the work practice which both improves that work practice and aggregates for the learning to the high level of critical awareness and leadership aimed for in the aspirational professional framework of practice.

2.3 Approach

In keeping with the role of this reflective loop, in this paper we employ reflection as the vehicle for describing the processes, actions, thoughts and mindset of a Master of Professional Practice candidate, via a first-hand account of his returning to tertiary education via a WBL programme. We look at the changes the candidate has made to his overall work practice, in terms of development as both professional and student within the ICT industry, what problems or difficulties have arisen and how these have been mitigated as part of the ongoing process. The WBL approach as described in this paper is still in its relative infancy, compared to traditional methods of learning such as the taught masters or research masters not in a professional practice context, it is our hope that this account of how this process has worked and the benefits gained from it will encourage a discussion about the role of professional practice research and education in IT.

3. IT PROFESSIONAL PRACTICE

Jumping ahead to the conclusion, it is worth stating at that outset that MPP qualification process has had multiple significant benefits to my role as ICT Manager, especially so given that it is such a drastic departure from the IT roles I have held previously. Considering my background and progression thus far, the MPP programme is essentially the ideal solution, solving the roadblocks and obstacles I face in my ongoing development requirements, both as a professional and academic. The following first-hand account has been written solely for this paper: to describe my own personal journey through the MPP programme thus far, and while sometimes challenging, these challenges have enhanced the benefits seen not only by myself and my employer, but in all aspects of day-to-day life.

3.1 Career Development

Immediately prior to taking up the challenge of the MPP programme, my shift in employer meant an equally significant shift in how I operated professionally. For nine years I worked as an intermediate-level engineer, providing broad IT services and advice across a large and varied client base. Instead, I was now working as an in-house ICT resource, responsible for ensuring that 75 professionals could log in and work on any given day, my mindset while at work had no choice but to adjust accordingly.

In those previous nine years, I had worked for an IT consulting firm, initially in their consulting team, and later with the managed services and service desk teams. My workload consisted mainly of systems administration, break-fix and installation, the work was managed by the individual but the workflow was managed centrally. Despite this, my level of responsibility was somewhat low, matching my perception at the time that my progression path as a consulting engineer was somewhat limited. For those who, like me, preferred not to develop into the niche levels of advanced systems, I came to feel that my work experience, without the motivating factors of responsibility and relevant industry development, was highly linear and unfulfilling. In hindsight, I do take responsibility for my part this; a lack of initiative and ambition did not help, my mind also firmly reiterating the narrow point of view around my work environment. I remember experiencing an overwhelming feeling of limitation, not just by the work but also by my own attitude towards it. The saving grace that made me happy to continue in that situation was the people; co-worker and client alike, I am pleased to say I left there on good terms, I still count my former colleagues and clients among my friends and acquaintances.

It was how I interacted with people that made my transition away from consulting possible, proving the point that it's not what you know, but who you know; that relationship-building is a vital aspect of the typical role in the IT industry. My real strength as an engineer lay in how well I related to the users I was supporting more so than the systems – very early in my consulting career it became clear that the people are the key component: learning what a system needed to run properly depends mostly on the people using it. Given this realisation, my focus became my working relationships with my clients; for many of whom I became the first point-of-contact, building up a strong level of mutual respect and trust that results from getting the job done with my client's best interests at heart.

In early 2017, the efforts of a Dunedin-based client to find a new ICT manager coincided with my own thoughts of potentially changing career. IT was all I knew since dropping out of a BA in Music in 2005, my concerns at possibly requiring a change in field were apparently unfounded. I jumped at the opportunity provided by a firm whose systems I was familiar with, a firm that knew who (and what) they were getting in offering me the position. Most importantly, I soon found how profoundly and horrifically *wrong* my whole outlook on an IT career had been.

There was a considerable culture shock involved in moving away from consulting. It started with a sudden lack of managed workload and timesheets, followed by a vast increase of responsibility and autonomy, not to mention greater freedom to get on with the work at hand (at least, without worrying who would be paying for it). Over and above this, I was, for the first time in nearly a decade, working as part of the team and supporting only one system, rather than as an external resource to the dozens of clients I had been supporting previously. In adjusting to a single system, I felt that, as a consultant, I had fallen into a trap of a building a static skillset or series of habits that only changed in response to a change in technology; for example, an updated operating system retiring a well-known tool or app and replacing it with something completely different. In many cases I found myself reluctant to use new tools in favour of the old ones, clinging to the familiar instead of accepting that adapting to changing technology was a significant part of my role. I had also found that consultants were, in general, only called upon when clients could not fix or otherwise attend to something themselves, as such I was highly apprehensive about what my daily workload as a dedicated resource would look like. My fears were again unfounded though, if anything these factors meant a stark contrast between my old role and new. With my new employer, I became part of a firm that takes a pro-active approach to technology and community, determined to be part of the widespread technological development within its own industry as well as those it services. I found myself in a position of broad overview of all firm systems: workstations, production servers, through to Information and communications infrastructure. On the inter-personal level, I found myself also handling the concerns

of colleagues and corresponding with vendors with a far higher degree of responsibility.

After leaving my role as a consultant and engineer behind, I was now representing both the technical capabilities of the firm as well as its ICT infrastructure and strategy. Contrary to my former outlook on the subject, the available options and progression paths in the IT industry are far from limited. Quite frankly, how could I have ever thought otherwise? The technological world was my oyster, and now I get to play a pivotal role in guiding the firm through the pros and cons of the constantly changing technological landscape.

This is brilliant, one thinks quietly to oneself. *How exactly do I go about doing that, though?*

It was quite overwhelming in many respects, nothing I had done before had prepared me for the reality of this situation. The troubleshooting and systems administration aspect of the role are already second-nature, but the firm needed more than a sysadmin, they needed someone to take the ICT strategy of the firm to the next level. Considerable thought had already been put into the integration of technology, with many initiatives such as Clevertouch presentation screens and cloud hosting proposals already underway prior to my arrival. While these initiatives were within my skillset, the mid- to long-term vision for the firm would require considerable attention and development. It became apparent that if I was to enable greater technological capabilities within the firm higher, I would need to develop my own abilities as well. Standard IT support would need to incorporate aspects of management, governance and strategy, just to name a few. Any one of those aspects alone was something I had not attempted myself before, how do I go about integrating not just one, but multiple forms of managerial thought process into my daily work routine? The answer, it appeared, was quite literally just a few metres down the hall.

I had walked past SIGNAL many times before deciding to wander in, just on a whim, and see what it is exactly that a grad school does. Within a few weeks, I was enrolled as an Xtend candidate, working with the tools and processes I needed to assess my own aspirations within the spectrum of the IT industry, and what I could do to achieve those aspirations.

3.2 MPP Stage 1: The Review of Learning

The first course was the Review of Learning, a reflective essay based on nearly three decades of personal education and how it contributed to who I am today. The life lessons and teachable moments I experienced along the way form the narrative that shaped my persona and how I came to interpret the world around me. After a slow start, the words flowed, the fourteen-thousand-word document that resulted could easily have been twenty-thousand without restraint. While only a short document by academic standards, it was still more than I had written in any of my undergrad classes a decade ago, but most importantly, it was long enough to examine my thought processes, habits and ethics throughout my life. This provided a far greater perspective about my previous actions and attitudes that I had not considered before, a cathartic experience in how I could reflect on how both success and failure have personally affected my progression. As part of the Review of Learning exercise, I also considered ways to self-assess my abilities and demeanour, which became my first attempt at the auto-ethnographic review process. By the time the document had been completed, I had decided there were two primary aspects of my persona that drive how I behave as a professional: my IT skills and abilities, and my ability to work well with other people. The challenge lay in how to express these two very different skillsets in a clear and concise manner.

Two frameworks of assessment were decided upon for this purpose; the SFIA (Skills Framework for the Information Age: https://www.sfia-online.org/) framework to assess my technical ability and the FlipCurric Learning Capabilities framework (FlipCurric.edu.au) to assess my interpersonal skills and potential for leadership and responsibility, both of which I have detailed further in a separate paper: Learning Frameworks: Practical Application of Self-Assessment Tools (this volume).

SFIA works by separating the IT industry into a series of categories, such as IT Governance, Information management, and many others that cover any given ICT-based role. These categories are then divided further into up to 7 levels of complexity, the most basic at level 1 through to the most advanced at level 7. I reviewed the entire version 5 framework reference document, manually mapping out which of the listed IT categories applied to my current role. By highlighting the areas within each code that I was reasonably certain applied to me, I could then plot the appropriate levels of each category on a spreadsheet; as I have since discovered, this is very similar to the function of the current self-assessment tool available on the SFIA-partnered SkillsTx website (2018). I also performed the same self-assessment for each of my previous roles, from my previous work as an Engineer back to my first job in retail, plotting the results from each and overlaying this information as a separate colour. I then did the same for my expected progression path, projecting the potential development options based on my current responsibilities, and plotting this data in as well. The resulting spreadsheet highlighted for me where and when the personal and professional growth of my ICT-related skillsets occurred.

The Flipcurric framework originally developed by Professor Geoff Scott of Western Sydney University, consists of a list of personal qualities that are desirable in a successful student or learner. These qualities are separated into three groups:

- Personal, qualities of identity, further divided into self-awareness, decisiveness and commitment.
- Inter-personal, qualities on interaction, further divided into Influencing and Empathising.
- Cognitive, qualities of knowledge and perception, further divided into diagnosis, strategy and flexibility & responsiveness.

These categories were presented in the form of a table, I took each listed quality and put them into a flash-card format, colour coded to match each group. I then asked several of my colleagues to carefully read each card, then place it into one of four piles, each representing how strongly they felt it applied to me: Definitive (a core quality), Descriptive (often apparent), Applicable (sometimes apparent) and Negligible (seldom apparent, or an opportunity for development). I asked for honesty from my colleagues, thankfully there was a consensus regarding how I was perceived professionally and personally that was overwhelmingly positive, but above all this approach meant that the resulting constructive criticism was presented positively, and I found I was more willing to accept advice on those qualities I may need to work on.

I plan to repeat both exercises at the end of my MPP programme during completion of the thesis, including peer review from my MPP mentors and appropriate community members. SFIA provides options for validated assessment through an accredited assessor, I am investigating local options for this service. From my experience, I believe the Flipcurric framework can be adapted further for the corporate IT environment; the interpretation of the questions by my assessors varied considerably, appearing to result in participants over-thinking, focusing more on the questions than on the person they were assessing.

In summary of the Review of Learning and MPP stage 1, the long-held saying goes that one cannot know where one is going until one knows where they have been. This is certainly how I interpreted the philosophical underpinning of this process; the reflective thought experiment of the Review of Learning put wider perspective and some form of logical framework around the long chain of decisions and actions throughout my life that have led me to this point. Most importantly, it prepared me for the thought processes propagated by stage 2; learning to ask questions about how I further develop the skills I already have, how these will benefit my employer, myself and others, and my own aspirations going forward.

3.3 MPP Stage 2: The Learning Agreement

The second stage of the MPP involves a learning agreement that acts as both contract and roadmap for the learning process. The "trick", as my mentor keeps telling me, is the relationship between my aspirational framework of practice and the in-work project that will serve as a vehicle for developing that "new me".

My personal aspiration is to further my professional development as an ICT specialist, with a focus on services delivery and quality assurance to a corporate environment. In doing so, I expect to make progress in both my management and governance skills, as well as interpersonal and relationship building skills. This is roughly summarised into a goal to "explore what it means to be an ICT Manager supporting a modern and future-oriented Law firm and the nature of IT Governance and Risk Management inherent in in this context".

Looking back, this goal now seems obvious, but it was perhaps the most significant component of my MPP journey to date (this is discussed further in Section 3.5).

This goal was developed around identifying an area within my responsibilities that will act as a suitable in-work project; an aspect of my role that can demonstrate my professional growth as part of my normal duties. The in-work project itself is designed to provide a structure that maintains the following:

- Benefit to the candidate, action or research that allows for personal development and reflection of such
- Benefit for the employer, business development and genuine improvement to business practices
- Proof that the candidate has shown thought and learning consistent with that of a level 9 qualification.

This project forms the basis of my autoethnographic research, the primary source of data for reflection and analysis of my actions and development as a professional. Once the project was decided upon and all relevant areas were considered, the Learning Agreement was signed by myself, my employer, and the educational institution to ensure the MPP efforts will proceed as planned.

In careful consideration of these requirements and discussion with my employer, the subject that made the most sense was cybersecurity. This area within my role seemed to fit all the criteria: it would benefit the firm from having an in-depth analysis of practices where required, it would test my abilities and give ample opportunity to expand my existing skill sets and learn new ones to complement them. Ideally, it will also create more raw data for an area of high interest to a wide range of industries and communities. The approach decided upon begins with research of cybersecurity, determining the current expectation of ICT best practices in SME businesses and how they apply to a partnership operation model. This forms the basis for a case study of current practice within the firm, aiming to identify what we do right and what we need to work on. In turn, this will justify my recommendations as ICT Manager on how the firm should act on these findings. With the full co-operation of the management team, these recommendations are considered and tested from every necessary angle, before being incorporated into a full project proposal enacting the chosen recommendation.

The project is the central 'pillar' of my MPP efforts, building around this are considerations regarding several factors:

- interaction with my audience
- reflection on the project
- ongoing literary review
- reflection on my own professional practice

These considerations are combined with the results of the project in the final thesis, and has been documented as an expected timeline from the start of stage 3 up to completion of the thesis in October 2018 (Figure 1).

The question regarding which aspects of cybersecurity involved in the case study became part of the Learning Agreement process, as a guide for the form and scope of the work expected. Several major considerations became apparent from this questioning, mostly relating to potential effects on productivity, working environment and benefits for the firm and its assets, but perhaps more importantly, what drawbacks might also arise? These considerations (and how they relate to each other) became smaller questions within the greater process of fleshing out the learning agreement, providing further opportunity for the candidate to explore a wider perspective of their profession.

Each Learning Agreement document surely ends up as unique as the candidate that wrote it, tailored to the experiences and temperament of its author. The flow charts, diagrams and templates that guide its creation were provided early in stage 1, though at the time I did not fully appreciate the ramifications of what the documents would be asking of me. The in-work project itself, while significant, is still only one part of stage 3 and a vehicle for the primary goal of the entire MPP learning method: autoethnographic action research. Documenting the project plan maps out the expected actions of the candidate as the project progresses (with the approval of employer and tertiary institute), but the rest of the Learning Agreement ensures the supporting aspects of the project are considered thoroughly and integrated into the entirety of the work.

3.3.3 Sustainability, Maori and Ethics

Other than the expected methodology and justification of the project, there are sections focused on the wider implications of the research on other individuals and communities such as Māori, Sustainability and Ethical concerns, all of which prompted a considerable amount of contemplation. The conclusions reached in these regards were:

- my work does not directly impact Maori interests beyond my ability to ensure the firm can provide legal services (as it would for any client of any nationality or ethnic descent)
- the firm is already conscious of sustainability practices, evidenced in its effort to reducing office waste and commitment to the 'paperless' movement
- my work is unlikely to cause ethical dilemma, t I do not directly manage employees and the project is highly unlikely to encounter power imbalances or vulnerable participants.

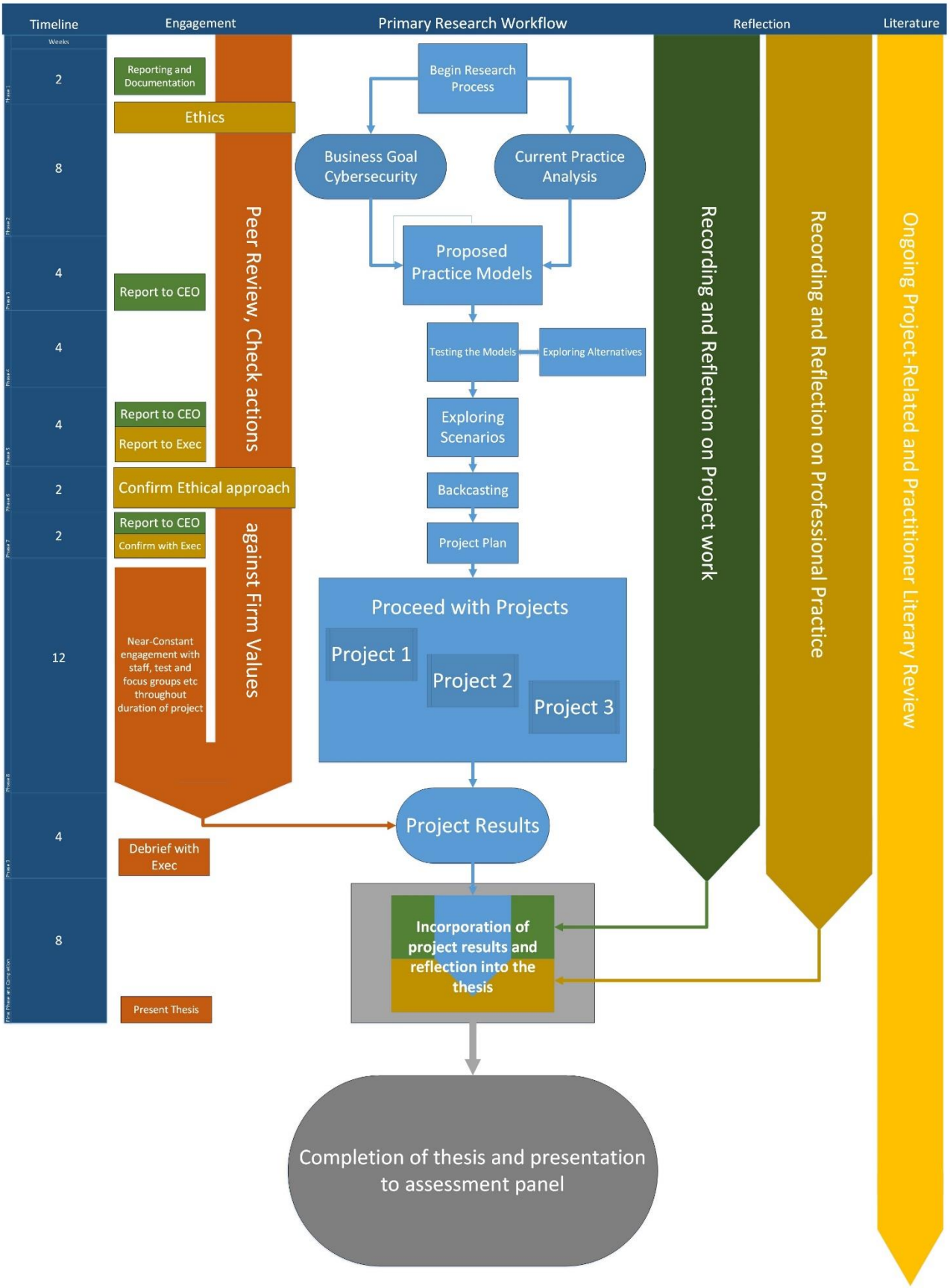

Figure 1: Stage 3 Workflow plan; the central portion in blue indicates WBL in-work project

Nonetheless, I made the decision to include an opt-in approach rather than opt-out; any comment or input contributed as part of my research would identify or impact a group or individual, then specific permission to include it would be sought from that party before publishing.

All three aspects of Maori, Sustainability and Ethics are expected to remain actively monitored as the project progresses, this expectation written in to the Learning Agreement itself. My facilitator, Professor Mann, is a recognised thought-leader in sustainability; any concerns that arise with Maori or Ethics will result in consultation with Kaitohutohu and the Otago Polytechnic Ethics committee respectively. Despite my initial expectation that considerations of these matters would be somewhat procedural in nature, the exercise of including them within this document has clarified and expanded upon concerns that are more complex than they appear at face value. This has been particularly insightful for my role of ICT Manager; as part of the management team, I share responsibility of ensuring these considerations are given the appropriate level of attention at a corporate level.

3.3.4 Practical Applications

The case study of Cybersecurity, conceived and fine-tuned to guide and bolster my personal development, will focus specifically on how I learn to approach the tasks and duties at hand. Regarding practical application of the Learning Agreement, there are several habits and techniques from the planning process that I can and will apply to my work as an ICT Manager, continuing after the completion of the MPP. For example, the project itself involves a basic to intermediate level of project management skills; through the learning agreement process I have developed these further as a derivative of my existing skillset. This also differs in that I now act as an internal project sponsor, or potentially managing projects myself; compared to my former role as a consultant, in which I would act as a resource to be managed. Both Project Management and Sponsorship will always be integral parts of my IT Management role by default, however the MPP research project and Learning Agreement have provided significant guidance around the transition from Engineer to Manager. The experience and perspective gained from the planning stages of the in-work project combined with the contemplative exercises on the nature of my role have given shape and direction to the path ahead.

Regardless of whether I act as Manager or Sponsor, a requirement of my role is to provide accurate and competent ICT advice on the best path forward for any project. As such, industry research, both at a broad level as well as in-depth for individual projects, will be a regular part of my ongoing work as both ICT Manager and MPP Candidate. Despite over a decade-long break in study, I expect research skills from my time as an undergraduate to assist with the ongoing work, although in practice my in-work research feels very different to the undergraduate studies performed in my time at the University of Otago. In contrast to the course-assigned research of a BA in Music and History, the entirety of my MPP research scope has been defined by me, albeit with guidance from my MPP Facilitator to ensure it is in line with the subject. While the concept of self-assigned study at this level was overwhelming at first, the structure of the Learning agreement meant my own aspirations, my employers requirements and academic standards consistent with a level 9 qualification were accounted for right from the outset. Furthermore, inclusion of ongoing literary review is designed to establish a habit of continued reading for development purposes, a habit I intend to continue long after completion of my MPP studies.

3.4 Audience

Maintaining the theme of broadening of perspective, authoring the Learning Agreement document resulted in discussion and consideration of potential interested parties in the outcome of my work. At the outset, my assumption was that the in-work project was of benefit mainly to myself and my employer. While not necessarily incorrect, my assumption was lacking educated context, showing only a small part of the larger picture regarding the potential outcomes of the case study, as well as the intentions of the MPP programme itself.

From the outset, the project establishes the firm as the main participant, intending to analyse and overhaul the security practices within the firm, promoting internal and external risk management on all firm systems. While this position has not changed as the project has evolved, the first addition to the list of potential participants came about from discussion regarding engagement with external organisations; for example, let's assume the case study and subsequent improvements are completed successfully and the firm can reasonably claim that it follows best practices for Cybersecurity and Risk Management. Do we advertise this as a differentiating factor in our advertising to an increasingly risk-conscious market, or do we share our new-found expertise, perhaps in a consulting function, with other SME businesses with concerns for their digital wellbeing? This raises other questions, do we advertise this expertise at all, lest we paint targets on our backs for those with nefarious intent? As such, the first addition to my list of potential audience members was the that of Industry: Legal, IT and possibly many others that might benefit from the results of the case study and project. This also expands further upon the role of my employer as an audience member, the expectation is that while we will benefit from this work, careful consideration of my recommendations will need to include appropriate risk management and governance actions to ensure there are no negative side-effects to our operations, including contemplation of individual legal responsibilities of any actions taken.

Another component of the Learning Agreement includes presentation of my proposal to an assessment panel, in my case made up of my facilitator, the CEO of my employer, my industry and academic mentors and representatives of the Otago Polytechnic. During this presentation and resulting Q&A session, the esteemed panel members had some very positive feedback regarding my proposal, but also pointed out some glaring areas regarding my audience that I had apparently overlooked. Following further discussion with the panel, the next addition was that of the wider IT community, both professional and academic, who might be interested in the conclusions reached by the end of the project. My membership of IITPNZ and work as a student within SIGNAL both require commitment to my participation within the IT community in general, it had not occurred to me that others within this sphere might find my work interesting as well. The potential for authoring white-papers based on the work was also mentioned, another intimidating idea that I have never considered before and, quite frankly, made me wonder what on Earth I had gotten myself into (though it must be mentioned this paled in comparison to the question of co-authoring a paper for a certain Wellington-based conference).

This feedback served to drive home the importance of community participation, but ultimately lead to an important revelation of the Stage 2 process, and the final addition to my intended audience: Me. This is not to say I had not considered

my place within the ongoing project, it will be me that performs most of the work and reaps the rewards, my constant recording and reflection of the process and my understanding of what the MPP thesis requires of me. The aspects that I needed to reconsider were those of my personal and professional aspirations, emphasised not only by the assessment panel, but also by my mentors and facilitator as well. Attempting to define these aspirations became something of a struggle; I felt I did not have an adequately accurate or realistic perception of my situation given how many new concepts I have had to consider since changing role. In taking the view that I am also an audience member of the work at hand, the bigger picture became easier to comprehend, as did my place within it.

3.5 Aspirations

Moving past the mental roadblock around identifying where my own aspirations lay was perhaps the most significant part of the process so far, at least for my personal development. From the initial questions regarding this in Stage 1 and beginning the Learning Agreement in Stage 2, attempting to give a genuine answer as to what transformational direction I would like my MPP efforts to take often wound up in the too-hard basket; I couldn't figure that one out so I promised myself to think about it later.

When I moved from my former role to my current one, the difference between the two was a significant shift in mind-set in and of itself. The change from my long-term desk job as an engineer to the autonomous, highly responsible role managing the systems of a larger firm was more than enough of a shock to the system as it was; I had found it very difficult to give my own aspirations much serious contemplation, let alone a thought-out or even comprehensible response. I had already taken what I perceived as a considerable step upwards in the world, and was also now studying for a master's degree to boot. How could I possibly think about what comes next? Nonetheless, that is exactly what the MPP programme was requiring me to do.

I have thrown the word 'perspective' around several times throughout this paper, relating to the industry I work in and the actions I have taken previously, as noted in my Review of Learning. Through this same process, I was now attempting to apply the level of contextualisation achieved from my reflective work to the actions I intend to make going forward. In applying this level of thought and the occasional push in the right direction from those guiding me through this process, my prior lack of ambition to progress within the IT sector was disappearing rapidly, replaced with new-found appreciation for the near infinite number of directions I could potentially develop my career. In any case, I was finally able to put express a long-term aspirational statement that accurately reflects what I am trying to achieve: to progress as a technical management and governance specialist within services delivery and quality assurance to a corporate and professional audience. Even this is a mouthful, and is highly likely going to evolve further as the project does. For the purposes of the MPP programme, my overall reflective work incorporating the in-work project and professional development will focus on defining exactly what my role of ICT Manager means, not just to myself and my colleagues at Gallaway Cook Allan, but also to those I will work with in the wider IT community.

3.6 Academic Development

My previous attempt at tertiary study was a major contributing factor to my initial decision to pursue the MPP Programme. I attended the University of Otago for nearly 3 years following High School, with the expectation I would graduate with a BA in Music and History, followed up with a degree in Secondary Education. While I enjoyed my time there, by the end of first semester in my third year, I concluded that I really wasn't cut out for a career in professional music, and I should probably find a different vocation. I intended to cross-credit into Comp Sci, most of my friends in music classes were doing it, how hard could it be? My over-confident ego did not survive attempts to write code in Java, in frustration I opted to drop out rather than persevere, taking on more hours at work; at the time a combination of computer retail and very basic tech support at a big-box retailer. I never went back to complete my degree despite the fact I am only two 300-level classes from graduating with my original BA.

This apparent complete waste of time and student loan balance has been a source of nagging regret since; while on most days this is something I could ignore, it was something I was not proud of at all. As I moved into IT consulting a few years later, I was very self-conscious of the fact I did not have any qualifications to my name, regardless of whether they were relevant to my work or not. In my consulting role, I did attempt other forms of certification, mainly that offered by Microsoft, but found aspects of this frustrating. From the lack of a local testing centre, the speed at which the certification becomes obsolete and the tiny percentage of the certification that was genuinely relevant to the work I performed, once again I let my frustration get the better of me and allowed industry certification options to fall by the wayside. On several occasions in my 9 years as a consultant and Engineer, I would enquire with the University about completing my degree, perusing the various websites regarding options that will allow me to work and study at the same time. On one occasion I even called and spoke to the Music Department HOD to discuss the best way forward, potentially looking at part-time study options. However, these plans never eventuated. I now had a household to support, all the responsibilities that went with it, not to mention enough excuses to bury any motivation that might accidentally occur. Either way, the sacrifices required to leave work for study appeared to simply not be an option. Something would always pop up to perpetuate this pattern as well, be it the birth of my eldest son, my wife trying her hand at a retail business, buying a house, getting married, the birth of my youngest son, amongst many others. I'm sure it is a common story, life just seems to get in the way.

Do not misconstrue, I make no attempt to shift the blame for this. The responsibility for not completing either of these qualifications was my own, I chose to focus my attention elsewhere rather than on engaged personal development, so the consequences of doing so were my also of my own making. In saying that, given the arguably momentous examples of a life well-lived listed above, I would still make the same decisions every single time without question, but I argue it shows how easy it was for my academic goals to get lost in the background of everyday life.

