The Professionalisation of Computing Work in New Zealand, 1960 to 2010: A Feminist Analysis

Alison Adele Hunter

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Abstract

This thesis examines professionalisation activities within New Zealand's computing industry over the period 1960 to 2010, and argues that these constitute a professional project involving a range of neo-Weberian occupational closure strategies. It also considers gender issues in the industry and women's exclusion from the professional project.

The thesis first offers a contingent model which characterises the industry and locates the professionalising body, the New Zealand Computer Society. It then proceeds diachronically, presenting qualitative data sourced from 44 interviews with computing practitioners and other key stakeholders (altogether 17 female and 27 male participants) and from a range of archival records. An autobiographical preface and two personal vignettes reveal the personal lens which underpins my research.

The thesis identifies and refutes the two main arguments used to support professional claims; that professionalism will (1) engender the trustworthiness required of the computing industry, and (2) reduce the shortage of practitioners by raising the status of computing work. In contrast I argue that the claims comprise a professionalisation project which, by incorporating a range of dual closure activities, will reduce the number of practitioners and fail to ensure trustworthiness.

I conclude that the professional claims will not be easily legitimated in any of the stakeholder arenas, due to a lack of interest in professionalisation amongst most computing workers, the impersonal nature of computing work, and government reluctance to legislate for a computing profession. I argue that control of computing work, another prerequisite for successful professionalisation, will also not be achieved due to inhibiting factors such as uncertainty surrounding the body of knowledge, the diversity of computing education, amateurism within the industry, and globalisation of computing work.

The data concerning the experiences of women working in computing careers in New Zealand reveal significant horizontal and vertical gender segregation in computing occupations and marked discriminatory practices within the industry. Women are rarely involved in the activities of the professional body. I conclude that women participate in the industry in an "outsider-within social location", and that this marginalisation extends to the professionalisation project. Women cope with their marginalisation by various mechanisms but very few openly resist their situation or seek to bring about change.

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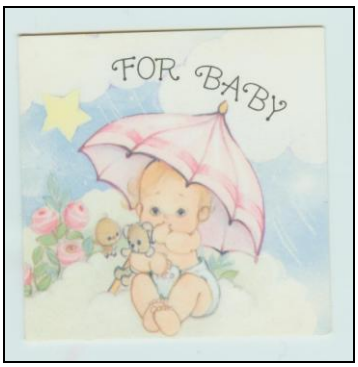
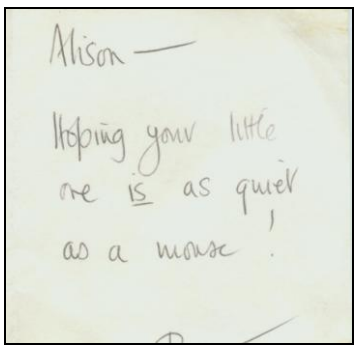
Preface - Autobiographical

One of the participants in this research