By the time I left my consulting role, my experience and reputation in the IT sphere spoke for itself, the lack of a formal qualification was far less of a concern than it once was. For my new employer, it was not a concern at all, yet nonetheless it was something that weighed heavily on my mind in those first weeks of exploring my new role. Imagine then, walking into a tertiary institute for no reason other than that it matches your field of work and happens to be down the hall. While there, you are told that the long-held plan returning to tertiary studies, while still working no less, was not only possible but actually very likely; amazingly, the previous thirty thousand dollars-worth of University study and years of professional practice count as evidence of prior learning and meeting eligibility criteria for the advanced courses the grad school offers.

All the required boxes were ticked; I could study while working, I would earn a level 9 qualification relevant to my field and I can expect to make a meaningful contribution to my workplace and community through the in-work project. I am fortunate enough to have the full support of my employer in pursuing the MPP programme, given these factors alone I would have been negligent to decline.

4. LOOKING FORWARD

Under normal circumstances, a paper would now conclude and summarise its findings, but in this case my MPP progress is still ongoing, and I can only report on the results of the programme thus far. As of January 2018, I have begun the third and final stage of the MPP programme, the research into Cybersecurity and Risk Management practices is underway, leading preparation for the upcoming case study into the performance of a future-oriented law firm. I have described here the experiences and benefits I have gained from the programme so far, and I am not yet half-way through the programme. Many more steps in my development as a professional lie ahead of me, all of which I expect to include in my final thesis and any reflective exercises I choose to partake in once the MPP programme has been completed.

Canning & Callan, 2010 described, heutagogy fundamentally changes the role of the educator in higher education from one of "'expert' in a body of absolute knowledge" to one where learning "is achieved through shared meaning making in a relational, facilitative approach to reflection" (p75). I have experienced this firsthand. In1998, my third form year at Otago Boys High School, I had a maths teacher named Mr Bell, on the first day of class he told us a sentiment I will often paraphrase, but never forget: 'Teacher' is not an accurate word for what he does, as it implies that he must provide the information and learning for the class he teaches. In truth, his role is that of a Facilitator; he is there to guide and assist the student while they learn for themselves. In short, he is there to show us the way, and guide us while we walk that path for ourselves. To me, this sentiment sums up my experience of the MPP programme so far, through my studies in the last 9 months I have learnt of the tools and methods that will allow me to guide my own process of learning and natural development within my role.

Without any doubt whatsoever, I am a very different person now when compared to the person I was fifteen months ago. As an engineer in the call centre, with no long-term plan or goal in mind, I was the architect of my own situation and very unlikely to make notable progress beyond it. Thankfully, I jumped at the opportunity that presented itself, and made the transition into IT Management, only to jump at the next opportunity offered by SIGNAL, to take that role and learn how to truly make it my own. These steps I have taken, both on my own and with the guidance of the MPP programme, have already been profoundly transformative in my attitude and outlook, leading to a level of confidence and motivation unlike anything I have ever experienced before. As I continue my efforts in Stage 3, I very much look forward to finding what else this version of me will achieve, and what potential I have yet to live up to.

While the argument could be made that I would need to adjust my own professional practices regardless to succeed and develop in my current role, the efforts made through my WBL have provided a far higher level of introspection and perspective on how I, as both professional and individual, think and act compared to what I would likely achieve on my own.

Beyond the process of reflection, the guidance offered through the WBL platform, how it has been customised to my skill and experience, has also meant I have composed my own framework of processes and potential goals to support my ongoing learning, giving some direction regarding the areas and skillsets that would best benefit my professional practice, my employer and (hopefully) the IT and legal communities.

A year ago, I might have asked you to wish me luck in this process. Given my experience since then, however, I am sure I already have everything I need to succeed.

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4 ITx 2018: Learning Frameworks

Following the completion of the first ITx paper, it seemed appropriate to write a second that discussed the use of self-assessment tools, further describing my use of two Learning Frameworks during my Review of Learning and Learning Agreement: the SFIA Framework and Professor Geoff Scott's Flipcurric Personal Capabilities framework. Included in this descriptive paper were the methods used in implementing these frameworks and how I came to make conclusions about the state of my technical and interpersonal skill sets respectively. Separating these concerns from the first paper and writing a second in the form of a case study informed by practitioner narrative allowed for a more detailed account of the methodology and interpretation of the results. This paper was also accepted into the ITx/CITRENZ conference (Figure 4)[4].

[4] In the interests of keeping the published paper as a coherent whole, figure 4 is repeated within the encapsulated paper *Learning Frameworks: Practical use of Self-Assessment Tools*

Learning Frameworks: Practical Application of Self-Assessment Tools

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ABSTRACT

In this paper, we describe the methodology of existing tools for the self-assessment of professional skillsets, from the perspective of a work-based learning student in the IT industry. We consider how the industry is widely non-regulated, with an ever-increasing multitude of potential certification and career progression options but very few resources to guide the learner through these options and choose the most effective development pathway for their needs and circumstances. Outside content-controlled instruction programmes, the available methods for independent skillset auditing or introspective self-assessment can be limited, we have attempted to address this via the use of SFIA and a Learning Capability framework. These have then been adapted to the requirements of the ICT and Legal industries, as well as the individual being assessed by manually applying the principles laid out in each Framework and the environment of the learner.

Keywords: Work-based learning, Master of Professional Practice, SIGNAL Xtend, SFIA

1. INTRODUCTION

Leadership at all levels in Information Technology can be enhanced through an exploration of IT professionals' professional framework of practice. A self-assessment of skillsets is an important first step in the articulation of an individual's professional framework of practice and as such contributes to the initial review of learning in the Masters of Professional Practice (MPP). The first author is undertaking the MPP though Otago Polytechnic in association with SIGNAL ICT Grad-School.

As part of the work-based learning programme described in our paper *Continuing Professional Development: Returning to Study with Work-Based Learning* (Vaughan and Mann 2018), we described the ongoing processes within the Master of Professional Practice (MPP) and the implications for the learner in undertaking the MPP programme. In the first stage of the MPP process, the learner writes a reflective analysis of their own learning history up until the point of writing, with the intention of reviewing the story of their life from a critical standpoint. In this paper we describe the use of two methods of self-assessment, The Skills Framework for the Information Age (SFIA) a Learner Capability framework (described by Scott 2016). These frameworks were selected because of their respective focus on the ICT technical expertise and interpersonal skills. These aspects were identified by the learner as his primary motivating factors in his work role.

Our intended use of SFIA was to provide an accurate picture of where the candidate believes their technical ability lies within the wider sphere of the Information and Communications sphere at large. We hoped that this would be particularly useful in our situation whereby the learner was exploring a new role and coming to terms with how to make it his own. The assessment itself consisted of evaluating the career descriptions and each corresponding level of complexity within, and deciding which of the roles described accurately described what the candidate is expected to do as part of their normal duties, the value and accuracy of this data depends considerably on the honesty of the candidate in how the descriptions apply to them.

In the Learning Capabilities framework, we explored the idea of describing the candidate using a specified series of personality and behavioural traits and attempting to describe to what degree each trait contributed to the thoughts and actions of the individual, as a form of measurement of the candidates innate ability to interact with others.

This quality assured paper appeared at the 9th annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2018) and the 31st Annual Conference of the National Advisory Committee on Computing Qualifications, Wellington, NZ, July 11-13, 2018 as part of ITx 2018.

2. METHOD

The SFIA (Skills Framework for the Information Age) Foundation was founded in the UK in 2000, the successor to several skills-assessment initiatives attempting to define the general 'shape' of the IT industry at large. The basis and inherent utility of the SFIA framework is to provide a common context for referring to competencies and skillsets within the realm of Information and Communication industries, despite the variety and complexity of the ever-growing number of potential careers within them. Since 2000, the platform has been continuously updated through consultation and collaboration with its users, to reflect the current state of technological and practical progress. As of the time of writing, the supported releases are Versions 5 and 6, with Version 7 currently in development.

The first author completed a self-assessment against SFIA version 5. As described in sections below, this was repeated several times, to produce a 'moving front' of his career development.

The presentation of this paper at ITx was well received, with an engaged audience that showed genuine interest in the practical applications of both frameworks and the conclusions drawn from them. My initial plan for both frameworks was to revisit them as part of the completion of this thesis, unfortunately this has not been possible for the Flipcurric exercise. As detailed in the ITx paper, concerns regarding the consistency of interpretation within each personality trait have been addressed via a redesign of the original flash cards, however this has been proven to be more time-consuming than originally planned. Given the framework

itself was demonstrated to be both useful and insightful, following completion of the MProfPrac I expect to continue the redesign for future use.

The SFIA framework has taken a far more prominent role in my study efforts, not only as a self-assessment method but also another form of community engagement. SFIA has effectively mapped and visualised my current and former progress, assisting with the musings I have had regarding best corporate practices and my place within the overall 'shape' of the ICT industry itself. Through these insights, I have found a greater awareness, not only of how many potential ICT roles can be found in the modern workplace, but also how many of these roles relate to each other and, by extension, myself. I have also suggested the use of SFIA to others in ICT roles, in the hopes that it may provide the same benefit to them that it did me. Courtesy of SIGNAL ICT Grad School, I also took the opportunity to participate in the 'Understanding SFIA' training course in September 2018, the first step in attaining accreditation as a SFIA practitioner or consultant by the SFIA foundation (BSMImpact, SkillsTX, 2018). The SIGNAL team and I were taught to use the framework to analyse job descriptions and resumes, applying our best judgement to determine the appropriate skills and levels of responsibility. This course clarified many aspects of the SFIA framework and re-affirmed the methods in which I was already utilising it, either way I am grateful to SIGNAL ICT Grad School for inviting me. From the outset of the Review of Learning, I was sure that I would be making use of and advocating the SFIA framework for a long time to come, in the time since I have only become more certain of this. My revisited self-assessment using the SFIA framework is included and analysed in section 7.1 of this thesis.

After the experiences of ITx, a third paper was discussed, once again from an Autoethnographic perspective, to describe the ongoing MProfPrac learning process following on from where we left off in the first ITx paper, as we approach the end of the documented learning path and its expected conclusions.

Learning Frameworks: Practical Application of Self-Assessment Tools

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Keywords: Work-based learning, Master of Professional Practice, SIGNAL Xtend, SFIA

1. INTRODUCTION

Leadership at all levels in Information Technology can be enhanced through an exploration of IT professionals' professional framework of practice. A self-assessment of skillsets is an important first step in the articulation of an individual's professional framework of practice and as such contributes to the initial review of learning in the Masters of Professional Practice (MPP). The first author is undertaking the MPP though Otago Polytechnic in association with SIGNAL ICT Grad-School.

As part of the work-based learning programme described in our paper *Continuing Professional Development: Returning to Study with Work-Based Learning* (Vaughan and Mann 2018), we described the ongoing processes within the Master of Professional Practice (MPP) and the implications for the learner in undertaking the MPP programme. In the first stage of the MPP process, the learner writes a reflective analysis of their own learning history up until the point of writing, with the intention of reviewing the story of their life from a critical standpoint. In this paper we describe the use of two methods of self-assessment, The Skills Framework for the Information Age (SFIA) a Learner Capability framework (described by Scott 2016). These frameworks were selected because of their respective focus on the ICT technical expertise and interpersonal skills. These aspects were identified by the learner as his primary motivating factors in his work role.

Our intended use of SFIA was to provide an accurate picture of where the candidate believes their technical ability lies within the wider sphere of the Information and Communications sphere at large. We hoped that this would be particularly useful in our situation whereby the learner was exploring a new role and coming to terms with how to make it his own. The assessment itself consisted of evaluating the career descriptions and each corresponding level of complexity within, and deciding which of the roles described accurately described what the candidate is expected to do as part of their normal duties, the value and accuracy of this data depends considerably on the honesty of the candidate in how the descriptions apply to them.

In the Learning Capabilities framework, we explored the idea of describing the candidate using a specified series of personality and behavioural traits and attempting to describe to what degree each trait contributed to the thoughts and actions of the individual, as a form of measurement of the candidates innate ability to interact with others.

2. METHOD

The SFIA (Skills Framework for the Information Age) Foundation was founded in the UK in 2000, the successor to several skills-assessment initiatives attempting to define the general 'shape' of the IT industry at large. The basis and inherent utility of the SFIA framework is to provide a common context for referring to competencies and skillsets within the realm of Information and Communication industries, despite the variety and complexity of the ever-growing number of potential careers within them. Since 2000, the platform has been continuously updated through consultation and collaboration with its users, to reflect the current state of technological and practical progress. As of the time of writing, the supported releases are Versions 5 and 6, with Version 7 currently in development.

The first author completed a self-assessment against SFIA version 5. As described in sections below, this was repeated several times, to produce a 'moving front' of his career development.

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In the Learner Capability framework, we explored the idea of describing the candidate using a specified series of personality and behavioural traits and attempting to describe to what degree each trait contributed to the thoughts and actions of the individual, as a form of measurement of the candidates innate ability to interact with others. A Learner Capability Framework describes the personal skills and attributes which enable them to be effective in the workplace, whether that be in employment or self-employment.

We chose to use a framework that is based on Geoff Scott's Capability framework (http://flipcurric.edu.au/) that distinguishes between competency - capability framework:

- Competency: what the graduates can do; e.g. you have the skills to carry out a team-skills needs analysis
- Capability: how they use those skills when the going gets tough (or unexpected opportunities arise); e.g. you have the ethical maturity to manage a staffing review

Understanding how these competencies and capabilities contribute to each learners' emergent professional framework is part of managing one's own career (Carpenter 2013) and as a "meta-capability" is an important part of one's emergent professional frameworks of practice that the MPP seeks to develop.

Scott's list of traits was originally presented in the form of a table which we adapted for experimental use in the form of coloured flash cards, which could then be arranged according to how they fit in one of four categories representing the scale of relevance to individual.

Unlike SFIA, the Learning Capabilities framework was not completed solely by the candidate alone, but also by a selection of colleagues who have worked closely with him and had ample opportunity to observe the presence or absence of the described traits as evidenced by work ethic and personal interactions. Each assessor completed the same series of questions, reading each trait and placing the card in one of the four categories. These results were recorded and analysed, gleaning some insight into how the candidate was generally perceived by those around him, specifically what they felt he is doing well and providing opportunity for positive constructive criticism.

The resulting insight from both experiments contributed to the final stages of writing the Review of Learning.

In keeping with the reflective research and learning process, the following sections are written in an autoethnographic framing (Ellis and Bochner 2000).

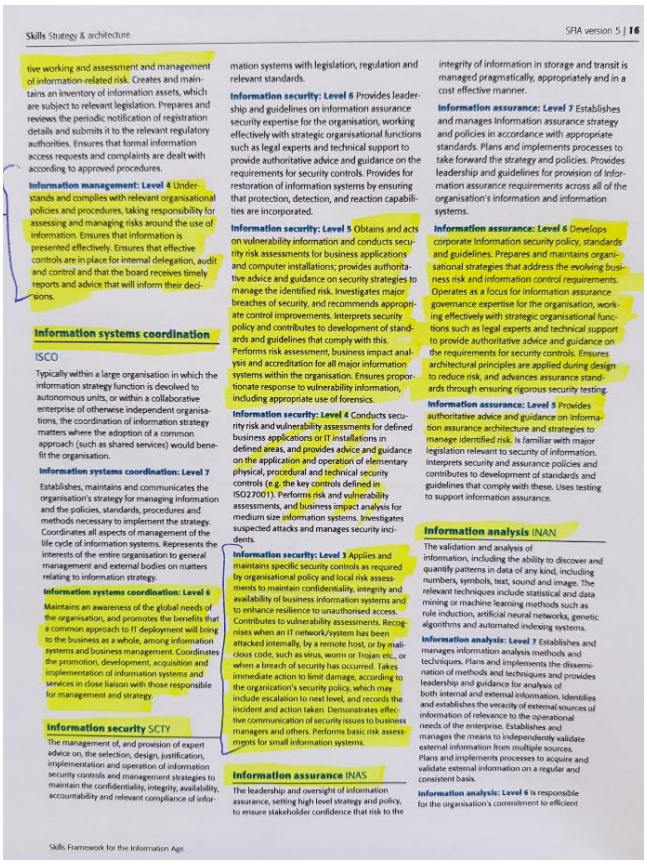
3. SFIA

SFIA was an interesting but overwhelming concept initially, my first thoughts being that there must be an easier way to achieve a similar result and figure out roughly where my abilities sit in the spectrum of professional IT skillsets. The framework reference provided on the SFIA website was just a list of the multitude of possible IT careers that one could conceivably aspire to, but I would expect there are more than a few outlier professions that the framework does not cater for. This list breaks down further into detailed job descriptions, breaking these professions down into their basic components and duties, as well as the expected corresponding level of responsibility. The website and related resources that support the framework described the means to self-assess as well as have an assessment that is verified by an accredited authority, however these appeared to be services that one would presumably be required to pay for, at this stage I was reluctant to commit to any expenditure for this, whether it comes out of my corporate IT budget or my own personal one.

3.1 Using the SFIA Reference Document

It appeared the only way I could make any headway with finding my place within the SFIA scale was to just work my way through the reference and take note of which areas of expertise directly applied to my current role and level of skill and experience. After carefully reading through the SFIA version 5 reference document (I could not find the version 6 document at the time), I highlighted every section and category that I could reasonably argue falls within my job description and wider sphere of influence. This ended up covering 16 categories, once I then marked the various categories I would like my role to include in the near future, this number grew to 25. From here, I ignored all the categories that were no longer relevant, and highlighted every aspect the various levels within each category, determining how they apply to me. This was often not an exact science, as not all aspects of a given category and its corresponding levels would always accurately describe my duties, in which case a judgement call would be made as to whether I could realistically include that level as an accurate description of what I do; for example, Procurement, in which I have multiple approaches, sourcing equipment from suppliers on my own as well as through aggregators, two practices that fall in different levels within the procurement category. In this case, I decided my skills fell within the levels of 5 and 6, undertaking the strategic analysis and organisational aspects of purchasing, but falling short of the company-wide policies described at level 7, which would be decided upon at the executive level. For others it was very straight-forward, such as IT Management or IT Support, where every level described by the framework accurately describes my normal workload, from the most basic responsibility right up to the most advanced.

By addressing each category one-by-one and manually highlighting the relevant aspects within them, I could assess each one and give it the most accurate 'score' I could, based on the 7 levels within each category. My justification for deciding which level was the most applicable came down to how many of the descriptive elements of the level in question were highlighted, at which point it became a numbers game, where the level with the most highlighted elements was deemed to be the most accurate reflection of my skillset.



Skills Strategy & architecture SFIA version 5 | 16

tive working and assessment and management of information-related risk. Creates and maintains an inventory of information assets, which are subject to relevant legislation. Prepares and reviews the periodic notification of registration details and submits it to the relevant regulatory authorities. Ensures that formal information access requests and complaints are dealt with according to approved procedures.

Information management: Level 4 Understands and complies with relevant organisational policies and procedures, taking responsibility for assessing and managing risks around the use of information. Ensures that information is presented effectively. Ensures that effective controls are in place for internal delegation, audit and control and that the board receives timely reports and advice that will inform their decisions.

Information systems coordination

ISCO

Typically within a large organisation in which the information strategy function is devolved to autonomous units, or within a collaborative enterprise of otherwise independent organisations, the coordination of information strategy matters where the adoption of a common approach (such as shared services) would benefit the organisation.

Information systems coordination: Level 7 Establishes, maintains and communicates the organisation's strategy for managing information and the policies, standards, procedures and methods necessary to implement the strategy. Coordinates all aspects of management of the life cycle of information systems. Represents the interests of the entire organisation to general management and external bodies on matters relating to information strategy.

Information systems coordination: Level 6 Maintains an awareness of the global needs of the organisation, and promotes the benefits that a common approach to IT deployment will bring to the business as a whole, among information systems and business management. Coordinates the promotion, development, acquisition and implementation of information systems and services in close liaison with those responsible for management and strategy.

Information security SCTY

The management of, and provision of expert advice on, the selection, design, justification, implementation and operation of information security controls and management strategies to maintain the confidentiality, integrity, availability, accountability and relevant compliance of information systems with legislation, regulation and relevant standards.

Information security: Level 6 Provides leadership and guidelines on information assurance security expertise for the organisation, working effectively with strategic organisational functions such as legal experts and technical support to provide authoritative advice and guidance on the requirements for security controls. Provides for restoration of information systems by ensuring that protection, detection, and reaction capabilities are incorporated.

Information security: Level 5 Obtains and acts on vulnerability information and conducts security risk assessments for business applications and computer installations; provides authoritative advice and guidance on security strategies to manage the identified risk. Investigates major breaches of security, and recommends appropriate control improvements. Interprets security policy and contributes to development of standards and guidelines that comply with this. Performs risk assessment, business impact analysis and accreditation for all major information systems within the organisation. Ensures proportionate response to vulnerability information, including appropriate use of forensics.

Information security: Level 4 Conducts security risk and vulnerability assessments for defined business applications or IT installations in defined areas, and provides advice and guidance on the application and operation of elementary physical, procedural and technical security controls (e.g. the key controls defined in ISO27001). Performs risk and vulnerability assessments, and business impact analysis for medium size information systems. Investigates suspected attacks and manages security incidents.

Information security: Level 3 Applies and maintains specific security controls as required by organisational policy and local risk assessments to maintain confidentiality, integrity and availability of business information systems and to enhance resilience to unauthorised access. Contributes to vulnerability assessments. Recognises when an IT network/system has been attacked internally, by a remote host, or by malicious code, such as virus, worm or Trojan etc., or when a breach of security has occurred. Takes immediate action to limit damage, according to the organization's security policy, which may include escalation to next level, and records the incident and action taken. Demonstrates effective communication of security issues to business managers and others. Performs basic risk assessments for small information systems.

Information assurance INAS

The leadership and oversight of information assurance, setting high level strategy and policy, to ensure stakeholder confidence that risk to the integrity of information in storage and transit is managed pragmatically, appropriately and in a cost effective manner.

Information assurance: Level 7 Establishes and manages Information assurance strategy and policies in accordance with appropriate standards. Plans and implements processes to take forward the strategy and policies. Provides leadership and guidelines for provision of Information assurance requirements across all of the organisation's information and information systems.

Information assurance: Level 6 Develops corporate Information security policy, standards and guidelines. Prepares and maintains organisational strategies that address the evolving business risk and information control requirements. Operates as a focus for information assurance governance expertise for the organisation, working effectively with strategic organisational functions such as legal experts and technical support to provide authoritative advice and guidance on the requirements for security controls. Ensures architectural principles are applied during design to reduce risk, and advances assurance standards through ensuring rigorous security testing.

Information assurance: Level 5 Provides authoritative advice and guidance on Information assurance architecture and strategies to manage identified risk. Is familiar with major legislation relevant to security of information. Interprets security and assurance policies and contributes to development of standards and guidelines that comply with these. Uses testing to support information assurance.

Information analysis INAN

The validation and analysis of information, including the ability to discover and quantify patterns in data of any kind, including numbers, symbols, text, sound and image. The relevant techniques include statistical and data mining or machine learning methods such as rule induction, artificial neural networks, genetic algorithms and automated indexing systems.

Information analysis: Level 7 Establishes and manages information analysis methods and techniques. Plans and implements the dissemination of methods and techniques and provides leadership and guidance for analysis of both internal and external information. Identifies and establishes the veracity of external sources of information of relevance to the operational needs of the enterprise. Establishes and manages the means to independently validate external information from multiple sources. Plans and implements processes to acquire and validate external information on a regular and consistent basis.

Information analysis: Level 6 Is responsible for the organisation's commitment to efficient

Skills Framework for the Information Age

Figure 1: A page from the SFIA Version 5 reference document, the sections deemed relevant to the current role have been highlighted

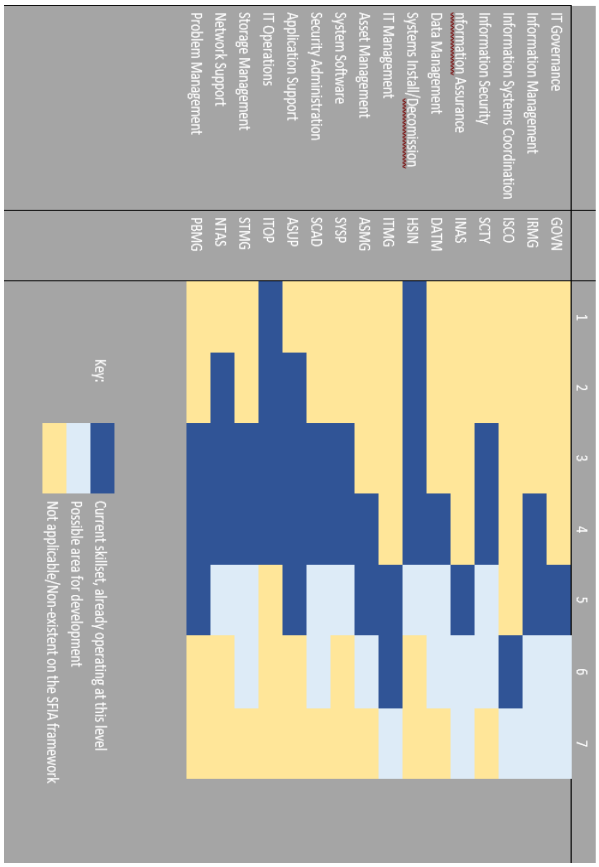


Figure 2: The first attempt at a reasonably presentable spreadsheet, prior to repeating the process for former roles and potential career paths

3.2 Recording the data

As the review of each category progressed, the scores for each were added to a simple spreadsheet, with the names of each category down the column to the left, and the 7 levels across the row at the top. As I was to find out later, this is essentially the same format SFIA itself uses when presenting the results of their self-assessment questionnaire, which was oddly reassuring that I was on the right track when performing my own self-assessment without the more advanced resources on the SFIA website. As such, I had created a visual representation of my IT skills as they stood at the time, along with it a far better understanding of how I fit in to the wider IT community and what I can offer in terms of systems and business support.

3.3 Including past and future development

This tied in nicely with my MPP reflective essay as it gave the story of my development within IT a tidy conclusion; this is what I learnt over time, and here is the result of that learning. While that would be fine in and of itself, it does not add to the narrative of my progression, following discussion with my facilitator, Professor Sam Mann, it only made sense to repeat this process for my earlier IT roles as well. Starting with my most recent employment as a Systems and Managed Services Engineer, I worked my way back from there, a process with its own challenges given that I had spent 9 years in my previous role and a considerable amount of professional development had taken place there. To account for this, I assumed the scores would be reflective of my approximate skillset when I left the role, so that the entirety of my experience there was included and accounted for within the assessment. The divide between my old role and my current one is quite dramatic, many categories of SFIA that I have listed within my current skillset are not even remotely applicable to my previous role, others that do are all at least one level lower, which clearly shows the extent of what is expected of my current role compared to my previous one. The same can be said when the assessment is taken a step further, to my role before that when I was In-home and retail tech support for a well-known computer retail outlet, once again some categories could not be considered relevant to my skillset at the time, while those that were once again fell at least one level lower than those of my time as an Engineer. At

this stage I decided not to venture any further into my prior work experience, my work before this time does not even show up as a blip on the SFIA radar and cannot add any value to the experiment. Instead, I chose to look ahead, firstly including the areas within the framework that I did not highlight as part of my current skillset, but expect to potentially develop into in the short-term timeframe as my MPP and normal professional development continues; these include the higher levels of categories such as IT Management and Security Administration. In some cases, such as IT Governance and Information Security, this did not quite go far enough, so I created one further iteration to account for long-term professional development over the next few years.

The data for all five iterations my skill set (for the sake of keeping it simple this was limited to the original 16 categories I had decided were most relevant), which included my two previous IT roles as well as my short-term and long-term development projections, was plotted on the same spreadsheet, colour-coded to each role so that a clear progression path, both realised and potential, cold be shown within the context of the SFIA framework. As such, I now had a visual representation not only of my progression within IT from the last 12 years, but also the direction I would like my career to go in the near future, not only concluding the MPP Review of Learning but also providing additional material for consideration in my Learning Agreement and final Practitioner Thesis.

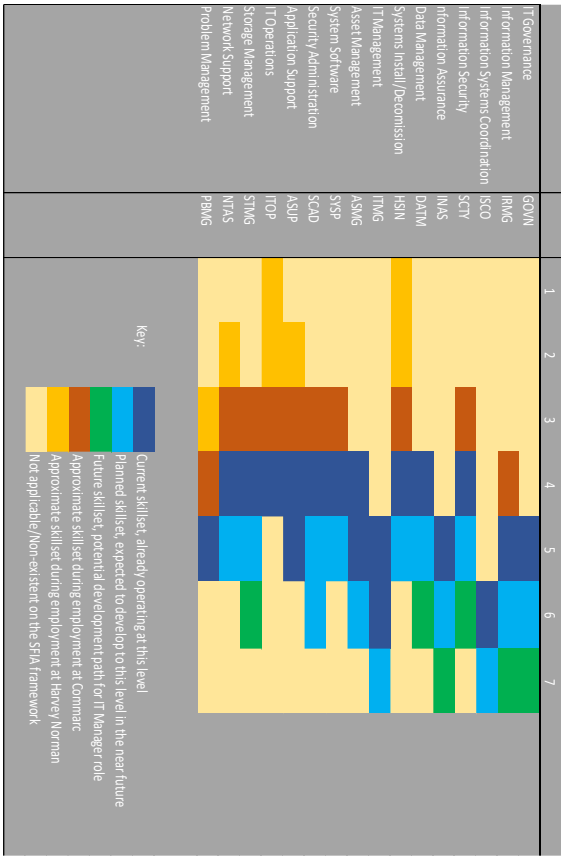


Figure 3: The spreadsheet included as an appendix of the Review of Learning document, including reflection and projection of technical capabilities

3.4 Further use within the MPP

Since submitting my Review of Learning, I have considered the further use of the SFIA framework as part of my MPP studies, as a form of mapping the progression made in the time since my initial self-assessment. I have also performed the online self-assessment questionnaire provided by SFIA-Accredited partner SkillsTX, which gave very different results to my previous attempt at self-assessment. The online tool was far more generous in its scoring, placing my skills up at the levels of 6 and 7, whereas my own scores fell in the 4 to 5 range, with the odd 6 popping up. As such, I have made enquiries to potentially attempt a validated assessment, where my skillset and its position within the framework will be verified by an accredited SFIA consultant and confirm the accuracy of the self-assessment exercises. Accredited SFIA consultants are somewhat few and far between, at least in Dunedin, however I will continue to approach this via SIGNAL and attempt to have this completed before submission of my final thesis.

3.5 Further Practical Application

My work with the SFIA framework has had other real-world applications as well, in that it is an accepted form of qualification for membership of the Institute of IT Professionals of New Zealand. IITPNZ was mentioned several times during the first stage of my MPP study, given that I attended several seminars and guest speaker events held by the Institute and hosted by SIGNAL throughout 2017. I promptly applied for and was accepted into associate membership, up until my Review of Learning was completed. At this stage I decided to pursue full membership of the Institute, which meant proving I met the basic requirements expected of Institute members. There are three ways to do this: Hold a relevant degree and 4 years of experience, two of which were in a senior position; or no degree but ten years of experience, three of which were in a senior position (at the time I had the ten years, but I would need to argue the three years as with senior responsibility); or to provide proof of skills equivalent to that of Level 4 in my chosen relevant categories of the SFIA scale.

The spreadsheet created for my Review of Learning was submitted as my proof, with one adaptation made to fit the requirements. My own form of self-assessment was focused more on the categories within the IT industry that I considered relevant, however application of the SFIA results to real-world situations appears to place higher value on the level of responsibility that it does on the categories themselves. To adjust my results accordingly, I applied a 'best fit' logic to the total scores from each category, applying a kind of average across the board. By this train of thought, the majority of my scores came in at level 4, many at level 5 and two outliers at level 6, so I reasoned that my SFIA level equivalent fell somewhere between 4 and 5. Combined with the required character references, this was more than enough evidence for the Institute of IT Professionals, and full membership was granted.

Given this experience, if and when I am involved in assessing potential IT staff, whether it is adding to my own team or assisting another business add to theirs, I intend to use the SFIA framework to qualify the individual. My belief is that it is the most accurate and potentially enlightening method to determine the technical capability of a potential candidate, while providing a benefit of awareness to both involved parties.

4. LEARNER CAPABILITY

SFIA was the means of assessing my technical abilities and where my skills fit within the IT context, but these abilities are only one side of my applicable skills that form the basis of my job. The other side, which many might argue is the more important of the two, is how I interact with others within my environment; in other words, my 'people skills'. Professor Mann suggested the Flipcurric Learner Capability Framework, originally developed in Australia by Professor Geoff Scott, as a means to assess how I perceive my own personality traits, both good and bad, while also giving those who work with me an opportunity to express their own perception of my personality and modus operandi, and how these contribute to our working environment.

Professor Scott created the original framework, which was presented to me as a three-page long table, listing 41 personality traits in three categories:

- Personal, with the subcategories of commitment, decisiveness and self-awareness
- Interpersonal, with the subcategories of empathising and influencing
- Cognitive, with the subcategories of diagnosis and strategy

Personal capabilities

Table 1 presents the scales and items developed to provide measurement of the domain of personal capability. This aspect of the practitioner's capability is made up of three interlocked components: Self-awareness, Decisiveness and Commitment.

Table 1 Personal capability scales and items

Scale	Item
Self Awareness & Regulation	Deferring judgment and not jumping in too quickly to resolve a problem
	Understanding my personal strengths and limitations
	Being willing to face and learn from my errors
	Bouncing back from adversity
	Maintaining a good work/life balance and keeping things in perspective
	Remaining calm under pressure or when things take an unexpected turn
Decisiveness	Being willing to take a hard decision
	Being confident to take calculated risks
	Tolerating ambiguity and uncertainty
	Being true to one's personal values and ethics
Commitment	Having energy, passion and enthusiasm for my profession and role
	Wanting to produce as good a job as possible
	Being willing to take responsibility for projects and how they turn out
	PA willingness to persevere when things are not working out as anticipated
	Pitching in and undertaking menial tasks when needed

Interpersonal capabilities

Table 2 presents the scales and items developed to provide measurement of the practitioner's interpersonal capabilities. This has been distinguished into two subscales: Influencing and Empathising with others.

Table 2 Interpersonal capability scales and items

Scale	Item
Influencing	Influencing people's behaviour and decisions in effective ways
	Understanding how the different groups that make up my university operate and influence different situations
	Being able to work with senior staff within and beyond my organisation without being intimidated
	Motivating others to achieve positive outcomes
	Working constructively with people who are 'resistors' or are over-enthusiastic
	Being able to develop and use networks of colleagues to solve key workplace problems
	Giving and receiving constructive feedback to/from work colleagues and others
Empathising	Empathising and working productively with people from a wide range of backgrounds
	Listening to different points of view before coming to a decision
	The ability to empathise and work productively with people from a wide range of backgrounds
	Being able to develop and contribute positively to team-based programs
	Being transparent and honest in dealings with others

Cognitive capabilities

Table 3 presents the scales and items developed to provide measurement of the domain of cognitive capability. This aspect of the practitioner's capability is made up of attributes that fit into three interlocked subscales: Diagnosis, Strategy and Flexibility & Responsiveness.

Table 3 Cognitive capability scales and items

Scale	Item
Diagnosis	Diagnosing the underlying causes of a problem and taking appropriate action to address it
	Recognising how seemingly unconnected activities are linked
	Recognising patterns in a complex situation
	Being able to identify the core issue from a mass of detail in any situation
Strategy	Seeing and then acting on an opportunity for a new direction
	Tracing out and assessing the likely consequences of alternative courses of action
	Using previous experience to figure out what's going on when a current situation takes an unexpected turn
	Thinking creatively and laterally
	Having a clear, justified and achievable direction in my area of responsibility
	Seeing the best way to respond to a perplexing situation
	Setting and justifying priorities for my daily work
Flexibility & Responsiveness	Adjusting a plan of action in response to problems that are identified during its impl
	Making sense of and learning from experience
	Knowing that there is never a fixed set of steps for solving workplace problems

Figure 4: FLIPCURRIC Learning Capabilities Framework, as it was first presented during the Review of Learning process.

Most notably, the various traits are framed in a positive light, in that that are all personal qualities that are generally viewed favourably and arguably seen as values that one should aspire to, none of them question the capabilities or attitudes of the candidate in a negative way. Following discussion with Professor Mann, we decided to use this framework as a thought experiment, to weigh up each of the described personality traits as they apply to me, and attempt to determine to what degree these traits are applicable. The table was printed and cut out, and we briefly went through the process as a quick proof of concept, picking out certain traits and asking the simple question about the extent that I would use those traits to describe my own personality. This test run seemed to be somewhat successful, however my first thought was that there surely must be a way to make the process easier to perform and understand.

4.1 Framework Adaptation

Adapting the framework to the needs of my self-assessment happened in two parts, firstly in how each trait was presented, and secondly in how I would determine the relevance of each trait to my personal character; the combination of these two adaptations forming the basis of my assessment methodology. In many respects, the

requirements and intended results of the experiment bear a passing resemblance to the well-established Johari Window, created by Luft and Ingham (1955), a test in which the expectation is to ascertain how the 56 adjectives defined within the test apply to the test subject, depending entirely on how the subject perceives themselves as well as how they are perceived by their peers. In the case of the Flipcurric framework, the 41 personality traits arguably act as the counterpart of the 56 adjectives, however the traits are considerably more detailed and firmly rooted within the educational discourse. For example, the Johari adjective 'adaptable' could translate to several Flipcurric traits, such as the Cognitive

> "Adjusting a plan of action in response to problems that are identified during its implementation" or the interpersonal "The ability to empathise and work productively with people from a wide range of backgrounds", amongst several possible others.

While the Johari method aligns the adjectives on a two-by-two grid, each field correlating with whether the adjective in question is known or unknown, with one axis for self and the other axis for peers, the Flipcurric framework as it was initially presented did not have an immediately obvious method for arranging and analysis the results of the test. The document I used was just a series of traits written in plain text, which all tended to blur together when attempting to perform an assessment. To make this process easier, I used my same tendency to colour-code that made my SFIA assessments so much more interesting, and applied a colour to each of the three main trait categories: blue for personal, green for inter-personal and red for cognitive. I formatted the text into very basic flash cards before running the resulting pages through the laminator and guillotine, creating a set of cards that can be laid out in front of the testing candidate and easily interpreted. With this task completed, I moved on to the second challenge, of determining the context around how I would use these traits to describe myself.

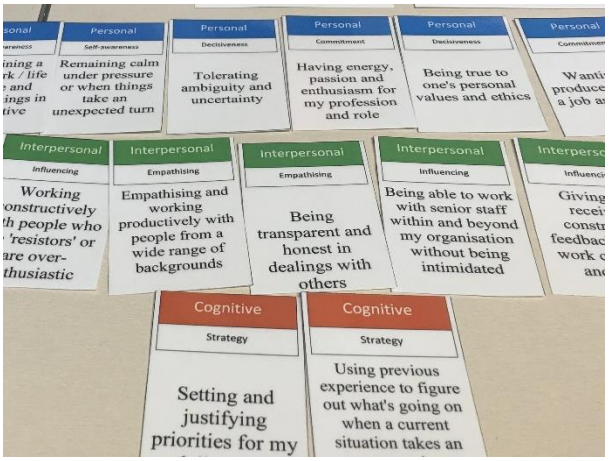


Figure 5: The first attempt at creating flash cards from the original Framework document, circa June 2017

After much thought and soul-searching, bearing in mind that the assessment needs to be kept relatively simple while retaining its accuracy, I decided that there only needs to be four separate tiers indicating the degree of application, which I described like this:

- 1: Definitive, the highest degree of application, the traits listed here are those considered core to my character and apparent in all thoughts and actions
- 2: Descriptive, the traits listed here are an important part of my character but a lesser degree than those considered Definitive, apparent in most thoughts and actions
- 3: Applicable, the traits listed here are less noticeable than those of Definitive and Descriptive, apparent in some thoughts and actions
- 4: Negligible, the lowest degree of application, these traits do not really apply to me, apparent in few thoughts and actions; this was later expanded to include the possibility that these traits are potentially an area of personality that would benefit from further development.

Given these newly-defined criteria, the experiment could be conducted by arranging these four tiers across a surface, then reading each personality trait flash card and making a judgement call regarding which of the four tiers that trait belonged to. That trait would then be neatly placed below the corresponding tier and the next trait would then be read, until all traits have been assigned to the tiers the assessor believed to be appropriate. Naturally this highly-subjective process, like the SFIA assessment before it, depends entirely on the honesty of the candidate and their interpretation of the traits and their relevance at the time, making it difficult to account for bias. As such, the suggestion was made that the test be carried out by others within my sphere of influence, specifically those who have engaged with me often and closely enough to have a reliable opinion on how I operate as both a professional and individual. Once this has been done, we can analyse the results and identify any trends that there might be between all the data sets, indicating which traits we could realistically expect to call the 'truth' of my outward-facing personality. In comparison to the Johari model, this concept is similar to that or the Arena quadrant, the adjectives known to both self and peers, however in my adapted model we have an added dimension of attempting to determine the varying degree of relevance that the traits may or may not have on my personality.

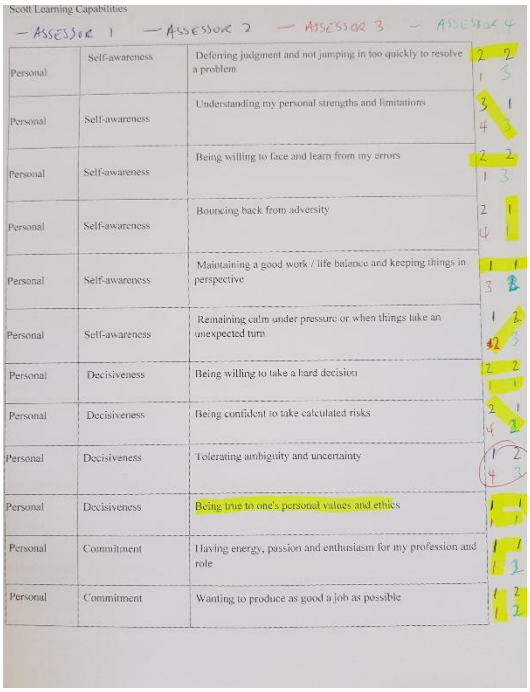
4.2 Review of Learning Experiment

Four candidates were selected to perform this test, namely my long-suffering wife and three of my colleagues from the administration team: the firm accountant, the accounts assistant and the Human Resources and Marketing Intern, all of whom have frequent interaction with me on a daily basis. Each assessor was instructed to read each trait card carefully, and to think about what that trait means within the context of their experienced interactions with me, both personally and professionally. Once a firm and constructively honest conclusion had been reached, they were to place that trait below the tier that they felt was most

appropriate. Once this was done for all traits, I recorded the results in photographic form and discussed with the assessor how they felt while performing the test, again encouraging honesty, so that we can understand some of the justification behind their conclusions. Given the subjective nature of the assessment, the interpretation of the individual did enter the equation for some of the questions more so that others; for example, "Being Confident to take risks" was universally understood, but "Tolerating Ambiguity and uncertainty", to my amusement, was interpreted differently across all 4 assessors, mainly around whether this applies to my work, my interactions with others, or just our work environment in general.

4.3 Analysis and determining patterns

Following the discussion with the assessors, the results were roughly recorded and collated into a blank copy of the Flipcurric framework, colour-coded according to assessor, the tier number that the assessor assigned was written by hand beside each trait for further analysis. As a form of basic analysis, I read through each trait and highlighted all instances of assessors agreeing on the tier at which the believed that trait belonged. While time-consuming, the resulting data was in a format that clearly showed not only where the assessors agreed on personality traits, but also to what extent they agreed which would indicate that the trait in question and the degree in which it applies to me could be considered 'truth', that we could accurately state the nature of my evident thoughts and actions. There were three traits that all four assessors completely agreed on: the personal trait of being true to one's personal values and ethics, and the interpersonal traits of being open and honest in dealings with others and Empathising and working productively with people from a wide range of backgrounds. Several other traits were agreed upon by three of my assessors, and many that were agreed upon by two of them. By applying the 'best fit' logic that was applied to my prior SFIA assessment, I could map out the various traits that others not only considered my strengths, but also my weaknesses, showing some insight into likely development paths going forward.


Scott Learning Capabilities

			Assessor 1	Assessor 2	Assessor 3	Assessor 4
Personal	Self-awareness	Deferring judgment and not jumping in too quickly to resolve a problem	2	2	1	3
Personal	Self-awareness	Understanding my personal strengths and limitations	3	1	4	3
Personal	Self-awareness	Being willing to face and learn from my errors	2	2	1	3
Personal	Self-awareness	Bouncing back from adversity	2	1	4	1
Personal	Self-awareness	Maintaining a good work / life balance and keeping things in perspective	1	1	3	2
Personal	Self-awareness	Remaining calm under pressure or when things take an unexpected turn	1	2	2	3
Personal	Decisiveness	Being willing to take a hard decision	2	2	1	1
Personal	Decisiveness	Being confident to take calculated risks	2	1	4	3
Personal	Decisiveness	Tolerating ambiguity and uncertainty	1	2	4	3
Personal	Decisiveness	Being true to one's personal values and ethics	1	1	1	1
Personal	Commitment	Having energy, passion and enthusiasm for my profession and role	1	1	1	2
Personal	Commitment	Wanting to produce as good a job as possible	1	2	1	2

Figure 6: Page 1 of 4 used to record the results of the experiment, agreement between some assessors is highlighted on the right, while the highlighted subject line notes complete agreement between the assessors. The values on the right circled in red note complete disagreement.

The other result from this analysis also showed where my assessors completely disagreed, with some traits being assigned a different tier by all four. This is also an opportunity for further reflection, as the assessment itself does not distinguish between the genuine perception held by my assessors and the possibility that their interpretation of the question being asked of them is unique to the individual. The question to ponder then would be whether there are just differences in opinion, or if the trait has been defined in a way that negatively impacts the overall consistency of the assessment. Similarly, this may also be the natural presence of the three other quadrants identified in the Johari model: Façade (known to self but not to peers), Blind Spot (known to peers but not to self) or Unknown (not known to either party), in which case an entirely subjective test may not ever give a satisfactory answer, given the expectations of the original test.

4.4 Challenges

Several problems with the methodology were encountered while performing this experiment, while the results were of perfectly acceptable for a personal reflective essay, there are some lingering doubts regarding the accuracy of the answers given.

Firstly, the sample size from which our assessors were chosen was not diverse enough. Of my colleagues, all were female members of the administration team, who frequently work in a mutually assistive role; for example, the firm accountant is the former IT contact prior to my role existing, and was guiding me while I adjusted to the reality or corporate in-house IT. The HR & Marketing Intern would work closely with me when implementing or maintaining most user-centric technological capabilities of the firm, and

the Accounts Assistant was seated beside me in our large shared office. Further complicating this, the working relationship with all three was very strong; as such, I am not convinced this approach effectively mitigated the possibility of bias in the results.

Secondly, the four tiers defined for the experiment were well understood, however the feedback from the assessors following completion was that the individual traits were not uniformly interpreted across my three volunteers. The net result of this was that the question my assessors thought they were being asked changed drastically depending on how each of them personally interpreted the trait, throwing consistency out of the equation. An example of this is pictured in figure 6, relating to the trait 'tolerates ambiguity and uncertainty', problems that arose were discussed after the exercise, it appeared that the definition of these terms was different for each assessor. One thought this meant in dealing with technology and the firm systems, another thought it meant in interaction with vendors and third parties, while another thought it meant how I defined my current role and the struggles of adjusting to it. As such, the feedback from my assessors was that in many respects the questions may be too open-ended.

Another example of this relates to tier four, in which I described negligible as traits that do not apply to me, or an area I should invest in development. While this consideration thankfully did not become apparent during the tests themselves, in subsequent analysis I felt this did not go far enough to clarify that this tier includes the possibility that the trait does not apply to me, and that is not a problem (it does not impact my ability to perform my duties or interact with others), while simultaneously meaning that the trait might not apply to me but a serious effort should be made to improve on this for the benefit of my role and responsibilities. This does also raise questions regarding the overall positive approach of the Flipcurric traits, and it may be worth exploring the scenario where the experiment was attempted using traits that are not desirable, or inverting the four tiers as they are defined to instead indicate the degree to which the candidate does not display those traits.

4.5 Improvement and Re-attempt

Prior to completion of my MPP thesis, my intention is to improve upon this experiment and run another set of exercises using the improved process. This will begin with a redesign of the flash cards, including additional colour-coding to integrate the subcategories of each trait, for further clarity, as well as a general cosmetic improvement to make the flash cards look better than the initial attempt. Further work will be put in to clarifying the criteria required for each of the four tiers, as well as realistic definitions of each individual trait, so that the question that they are asking is more reliably framed the results can be trusted to have a greater degree of accuracy. Finally, a larger sample pool will be selected, moving beyond the administration team to include the Partners, Authors, support staff and third-party vendors of the firm, as well as friends and acquaintances that are not work-related. In doing so I expect the results to become more complex but also give a far more accurate picture of the subjective reality and perception of my role and how I perform in it.

5. DISCUSSION

In the case described above, the SFIA framework was initially used as a reflective tool, then expanded upon to include potential career development paths as well, the overall benefit of this being a wider scope of perspective from which the candidate can base their reflective writing on. As the processes described were performed without any outside assistance other than the SFIA Version 5 reference document itself and nudges in the right direction from SIGNAL, the amount of work required was considerable; however, in many respects the act of defining the relevance of each category from scratch added far more reflective value to the exercise as a whole. While the intention of the SFIA assessment is to provide a form of industry-consistent context to the assessment subject's capabilities at the level of the individual, the method described here also served to greatly improve awareness of and exposure to the wider IT industry and communities in general.

As an educational tool, the SFIA framework effectively tied in the development of IT, technological and problem-solving skillsets to the life-story narrative that made up the majority of the Review of Learning reflective essay, simultaneously adding rationale around the career path described and a relatable frame of reference to others in the IT industry. The added benefit of real-world applications, such as proof of competency, further demonstrates the inherent value of the Framework, regardless of the form or function of the IT role it is assessing.

The value of the Flipcurric framework in this educational setting was the insight into the candidate's professional presence as well as practice, in that it provided real-world feedback on the personal interaction aspect of their role. Many IT professionals consider the means in which they engage their audience and client base to be just as important, potentially even more so, than how they work with the technology they support; this being the case, personal interaction as an effective IT-industry skill cannot be ignored or relegated as a lesser concern. In this case, the original concept developed by Professor Scott was adapted to meet the needs of the MPP Review of Learning and the reflection of self, adding context to the developments of personality and interpersonal skills throughout the life of the candidate. An added benefit is the means of delivering constructive criticism within the work environment in a positive way, any issues with personality, habit or work ethic can be raised as a concern with far less emotional attachment or potential cause for insecurity, while effectively gauging the overall performance of the employee as part of a wider team.

6. CONCLUSION

In this paper we have described the active undertaking of two separate Learning Frameworks as methods of self-assessment in the educational environment, one as a means to assess technical and problem-solving capabilities within the IT industry, the other to assess personality attributes that complement those capabilities. Together these frameworks provided considerable perspective, context and awareness to the potentially sub-conscious progression and career choices made up to this point, as well as many points to consider in choosing the ongoing development ahead.

Through SFIA, the wider IT industry and community has been brought further into the focus of the candidate, where prior roles and attempts to develop tended to leave such

considerations at the periphery of awareness, at least in comparison to the immediate concerns surrounding getting the job at hand done. Through Flipcurric, a similar effect has been noted in the self-awareness and emotional maturity in engagement with other parties and individuals; no longer just providing a service and keeping the wheels of the machine turning but also the expert and advisor who is entrusted with guiding a growing firm in its efforts to remain an industry leader in an ever-changing technological landscape.

By completing the exercise of mapping his career and competency in comparison to agreed industry norms, the exposure of our candidate to how broad and varied the IT industry and communities really are resulted in a significant shift in mind-set, also creating a far greater level of awareness of the challenges faced in the ever-changing connected world.

Both tools contributed a strong sense of closure to the review of learning. It contributed to a sense that the narrative detailing the learning experiences of the candidate thus far had led to a natural conclusion and a clear statement of the current professional framework of practice. The data collected contributed to a wider state of awareness and perspective on his environment and his place in it, effectively creating a current baseline from which all further development could be measured.

Reich and Hager (2013) pointed out that "practices are emergent, in the sense that the ways that they change and evolve are not fully specifiable in advance". This paper has demonstrated that a real benefit of a self-assessment against frameworks allows not just for a snapshot of the current skills and knowledge, but also highlights the importance of considering how these have developed and changed over time, and can form the basis for the development of the emergent and aspirational professional framework of practice that the rest of the MPP aims to foster.

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5 ACM SIGCSE 2019: Mapping Changing Professional Identity

Following the successful completion and presentation of the ITx papers, another chapter that continues the narrative was the next logical step. Writing papers has been proven effective as a means of recording my reflection while also serving the purpose of contributing to the ICT and computing education community. This third paper, co-authored by Professor Mann and Associate Professor Alison Clear of the Eastern Institute of Technology, would describe the ongoing MProfPrac process as it reaches the final stages, demonstrating further development of my change in mindset and practice and directly relating yet in contrast to the first ITx paper (Figure 5)[5]. This was also another step in the ongoing change of practice, unlike the ITx papers that were written in a standard word processor, this paper was written using an online LaTeX-based tool, both to ensure high-quality typesetting as well as optimise potential for collaboration.

This paper was submitted for peer review to the Computer Science Education Special Interest Group (SIGCSE) of the Association for Computing Machinery (ACM), in the hopes it would be selected for the SIGCSE conference scheduled for February-March 2019 in Minneapolis, Minnesota. The paper has been included here in its anonymised version, as required by ACM submission policies. Unfortunately, the Autoethnographic methodology to the documented Research was deemed to be unfamiliar and controversial by the anonymous reviewers, who were critical and unconvinced the paper was an appropriate fit to the SIGCSE conference, see Appendix 4. This attitude is summarised by one of the reviewers:

> "*This approach of sharing personal experiences as a scholarly paper is so foreign to me that it is either brilliant or an insult"* -Anonymous Reviewer.

The authors are seeking an alternative forum for publication of this paper as of time of writing.

[5] In the interests of keeping the published paper as a coherent whole, figure 5 is repeated within the encapsulated paper *Mapping Changing Professional Identity during Graduate IT Education*

Mapping Changing Professional Identity during Graduate IT Education

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ABSTRACT

Education design through constructive alignment places importance on the links between a professional framework of practice, graduate profiles, learning outcomes and assessments. But in post-graduate professional practice computing education involving practicing IT professionals, the professional framework of practice is often complex, dynamic, and unique to each learner. The literature describes understandings of professional identity but there is little research into the professional identities of computing professionals and less on the development of these through computing education journeys. In this paper we take an auto-ethnographic action research approach to examine the evolution of an experienced IT practitioner (first author) as he undertakes a Masters of Professional Practice. We describe the professional identity of the author at seven stages through the learning journey and show an evolution of how this identity provides more than just support for the learning journey, to a great extent it is the journey. We expect this work to be of interest to those teaching in computing education, particularly those developing graduate programmes, and to those interested in furthering understanding of what it means to be a computing professional.

CCS CONCEPTS

• **Social and professional topics → Computing education; Adult education; Computing profession;**

KEYWORDS

professional identity, professional practice, ethnographic, graduate studies, heutagogy

ACM Reference Format:
xxxxxxx, xxxxxxx, and xxxxxxx. 2019. Mapping Changing Professional Identity during Graduate IT Education. In *Proceedings of ACM SIGCSE Symposium (SIGCSE 2019).* ACM, New York, NY, USA, Article 4, 6 pages. https://doi.org/10.475/123_4

1 INTRODUCTION

The design of education is largely founded on a principle of constructive alignment [1] that places importance on the links between a professional framework of practice, graduate profiles, learning outcomes, learning activities and assessments. In undergraduate computing education the curricula documents have the assumption of well-founded understandings of roles and disciplinary boundaries. However, in post-graduate professional practice computing education involving practicing professionals, it becomes clear that professional framework of practice is often complex, dynamic, and unique to each learner [2]. Hence a better understanding of the professional framework of practice of computing professionals and how this evolves is of interest for both undergraduate and postgraduate computing education and the ongoing professional development so critical to the functioning of a professional discipline.

Researchers know little about how professional identities are formed or evolve [18] but the narrative is key: "what I call myself is who I am" [16]. Giddens writes of "trajectories of the self...from the past to an anticipated future" [8]. Sfard and Prusak [19] describe professional identities as narrative - not just informed or revealed by narratives, to which Juzwik adds the importance of the lifestory [13]. Images of desired futures serve as catalysts for identity development, and we experiment with what Ibarra calls "provisional selves" [12]. These future selves are usually prompted by mismatches. In work practice, [9] described role transitions in careers as the expectations of new roles become a "dance of subidentities" as "new parts of me were born with a very difficult labour". Pratt et al. meanwhile [18] followed the "identity construction" of medical students finding that identity construction was "triggered by work-identity violations" a mismatch between what they did and who they were.

There is, however, is little research into the professional identities of computing professionals and and less on the development of these through computing education journeys. Stevens [20] described three dimensions of becoming an engineer: accountable disciplinary knowledge; professional identity; and navigation. McCartney and Sanders [14] followed the development of professional identity of two undergraduate computing engineering students and found "critical incidents" were important, non-linear, and specific to the individual (the two responded quite differently to similar events). While they found there was a "complex relationship" between course work and "external job related factors", it doesn't really tell us much about the evolution of professional identity beyond an affinity with established sub-disciplines - except that it took a "persistent mindset" to stick with computing. The aim of this paper is to explore the ongoing development of professional identity within computing practice.

2 METHOD

We take an autoethnographic action research approach to this work, following the examples of [4, 9]. This narrative approach aligns with the personal narrative dialogue one has with oneself as part of a transformative experience [15].

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Figure 4: Anonymised version of ACM SIGCSE paper 604

The ITx papers that came before this one centred around the changes within my practice and awareness during my period of discovery and exploration of the MProfPrac, such as its processes and their related tools; however, this paper benefited from far greater introspective thought, focusing on the concept of Professional Identity and what it has meant to me as a developing practitioner. With this adjusted focus, the result has been a more nuanced view of

this reflective interval of my MProfPrac study. Following the trend of previous work, I had once again attempted to summarise my Framework of Practice in a single term, this time using the word ‘Advocate’ as a conclusive role description. I do, however, also acknowledge in this conclusion that my definition is likely to change, given the transformative nature of my learning path; this is a discernible progression from the conclusions reached in the ITx papers and, in hindsight, foreshadowing to the state of flux framework of practice articulation that this thesis attests to.

Mapping Changing Professional Identity during Graduate IT Education

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ABSTRACT

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The first author is an experienced computing professional undertaking a Masters of Professional Practice (MPP) which has provided the vehicle for this study. The body of the paper is written in first person, from the perspective of the first author, concluding with some observations and emergent themes.

To give context to the narrative, it is useful to describe the heutagogical basis of the MPP. Heutagogy refers to self-determined learning [10]. It applies a holistic approach to developing learner capabilities, centering learning as an active and proactive process [3], with learners acting as "the major agent in their own learning, which occurs as a result of personal experiences" [11], assisted by mentors who facilitate the learning journey. Exemplifying this methodology is the work-based learning approach of xxxxxxx (the professional practice school within xxxxx). xxxxxxxx works with learners to recognise and extend learning in a professional work-based context at both undergraduate and graduate levels. At undergraduate levels (such as the Bachelor of Information Technology), xxxxxxxxxx works with learners to align their professional framework of practice - their professional identity - with graduate profiles. These learners are expected to learn new areas, mostly to wrap their practice in theoretical context, but there are no formal classes. Instead the focus is on an individualised supportive environment for personal reflection. xxxxxxxx has professional practice graduate qualifications for experienced practitioners: the MPP and the Doctor of Professional Practice (DPP). For both, the goal is the advanced professional framework of practice. This is articulated in a "practitioner thesis" where the defensible argument is that professional framework of practice. The process starts with a review of learning that leads to stating the learnerâĂŹs aspirational framework of practice (e.g.: "to become a thought leader in values driven software development"). This is paired with an organisational practice goal (e.g.: to create a culture of values driven software development). The main work then becomes the professional development thread, interwoven through reflective practice with the work-based professional practice change. The graduate profiles for both the MPP and DPP are written in terms of higher levels of thinking in a post-disciplinary sense, rather than for specific disciplines. This then, means a loop is created between the doing and the learning, whereby the reflection provides a perspective on the work practice which both improves that work practice and aggregates learning to the high level of critical awareness and leadership aimed for in the aspirational professional framework of practice. This reflective critical awareness undertaken by the first author, focussed on the professional identity provides the narrative that follows which integrates the discussion and conclusion.

3 NARRATIVE DISCUSSION

3.1 The unexpected career

My work in the computing industry began without fanfare in 2005, computer retail seeming a more economical alternative to completing a degree in music. Here I learnt the basics of IT systems and support, realistically little more than a reasonably-savvy home user could manage when setting up new systems or troubleshooting problems. However, it did serve as a reasonable starting point; while my capabilities at the time were still relatively basic, it was enough to move from home-user support into Corporate IT support as a Systems Engineer, with my new employer taking the approach that I had the right attitude and they could teach me the rest. To me, this turn of events in 2008 is the moment that defines my transition to a legitimate computing career path: enabling local businesses and improving productivity and work-life balance through technology.

There was a downside to this, in that I was unfamiliar with the added complexity of corporate environment technology. For example, a Windows Server would, at first glance, look and act like its consumer-level counterpart; Server 2003 shared many components and an overall feel with Windows XP. Any similarities between the two ended quickly though, a work-day restart of an XP computer during the work day was a minor inconvenience for one user, but restarting a Windows Server during the work day meant costly delays and downtime, particularly when Server SBS installations were common, running every business-critical function on a single server. This is representative of wider corporate practices; printing systems, power supply, software support amongst many others, all complicated solutions designed to minimise interruption to business. These differences between consumer and corporate realms meant a whole new set of rules to follow, in turn impacting my own framework of professional practice.

My 9-year period within consulting began with adjusting my existing skillsets to align with the needs of corporate clients. While my knowledge of basic PC operations had some value, learning server administration was very high on the priority list. This was not an easy process, patience was tested for all parties involved as I essentially started from scratch, and training opportunities with my colleagues were few and far between. This struggle was resolved upon taking responsibility for my own development, rather than constantly looking to my colleagues for guidance; a lesson echoed often during my MPP study. As I started contributing to the consulting team, the rules of corporate IT became embedded in my head and habits, in practice if not always in understanding, with a primary learning focus on the more advanced aspects of Server support. My in-work training answered the how aspect of my work, but seldom the why, I was learning the methods of the trade but very little on the context around them. Study towards Microsoft Certification was incorporated into my development plan, as well as increased attention to those of my colleagues that were suitable role models. To my dismay, my development later seemed to stagnate. Server 2008 study became Server 2012, my frustration mounting that only a fraction of this study was used in my workload. The progression path of the Engineer appeared highly rigid, focusing on further development as a technical resource leading to promotion within the team. In time, I came to see the professional practice of my colleagues as something I did not see in myself; the architecture and advanced troubleshooting of systems within the Windows server family such as Exchange, SQL and Virtual Systems did not interest me at all, and I started to make these thoughts known. The need for change in my role did not align with business interests though, leading to dissatisfaction in my work. Despite this, I did my best to keep up with ongoing developments within the systems we supported, working on my professional interaction skills and further building on already-strong relationships with local clients. Eventually, waning interest in improving technical skills or progression along this path became untenable, resolved in the short term by an internal transition to the Managed Services team,

supporting Cloud services and the busy Service Desk. Welcomed at the time, this change did nothing to alleviate perception of a limited progression path. Promotion within Cloud services required the same skills development as a consultant, as did promotion from within the Service Desk. I came to view this change as an admission that I no longer had any aspirations to develop within the industry, that I would go no farther in IT. For all intents and purposes, my own actions and attitudes meant I had worked myself into a corner, with little opportunity of escape.

3.2 When opportunity knocks

The escape came about in no small part from the working relationships I had built. In early 2017, a regular local client suffered the unexpected resignation of their Systems Administrator and requested advice on a suitable replacement. This coincided with my own decision that a change was needed; considering I knew the firm, its people, its systems and how it all fits together, it made sense to put my own name forward. At the start of March 2017, I took up my new mantle as Systems Administrator for the law firm away xxxxxxxx (xxxxxx). Initially, the work involved was nearly identical, any required adaptation of my own practices was not immediately apparent. Becoming the firm's sole in-house IT resource, I was inheriting an IT platform nearing the end of its life, which I had assisted in installing just over 5 years prior. As systems of this age do, many of the servers had begun to develop what I refer to as personalities, idiosyncrasies, quirks and, in some cases, chronic system issues that would routinely need my attention to prevent downtime or outages. This was familiar to me, the IT engineers skillset built over 9 years meant my professional capabilities comfortably matched the profile of my role at the outset, reinforcing the opinion that I had made the right choice in changing roles. As In-house resource, all IT systems within the firm were my responsibility, some of which had been neglected prior to my start. Through my experience and troubleshooting preference to treat the cause rather than ease a symptom, there was a relatively quick turnaround in the occurrence of the occurring problems this neglect caused. Memory leaks, network bottlenecks, user errors and lack of capacity amongst others all contributed to a dysfunctional yet functioning IT infrastructure, but with the appropriate changes and upgrades, the constant need for IT support was significantly reduced. As the constant troubleshooting eased and relationships with our vendors were established, it became apparent that there were far more potential options for role development, despite my limited awareness of business practice and strategy one would expect of a former engineer. I deferred overall management to the existing leadership team, leaving me free to focus on the technical issues that had plagued the firm for some time.

3.3 xxxx ICT Grad School

A collaboration of five tertiary academic institutes in the xxxxxxxxxxx, xxxxxxxxx ICT Grad School is also convenient in that it shares our Dunedin office space. Proximity and curiosity resulted in my uninvited visit to discuss their courses, with some discussion regarding my background, the Master of Professional Practice was suggested. This coincided with discussions about the emerging responsibilities of my role, such as vendor and licensing management, as both the firm and I considered the implications of my position. These factors became the beginnings of my own exploration of professional identity; With the full support of the firm, I was enrolled into the MPP programme, which became my guidance in this exploration, providing valuable insight into the possibilities and expectations of my professional practice.

A Review of Learning is the first of the MPP's three stages and results in personalised documented evidence of the saying "You donâĂŹt know where you're going until you know where you've been", in my case this was my first attempt at reflective writing. This alone was highly insightful, forcing awareness of my own attitudes and practices, celebrating my successes as much as reliving the lessons of my failures. Writing the document revealed limitations I had placed upon myself and opportunities I had missed; such as choosing to abandon my University study and later Microsoft certification rather than work through my misgivings; this was my own poor attitude towards education and nothing to do with the institutions. I concluded that this was evidence of lack of engagement on my part, acknowledging that change to this attitude had to come from within, from a personal internal commitment rather than imparted to me from an external source.

I also noted a tendency towards introversion in my former role, working well with colleagues, clients and vendors as needed, but seldom engaging any further. Professional networking seemed strange to me, as did wider tech community involvement; options I was not even aware of, let alone something I or others might pursue. As my role and work on the MPP developed and possibilities for progression seemed endless, building wider business relationships soon became a key part of those possibilities. xxxxxxxxx introduced me to the Institute of IT Professionals xxxx (xxxxx, xxxxxx's only professional body for IT professionals; despite my prior introversion I had decided that joining xxxxx would benefit both my career and studies while also encouraging contribution to an external organisation. As I moved further beyond the Systems Administration into Management, the greater my awareness became of available progression paths and the potential to make genuine contributions, not only to the firm and my own development, but also to communities that I had previously been unaware of.

At this time, it also occurred to me that I could (and should!) explore the possibilities of different software and tech solutions that would benefit the firm, a disconcerting change from my previous practice of leaving those considerations to those more senior and qualified to do so. Ibarra notes the first of three tasks that an adapting professional performs is observe role-models to identify potential identity traits that would benefit their own practice [12]. In my former role, potential role-models were readily available, despite unwillingness to continue that development path. These former role-models were now a vendor for me to manage and a business cost that I would need to justify. As the only IT resource in the firm, there were no immediate candidates to observe for the social and professional cues as to how I should adapt the practices specific to my role. Instead, I adapted my methods for obtaining feedback, finding a well-respected industry mentor from another firm and seeking non-IT advice from our CEO in order to establish professional norms and etiquette. While my mentor could not guide me on matters of day-to-day operation, and advice from our CEO was outside my sphere of expertise, I am highly grateful to both as

examples of managing realised and potential business, leadership and strategic aspects of my framework of practice, certainly the guidance from both thus far has been invaluable. It has highlighted my responsibility for ensuring the firm's operation and the autonomy that goes with it, that I am trusted to get the job done within the firm's best interests; my judgement as an IT professional is part of that trust. Using this lesson as a baseline, I opted to take ownership of my role and development of my framework of practice, taking advice but trusting in my skills and experience as an IT professional to guide my actions and growth as an individual. The points of difference between my former role and new role were becoming visible, showing two different professional identities: The Engineer identity that my existing skillset was built upon, and a new Manager identity that will adapt these skillsets to my emergent role.

3.4 Learning Agreement

Stage 2 of the MPP was the Learning Agreement, a document designed to find and balance my development requirements with the needs of the firm. Once identified, this defines the in-work project, providing a vehicle for the autoethnographic action research process that also benefits the firm. The document also addresses community impact concerns, such as matters of ethics and sustainability, as well as discussion about Maori or minority consultation. This latter consideration was of interest to me, given my own heritage that includes Polynesian ancestry; how my development, both professional and personal, has been impacted by my culture and ethnicity is something I intend to research at a later date. I also found difficulty in my Learner Aspirational Statement, the description of the direction I want my career to take. I was still adjusting to the new role and emerging thought process, still barely scratching the surface of the possibilities available to me. I did not have the occupational awareness of my industry or, arguably, the emotional intelligence to adequately answer the question [6], Ibarra noted a similar experiences in her research: "issues of how to convey an effective image and define for themselves what kind of professional they aspired to become dominated their descriptions of transition hurdles" [12].

As my former Engineer identity became the new Manager identity, cognitive dissonance crept in as the professional framework of practice that had served me well for over 9 years was now being challenged; my workload was expanding to include far higher levels of responsibility and decisions, with implications not only my own interests but also those of the firm itself. A new type of unfamiliar thinking and greater understanding was required by my new Management identity, including many potentially conflicting considerations: the strategic plans of the firm (which are subject to change), mitigating risk and ensuring reliability. I had to find solutions that mitigated the risk to productivity and simplified future migration plans, all while keeping the costs to a minimum, with the revelation that my role is no longer solely technical. The need for technical competence within my workload will not change, but to paraphrase my mentors, if I can't fix it myself, it is my responsibility to find someone or something that can. As I finished the Learning Agreement, it was clear to me that the strategic aspect to my role was both enjoyable and my preferred development path. The in-work project we decided on was a Cybersecurity case study, making up the central theme of the work-based objectives of my study. I had answered the question of aspirations, amounting to a broad goal as an ICT specialist in services delivery and quality assurance; this combined with the subject matters of Cybersecurity, strategy and leadership appeared to be well received by my assessors. The panel also discussed the possibility of white papers from my Cybersecurity work that would be of interest to the technology and education communities.

3.5 Communities of Practice

My detailed in-work project plan lasted a matter of weeks. My original plan called for a rewrite of the Cybersecurity case study, supported by concurrent research into best practice within Corporate Cybersecurity. However it quickly became apparent that this plan was based in an ideal world, and not the messy, shifting real-world requirements of our systems. As research on the subject continued, authors like Bruce Schnieier and Kevin Mitnick explained the methods and counter-methods to common forms of computer-based crime or exploitation. These insights reinforced many of my existing skills and practices, more importantly providing some context as to the why of these methods that my former role had not been exposed to and expanding upon the distinction between my Engineer and Manager identities.

At this time, my academic mentor discussed paper submissions for the upcoming ITx conference in Wellington. While I was aware of the purpose of academic papers, the possibility of co-authoring one is not something that had occurred to me. Writing papers based on my learning experience and reflection so far was not only a way to record my ongoing autoethnographic research, but also contributed to the academic community, demonstrating the research process in action. With the added bonus of professional exposure, adding my name and profession to a paper meant for distribution was an exciting but also troubling prospect. While I felt that my professional development had already made significant strides in a short time, becoming involved and claiming ownership of a contribution to the professional sphere was still something of an alien concept to me. As my narrative within the paper took shape, so too did the recurring feeling of unease as my emerging professional identity was again at odds with my former one. The Manager identity was more dominant this time, the negative emotional state brought about by the cognitive dissonance was held at bay through the knowledge that my expertise and judgement as an IT Professional would speak for itself, and that others could benefit from my sharing of the experience.

During this time, I also volunteered for the local committee of the New Zealand TechWeek event, a nationwide celebration of technology. I became heavily involved, assisting with several events such as an Innovation discussion panel and a presentation about digital music distribution and aggregation. I ran five very well received presentations of my own, advocating online safety practices, based on my experience and ongoing research. This encouraged new thinking along the lines of user education: there are many communities and individuals out there that would benefit from the sharing of my professional expertise. I was also surprisingly comfortable with speaking in public, the audiences were receptive and

welcomed the opportunity to learn. This highlighted potential as a means to offer IT advice as added value to the clients of the firm, as well as upskill my colleagues in the aspects of IT that benefit their own professional practice. By putting effort into a community-based initiative that lay outside the responsibilities of my role, I found support and affirmation that my professional development was moving in the right direction.

As the xxxx paper deadline approached, we split the paper draft, leaving the narrative of the ongoing journey intact, but moving the practical use of learning frameworks, such as SFIA [7], into a second paper, describing how these frameworks have contributed to my reflection and self-assessment within the context of my MPP work. To my surprise, both papers were accepted for xxxx. The internal projects, the launch of our new intranet and final migration of our systems to the cloud-hosted platform, were both completed near-flawlessly and under-budget; and the upgrade and integration of our systems made day-to-day operation much easier with the bare minimum of disruption. Between this, TechWeek and the xxxx papers, my confidence in my capabilities and drive to develop myself further had never been higher. My identity shifted again - an IT Manager, but with a greater sense of being an IT professional.

3.6 On a bigger stage

Efforts to simplify our already-improved systems continued, warranty or capacity concerns no longer relevant, but of course minor issues remain for users - a template not loading properly for example. My professional identity as a Manager was now well-established, though I would occasionally still respond like a consulting Engineer, resolving an issue as if it were my sole responsibility. While a technical aspect of my role will always be present, I noticed frequently recurring issues that required little technical expertise to fix. A user would report the issue, then wait for me to resolve it - wasting time for both parties. In always fixing it for them rather than showing them how to fix it themselves, I became concerned that my habits were preventing the development of IT literacy within the firm.

As I continued to ponder this, I attended the xxx conference to present the two papers I had co-authored. This trip was highly educational, Many vendor booths were visited, free coffees consumed, and various presentations attended, overall the conference was highly enjoyable. I also spoke in public once again, my presentations were well-received and reinforced my perception that public speaking is within my skillset. I found the atmosphere and those in attendance to be very inclusive and supportive, which was for the best given my unfortunate accident: falling while making an ill-fated attempt to leave a presentation, hitting my head on a chair. The damage looked worse that actually was, but I was grateful for the first-aid trained IT Professionals that assisted, one of whom being co-author of this paper. The following good-natured jokes at my expense were well-deserved, and a welcome distraction from the bandages on my forehead. Previously, I have no doubt my introverted Engineer identity would have left the conference given this situation. My Manager identity, with greater professional awareness and emotional intelligence, persevered, finding attendees that afternoon were laughing with me, not at me, sharing in my amusing misfortune; I had found yet another community in which I felt welcome. The last session I attended held one more surprise for me; in the xxxxx conference best paper award session, where I hoped one of our papers might have been deemed worthy of a commendation. The judging panel had other ideas, I was very humbled to accept the xxxxxx for best research paper, very likely the best form of external validation of my efforts that I could have asked for. Following this, my work in TechWeek and involvement with ITPNZ, it had become abundantly clear to me that my professional identity was far more than my employment; that in volunteering and sharing my experiences and expertise, my contribution was not only valued by others, but also highly rewarding for myself. As I began preparing my notes and reflections into the last stages of my MPP, I had no doubts whatsoever that xxxxxxx would not be my last conference, and that I would continue to contribute to this community and others for a long time to come.

4 EXPLORING PROFESSIONAL IDENTITY

I conclude with two sets of observations. The first, a summary of the evolution of my professional identity as a computing professional undertaking graduate study.

(1) Move from retail to consulting - theme is adjusting to corporate support practices
(2) Move from Consulting to In-house - theme is changing practice again but initially remaining within existing skillset
(3) Starting MPP - theme is added responsibilities of management are becoming apparent, performing RoL and first glance at concepts RE professional identity
(4) Learning Agreement - theme is exploration of professional identity and aspirational framework of practice, beginning Cybersecurity research
(5) Papers - theme is continuing exploration, experimenting with community involvement supported by experience and research,
(6) xxxx - theme is forming conclusions regarding aspirations, practices and need for ongoing education, both for myself as well as the firm (part of the CS case study)
(7) Technology Advocate, now and future - theme is (perhaps) becoming comfortable with progress made and plans from here, this will continue to evolve

As my thesis and the arguments within are taking shape, supported by my Cybersecurity case study, I expect that these two documents will shape the IT strategy of the firm and my own development over the next few years, evolving and adapting as new technologies emerge. The experience I have had over the last eighteen months has been profound and deeply personal, questioning my former professional framework of practice as an Engineer and its inherent tendency to remain within a safety zone. At each of the described stages of the MPP process, I have experienced new ideas and concepts through varying combinations of business, education, theory and practice that my former professional identity was mostly unaware of, supplemented by ongoing research and literary review. These observations and thought processes, brought about through this exposure to unfamiliar and varied discourses, have become part of my emergent framework of practice, each iteration imparting a sense of greater awareness of both self and industry.

The recommendations reached via my in-work project represent the result of months of inquiry, testing, research and contemplation, concluding on what Cybersecurity best practice means to the firm and informing decisions made during my normal workload. The Learning Agreement forced me to think outside my former framework of practice, examining my Engineer identity and how it differs from my Manager identity. The Review of Learning, in addition to preparation for the reflective writing skills required, resulted in significant insight into how my former role came about, adding context to the decisions I have made and a sense of appreciation for the hard skills those experiences incorporated into my skillset at a sub-conscious level [17]. Without a doubt, I am not the same person I was when I left my former role, though the question remains, can I now answer the question about my aspirational framework of practice, and be happy with the answer?

I think I can. Currently, I define of my aspirational career path as that of a Technology Advocate, incorporating my current employment as an IT Manager into a wider role, one that includes community involvement and encouragement of technology education, recognising that any given technology is only as good as the people that use it. This too is subject to change; as demonstrated in this paper, my MPP studies have been the catalyst of profound transformation of my thought processes, practices and overall professional identity, brought about through guided reflection and introspection. Returning to old habits and ways of living is no longer possible, so while my studies within the MPP programme will soon come to an end, I have no doubt whatsoever that my MPP is just the start of something far greater.

The second set of themes relates to a broader understanding of professional identity and how it relates to computing education. Along my learning journey I have been able to identify several different professional identities. This aligns with Giddens' trajectory of development from the past to the anticipated future [8], and with Ibarra's provisional selves. Ibarra uses the term "repertoire" which I interpret as a playlist but I don't think that I ever really had a concurrent set to choose from (except when explicitly prompted to do so (Learning Agreement).

The development of my professional identities were prompted by quite different drivers: role transition [9]; trajectory of development from the past to the anticipated future [8]; and a broadening of horizons - I was transformed by identities and communities of practice [21] that I didn't know existed, let alone that I could aspire to.

The existing model for graduate professional practice education presumes a model that is largely linear, predictable and largely refines an existing understanding [2]. We are asked to consider an aspirational framework of practice and this becoming solidified during the research process. But for me there several different professional identities so rather than an convergent honing process, the learning is much more like design's double diamond of repeated convergence and divergence [5]. As others have found [20], the explicit focus on my professional identity has been a useful lens for my learning journey. I agree with Stevens that unpacking my own journey (navigation) with a focus on professional identity can also be seen in ownership of the technical competencies (domain knowledge).

My learning journey is heutagogical - it is self determined and is explicitly autoethnographic action research. This is based in reflective practice and I have reflected on my past, current, and future practice. Some of intentions of transformative change are revealed only after initial point of commitment ([15] so it was helpful to use this professional identity lens for my prehistory. As a means of thinking ahead [8] the aspirational professional framework of practice lens becomes normal professional practice.

I conclude that visualising professional identity has not just worked as a narrative frame but also as a compelling motivator in graduate computing education.

ACKNOWLEDGMENTS

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6 Cybersecurity Case Study

As per the Learning Agreement document, the focus on my work-based project was to be that of cybersecurity and how the firm and its users operate within that context. The initial planning diagram called for several weeks of research with a concurrent case study that outlines current practices, followed by recommendations for improvement. These recommendations would then be reviewed for approval to perform as part of a series of projects later, all of which would contribute to the ongoing Autoethnographic Action Research. The original plan, depicted in Figure 5 Learning Agreement Project Plan, shows the cybersecurity project taking a central role within my MProfPrac workload, all other concerns such as reflection, engagement with the firm and literature review becoming peripheries of the main project.

Initial thoughts around the potential for cybersecurity initiatives within the firm were many and varied, most of which were focused on improvement or replacement of existing services to benefit existing operations. Some were potential revenue-generating plans, such as the possibility of creating a high-security digital storage environment for software escrow and sensitive data, or security consulting for matters such as advice, auditing and penetration testing, depending on my own attempts to upskill or if the firm was willing to consider adding resources. As depicted in this diagram, such considerations would be investigated and judged on their own merit, any that were thought to be a viable option would be included as one of the planned sub-projects for further testing and implementation. While such options are highly unlikely, it does demonstrate the thought given to the possibilities of cybersecurity research.

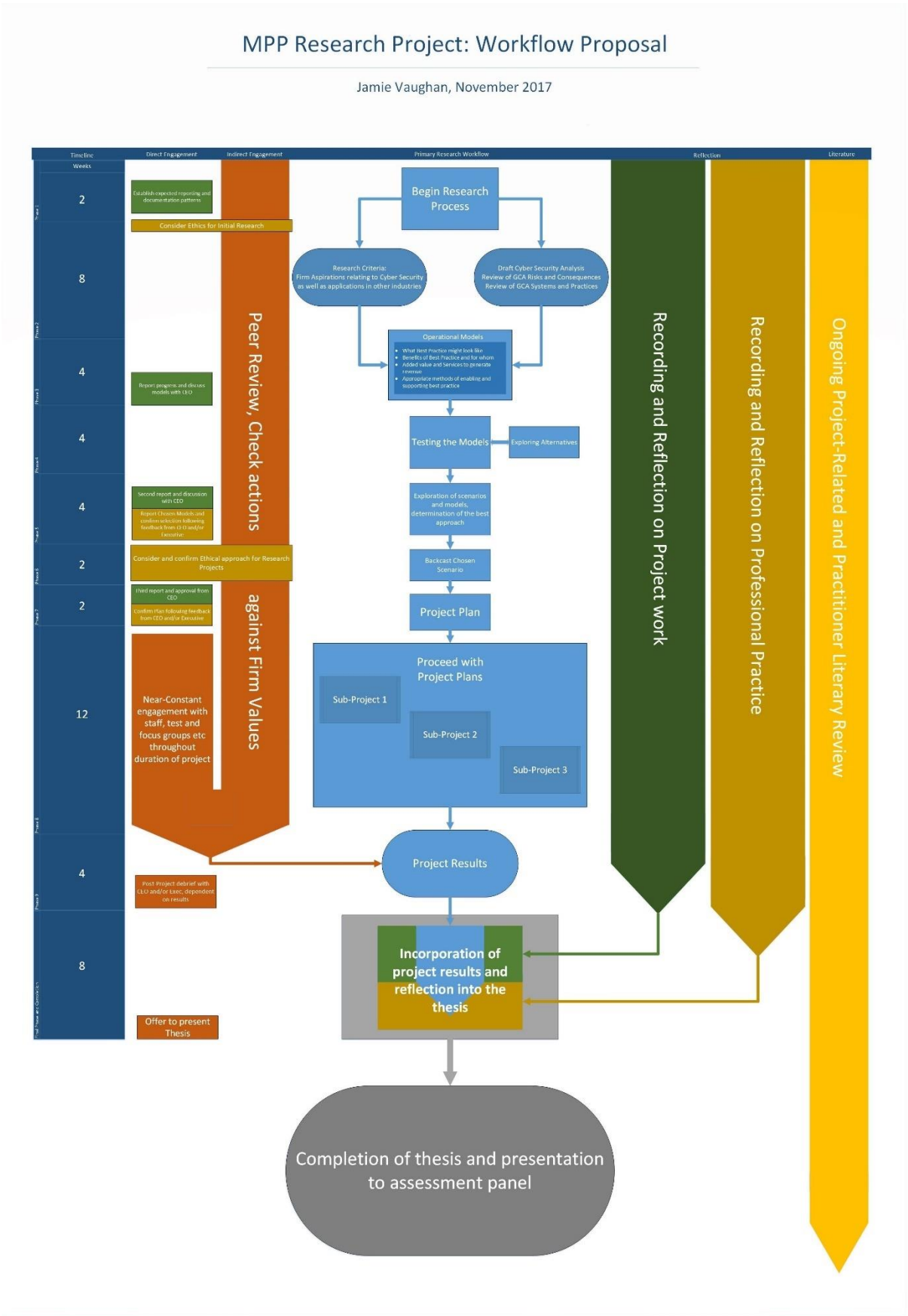
MPP Research Project: Workflow Proposal
Jamie Vaughan, November 2017
Timeline
Direct Engagement
Indirect Engagement
Primary Research Workflow
Reflection
Literature
Weeks
2
8
4
4
4
2
2
12
4
8
Establish expected reporting and documentation patterns
Consider Ethics for Initial Research
Report progress and discuss models with CEO
Second report and discussion with CEO
Report Chosen Models and confirm selection following feedback from CEO and/or Executive
Consider and confirm Ethical approach for Research Projects
Third report and approval from CEO
Confirm Plan following feedback from CEO and/or Executive
Near-Constant engagement with staff, test and focus groups etc throughout duration of project
Post-Project debrief with CEO and/or exec, dependent on results
Offer to present Thesis
Peer Review, Check actions against Firm Values
Begin Research Process
Research Criteria: Firm Aspirations relating to Cyber Security as well as applications in other industries
Draft Cyber Security Analysis Review of GCA Risks and Consequences Review of GCA Systems and Practices
Operational Models
What Best Practice might look like
Benefits of Best Practice and for whom
Added value and Services to generate revenue
Appropriate methods of enabling and supporting best practice
Testing the Models
Exploring Alternatives
Exploration of scenarios and models, determination of the best approach
Backcast Chosen Scenario
Project Plan
Proceed with Project Plans
Sub-Project 1
Sub-Project 2
Sub-Project 3
Project Results
Incorporation of project results and reflection into the thesis
Completion of thesis and presentation to assessment panel
Recording and Reflection on Project work
Recording and Reflection on Professional Practice
Ongoing Project-Related and Practitioner Literary Review

Figure 5 Learning Agreement Project Plan

6.1 Cybersecurity Brief

The plan did not eventuate as intended, given that the real-world requirements of the firm could not wait for research and planning to take place, particularly when it came to the age and warranty status of the hardware the system depended on. Regardless, an initial case study was undertaken as a proof-of-concept for the Learning Agreement, resulting in a document based on my own existing cybersecurity skills and interpretation of best practice (Figure 6). The document outlined the current practice within the firm as part of a custom-made assessment framework, defining the following eight areas of concern:

1: Firewall and Intrusion Prevention

2: IT Policies within the firm

3: Mobile Devices and IoT

4: User Education

5: Password Management

6: Backups

7: Anti-Malware and Updates

8: Multi-Factor Authentication

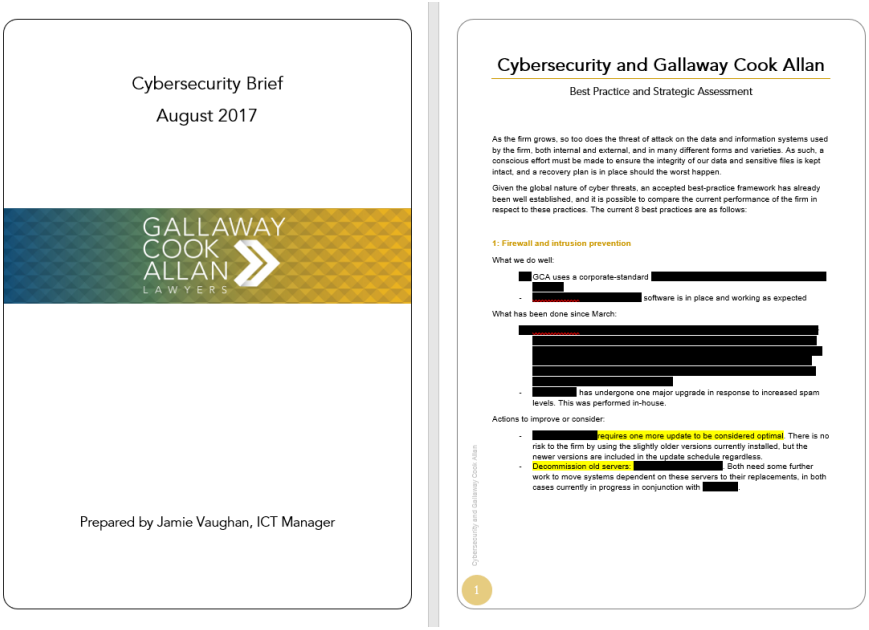

Figure 6: Cybersecurity Brief, August 2017

Each of the above areas included a brief description of the concern, how the concern had evolved since my tenure at GCA began and my recommendations on how any issues noted therein can be resolved. This document, see Appendix 5, was included within my Learning Agreement presentation as a form of initial peer review, prior to additional review by my industry mentor. Feedback from both suggested that the framework itself needed further definition and improvements to how it is presented to its audience. Focusing heavily on the creation of firm-wide ICT policies to manage the various identified risks and any consequences they might have, the format of the report was little more than a to-do list, outlining possible areas to work on but giving very little information regarding the factors within our system that justified those recommendations. Furthermore, given that some of the suggestions included were already in the process of implementation, such as mitigating server warranty concerns via a partial cloud migration, this case study was not presented to the Executive or Partnership at this time, instead being held as a comparative work for a second case study that would be informed by the ongoing cybersecurity research. Also omitted was the consideration of cybersecurity from the perspective of factors of business differentiation, specifically regarding any means to set the firm apart from our competition. My

opinion of this was, and remains, that any attempt to market our security practices as a benefit of working with the firm would be an error of judgement, more likely to be interpreted as a challenge by Black-Hat practitioners and a needless risk to our data integrity, creating a far greater liability that cannot be mitigated by the potential benefits from advertising. Even here at the outset, it was clear that any form of business differentiation via cybersecurity would need to be highly innovative, somewhere outside the potentially narrow definition of 'the most secure' where we could attract the attention of potential clients without creating undue exposure of our systems.

6.2 Case Study and Report 2018

The research into cybersecurity practice continued for six months instead of the originally planned eight weeks, considering the works of authors Bruce Schneier and Kevin Mitnick as well as an online course in Penetration Testing hosted by Mile2. Despite learning the basics of Penetration Testing (Experts Exchange, 2018), the amount of extra training and additional software required to perform even the most basic of vulnerability report removed this as an option in the very early stages of research. In investigating multiple options for software and solution replacements, there are many well-trained and well-equipped vendors providing these services for reasonable fees. Any attempt to compete through an added-value service offered by a legal firm would not only be highly unrealistic, but also distracting from my normal workload; I have since concluded that I am far more valuable acting in-house, interpreting the reports from one such vendor and deciding upon the approach to address any concerns raised. Given that many of the systems analysed within the original document had already undergone considerable change, a second case-study informed by relevant industry research was a logical next step.

The second case study, (Figure 7, Appendix 6), was initially based on the same framework as the original, however with a broadened perspective that looked at the overall system impact rather than the eight individual systems discussed previously. The new framework consisted of six categories:

1: Physical Security

2: Firewall and Intrusion Prevention

3: Software and updates

4: Backups

5: Access Control

6: Education and Policy

These six categories represent a significant change in thinking since the original case study.

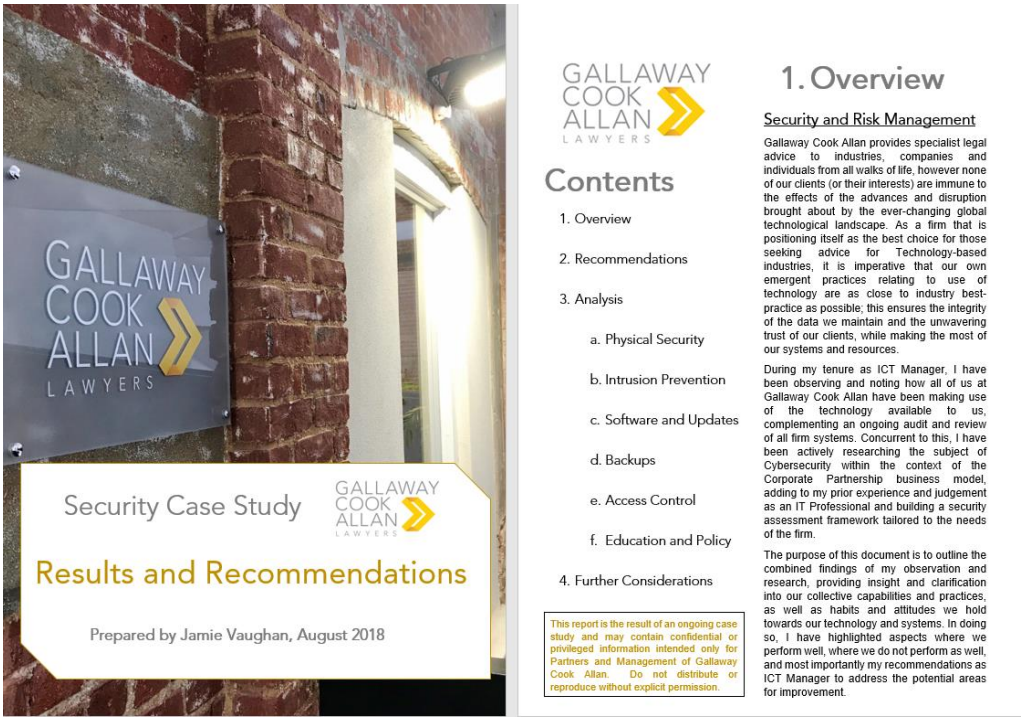

Figure 7: Security case study 2018

6.2.1 Comparative Analysis

The first category of physical security was notably absent in the first attempt, in hindsight it seems absurd that any attempt to strengthen cybersecurity precautions would not also involve security in the traditional or physical sense: keeping unwanted guests out. My initial attempt from 2017 made suggestions highly reliant on technology and software. Both Schneier and Mitnick had much to say on the subject.

> "*Technology is generally an enabler, allowing people to do things. Security is the opposite: It tries to prevent something from happening, or prevent people from doing something, in the face of someone actively trying to defeat it. That's why technology doesn't work in security the way it does elsewhere, and why an overreliance on technology often leads to bad security, or even to the opposite of security"*
>
> *Beyond Fear* (Schneier, 2003)

Through expert and perpetrator interviews, Mitnick went into even more detail with narratives of real-world events, giving examples of genuine threats and how they were executed. One such example was that of 'Tailgating', in which an intruder can closely follow a legitimate user into a restricted area, as told by a professional Penetration Tester gaining unauthorised physical access within the target building through social engineering and manipulation of unwitting staff (Mitnick & Simon, 2001; 2005). As such, physical security now occupies the very first position on our list, as it is the foundation for so many of the considerations that come after it.

Firewall and intrusion prevention remains; however, the difference now is a focus on key systems like replacing the physical firewall and software suites; the previous attempt that detailed long-outdated servers waiting for decommissioning and neglected software, both issues long resolved. Likewise, Software and Updates remains, a renamed version of Software, Anti-Virus and Anti-Malware from the 2017 document. This too focuses on replacing the current software suites, this time including the full range of Microsoft software from Server

and Workstation operating systems through to Office, citing the need to maintain and replace this software as it approaches the end of its life cycle. Given that the timeframe on these considerations ranges several years while emphasising the importance to the sustainability of the current systems, I argue that these recommendations demonstrate a pronounced shift in thought process, away from an Engineers perspective of day-to-day operations within IT, towards a Managerial perspective that includes a critical and strategic approach to the system.

The Backups section does not make any recommendations in the latter case study, however as it is an important part of any ICT system, I opted to keep this category in the report for the benefit of awareness surrounding the developments made there, as well as reassure the Executive that the most appropriate solution has been implemented.

Access control is the combination of three sections from the 2017 framework: Password Management, Multi-Factor Authentication and Mobile Devices/IoT. While each is certainly an important consideration in and of itself, each is also part of a greater whole surrounding how our users directly and indirectly interact with our ICT systems. Despite consolidation, the original recommendations for each of these three aspects still stand on their own merit, though the ICT infrastructure of the firm has changed considerably since. As software and solutions are moving towards a simplified, integrated approach through initiatives such as single sign-on, matters relating to Access Control will also be included in proposals for any planned solutions or changes going forward.

Lastly, I have placed the Education and Policy section at the end, perhaps the strongest evidence of change in practice and approach. Unlike the first document, here we see a different direction regarding the firm ICT policies, advocating a move away from overly-prescriptive written rules regarding acceptable behaviour within our systems, instead opting for a short intranet article that aligns the expected behaviours outlined in our employment agreements and firm values (bring it, do it, own it) to the use of our technology. In other words, we assume our users will utilise our systems in a manner consistent with that of professionals

within the legal industry. While this simplifies the approach to any internal abuse or negligence toward our systems, it does not address the problems likely to arise in situations of unintentional misuse or compromise, leading us to the second part of this section: Education.

A common adage within the ICT Industry is that the biggest risk to digital security that a business could face is its own employees; insider threats, social engineering, bad habits and old-fashioned human fallibility, all playing a part in an overarching concern often referred to by the acronym 'PEBKAC': Problem Exists Between Keyboard And Chair. Given GCA already encouraged development within its team, it made sense that an ongoing element of ICT skills should be included in the Continued Professional Development schedule for all staff, attempting to mitigate any internal threat by raising the collective technological awareness of the team.

This concept of education within computing has come to dominate many of my thoughts around not only cybersecurity but general practice as well. In researching cybersecurity and interacting with my colleagues and other communities, such as the audiences attending Techweek, the arguments relating to technological literacy has become something of a central focus within my personal reflection. Regarding the Online Safety presentations described in section 2.5, these were originally aimed at the senior citizen community, based on well-documented physiological and psychological trends showing a decline of technological abilities as a user ages (Westerman & Davies, 2000). There are similarly well-documented factors surrounding a generational and, in some respects, cultural factor to technology, one argument being that more recent generations benefit from early and prolonged exposure to technology, thus more proficient in its use. This is referred to as the age/generation gap school of thinking, describing the main factor of this gap as a hypermedia digital environment that is better suited to younger generations than those that are a product of a different time. Along these lines there is also the usability/experience school of thinking, that the overall user-friendliness and experience account for the apparent divide in technological literacy (Eshet-

Alkalai & Chajut, 2010). Similar thoughts are expressed by many authors, another example being the musings on smartphone technology by Adam Greenfield in his book Radical Technologies:

> "*When pursuits as varied as taking a photograph, listening to music and seeking a romantic partner all start with launching an app on the same device, and all of them draw on the same, relatively limited repertoire of habits and mindsets, a certain similarity inevitably comes to color each of them.*"
>
> Greenfield (2017)

Though I do not doubt it exists, in my role I do not see the same pronounced difference between the generations described as 'Digital Natives' and 'Digital Immigrants' (Prensky, 2001), I see a more common denominator in people from all walks of life asking the same questions. From "which device should I choose to buy?" or "how do I tell if I have a virus?" through to "it fell in the toilet, do I need a new one?", these are all common concerns regardless of demographic; I have found that a senior citizen attending an Online Safety seminar is just as likely to ask these questions as a legal professional in their thirties deciding they need some assistance with their computer. Even those of the Millennial generation are susceptible to this, happy to navigate a smartphone app but express frustration when the skills required to operate their monthly subscription of Adobe Photoshop are almost completely alien to them. While the younger generations are perhaps more familiar and confident with their technology than those that came before them, my experience with Digital Natives seems to indicate similar limitations to Digital Immigrants in how they interact with technology, often lacking awareness of the full capabilities of their devices and prone to panicking when something goes wrong. This is also voiced in a general, yet justified, anxiety relating to digital privacy, with many users in both public and corporate spheres pre-occupied by the possibility that their devices also act as data collectors for entities both known and unknown, tracking their movement, shopping habits and internet browsing in an apparent non-monetary cost of using said devices (Greenfield, 2017,

Schneier 2015). To me, the slow uptake in technological literacy became an expression of how my own professional practice needed to adjust to my new Manager identity; it was no longer a case of simply fixing an issue for those I support or ensuring their needs were met, as I would in my time as an Engineer. I felt that continuing this approach was a temporary resolution, particularly with the minor problems like unresponsive addins, a hallmark of our practice management software, where I would often repeat the same fix for the same users many times. One could give someone a fish and feed them for a day or teach them how to fish and feed them for a lifetime; this age-old approach suggesting that showing those I support how I go about resolving these issues as they occur will simultaneously allow greater independence from any ICT support needs, reduce overall downtime due to issues that arise and prepare for ongoing technological disruption within the legal industry.

6.3 ICT Strategy

The cybersecurity case study was intended as a vehicle for Autoethnographic Action Research from the outset, while it was a significant undertaking that serves as evidence of professional development, it also highlighted one of the primary concerns of my expanding role as an ICT Professional: ICT Strategy. While the mindset and the required commitment to developing supporting strategic skillsets within security has already been demonstrated in the previous section, my thoughts on strategy within the business were not solely limited to cybersecurity and risk management. My first strategic concerns upon joining Gallaway Cook Allan centred around ageing, overworked hardware and intermittent outages during work hours; even making allowances for an infrastructure at the end of its lifecycle, the ICT systems in general were not performing to an acceptable standard. My existing Engineer skill set informed the planning process of mitigating these issues, however there was a learning curve inherent in deciding the best path forward, balancing the functionality of the systems with the economic viability of the IT budget. A significant portion of this learning curve, as pointed out by my mentors, was coming to terms with the reality that I am unable to fix everything myself,

in which case it is my responsibility to find someone or something that can. Many of these initial issues could be performed by myself, such as hardware upgrades to resolve resource issues and improvements to the maintenance process. Over time, the ongoing issues and inconsistencies like software crashing, memory leaks and unresponsive servers were reduced, to the point that unexpected outages were a rarity, rather than a near-weekly occurrence; however, the issues of hardware warranties, system succession and complex solutions required advanced and specialised attention, work outside my expertise that would need to be sourced externally. As such, my former colleagues of our ICT services provider were now another resource that I would need to utilise and manage effectively and economically.

This new balance of workload brought the role of Project Sponsorship into my strategic duties as ICT Manager, reinforcing the need to provide appropriate levels of stewardship and leadership from within the firm throughout project implementation (Ellis, 2016; 2017). Through analysis of the ongoing issues, weighing up the available options and taking on board guidance where appropriate, the identified concerns were addressed through a combination of smaller projects; in-house work as described above, and a series of mid to long term migration plans through our ICT provider that would eventually result in a comprehensive cloud-hosted solution for our production environment, completely removing any hardware and warranty concerns previously held, with each stage of the migration planned to minimise any risk of data, hardware or services loss. Through careful planning, testing and an excellent working relationship with our ICT and hosting provider, the completed migration came in under budget and taking far less effort than originally estimated, while providing the performance and future-proofing benefit of brand-new hardware.

Having resolved the immediate concerns regarding reliability, functionality and consistency of the overall system, my strategic involvement within the firm has shifted to the long-term

roadmap of our ICT systems, such as the depreciation of server and workstation operating systems as described in the cybersecurity case study and our options for the various production and security software suites on offer, potentially replacing and integrating our existing isolated solutions. This is expected to include providing advice on potential and emerging beneficial technologies as well continuous improvements to all firm systems where possible, as such the involvement of ICT at all levels of the business will need to be encouraged. Despite the critical nature of technology within all aspects of modern business practice, often the implications and priorities of a given system are misunderstood by those that rely on it, or the priorities across different departments within a business may not align with the priorities of the business overall (High, 2014). While my advice and professional input is valued, my own experience from operating within a Partnership business model made up of affiliated yet separate Partners, there has been some inconsistency in communicating the balance between both the higher-level strategy, such as the long-term roadmap, and the day-to-day operational aspects of my role. This appears to be a common trend among ICT Managers and CIOs, who find that their inclusion in management decisions is not guaranteed, their voice within their organisation earned by proving their value to stakeholders and other senior management, supported by relationship-building that induces a level of trust within department leadership and perception that ICT involvement will be beneficial (High, 2014); in my case as transitioning to Manager, I perceive similarities between this argument and Ibarra's Provisional Selves, that demonstrating my value to the Partnership will require experimentation with my perceived professional identity until I find an effective framework of practice that supports my credibility as a Manager (Ibarra, 1999; Hall, 1995). My challenge within the sphere of strategy then, is to ensure visibility of my contribution to the ongoing strategic framework of the firm as well as the value this contribution provides, while continuing to develop and maintain a clear sense of priorities (Manson, 2017). As I do not report to the Executive, I have explored other methods to create visibility; following discussion with my

mentor, one such method was creation of a template for a bi-monthly or quarterly report, outlining my activities over the reporting period and demonstrating the various aspects of my duties beyond standard Systems Administration. While creating the report does not necessarily mean anyone will read it, it is a step in the right direction. Moving forward, a key motivator to my efforts within the firm will be to ensure that the correct message is perceived through my thoughts, words and actions, that there is value not only in my contributions as ICT Manager, but also in my efforts to educate and collaborate as a developing leader in my field.

7 Framework of Practice

In joining Gallaway Cook Allan as a former Engineer, I held no expectation that my overall Professional Identity would change, that my standard workload would remain firmly rooted in Systems Administration and its supporting skill-sets. On reflection, my interpretation of the role at the time was that I would be maintaining the system and ensuring its day-to-day operation, performing any work within my capabilities while leaving the more advanced projects to our third-party ICT Services Provider. The idea of moving beyond this and expanding my abilities beyond standard ICT support was not something I had thought about to any meaningful extent in the time leading up to my career transition, however the change in working environment and adjusting to the ICT requirements of a new employer prompted a pronounced change in mindset and behaviour. I attribute this mainly to the new-found autonomy and accountability of my new role, unlike the workload of an Engineer that was provided for me, as a Manager it was my responsibility to assess and respond to the ICT needs of the firm appropriately. I was largely left to my own devices to do this, while it was somewhat disorienting at first, my experience and knowledge of the firm and its systems were instrumental in clearing this first hurdle of my transition. The feeling of disorientation as my former Engineer identity and my new Manager identity were at odds would occur again on many occasions throughout my MProfPrac efforts, at first incorrectly interpreted as a lack of general direction. As my Professional awareness grew in ICT and general business practices, I came to appreciate my autonomy more and more, recognising that I was trusted to get the job done and utilise my best judgement as an ICT Manager.

Alongside these musings on autonomy, the requirement for a strategic and planning aspect to the ICT capabilities of the firm were also becoming apparent, an area that I had little exposure to in my former role, other than assisting senior technical colleagues. While ensuring the ICT systems remained functional and enabling our people to be productive occupied most

of my time at the beginning, the age of the system and vague succession plan meant that my focus began to drift towards options for replacement and decommissioning of the old system. Despite not having directly attempted this sort of thinking before, I found the process to be enjoyable and motivating, several scenarios that involved finding and discussing possibilities for an ICT solution, weighing out the advantages and drawbacks before deciding on the best approach have been highlights throughout the exploration of my Managerial role and its responsibilities. The more effort I put into this aspect of my role, the more I wanted to focus on it, leading to one of my key behavioural changes that has come about through the MProfPrac: I was far more capable as an ICT Professional that I thought, that my contribution within my role had far more value than I was aware of. The subject of strategy was a consideration I would have left to senior staff previously, while my former role had no exposure or requirement to take higher- and corporate-level strategy into account, on reflection it appeared that I had assumed I simply lacked the skill to do so. As such, Strategy has not only become a central focus of my new Professional and Aspiration frameworks of practice but was also the first stepping stone in the extensive revelation that if I was wrong about this, there is probably a lot more I am also wrong about that should be explored.

Another aspect of my Engineer role that underwent drastic change was that of external engagement. I considered business relationship-building something I had some experience in, as my prior responsibilities as an Engineer meant regular correspondence with other vendors or support agents as part of my client support practices. My current philosophy, that one catches more flies with honey than vinegar, was a result of this; that building good working relationships with others will not only encourage a positive work environment and attitude, but usually result in those others becoming more receptive to assisting in times of unusual need (pessimists may refer to this as ‘calling in a favour’). While this skill served me well, the more advanced practice of business networking, specifically directly interacting with others from

many other organisations solely for forging the beginnings of business relationships, was somewhat terrifying for me. It was not something that I saw as relevant to what I did, nor something I would want to participate in, to the point that I would generally not interact with any external organisations or individuals beyond what was needed to perform my job. This is another example of a behaviour and skill-set that I would observe in others, while deciding that it was not something that I was capable of myself. As my transition progressed and my role continued to develop alongside the first two stages of my MProfPrac, I also began to see the value of networking and how increased contact and exposure to the wider business communities typically results in mutual benefit for all involved. While my studies with SIGNAL and CapableNZ also count as an example of this mutual benefit, there have been many more instances that would have been a missed opportunity had I retained my antisocial tendencies. I met Shane Boyle, my industry mentor, at a quiz night hosted by Gallaway Cook Allan, where a colleague introduced us as each other's counterpart within our organisations. It would be several weeks later that I would approach Shane and ask if he would act as my mentor and I have been grateful for his guidance in the months since.

In overcoming the tendency towards introversion and choosing to continue working on my social skills, involving myself with events and initiatives became enjoyable, in turn motivating further involvement. The smaller networking events and study through SIGNAL naturally lead to joining ITPNZ as an associate, later upgrading to a full member by using the SFIA skills framework to prove I meet the qualifying criteria. As discussed in section 2.3, when the possibility was raised of a volunteer from GCA joining the Dunedin TechWeek 2018 committee, I expressed interest and later joined the committee as another voice at the table. While this was at first somewhat daunting, given that I often had no idea who the committee was discussing in terms of getting participants and keynote speakers, I threw myself into the role and tried to assist as much as I could. Despite my limited contacts, I found that an extra set of hands for the logistics and technological requirements of the events was highly

appreciated all the same, across all the events I became involved in. While I was unsure what to expect going into it, the highly-receptive audiences during Techweek 2018 shifted my perspective considerably; while I was actively engaged in transforming my professional identity in the workplace, I was also being confronted by the reality of how my skills and experiences as a professional can be shared for the benefit of a far wider audience than I had previously thought possible. Furthermore, the Online Safety sessions were based on my observations of the security practices I intended to encourage within GCA, in presenting a more generalised version of these to the public, I noted that the overall message I was trying to convey regarding online safety was essentially the same regardless of the corporate or consumer environment. The corporate infrastructure may have more complicated and advanced methods of regulating user access and mitigating threats, nonetheless it appeared that the concerns and anxieties my Techweek audiences expressed mirrored those of the people I support in the workplace; for example, both groups were broadly aware that scammers and phishing attempts were a common occurrence, but had very little knowledge regarding how to recognise when something or someone online is being deliberately misleading or taking advantage of them. In creating my Techweek presentations, I was highly confident that my basic consumer guide could easily be adapted for corporate use and continued professional development. This confidence, when combined with the launch of our new Intranet as a knowledge base and ongoing contemplation regarding disseminating basic ICT awareness, became the catalyst for a new direction of thinking within my professional practice: User education and ICT up-skilling of others can be a significant part of my duty to enable the firm and its use of technology.

External interaction has now become a part of my standard workload since starting Stage 3 of the MProfPrac, not only evidenced by the conference papers that are included in this thesis, but also further involvement with ITPNZ in the form of joining the Southern ITPNZ committee and enrolling the firm as a corporate partner. On rare occasions, my experience

and credibility as an ICT Manager has been ‘lent’ to other organisations, with situations arising where other firms that we have close relationships with have requested my assistance in demystifying proposals that have been put forward by their service providers. Without an internal IT resource of their own, these firms have struggled to make informed decisions regarding these proposals in that many of the IT-based concepts are foreign to non-IT industries. Efforts for Techweek 2019 will also soon be underway, which I have every intention of becoming involved in once again. The value of this external involvement is not something I would have understood in my former Engineer role; outwardly, I would say it is a waste of time and energy that detracts from my workload, as a misguided attempt to retain credibility, or ‘save face’. In truth, the idea of direct engagement with others beyond the work at hand terrified my former self, not that I would have admitted this to anyone. Inwardly, my tendency to remain introverted came about from my insecurities surrounding my lack of qualification, in short, if I kept my mouth shut, no one would notice that I probably don’t know what I’m talking about. This type of ‘comfort zone’ thinking was alluded to when concluding the first ITx paper, section 3, specifically in the sense that it is not a mindset I intend to fall into again. Having now experienced this involvement for myself and reaped its benefits, I have come to understand that taking up the opportunities to connect and contribute elsewhere has meant added exposure of both the firm and myself as a professional, allowing me to begin building a network of contacts that I would not have otherwise met and interacted with. More importantly, it has expanded my awareness beyond the closed system and isolated ICT infrastructure of the firm, discouraging the single system I support from becoming an echo chamber and creating discussion and discourse of concepts and ideas in areas outside my immediate area of expertise. This in turn adds to my professional framework of practice, improving my skills and knowledge, ultimately adding value and benefit to the firm. Reflection on these changes in particular has been an interesting exercise, I try to imagine how my former Professional Identity would have behaved in the same situations, such as assisting with a week-long festival

of local events, taking up public speaking or writing conference papers (let alone accepting an award for one of them); I began the MProfPrac with the expectation that having a degree and some letters beside my name will benefit my career and credibility, I now find it highly amusing that I have already achieved this through the journey I have taken to get there before even reaching the destination. In setting aside my insecurities and stepping outside my comfort zone, choosing to actively seek opportunities and work with others, I have already accomplished far more than my former Engineer identity could have thought was possible. I began this process feeling the need to prove my credibility without the feeling that I had earned it; as I am reaching completion, I feel I have a well-earned place within the ICT Industry, and while the MProfPrac will remain ingrained within my Professional Identity for as long as I live, I now know for certain that the lack of letters beside my name was not what had been holding me back in the first place.

7.1 SFIA review

A key factor in this expansion of awareness has come from greater knowledge of the ICT industry itself, as an Engineer I was not aware of how large the industry is given how little of it I was exposed to in that role. Early in my MProfPrac efforts, Professor Mann introduced me to the SFIA framework, the Skills Framework for the Information Age (SFIA, 2015), which has since become an almost constant companion as my exploration of professional identity has continued. My interpretation of the framework began as a means to map my current skill level and historical progression within the ICT industry, summed up in my Review of Learning with a graph depicting a ‘moving front’ around an approximate overall skill level between 4 and 5.

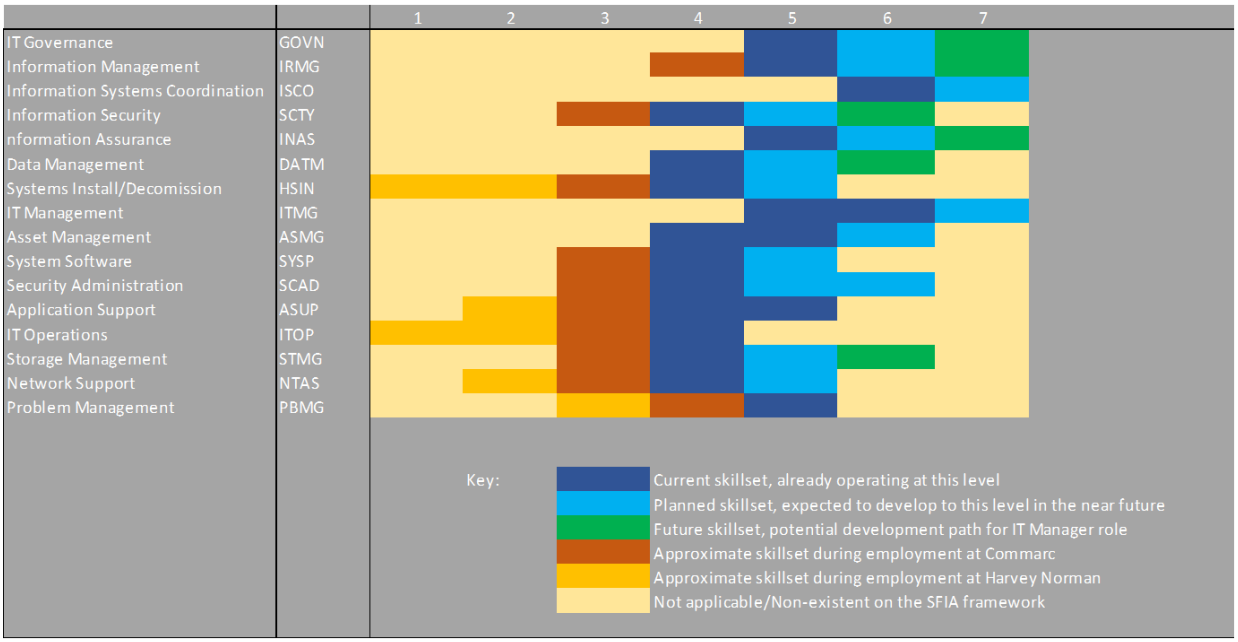

Figure 8: First Output using SFIA

Figure 8 was created using SFIA version 5 as a self-assessment of my technical skill at the beginning of MProfPac Stage 1, showing an estimated skill level during my former roles and potential development paths via colour-coding. This was done with no formal knowledge of the framework, the result of highlighting the described skills in the framework reference that I felt was relevant at the time, see Appendix 7. Following this method, the self-assessment process has been completed once again, also showing the moving front but adding in the values from 2017 as a separate data set. This method shows a clear progression in technical skills, which have come about as a by-product of focusing on the managerial and strategic skills. This second attempt was created using SFIA version 7 (SFIA, 2018), see Figure 9, which has seen an overhaul of the skill categories and the skill levels within them; taking this into account, my original 16 skill categories from the first attempt have now become 20. Unlike my first attempt to use SFIA, which focused almost entirely on the described skills within each level and category, this more recent attempt benefits from the added oversight of the factors of responsibility behind those skill descriptions, namely Autonomy, Influence, Complexity and Business Skills (SFIA Foundation, 2018). Overall, my self-assessed skill level sits comfortably

in level 5 (Figure 9), taking into account the identified skill categories combined with the four factors listed above. My high-level of Autonomy is defined by my authority and accountability within the entire ICT infrastructure of Gallaway Cook Allan, as well as how this area of work is managed. My Influence is defined by the advice I provide to the Executive, the decision-making within my area of authority and the ongoing development within ICT Strategy. My Complexity is defined by my extensive range and understanding of skills and duties, as well as ongoing development within my leadership and management qualities. My Business Skills are defined by Risk Management, Collaborative efforts, a commitment to a continued professional development programme for my colleagues that is inclusive of ICT aspects, combined with the responsibility factors listed above.

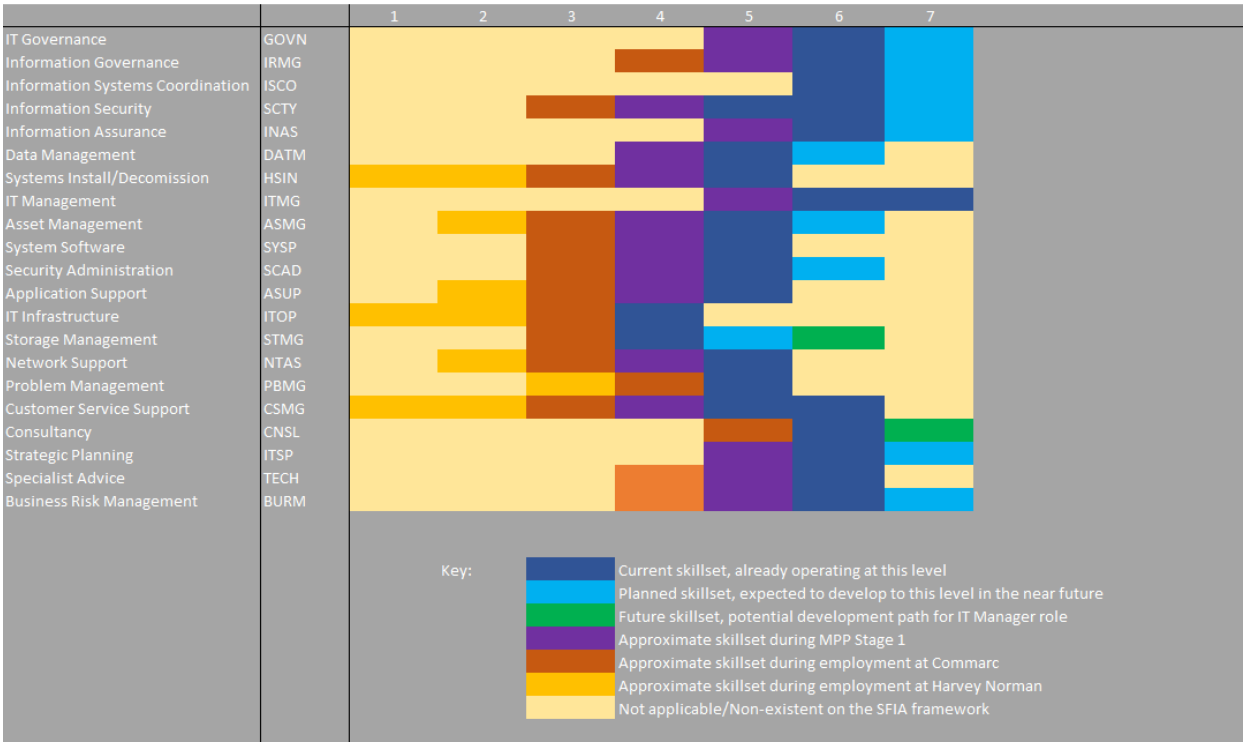

Figure 9: Second Output using SFIA

There are caveats to these self-assessments, however. This data assumes my self-assessments are correct and that I am accurate in my interpretation of the framework and its categories, I have no objections to the possibility that I may be wrong. Since my first attempt, I have seen this approach used by others with far fewer categories listed, the average

appearing to be 7 or 8 skill categories that describe their professional framework of practice. I have come to consider that the original self-assessment total of 16 categories was potentially far too high, which caused some concern during the second attempt when I could not whittle my list any further down than 20. Regardless, I still felt that these categories are a justified inclusion when describing my duties, given that my role is highly varied by its very nature, even if some of the selected categories are, in practice, a smaller subset of duties within my wider role. For example, the category of Application Support (SFIA code ASUP) runs from skill level 2 during my original retail ICT role from 13 years ago through to the maximum skill level of 5 that reflects my current duties. While accurate, this skill category is best described as a subset of my current role, something that I am capable of and typically performing often, but still only a small part of the work I perform on a day-to-day basis. As I related my skills to the relevant sections in the SFIA framework, I found four categories that accurately describe the overarching professional identity that also provide a loose timeline of development: Starting in retail, I chose Customer Service Support (CSMG), which developed into Consultancy (CNSL) when I moved into the Engineer role a decade ago. While my role changed, the customer services skill-set did not, as such I believe it is important to depict the first skill category as a base upon which the second is built. Consultancy then developed into IT Management (ITMG), the skill-set that best describes the role I am performing now, which was built upon the bases of Customer Service Support and Consultancy. Finally, I have included Enterprise ICT Governance, building upon the three previous categories and including the ICT strategy skills that I am working on as well as a roadmap for my aspirational framework of practice.

Removing these four categories from the twenty I began with, the remaining sixteen can now be plotted as sub-categories within my primary four, resulting in a graph that accurately and comprehensively displays the nuances of my role and the myriad of responsibilities within it (Figure 10).

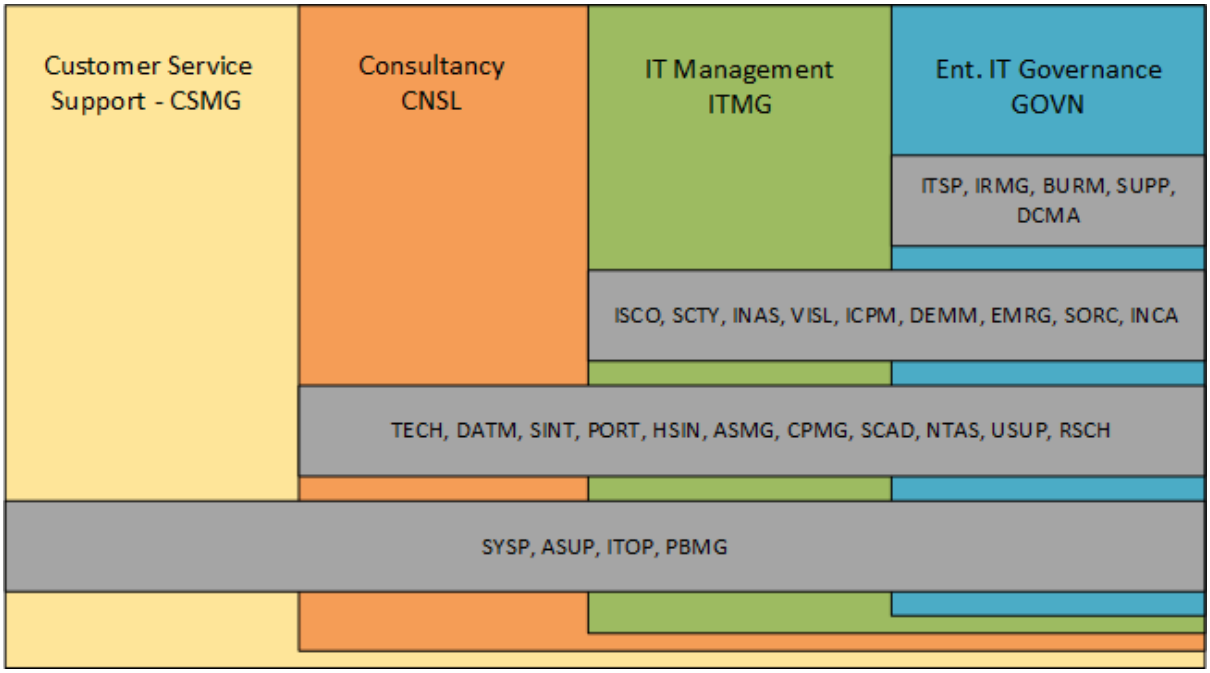

Figure 10: My aggregated SFIA categories.

Reflecting on the Understanding SFIA course discussed in section 4, for which I repeat my gratitude to SIGNAL ICT Grad School, completing this course re-enforced my emerging philosophy that community involvement and education should be a priority within the tech sector, of which the SFIA framework is a highly effective tool to assist with that goal.

7.2 Process review

The final exhibit in my portfolio of evidence is that of the project plan originally included in my Learning Agreement, outlined in section 6. Paraphrasing Prussian Field Marshal Helmuth Karl Bernhard Graf von Motke: No plan survives contact with the enemy. My plan was no different, lasting only a few weeks before it became apparent how unrealistic my expectations were when the plan was written. Each aspect of the MProfPrac was intended to be its own process, with the cybersecurity project as the central theme. To one side there was engagement with the firm and its management, on the other side was ongoing personal development within the project, within my role and my literature review, each of these efforts

being monitored and reflected upon separately. Though it looked fine on paper, this approach was almost completely impractical when trying to implement it in a real operating work environment. The cybersecurity project, initially planned to take several weeks of research and qualified by a case study, became a smaller part of a larger picture as the demands of the firm forced my hand before I could research and determine the priorities. An issue or a concern regarding the ICT Infrastructure would present itself, at which point I would need to act as part of my normal workload; for example, a security concern listed on the first cybersecurity case study was that of two Windows Server 2003 virtual machines dedicated to the old Intranet and previous practice management system respectively. The original plan intended for these to be phased out over time, however given the migration to the cloud platform and launch of the new intranet took longer than expected, having two servers running dangerously outdated operating systems during a time of several high-risk malware alerts was deemed a critical risk. Instead of having the time allotted in the project plan to carefully assess the implications of decommissioning, the remaining functions were urgently transferred to newer servers.

Furthermore, our ICT systems have undergone two major platform migrations and a complete overhaul of our Citrix solution, any plans made at the end of 2017 would no longer be applicable to the system as it is now. Unfortunately, my original project plan was made with a mindset of project management as it was when I was an Engineer, in the current climate of fast-paced technological development, any long-term strategic plans need to be lightweight and responsive enough to adjust to the ongoing changes in business requirements and changes in available technology. Despite having little direct project management experience, I found that even as a project sponsor, both the firm and I would need to be agile in our approach, just as the name of the current project management movement implies.

Likewise, the attempts at engagement were nowhere near what was expected either. Lawyers are by nature busy and time-poor individuals, very few were particularly interested in their ICT systems, so long as they were working. My intentions of reporting to the CEO and the

Executive did not quite take shape, however input from my mentor found that a bi-monthly report that outlined my comings and goings as well as any concerns they might want to know about was more than adequate, if any of the powers that be wanted an update, it was available to them in the secure network drive that was locked down from all except Partners and management. I created a simple traffic-light template: green means all is well, yellow means it is in progress, orange means it needs attention and red means there is an emergency. Each issue or notable event within our systems was included in the report, and assigned a traffic-light value, as well as a section at the end for comments. This has also been useful as a means of scheduling my own workload and preventing important tasks from falling off the radar. At the other end of this, my external involvement, as previously described, was far more involving than originally planned as well, this was not something that has been included when the plan was written.

The assumption that I could separate each process out appears to have been somewhat naive on my part, what I had found was that I could generally identify each process, such as what is the normal workload of an ICT Manager and what constituted external engagement, however this was usually only temporary as the two processes eventually merged and became indistinguishable from one another. Working on Techweek started off as volunteering, a separate process under external engagement, eventually this merged with my normal workload and reflection from my cybersecurity project, when my Online Safety presentations were informed by my research and performed as part of my role, the title ICT Manager of Gallaway Cook Allan and member of ITPNZ adding credibility to my expertise. My plan to record reflection of my cybersecurity project and my overall Professional Practice separately was also misguided, right from the outset there was generally little distinction between the two; my cybersecurity work was always part of my overall Practice, I could not justify any reason to remove one from the other. As such, I have come to view the project plan from a different angle, in which each of these processes are incorporated into a single ongoing process made

up of multiple channels that interact with each other, more accurately depicted as Figure 11: Representation of Actual Project Workflow.

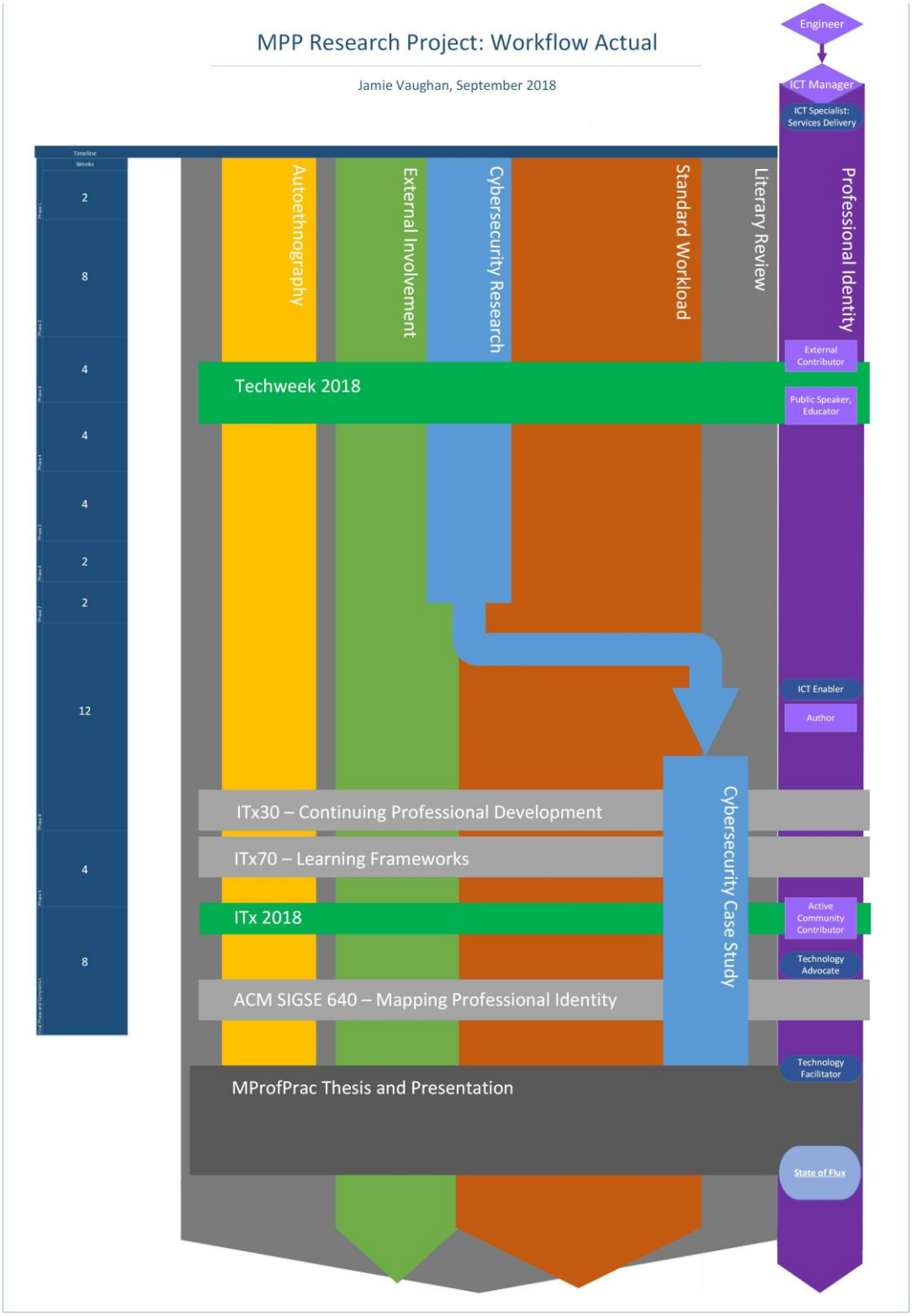

Figure 11: Representation of Actual Project Workflow

While I feel this accurately portrays the process of the last twelve months, this diagram demonstrates a shift in my approach to both my workload and the MProfPrac in general, now depicting a single workflow with the process streams from the original diagram now shown as individual ‘channels’ within the wider workflow. While the continuation of my normal workload is a given, the external engagement and literary review channel also continue, even after the reflective channel has ended and the cybersecurity channel has merged with my normal workload. Overall, the intention of this diagram is to move away from the suggestion of separate processes as the first diagram appeared to imply, instead depicting them as closely related and often interacting with each other. Here we see a wider standard workload incorporating internal engagement, with the cybersecurity project taking a far less prominent position as it moves from the combined internal and external engagement brought about by Techweek, through to the internal completion of the cybersecurity case study. The literature review is shown as all-encompassing, reflecting the contribution that my ongoing reading has made to each aspect of my ongoing learning, with the smaller horizontal bars of Techweek, the conference papers and finally my thesis and presentation, spanning across these channels as representation of the process as a whole contributing to these events. A new addition to this diagram that was not included in my Learning Agreement version is the channel relating to Professional Identity, adding my reflection on my place within the ICT community to the project timeline. The purple diamonds at the top represent my initial transition, the purple rectangles represent changes in practice and the blue fields represent the self-assessment of my overall role that has changed over the course of the MProfPrac.

8 Articulated Framework of Practice

As I have reached the end of the reflective body of work detailing the exploration of my role, as defined within the goal of my Learning Agreement, I have loosely chosen terms such as Technological Facilitator and my defined Mission Statements as a description of my contribution to the industries that I operate in, while concluding that my Professional Framework of Practice is articulated as remaining in a State of Flux. I have considered these statements carefully, with each section of this thesis intended to demonstrate my professional development from my former professional identity of Engineer, now considered the baseline against which all development since is compared.

Mission Statement 1: **To enable and advise.**

This is the only statement that is directly informed by my previous role, the skillset and practices of my Engineer identity were requirements for the original Systems Administrator role when I began my career transition. As described in the conference papers (sections 3-5), the Manager identity developed around these skills, as such my ability to maintain the operations side of the ICT infrastructure at Gallaway Cook Allan has expanded to higher-level management considerations, such as communications, leadership and ICT strategy, demonstrated throughout the conference papers and in sections 6 and 6.3.

Mission Statement 2: **To educate.**

My thoughts on education have come about following the start of my in-work project, as ongoing interaction with my Gallaway Cook Allan colleagues and other community groups have led to my conclusion that there is a certain commonality to technological illiteracy, and that ongoing anxiety and insecurity regarding technological progress will hamper many users from gaining the most benefit from their technology. As such, part of my ongoing framework of practice will be to promote and advocate for better ICT and computing education for anyone

that can benefit from it. The development of this framework is evidenced in the conference papers, 3-5, the cybersecurity case studies in section 6 and throughout section 7.

Mission Statement 3: **To collaborate.**

Since beginning my MProfPrac study, I have taken the opportunity to work with several organisations: ITPNZ, Techweek, CITRENZ and SIGNAL ICT Grad School. In each instance, I have contributed where I can and had the pleasure of working with some very dedicated and talented individuals. This is a stark contrast to my Engineer role, which did none of these things, to the detriment of my self-awareness and networking skills at the time. Through working with the ITPNZ southern committee, speaking at more ICT-related events, writing more conference papers and potentially moving into writing industry whitepapers, I expect to continue collaborative efforts as a regular part of my continued professional development. My external contributions are discussed in sections 4 and 5.

As in internal ICT resource, my normal workload has changed considerably, my former Engineer identity taking on far more responsibilities and areas of expertise that I would have considered possible prior to my transition. The Engineer that I was has taken on the Managerial aspects of autonomy and responsibility, can strategically plan for the future needs of the firm and no longer shies away from business networking or collaborating with other individuals and organisations. The Manager that I am has learned the importance of knowing his capabilities and values in conjunction with ongoing education, that how he contributes to the development and industry of others can potentially mean the difference between success and failure, that in using these capabilities, he can independently advise on and enable the technology requirements of those he supports; In committing to the above Mission Statements, I place myself firmly as a supporter and proponent of the tech sector, from the economic and social benefits gained from continued technological development through to the benefits of the individual via ICT and computing education. In reaching this conclusion, I expect my state

of flux to continue for the foreseeable future, with my Professional Framework of Practice constantly evolving alongside the ever-quickening pace of global technological development.

8.1 Ongoing Aspirational Framework of Practice

Following completion of the MProfPrac, the possibilities for career development can potentially go in many different directions; given that I have attained a far higher level of personal and professional awareness unlike anything I have experienced before, my expectation is to continue working on ICT leadership, strategy and communications, with the aim of development towards operational ability at C-level roles such as CIO or CTO. Either way, in continuing the practice of writing papers where possible and the potential to enrol in the Doctorate of Professional Practice, I have no doubt in my mind that education within the tech industry will feature heavily in my ongoing work and development.

As of recent weeks, I am pleased to say I am no longer the sole internal ICT resource at Gallaway Cook Allan. A new supporting role was created following the recent change in Anti-Money Laundering legislation, primarily to assist with all matters relating to Compliance within the firm but also to act as a secondary ICT resource. Our training schedule has already begun, given our new team member, a highly-capable young woman named Michaela, came from a non-technical background; as such this is an opportunity to explore the means of training and upskilling within the ICT industry, customised to and effective within the firm. These efforts can then be documented and adapted into ongoing training programmes as seminars and articles on our intranet for the benefit of our colleagues. So far, Michaela has made extraordinary progress, already taking over duties such as mail filter monitoring and assisting with front-of-house and conferencing technologies. I regret the results from these efforts will not be apparent before my MProfPrac process is complete, nonetheless I look forward to our work making a significant contribution to a workplace environment that encourages cultivation of ongoing ICT skills development.

8.2 Further Research

The concept of Identity has been explored considerably throughout this thesis and its supporting papers, solely from a strictly professional point of view. Briefly touched upon in section 2, there are many questions worthy of further research in the area of Cultural Identity. As someone descended from both Pasifika and European bloodlines, I have often struggled with the knowledge that I am partially one and partially the other, yet still somehow neither. I have often considered how things may have been different had I been more involved with the culture of my forebears on either side, though like many others before me, I have had to find my own culture somewhere in between. Should the opportunity to pursue the Doctorate of Professional Practice arise, I believe that there is considerable cultural and academic significance to any research relating to the dispersal of the Niuean descendants of English shipwreck survivors Robert Henry Head and George Nicholas, whose Niuean children would later leave Niue to settle across Australasia and beyond (Figure 12: Pelanisi Head, wife of Robert Henry Head, pictured with who is believed to be her son Archibald, my great-grandfather).

Figure 12: Pelanisi Head, wife of Robert Henry Head, pictured with who is believed to be her son Archibald, my great-grandfather

I estimate there are thousands of others like myself, vaguely aware of this connection to Niue but otherwise completely unaware of their cultural heritage, creating their own culture according to how they were raised and the environment they grew up in. I would ask how this self-prescribed cultural norm has affected their own personal and professional development, shaping them as an individual.

9 Conclusion

When my term at Gallaway Cook Allan began, I was little more than in-house tech support, in my own eyes as well as those of my colleagues. I have achieved the goal laid out in my Learning Agreement and explored my role as ICT Manager, finding that this role, while significant, is part of wider Professional Identity that includes aspects of user education and collaboration with other organisations and causes. In the eighteen months since joining Gallaway Cook Allan and beginning the MProfPrac, my Professional Framework of Practice, personal philosophy and self-awareness have all been subject to a prolonged and intense transformative process that I have no intention of ending. Through my efforts during this process, I have pursued multiple avenues to ensure I operate and behave in a manner consistent with the highest expectations of an ICT professional; through Autoethnographic Action Research and the mindfulness that it encourages, I have left behind the attitude of dwelling on what I cannot do; instead I have seen just a glimpse of what I can do, much to my surprise I have found the skills and philosophies I once thought separated me from the true ICT and business professionals were never far from my reach at all.

As my identity has changed, so too have the thoughts, feelings and motivations that I once held, both as a professional and an individual. When my former role was close to ending, it had become the daily grind that I endured to pay the bills. Certainly, I had positive experiences, with amazing colleagues that I am still friendly with to this day and excellent client interactions that left me feeling I had made a difference. It was also during this time that I experienced many personal achievements; I purchased my first home, married my long-term fiancé and brought two children into the world. Despite this, my professional life unfortunately suffered, without the ongoing growth within my former role, it had come to feel like a dead end. As I complete my Masters of Professional Practice and reflect upon the changes within myself over the last eighteen months, I find I cannot recognise the person I once was, nor do I care to. That person had come to believe he had no aspiration to improve, which would come to be

his reality; quite literally, the only achievement for which he was recognised in 9 years was the ‘Barney Gumble’ award, for getting inebriated and passing out at a work function. Since then, I have chosen to be actively engaged in my profession, my education and my communities, while also committing to enabling others to do the same. In that time, I have guided and supported a business through considerable technological change several times (and will no doubt continue to do so many times yet) and assisted external organisations in achieving common goals, building strong business and community relationships. I have spoken in public, on two occasions in presentation of papers I have co-authored, one of which was recognised by an unexpected but very welcome award for best research paper. Most importantly, I have spent hundreds, potentially thousands of hours over the last eighteen months critically reviewing my own thoughts, actions and practices, reading far more than I have before, making my brain work harder than I ever have before, the results of which I submit to you, the reader, in this thesis. My former self would not, likely could not, have even imagined any of these things, let alone achieved them. Even with these accomplishments, the more I contribute, the more I want to contribute, the more I want to continue these efforts that have made the last eighteen months so insightful and enjoyable. As of writing this thesis, I now have my mission statements: To enable and advise, to educate and to collaborate. Though I am not certain what my continued development within my Professional Framework of Practice will bring, what I am certain of is that I have a lot of work yet to do, and that I am looking forward to finding out.

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The MProfPrac has been a team effort as much as it has been my own, your unwavering support as we have walked this path has been greatly appreciated and will not be forgotten.

With thanks to those who blew the wind

and those who sailed the ship,

We sailed it tight against the tide

and I shall be forever in your debt

– Kirk Jones

Appendix 1.Job Description

IT Systems Administrator/User Support

Reports to: Chief Executive
Location: Dunedin office
FTE: Full time

Gallaway Cook Allan is a sizeable Otago-based full service law firm with offices in Dunedin and Wanaka. We act for commercial businesses, private clients, and local and regional government, across the South Island, nationally and internationally.

The purpose of this new role is to provide professional IT support to all users and clients (where applicable) of Gallaway Cook Allan. This role has a strong emphasis on ensuring that users are well inducted and trained on the use of our ICT systems. This is an autonomous role where you will be expected to wear multiple hats supporting our users across the variety of ICT needs and solutions we have.

We operate a Citrix based thin client environment in our two offices, and one satellite in Christchurch. The role provides support across all these sites, you will be required to provide both phone and onsite support, so you will have excellent interpersonal skills and have provided extensive remote support in your previous roles.

Key Tasks & Responsibilities

- Maintain and administer computer networks and related computing environments, including computer hardware, systems software, applications software, and all configurations.
- Oversee the management of our wide area networks (WAN), and internet access and filtering systems.
- Diagnose hardware and software problems, and replace defective components.
- Perform or be responsible for data backups and disaster recovery operations, including regular testing.
- Plan, coordinate, and implement network security measures in order to protect data, software, and hardware.
- Implement and operate portals/tools in order to monitor the performance of computer systems and networks, and to coordinate computer network access and use.
- Ensure all IT systems are documented and that documentation is maintained.
- Asset management of all IT hardware and software.
- Management of procurement for IT services and hardware.
- Management of phone systems including add/remove and changes.
- Management of dictation systems and units.
- Management of building security systems and staff access.
- Manage and maintain photocopiers and printers, specifically around consumables.
- Point of contact for all our external providers for ICT services.
- Training and induction of staff.
- Assist in the creation, planning and installation of any new ICT systems or upgrades.
- Create and maintain an IT intranet page.
- Travel two days per month to Wanaka to train, support and troubleshoot in the Wanaka office.
- Take personal responsibility for maintaining a healthy and safe work environment.

Skills & Attributes

- Exceptional organisational skills including and ability to juggle multiple tasks and meet deadlines and an ability to prioritise and manage work flow;
- Attention to detail;
- A sense of initiative & ability to think on your feet;
- Strong problem solving skills
- Professional approach to clients and colleagues;
- Client service focus;
- A friendly, down to earth nature;
- Ability to work in a fast paced environment;
- Ability to work autonomously;
- A can-do positive approach to making things happen.

Education & Experience

The person best suited to the role will have:

- At least five years of systems administration or helpdesk experience.
- Strong IT skills including MS Office and SharePoint.
- Strong skills in IT infrastructure services and the tools and technologies that support the delivery of a complex ICT environment, e.g. Networking, MS Server, backup products, Citrix, Active Directory, Microsoft Exchange, PABX and telephony solutions.
- Demonstrated experience in the creation of user help and documentation
- Skilled in the creation of and running of user training programs
- Knowledge of digital dictation and legal document management systems, practice management system (PMS), Landonline, ADLS Legal Forms, and information databases would be an advantage.

Appendix 2.Learning Agreement

Master of Professional Practice

Signal Dunedin, November 2017

Course 2: Advanced Practitioner Inquiry

Learning Agreement

Jamie Vaughan

ICT Manager

Gallaway Cook Allan

This Learning Agreement is between Master of Professional Practice Candidate Jamie Vaughan, Otago Polytechnic, and Gallaway Cook Allan. The purpose of the Learning Agreement is to help ensure work-based projects are completed in line with student learning goals.

MPP Candidate: Jamie Vaughan

Facilitator: Professor Sam Mann

Academic Mentor: Nathan Rountree

Industry Mentor: Shane Boyle, IT Manager for Polson Higgs

Title of project: Building A Digital Bulwark: A Case Study of Corporate Practice, Risk Management and Data Integrity

Learner's Aspirational Professional Practice/Identity/Framework Statement:

My personal aspiration is to further my professional development and career as an ICT specialist, with a focus on services delivery and quality assurance to providers of corporate and professional services. In doing so, I expect to make progress in both my technical management and governance skills, as well as my interpersonal and relationship building skills.

MPP goal:

To explore what it means to be an ICT Manager supporting a modern and future-oriented Law firm and the nature of IT Governance and Risk Management inherent in in this context.

Context and background to my MPP and project goals

I came to my current role as ICT Manager after an extended period of IT consulting, performing mainly maintenance, repair and the standard break-fix work that is expected of the typical IT engineer. Since joining the team at Gallaway Cook Allan, this skill set has grown considerably; rather than just keeping systems running from a support perspective, I am now responsible for the management of our ICT services in general as well all correspondence between Gallaway Cook Allan and the vendors, agents and third parties that provide those services.

As such, the overall focus of my MPP programme research will be the analysis of how I develop as an IT professional as I bridge the gap between the operations and systems support aspects of my role and my new responsibilities that are inherent in corporate IT management and governance. In other words, I expect that my thesis will center around what it means to be an IT Manager in a time of constant technological change, disruption

and development, supported by observations of how the legal industry is being affected by this and what I have done in my professional capacity to respond to it.

In terms of the in-work research performed with Gallaway Cook Allan, the proposed point of my projects will be to focus on the Cybersecurity and Risk Management capabilities of the firm, performing a comprehensive review and analysis of the relevant potential risks to the firm and their impacts, how these risks might be mitigated, and how to effectively develop best practices and maintain them once they are established. How these efforts will affect our clients, staff and infrastructure will require careful consideration at each stage, however with the correct approach and peer review with academic and industry mentors, I expect the opportunities and benefits of this research to be highly valuable to the firm. Other possibilities may exist in exploring realms such as digital privacy and data forensics, and what impact these subjects will have on the legal industry. Once this process has been completed, I do intend to review and document the procedures undertaken so that they can be adapted and applied to other areas of IT within the firm, such as our workflow or paperless projects, in the hopes that these efforts will be beneficial in areas other than just Cybersecurity.

On top of this, the firm has experienced more than its fair share of growth in the last few years, and the reality of this is that systems and practices within the firm need to adjust to meet the requirements of its increasing size. Alongside answering questions regarding capacity and resource so that our people have the tools required to properly perform their job, consideration must also be given to the policies and practices that allow us to work safely and securely, ensuring we get the most from our ICT systems while maintaining their integrity.

Once these possibilities have been explored and implemented internally, the question will then turn to what we do with these newfound skills and practices. The next step will focus on whether we keep them internal only and reap the benefits, or whether we share this knowledge via training and seminars so that others can benefit while we add value to our existing services. It must be noted that, in the latter scenario, this is not intended to compete with those that provide Cyber Security consulting as their main service, but simply to act as a middle-ground to raise awareness of security issues and allow others to make informed decisions regarding their digital wellbeing.

My expectation in taking this approach is that I will be able to consider and reflect upon how my actions and attitudes throughout this process have enabled me to develop as a professional, and what effect this has had on my methods and how I and others define my role at Gallaway Cook Allan, providing an ideal vehicle for the MPP research efforts. I also recognize that I need not re-invent the wheel in doing this, and another possible avenue to explore is to discuss with other IT and practice managers to compare notes and methodology, within reason. I have many contacts from my time at Commarc and I have no doubt that my colleagues can suggest other firms or clients that will be willing to collaborate for this purpose.

My learning outcomes

My main expected areas of development center around:

- Attempting to find common ground between IT Operations and Strategy and where my role fits in that spectrum, i.e. the 'sweet spot'
- Awareness of Cyber Security best practices and the value of engagement with those I am supporting in that context
- Project Management and Research Methodology for the purposes of performing the projects as proposed and creating an environment that will be accepting of the work undertaken
- Leadership and personal accountability

Main audience for my project

- Stakeholders, staff, vendors and contractors of Gallaway Cook Allan
- The legal industry in general, but potentially other professional industries as well.
- The IT Community, i.e. via IITPNZ
- Myself as part of my reflective process

Project Methodology

Please refer to Appendix A, figure 1.

- The project work is the vehicle for Auto-ethnographic action research, which will form the base of the final practitioner thesis
- The project itself is a series of integrated workstreams and communications channels
- Perform an initial review and analysis while researching best practice
- Creating practice models based on the results of the analysis and research, then testing them
- Selecting the model(s) best suited for the firm and preparing for implementation
- In-house experimentation with potential solutions and implementing the chosen models as a series of projects

Ethical Awareness

Research Ethics:

Ethics considerations are included to prevent any risk of those within the research environment from any negative effects the research might have on them or their work space. This includes possible abuse of power imbalance or taking advantage of vulnerable participants. All participants need to be adequately informed about what they are taking part in.

Practitioner Ethical Statement:

In the case of my role at Gallaway Cook Allan, I currently do not have any staff members that report to me, so I do not hold any undue influence or privilege over other staff members. Similarly, any work undertaken as part of the project will be done in my role as ICT Manager, and while similar efforts may have been made in this direction whether the MPP program was driving it or not, I do recognise that ethical considerations must be taken when creating a research environment within a working one. There will not be any privilege or influence exerted in these processes that could

be considered outside the normal duties of my role. As such, I do not believe there are currently any special considerations to be made regarding ethical approach in this case. If this situation changes, full consideration of ethical approach and an appropriate adjustment will be made before project efforts will resume.

Agreed Ethical Pathways:

The following statement regarding research was negotiated and agreed upon with CEO Matt Gorman, has been sent to all staff, and will be added to our induction process for any staff that join the firm throughout the research period:

- If it is not relevant to cyber security or the management of IT in general, it will be discarded
- Nothing will initially identify an individual, anonymity will be assumed from the outset
- If including any form of data does mean potentially identifying any individual(s) for any reason, this will only be done with the express permission and co-operation of the individual(s) in question, or will be discarded
- In ethics terms, we believe this to be very low risk, that there is no potential to take advantage of power imbalances and that none of us meet the definition of vulnerable participants. However, if you feel otherwise, do not wish to participate or have any concerns, please feel free to discuss in confidence with **Jamie, Matt, Christy** or **Jane S**.
- As this is work-based learning and research, while you are unable to opt out of the research environment, you can opt out of the research itself, and the people named above provide a “safety valve” for this. This safety valve runs throughout the project, with expected completion in November 2018.
- These considerations will be reviewed multiple times throughout the project. If the involvement of GCA staff needs to go further than the guidelines mentioned above, i.e. survey of staff, a full Category B application will be submitted to the Otago Polytechnic Ethics Committee

Māori Consultation

Given the current known scope of the proposed research path, I do not expect to have any impact on the Maori community beyond the normal interaction expected in my role as ICT Manager of a legal firm. This will be carefully monitored in a similar fashion to the ethical considerations mentioned above, and if the situation changes, further consultation will be sought with Kaitohutohu.

Literature Summary:

The literature mentioned in this section is indicative of the direction I currently intend to take with the project and the over-arching subject of Cybersecurity. Please note that the literature review for my MPP research is expected to be ongoing, as the research effort and potential industrial developments may push my efforts towards other outcomes. I also expect any reading done as part of the project to form a continuing habit as part of my ongoing professional practice, even after I have completed the MPP programme.

Mitnik, Kevin D. (2003). *The Art of Deception*. New Jersey: Wiley Publishing

Kevin Mitnik is a well-known hacker who successfully hacked his way in to corporate systems such as the LA Bus system, Digital Equipment Corporation and Pacific Bell, acquiring legitimate user credentials via the use of social engineering. He was arrested in 1995 and convicted on multiple charges of communications-related criminal activity, spending 5 years in prison as a result. Now, he operates his own security consulting firm and has written multiple books on cyber security.

Mitniks work focuses on the human aspect of cyber security, how the people using any given system are generally regarded as the weakest link in the security chain and the easiest way to gain access. This is the area of security that holds the most interest and concern for me as an IT manager, and the area that I believe Gallaway Cook Allan could most benefit from. This book is a starting point, and I am expecting to use Mitnik's other books, *The Art of intrusion* and *The Art of Invisibility* as part of my initial research.

Sikorski, Michael & Honig, Andrew (2012). *Practical Malware Analysis*. San Francisco: No Starch Press

Early in my search for relevant research material, this book was mentioned repeatedly on most reputable sites that reports on technology and cyber security, a large portion of these reviews stating that this book is the reviewers number one pick on the subject. The content is very hands-on, covering basic and advanced methods of analyzing and troubleshooting the diverse types of malware as well as various tools to assist with these tasks. As previously mentioned, the intent of my research is not to upskill myself to the point I can operate as a security consultant, so this material will be the extent of the technical development I expect to achieve as part of this process, also keeping to the basic aspects of the content.

The methods outlined by the authors focus on the threats that can be expected from external sources, for example malware that has infected systems from outside sources. My expectation is that this will not be the primary focus of the cyber security research, as our infrastructure already has multiple layers and processes in place for these threats, whereas the internal threats, both accidental and intentional, will be the area that I intend to focus on developing the most.

Ellis, Colin D. (2016). *The Conscious Project Leader: How to Create a Culture of Success for Your Projects, Your Team and Yourself*. Audible: Author's Republic
Ellis, Colin D. (2017). *The Project Rots from the Head*. Australia: Bright Print Group

Following a presentation by the Author hosted by Signal ICT and the IT Professionals Institute, I have decided to use Colin D Ellis and his 2 well-known books as listed above in my research of Project Management and how it fits in with my own professional role. In both books, Colin delves extensively into the reality of Project Management as both a practice and an industry, and how both Managers and

Sponsors can make all the difference. As an ICT Manager, I expect that my role will include aspects of both, as and when needed.

Colin is a highly captivating speaker, taking a very direct approach with his theories regarding why some approaches work, why very many do not, and what we can do as practitioners to change our own practices and behavior to increase our odds of success. Like the MPP programme itself, his approach does require reflection of self to improve, and does not rely on the standard triple-constraints triangle that other Project Management approaches are based upon. Colin promotes emotional intelligence and maturity, the building of solid working relationships and cultures and taking ownership of the role as key steps to success; all of which are qualities that I value highly myself and would like to incorporate into how I operate as an IT professional.

Other sources for research suggested include the following:

Covey, Stephen R. (1989). *The 7 Habits of Highly Effective People*. United States, Free Press.

This book is a well-regarded best-seller that has been recommended to me by mentor Shane Boyle for further development of my own professional practice. Shane was introduced to this book when he attended the Turning Point seminar, and attests to the benefits that this book can bring about.

Mintzberg, Henry et al. 1998. *Strategy Safari: A Guided Tour Through the Wilds of Strategic Management*, United States, Free Press.

Another example of corporate staple reading, this was suggested as a means to assist in developing my strategic thought processes and how I operate from a corporate systems management perspective.

Schneier, Bruce. (2003). *Beyond Fear: Thinking Sensibly About Security in an Uncertain World*. United States, Copernicus.

Bruce Schneier is a renowned American cryptographer who has authored several books on digital security and risk management. *Beyond Fear* is notable in introducing the concept of security as a trade-off, that efforts made to ensure the integrity of the data in question comes at a cost that needs to be considered in relation to their benefits. The cost is likely to be financial, but may also mean restrictions to ease of use and convenience for those needing legitimate access, amongst other considerations.

Weber, Rick. (2017). Latest cyber-risk trends report by PwC stresses collaboration across industry sectors. *Inside Cybersecurity; Arlington*.

Inside Cybersecurity: Arlington appears to have many relevant articles to corporate security strategy, as well as several that discuss the legal implications as well. This

will be particularly useful in analysing practice from the Legal firm perspective, and how it may impact other industries. I also find the articles relating to industrial collaboration to be of interest, as it may give indications regarding collective efforts towards cybersecurity rather than firms and entities having to face the risks alone. The article cited above is included as a relevant example of the Journal itself.

Key Milestones:

- Complete the Security Review and Analysis by Week 10
- Complete Project models by Week 14
- Complete Plan of Project(s) by Week 26
- Complete Project(s) by Week 38
- Complete Thesis by Week 50

Sustainable Practice

The research is expected to also investigate the means to keep the eventual findings up to date, for example how do the chosen models stand up if new technological disruption or significant industry change occurs? IT in all sectors is moving very quickly and it is the responsibility of the ICT manager to keep an eye on these developments. It is my hope that an effective and reliable way of building this into my own professional practice will become apparent as part of the research undertaken.

Reflection:

I expect to use a standard daily journal via speech recognition or dictation software, in conjunction with my workflow diagram and timeline. This may be tweaked as the project progresses and better methodology may come to light.

Reflective Critical Commentary

Stages 1 and 2 of the MPP programme have already been very enlightening. In stage 1, as I have retraced the steps I took to get here and consulted with friends, family and peers to see from a perspective other than my own, a great deal has been revealed about myself and how I operate that I am not usually conscious of. The best example of this how I perceive my level of technical expertise, while I have always thought my abilities to be more than adequate for the standard engineer work, I never did manage to complete Microsoft certification or move up the ranks from Systems Engineer in my time with my previous employer. This was a common cause of anxiety and insecurity in that I often felt I was not good enough for the role. What I have come to realise through the Review of Learning is that my technical abilities are not the issue, that my technical skill is more than ample for what is needed and the overwhelming perception from others is that there is no doubt that I know what I am talking about. On reflection, the revelation I have arrived at is that I am not the highly “technical” person that is needed in roles such as systems designers and architects. Instead, I am someone who works very well with people, and my experience as a Systems Engineer mean I have the skills to act as the medium between the people I support and the systems they are using.

In stage 2, I have taken the information gleaned from stage 1 and firmly combined it with both the academic requirements of the MPP programme and the expectations and possibilities of my role at Gallaway Cook Allan. Bearing in mind it has been over a decade since I was an undergrad student, the academic aspect has meant notable change of mindset, however I believe this change to be beneficial to my professional efforts as well; in many respects, the fact that I need to turn my reflection of this process into a defensible thesis is a reminder that as ICT Manager I need to be holding myself responsible and accountable for my professional practice.

In both courses, the questions posed to me as an academic candidate have provided the tools required to view my profession and how I operate from a unique perspective. The impression I have had is that by implementing the various frameworks used in recent self-assessment, I can now see the larger picture with greater clarity. I feel I am now less inclined to be distracted by the day-to-day minutia that can divert and delay the ongoing broader efforts to improve our systems, meaning I am in a better position to define what those improvements should be and the strategic long-term benefits.

I have also found the use of tools such as the SFIA framework very useful, as it has not only given me a means to track my progress in various skill levels up to now, which has further dispelled any doubts I might have had, but has also shown me possible paths of progression in various IT fields. As such, the programme so far has also been invaluable in trying to define what my professional aspirations boil amount to, a question that I struggled with when starting stage 1. I was a consultant for quite some time, and the progression paths available in my former role were very narrow. When I left Commarc for Gallaway Cook Allan, very suddenly my possible development choices were far too numerous to count, on reflection I believe I was somewhat overwhelmed by this. As I have completed the course requirements and worked through the assigned tasks with Professor Mann, I have been able to view my own career options from new perspectives, gaining a far better understanding of how I operate as a professional and ultimately the direction I want to take.

Main outputs from my study

- An in-depth initial analysis of the current security practices of the firm
- Detailed procedural plans for options to improve upon them
- My recommendations regarding these plans as ICT Manager
- Several comprehensive practice models that will involve implementation within GCA
- A final analysis of the change process and the margin between the benefits and drawbacks
- Potential Whitepapers or Industry documents based upon the findings of my research.

Employer /Professional Representative:

My MPP studies have the full backing of the Gallaway Cook Allan Executive, a letter of support from CEO Matt Gorman is attached.

I confirm the project plan as proposed meets the appropriate criteria for Level 9 Research and agree to proceed with MPP Stage 3 on this basis.

Signed by Learner:
Date:

Signed by Employer:
Date:

Signed by Capable NZ review panel:
Date:

Appendix 3.Online Safety Pamphlet

Attackers count on emotional reaction!

If the worst happens, don't panic!

- Use common sense
- Stop and think about what is really going on and why
- If in doubt, turn the device off and seek advice

There are many service providers available, find one and build a trusting relationship with them, just as you would with a doctor, hairdresser or mechanic. For many issues, a quick google may be all you need.

Above all else, your technology is here to help, we need not be anxious to use it! While it pays to be mindful of the concerns discussed in this session, do not let them stop you from using your technology to have fun and do wonderful things.

techweek.co.nz/whats-on

tech-week 2018 OFFICIAL EVENT

Tech for Everyone: A Guide to Online Safety

Tech Week, 19 -26 May 2018

Presented by Jamie Vaughan, MIITP
ICT Manager for Gallaway Cook Allan

GALLAWAY COOK ALLAN LAWYERS

Remember your Security ABCs:

A: Antivirus or Antimalware

- Paid products are generally low-maintenance
- Free products pay for themselves through advertising
- Many brands but all do the same general thing, don't overthink it!
- All will use space and resources on your system

B: Backups

- Same Paid vs Free situation as with Antivirus software
- Many brands doing the same thing
- Usually built in to an operating system or bundled with Antivirus
- Removable options are likely the best for most scenarios

C: Critical Updates

- Always built-in, often neglected
- Do not interrupt updates once they have started
- Updates will stop when a system goes end-of-life

Why do these attacks happen?

Almost always for financial gain, or for gathering information for other attempts to steal from yourself and others.

Typically, these are opportunistic attacks. You as an individual would not be targeted unless there was very good reason.

Things to look out for:

- Cold Calling (Microsoft calls): Companies like these will not call you in this manner
- Advance Fee Scams: there is no large sum of money that a complete stranger will send to you
- Identity Fraud: be wary of emails from trusted institutions asking for your personal information
- Extortion: blackmail attempts are generally a bluff

Email tips:

- Check the sender name and email address
- Check the context of the email
- Check the links and attachments

Keeping yourself safe

Internet tips:

- Listen to your browser and antivirus if they say something is wrong
- Check the address/URL of the site if you suspect something is wrong
- Check the address of any links that sites or emails redirect you to

Privacy concerns:

- All providers collect data!
- Be mindful of your browsing and that others may be watching
- If it is free, you are not the customer!

Harassment:

- Knowingly false assertions
- Information shared without permission
- Attacks on ethnicity, gender, sexual orientation or disability
- Indecent, obscene, grossly offensive, menacing or threatening comments and actions

Contact Police or netsafe for further advice

www.netsafe.org.nz

Appendix 4.ACM SIGCSE Reviews

---------- REVIEW 1 ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education
AUTHORS: Jamie Vaughan, Samuel Mann and Alison Clear

The work has a theoretical basis: 1 (No) The work has one or more research questions: 1 (No) The research questions are grounded in relevant prior work.: 1 (No) The work addresses the research questions.: 1 (No) The submission provides enough detail to support replication of results.: 1 (No) The process/methodology described in the submission is a valid way to answer the research questions.: 1 (No) The contribution is clearly described. For novel projects, the contribution beyond prior work is explained. For replications, the contribution includes a discussion on the implications of the new result when compared to prior work.: 1 (No) The threats to validity or study limitations are clearly stated and appropriate for the study process/methodology.: 1 (No) The presentation (writing, graphs or diagrams) was clear.: 1 (No)

---------- Summary ----------
Autoethnographic narrative approach to professional identity in Graduate IT.

---------- Strength and Weaknesses ---------- This paper does not appear to fit in this track on computer science education research.

---------- Overall Recommendation ---------- This paper does not appear to fit in this track on computer science education research.

---------- REVIEW 2 ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education
AUTHORS: Jamie Vaughan, Samuel Mann and Alison Clear

The work has a theoretical basis: 1 (No) The work has one or more research questions: 1 (No) The research questions are grounded in relevant prior work.: 2 (Somewhat) The work addresses the research questions.: 3 (Yes) The submission provides enough detail to support replication of results.: 1 (No) The process/methodology described in the submission is a valid way to answer the research questions.: 1 (No) The contribution is clearly described. For novel projects, the contribution beyond prior work is explained. For replications, the contribution includes a discussion on the implications of the new result when compared to prior work.: 1 (No) The threats to validity or study limitations are clearly stated and appropriate for the study process/methodology.: 1 (No) The presentation (writing, graphs or diagrams) was clear.: 3 (Yes)

---------- Summary ----------
The author(s) begin by explaining that the narrative of what we call ourselves is what we ultimately become. They use this same idea for professional identity.

The author then shares something like an autobiography.

This approach of sharing personal experiences as a scholarly paper is so foreign to me that it is either brilliant or an insult.

However, if this paper is accepted then I have a question: If we publish an autobiography for one person, why not publish an autobiography for every single person that attends SigCSE?

I can only conclude that this paper is not a research paper.

---------- Strength and Weaknesses ---------- It is written well, but it is not a 'research paper.'

---------- Overall Recommendation ---------- "learnerâĂŹs" is not a word. I believe it should be "learner's."

This is an autobiography, not a research paper.

---------- REVIEW 3 ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education
AUTHORS: Jamie Vaughan, Samuel Mann and Alison Clear

The work has a theoretical basis: 2 (Somewhat) The work has one or more research questions: 1 (No) The research questions are grounded in relevant prior work.: 1 (No) The work addresses the research questions.: 1 (No) The submission provides enough detail to support replication of results.: 1 (No) The process/methodology described in the submission is a valid way to answer the research questions.: 1 (No) The contribution is clearly described. For novel projects, the contribution beyond prior work is explained. For replications, the contribution includes a discussion on the implications of the new result when compared to prior work.: 2 (Somewhat) The threats to validity or study limitations are clearly stated and appropriate for the study process/methodology.: 1 (No) The presentation (writing, graphs or diagrams) was clear.: 2 (Somewhat)

---------- Summary ----------
The paper explores the Professional Identity of the author while enrolled in a Masters of Professional Practice in Information Technology. The paper uses an autoethnographic approach to document the author's professional identity evolution. The paper reported seven stages mapping the professional identity at various points of the author's professional and educational journey.

---------- Strength and Weaknesses ----------
Strength:
Professional identity and graduate professional education are areas that are not often explored by CS Ed researcher despite the fact that many schools provide graduate professional degrees.

Weaknesses:
"Professional identity" is not defined in the paper.
The submission does not list any research questions. If the work is exploratory, then it would have been useful to have a future work section.

The submission does not show how the work presented could benefit the CS ed community.

---------- Overall Recommendation ---------- It is unclear to me if the results can be generalized and how the CS Ed community can benefit from it.

---------- REVIEW 4 ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education
AUTHORS: Jamie Vaughan, Samuel Mann and Alison Clear

The work has a theoretical basis: 1 (No) The work has one or more research questions: 1 (No) The research questions are grounded in relevant prior work.: 1 (No) The work addresses the research questions.: 1 (No) The submission provides enough detail to support replication of results.: 1 (No) The process/methodology described in the submission is a valid way to answer the research questions.: 1 (No) The contribution is clearly described. For novel projects, the contribution beyond prior work is explained. For replications, the contribution includes a discussion on the implications of the new result when compared to prior work.: 2 (Somewhat) The threats to validity or study limitations are clearly stated and appropriate for the study process/methodology.: 1 (No) The presentation (writing, graphs or diagrams) was clear.: 2 (Somewhat)

---------- Summary ----------
The author, who is an experienced IT practitioner describes his/her journey at various stages of their professional life. The author describes their experience, mostly centered around self-learning at each of these stages.

---------- Strength and Weaknesses ----------
+ The narrative is an interesting read.

- I am not sure how this story is related to CS education research or why it would be interesting to graduate instructors as the author claims in the introduction.
- The structure of the paper can be organized better (for e.g., describe the 7 phases and the organization of the paper in the introduction).

---------- Overall Recommendation ---------- I found the paper hard to read and understand. If the writing and organization is improved, I am sure this piece of article will be an interesting read - but I don't think this is relevant to computer science education research.

---------- REVIEW 5 ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education
AUTHORS: Jamie Vaughan, Samuel Mann and Alison Clear

The work has a theoretical basis: 1 (No) The work has one or more research questions: 1 (No) The research questions are grounded in relevant prior work.: 1 (No) The work addresses the research questions.: 1 (No) The submission provides enough detail to support replication of results.: 1 (No)

The process/methodology described in the submission is a valid way to answer the research questions.: 1 (No) The contribution is clearly described. For novel projects, the contribution beyond prior work is explained. For replications, the contribution includes a discussion on the implications of the new result when compared to prior work.: 2 (Somewhat) The threats to validity or study limitations are clearly stated and appropriate for the study process/methodology.: 1 (No) The presentation (writing, graphs or diagrams) was clear.: 3 (Yes)

---------- Summary ----------
The authors present a narrative written by a practitioner who has changed from retail to consulting to management over several years in the field of IT, having started with very little formal preparation. The narrative talks about seeking additional education to provide new skills for the progression of his career. The authors introduce this narrative with the intent of contributing ideas to faculty who design courses for practitioners.

---------- Strength and Weaknesses ----------
Strengths: This is an interesting narrative by a practitioner in IT.

Weaknesses: Although the narrative is interesting, it is the story of only one IT person, who originally came from a background of little formal education in the IT field. It is hard to see how this one narrative can help faculty to design courses for practitioners who are seeking formal education to acquire new skills. Perhaps having such narratives from a large set of practitioners with different backgrounds and goals might help.

---------- Overall Recommendation ----------
The narrative itself is well written and interesting. The authors' introductory material is somewhat verbose and lacking in clarity. The primary reason for suggesting reject is that one narrative seems to contribute very little to helping with courses design. Since the IT practitioner who wrote the narrative has already presented a paper telling his story, the story is available for anyone to read.

---------- METAREVIEW ----------
PAPER: 604
TITLE: Mapping Changing Professional Identity during Post-Graduate Professional Practice IT Education

The submission presents "an auto-ethnographic action research approach to examine the evolution of an experienced IT practitioner (first author) as he undertakes a Masters of Professional Practice." Auto-ethnography is a controversial research method that is unfamiliar to most SIGCSE participants.

Reviewers agree that professional identity and graduate professional education are areas that are not often explored. They also agree that the paper is well-written in the sense that it conveys its intended message clearly.

However, they also agree that the submission is not appropriate to the CS Education Research Track (e.g. it has no stated research questions or results). The overall benefit to to the SIGCSE community is unclear.

Appendix 5. Cybersecurity Brief

Cybersecurity Brief

August 2017

Prepared by Jamie Vaughan, ICT Manager

Cybersecurity and Gallaway Cook Allan

Best Practice and Strategic Assessment

As the firm grows, so too does the threat of attack on the data and information systems used by the firm, both internal and external, and in many different forms and varieties. As such, a conscious effort must be made to ensure the integrity of our data and sensitive files is kept intact, and a recovery plan is in place should the worst happen.

Given the global nature of cyber threats, an accepted best-practice framework has already been well established, and it is possible to compare the current performance of the firm in respect to these practices. The current 8 best practices are as follows:

1: Firewall and intrusion prevention

What we do well:

- [redacted] GCA uses a corporate-standard [redacted]
- [redacted] software is in place and working as expected

What has been done since March:

- [redacted] has undergone one major upgrade in response to increased spam levels. This was performed in-house.

Actions to improve or consider:

- [redacted] requires one more update to be considered optimal. There is no risk to the firm by using the slightly older versions currently installed, but the newer versions are included in the update schedule regardless.
- Decommission old servers: [redacted]. Both need some further work to move systems dependent on these servers to their replacements, in both cases currently in progress in conjunction with [redacted].

2: IT Policies

What we do well:

- Good overall practices with ~90% of users, with the odd hiccup. Most users know what is expected of them when using firm systems, but this is very informal.

What has been done since March:

- No official policies had been completed, though [redacted] had begun some basic policy framework documents.
- New policy documents have been written from scratch, and are close to completion before being handed to the CEO for assessment. Currently this is waiting on completion of the people charter, as the enforcement sections will need to be consistent with each other.

Actions to improve or consider:

- Complete policy documents
- Explore BYOD policy (also relevant to section 3 of this document)
- Review policies annually/semi-annually

3: Mobile Devices/IoT

What we do well:

[redacted]

- Mobile devices are now expected to be on the guest network to isolate external devices from the server farm

[redacted]

What has been done since March:

- [redacted] to ease issues with availability of network leases, essentially separating our guest and corporate networks.
- Beginnings of a BYOD policy document written and investigation into possible device management solutions which include remote wipe capabilities.

Actions to improve or consider:

- Consider all options for BYOD policies and finalise a policy document, inclusive of plans for expansion of IoT capabilities and consistent with efforts from section 2 of this document.
- Review the finalised policy annually/semi-annually

4: User Education in IT Systems and Processes

What we do well:

- All users show a 'healthy skepticism', and have no qualms reporting unusual emails or sites, even though some of this can be attributed to prior incidents caused by human error in this regard
- Productive and educational equipment, tools and software already in place and well established

What has been done since March:

- Some training plans drafted and some basic training has been enabled, i.e. Teleconferencing and Clevertouch.

Actions to improve or consider:

- Finalise training plans and arrange seminars once test training has been completed
- Draft new training plans relating to Cybersecurity and the new policies as mentioned in sections 1 and 2.

5: Password Management

What we do well:

[redacted]

What has been done since March:

[redacted]

Actions to improve or consider:

[redacted]

- Educate users in a manner consistent with the points in section 4

6: Backups

What we do well:

- Backup process is very stable, typically only interrupted by human factors
- Tapes kept offsite

What has been done since March:

- Faulty tapes replaced

Actions to improve or consider:

[redacted]

7: Anti-Virus, Anti-Malware and Update schedules

What we do well:

- AV/AM up to date, [redacted]

What has been done since March:

[redacted]

Actions to improve or consider:

- Standardize and plan all updates for a specific night each month [redacted] so that all users have the same expectations and IT does not have to wait until all remote users log off to perform maintenance.

8: Multi-factor authentication

What we do well:

- Not applicable

What has been done since March:

- Discussion RE MFA has been had, but not progressed further

Actions to improve or consider:

- Plan MFA implementation [redacted]. This will need to be considered and kept consistent alongside the points mentioned in section 3 of this document.

Appendix 6.Security Case Study

GALLAWAY COOK ALLAN LAWYERS

Contents

1. Overview

Security and Risk Management

Gallaway Cook Allan provides specialist legal advice to industries, companies and individuals from all walks of life, however none of our clients (or their interests) are immune to the effects of the advances and disruption brought about by the ever-changing global technological landscape. As a firm that is positioning itself as the best choice for those seeking advice for Technology-based industries, it is imperative that our own emergent practices relating to use of technology are as close to industry best-practice as possible; this ensures the integrity of the data we maintain and the unwavering trust of our clients, while making the most of our systems and resources.

During my tenure as ICT Manager, I have been observing and noting how all of us at Gallaway Cook Allan have been making use of the technology available to us, complementing an ongoing audit and review of all firm systems. Concurrent to this, I have been actively researching the subject of Cybersecurity within the context of the Corporate Partnership business model, adding to my prior experience and judgement as an IT Professional and building a security assessment framework tailored to the needs of the firm.

The purpose of this document is to outline the combined findings of my observation and research, providing insight and clarification into our collective capabilities and practices, as well as habits and attitudes we hold towards our technology and systems. In doing so, I have highlighted aspects where we perform well, where we do not perform as well, and most importantly my recommendations as ICT Manager to address the potential areas for improvement.

2. Recommendations

Area of concern	Timeframe
A: Physical Security:	
Vogel Street Considerations:	
- Upgrade existing security system*	Before Dec 2019
- [redacted]	Before Dec 2019
- [redacted]	Before Dec 2018
Dungarvon Street Considerations:	
- Upgrade or integrate existing system*	Before Dec 2019
- [redacted]	Following upgrade
B: Intrusion Prevention Systems	
- Replace [redacted]	Before Dec 2019
- Consider multipurpose software solutions	2020-2021
C: Software and Updates	
- Consider multipurpose software as above	2020-2021
- Upgrade MS Office to O365/2016*	Before Dec 2019
- [redacted]	Before Jan 2020
- Replace or upgrade Windows 7 PCs	Before Jun 2020
- Continue scheduled maintenance	Now, ongoing
D: Backups	
- No recommendations	Not applicable
E: Access Control	
- Consider Multi-factor authentication*	2019-2020
- Consider Mobile Device Management*	2019-2020
- [redacted]	Before Dec 2018
- [redacted]	Before Dec 2018
F: Education and Policy	
- Standard IT documentation for GCA staff	Now, ongoing
- Internal seminars for common concerns	Before Dec 2019
- Develop internal resources	Now, ongoing
- Assessment of IT Helpdesk software*	Now, ongoing

*Implementation costs may be incurred, assessed on a case by case basis

3. Analysis

A: Physical Security

While I am confident that our current security systems perform the basics of office security, strong physical is the basis of hardening our digital security, reducing attack surfaces and scope of protection required. In short, if we can be reasonably certain that no un-authorised access is occurring within our offices, then we can also take this into account when assessing our cyber-security options.

Given the higher staff count and traffic in the Dunedin office, I am concerned by the current system in several ways:

[redacted]

Options for an upgrade to our system [redacted] are underway with Dunedin Security and Grounds Electrical, quotes for the consideration by the Exec are expected in the very near future. [redacted]

[redacted]

The Wanaka [redacted], the system does work well. Beggs Security will advise if the system can be upgraded as part of our support agreement, if not then I recommend quotes from both Beggs and Dunedin security for replacement or consolidation with the Dunedin system.

[redacted]

B: Intrusion Prevention Systems

Other than the encrypted connections between Dunedin, Wanaka and the remote datacentres provided by 2Degrees, our current Intrusion-Prevention systems are made up of several complementing hardware and software suites: [redacted].

[redacted]

[redacted] Going by our growth rate of data use and network traffic, an additional device is planned for installation in 2020-2021 to provide redundancy and additional security.

[redacted]. Recent developments in cloud-based software solutions have meant that there are now products being developed that will do the same job, but will either cost considerably less, or will be part of a wider software suite that performs multiple functions, such as better support of a firewall, Antivirus/Malware applications and external document control, amongst others. These options are generally cloud-based, meaning the only impact our system resources will be a light-weight client and we will no longer need constant updates or maintenance. Discussions regarding these solutions are underway with multiple vendors, [redacted], given the complexity of these systems, I intend this to be a medium-term plan to ensure there is enough time to consider all implications.

C: Software and Updates

As per section B, some software considerations are potentially capable of being bundled into one solution, allowing separate modules for Antivirus, Intrusion Prevention and other security utilities to be centrally managed from one heavily-protected place. The benefits and drawbacks to this approach will be explored in due course through consideration of vendor proposals.

Microsoft Office 2010: Our current Office version is 2010, still considered current but woefully outdated compared to current Office offerings. While this is manageable for now, support for this version will decrease and eventually discontinue as other software providers move on to supporting newer versions. An example of this is [redacted], who have not written an Office Addin compatible with any version of Office below 2013, in this regard other firms using newer versions of Office have an advantage over us. Upgrade proposals from several vendors have been requested for inclusion in the 2019 budget, [redacted]. Once all details are known, our options will be put before the Exec for consideration.

[redacted]. This process will be considerably less costly than previous proposals given that we no longer need to purchase dedicated hardware for these servers.

[redacted]. Full PCs such as we use now are a legacy solution required by the old version of Olympus dictation, the considerably cheaper and easier to secure Thin Client PC will be used for any future replacements of workstation PCs.

Maintenance Night: A dedicated monthly maintenance night is working very well, this will continue to be monitored and adjusted as needed.

D: Backups

Backups are currently managed centrally and actively monitored for us as part of our Cloud Services agreement. Nightly backups copy everything to disk, also performing a test restore to ensure the data is viable to restore. [redacted], monthly tapes are kept indefinitely.

Minor data restores are managed by a server function called Shadow Copy, which allows us to check and restore previous versions of files within a fortnightly period. At this stage, there are no recommendations needed for our backup solution.

E: Access Control

Access control refers to human interaction with our systems and the risks inherent within it. My concerns in this area come down to three areas:

Multi-factor authentication: adding MFA policies so that access to Citrix from remote computers requires an authentication app via mobile phone before login can be completed. This will prevent anyone who is not a GCA staff member from accessing our network from anywhere other than our offices, so the concerns mentioned in section A will need to be addressed to make MFA effective. Either way, there are multiple options to enforce MFA, [redacted] service we already use for our Intranet are two immediately available methods.

Mobile Device Management: Software that enforces security methods on those who use mobile phones to access GCA email, including the ability to remotely wipe the device. Like MFA, this locks down unauthorised remote access from outside our offices.

Password enforcement: [redacted] will be changed prior to the new financial year, with additional changes scheduled every six months or as required.

F: Education and Policy

With the new intranet in place, we now have an easily-accessible common area for sharing information. Given that the majority of IT-related issues experienced by GCA users are easily fixed, brief how-to guides on these fixes can be posted on the intranet for all users to access. While there will always be some issues arising that need specialist attention, my intention is to encourage any interested GCA staff in upskilling basic IT and troubleshooting skills, reducing downtime due to basic issues as well as contributing to ongoing professional development. This can be done in several ways:

Intranet articles: As described above, intranet posts documenting basic fixes

Internal Seminars: IT topics relating to firm or other relevant systems can be incorporated into our lunchtime CPD rota

IT Resource: Michaela is picking up our systems and processes quickly, as is Amy and Deb with our front-of-house systems. Any documented guidance written as part of this ongoing process will also be added to the Intranet

Loosely related to this, I am also continuing to assess several solutions for monitoring arising IT issues. [redacted] managed by Michaela and myself. [redacted]. Once implemented, an appropriate system along these lines will mean issues can be easily managed with transparency to our users, unable to be lost in an inbox or series of phone calls. The chosen solution will be incorporated into the itsupport email address when ready.

4. Further Considerations

Overall, the security functions within the firm would be considered adequate and largely in-line with the industry norm, perhaps in some cases slightly better than those of other Dunedin businesses I have previously worked with. Regardless, there will always be areas to improve and the recommendations outlined in this document should be considered a significant step in the right direction. To recap, the steps taken prior to this include:

- Upgrades and regular maintenance implemented on old server farm
- Partial cloud migration to mitigate Server warranty issues
- Decommission of two geriatric Windows 2003 servers
- Upgrade of Olympus Dictation software

As such, there has been considerable amount of change in the back-end of the IT infrastructure to ensure our systems remain as reliable as possible with as little impact on productivity and cashflow.

Outside the scope of Cybersecurity, there are several initiatives underway that will involve IT systems, including:

The new Citrix servers are performing well, . Given the recent addition of Michaela and the steps outlined in this document, I expect the management of any IT requirements that may arise as the firm continues to grow will be well in hand. Please advise If there are any concerns or considerations within this report that require any further discussion.

Jamie Vaughan August 2018

ICT Manager

Appendix 7.SFIA 7 Reference

As an example of the self-assessment method employed via SFIA version 7, this excerpt from the SFIA 7 Reference Guide demonstrates the manual skill highlighting process and how the selected skills were interpreted.

The complete reference guide document can be obtained from the SFIA website:

https://www.sfia-online.org/en/framework/sfia-7

Key: Current Relevant Skills; Skills I interpreted as relevant within my current practice, inclusive of all duties.

Expected Development Path; Skills I soon expect to become part of my practice through in-work development

Potential Development Path; Possible areas for further investigation that are not likely to develop within my normal workload

Subcategory: Information strategy

Enterprise IT governance GOVN

The establishment and oversight of an organisation's approach to the use of Information systems and digital services, and associated technology, in line with the needs of the principal stakeholders of the organisation and overall organisational corporate governance requirements. The determination and accountability for evaluation of current and future needs; directing the planning for both supply and demand of these services; the quality, characteristics, and level of IT services; and for monitoring the conformance to obligations (including regulatory, legislation, control, and other standards) to ensure positive contribution of IT to the organisation's goals and objectives.

Level 7

Leads the establishment and maintenance of a function that provides a consistent and integrated approach to IT governance in line with the organisation's corporate governance requirements. At the highest levels in the organisation's governance activities, provides assurance to principal stakeholders that IT services meet the organisation's obligations (including legislation, regulatory, contractual and agreed standards/policies). Ensures that a framework of policies, standards, process and practices is in place to guide provision of enterprise IT services, and that suitable monitoring of the governance framework is in place to report on adherence to these obligations as needed. Establishes the appropriate guidance to enable transparent decision-making to be demonstrated, working with senior leaders to ensure the needs of principal stakeholders are understood, the value proposition offered by enterprise IT is accepted by these stakeholders and the evolving needs of the stakeholders and their appetite for balancing benefits, opportunities, costs and risks is embedded into strategic and operational plans.

Level 6

Within a defined area of accountability, determines the requirements for the appropriate governance of enterprise IT, ensuring clarity of responsibilities and authority, goals and objectives. Puts in place and maintains governance practices and resources to enable governance activity to be conducted with reasonable independence from management activity, in line with the organisation's corporate governance requirements. Undertakes and/or directs reviews as necessary to ensure management decision-making is transparent, and that an appropriate balance between benefits, opportunities, costs and risks can be demonstrated to principal stakeholders. Establishes and maintains the policies for compliance with the organisation's obligations (including legislation, regulatory, contractual and agreed standards/policies), holding the management team to account. Acts as the organisation's contact for relevant regulatory authorities. Ensures proper relationships between the organisation and external parties, with valid interest in the organisation's governance, are in place.

Level 5

Reviews current and proposed information systems for compliance with the organisation's obligations (including legislation, regulatory, contractual and agreed standards/policies) and adherence to overall strategy. Provides specialist advice to those accountable for governance to correct compliance issues.

Strategic planning ITSP

The creation, iteration and maintenance of a strategy in order to align organisational actions, plans and resources with business objectives and the development of plans to drive forward and execute that strategy. Working with stakeholders to communicate and embed strategic management via objectives, accountabilities and monitoring of progress.

Level 7

Leads the definition, implementation, and communication of the organisation's strategic management framework and directs the creation and review of a strategy and plans to support the strategic requirements of the business.

Level 6

Sets policies, standards, and guidelines for how the organisation conducts strategy development and planning. Leads and manages the creation or review of a strategy which meets the requirements of the business. Develops, communicates, implements and reviews the processes which ensure that the strategic management is embedded in the management and operational plans of the organisation.

Level 5

Ensures that all stakeholders adhere to the strategic management approach and timetables. Collates information and creates reports and insights to support strategy management processes. Develops and communicates plans to drive forward the strategy. Contributes to the development of policies, standards and guidelines for strategy development and planning.

Information governance IRMG

The overall governance of how all types of information, structured and unstructured, whether produced internally or externally, are used to support decision-making, business processes and digital services. Encompasses development and promotion of the strategy and policies covering the design of information structures and taxonomies, the setting of policies for the sourcing and maintenance of the data content, and the development of policies, procedures, working practices and training to promote compliance with legislation regulating all aspects of holding, use and disclosure of data.

Level 7

Specifies at a strategic level the business functions and data subjects needed to support future business, thereby enabling the development of an Information Architecture. Establishes and communicates the organisation's information management strategy, developing it as an integral part of the business strategy. Directs information resources, to create value for the stakeholders by improving the performance of the organisation, whilst maintaining the principles of professional standards, accountability, openness, equality, diversity, and clarity of purpose. Responsible for compliance with regulations, standards and codes of good practice relating to information and documentation, records management, information assurance and data protection.

Level 6

Develops organisational policies, standards, and guidelines for information and records management ensuring that uniformly recognised and accepted data definitions are developed and applied throughout the organisation. Ensures that the business processes and information required to support the organisation are defined, and devises appropriate processes and data architectures. Identifies the impact of any relevant statutory, internal or external regulations on the organisation's use of information and develops strategies for compliance. Leads and plans activities to communicate and implement information management strategies. Coordinates information resources to meet specific business objectives whilst maintaining the principles of professional standards, accountability, openness, equality, diversity and clarity of purpose. Implements systems and controls to measure performance and manage risk.

Level 5

Understands the implications of information, both internal and external, that can be mined from business systems and elsewhere. Makes decisions based on that information, including the need to make changes to the systems. Reviews new change proposals and provides specialist advice on information and records management, including advice on and promotion of collaborative working and assessment and management of information-related risk. Creates and maintains an inventory of information assets, which are subject to relevant legislation. Prepares and reviews the periodic notification of registration details and submits them to the relevant regulatory authorities. Ensures that formal information access requests and complaints are dealt with according to approved procedures. Contributes to development of policy, standards and procedures for compliance with relevant legislation.

Level 4

Ensures implementation of information and records management policies and standard practice. Ensures effective controls are in place for internal delegation, audit and control relating to information and records management. Assesses and manages risks around the use of information. Provides reports on the consolidated status of information controls to inform effective decision making. Recommends remediation actions as required. Ensures that information is presented effectively.

Information systems coordination ISCO

Typically within a large organisation in which the information strategy function is devolved to autonomous units, or within a collaborative enterprise of otherwise independent organisations, the coordination of information strategy matters where the adoption of a common approach (such as shared services) would benefit the organisation.

Level 7

Establishes, maintains and communicates the organisation's strategy for managing information and the policies, standards, procedures and methods necessary to implement the strategy. Coordinates all aspects of management of the life cycle of information systems. Represents the interests of the entire organisation to general management and external bodies on matters relating to information strategy.

Level 6

Maintains an awareness of the global needs of the organisation, and promotes (to both information systems and business management) the benefits that a common approach to information and communications technology deployment will bring to the business as a whole. Coordinates the promotion, acquisition, development, and implementation of information systems and services in close liaison with those responsible for management and strategy.

Information security SCTY

The selection, design, justification, implementation and operation of controls and management strategies to maintain the security, confidentiality, integrity, availability, accountability and relevant compliance of information systems with legislation, regulation and relevant standards.

Level 7

Directs the development, implementation, delivery and support of an enterprise information security strategy aligned to the strategic requirements of the business. Ensures compliance between business strategies and information security and leads the provision of information security resources expertise, guidance and systems necessary to execute strategic and operational plans across all of the organisation's information systems.

Level 6

Develops and communicates corporate information security policy, standards and guidelines. Contributes to the development of organisational strategies that address information control requirements. Identifies and monitors environmental and market trends and pro-actively assesses impact on business strategies, benefits and risks. Leads the provision of authoritative advice and guidance on the requirements for security controls in collaboration with experts in other functions such as legal, technical support. Ensures architectural principles are applied during design to reduce risk and drives adoption and adherence to policy, standards and guidelines.

Level 5

Provides advice and guidance on security strategies to manage identified risks and ensure adoption and adherence to standards. Obtains and acts on vulnerability information and conducts security risk assessments, business impact analysis and accreditation on complex information systems.
Investigates major breaches of security, and recommends appropriate control improvements. Contributes to development of information security policy, standards and guidelines.

Level 4

Explains the purpose of and provides advice and guidance on the application and operation of elementary physical, procedural and technical security controls. Performs security risk, vulnerability assessments, and business impact analysis for medium complexity information systems.
Investigates suspected attacks and manages security incidents. Uses forensics where appropriate.

Level 3

Communicates information security risks and issues to business managers and others. Performs basic risk assessments for small information systems. Contributes to vulnerability assessments. Applies and maintains specific security controls as required by organisational policy and local risk assessments. Investigates suspected attacks. Responds to security breaches in line with security policy and records the incidents and action taken.

Information assurance INAS

The protection of integrity, availability, authenticity, non-repudiation and confidentiality of information and data in storage and in transit. The management of risk in a pragmatic and cost effective manner to ensure stakeholder confidence.

Level 7

Directs the creation and review of an enterprise information assurance strategy to support the strategic requirements of the business. Ensures compliance between business strategies and information assurance by setting strategies, policies, standards and practices and leading the provision of information assurance expertise, advice and guidance across all of the organisation's information and information systems.

Level 6

Develops corporate Information assurance policy, standards and guidelines. Contributes to the development of organisational strategies that address the evolving business risk and information control requirements. Drives adoption of and adherence to policies and standards through the provision of expert advice and guidance in order to ensure architectural principles are applied, requirements are defined and rigorous security testing is applied. Monitors environmental and market trends and pro-actively assesses impact on business strategies, benefits and risks.

Level 5

Interprets information assurance and security policies and applies these in order to manage risks. Provides advice and guidance to ensure adoption of and adherence to information assurance architectures, strategies, policies, standards and guidelines. Uses testing to support information assurance. Contributes to the development of policies, standards and guidelines.

Analytics INAN

The application of mathematics, statistics, predictive modeling and machine-learning techniques to discover meaningful patterns and knowledge in recorded data. Analysis of data with high volumes, velocities and variety (numbers, symbols, text, sound and image). Development of forward-looking, predictive, real-time, model-based insights to create value and drive effective decision-making. The identification, validation and exploitation of internal and external data sets generated from a diverse range of processes.

Level 7

Directs the creation and review of a cross-functional, enterprise-wide approach and culture for analytics. Leads the provision of the organisation's analytics capabilities. Leads the organisation's commitment to efficient and effective analysis of textual, numerical, visual or audio information.

Level 6

Develops analytics policy, standards and guidelines. Establishes and manages analytics methods, techniques and capabilities to enable the organisation to analyse data, to generate insights, create value and drive decision-making. Sets direction and leads the introduction and use of analytics to meet overall business requirements, ensuring consistency across all user groups. Identifies and establishes the veracity of the external sources of information which are relevant to the operational needs of the enterprise.

Level 5

Evaluates the need for analytics, assesses the problems to be solved and what internal or external data sources to use or acquire. Specifies and applies appropriate mathematical, statistical, predictive modelling or machine-learning techniques to analyse data, generate insights, create value and support decision-making. Manages reviews of the benefits and value of analytics techniques and tools and recommends improvements. Contributes to the development of analytics policy, standards and guidelines.

Level 4

Applies a range of mathematical, statistical, predictive modelling or machine-learning techniques in consultation with experts if appropriate, and with sensitivity to the limitations of the techniques.
Selects, acquires and integrates data for analysis. Develops data hypotheses and methods, trains and evaluates analytics models, shares insights and findings and continues to iterate with additional data.

Level 3

Undertakes analytical activities and delivers analysis outputs, in accordance with customer needs and conforming to agreed standards.

Data visualisation VISL

The process of interpreting concepts, ideas, and facts by using graphical representations. Condensing and encapsulating the characteristics of data, making it easier to surface opportunities, identify risks, analyse trends, to drive effective decision-making. Presenting findings and data insights in creative ways to facilitate the understanding of data across a range of technical and non-technical audiences.

Level 5

Establishes the purpose and parameters of the data visualisation. Provides overall control, to ensure appropriate use of data visualisation tools and techniques. Formats and communicates results, using textual, numeric, graphical and other visualisation methods appropriate to the target audience. Advises on appropriate use of data visualisation for different purposes and contexts to enable requirements to be satisfied. Develops plans showing how the identified user needs will be met. Leads exploration of new approaches for data visualisation.

Level 4

Applies a variety of visualisation techniques and designs the content and appearance of data visuals. Operationalises and automates activities for efficient and timely production of data visuals. Selects appropriate visualisation approach from a range of applicable options. Contributes to exploration and experimentation in data visualisation.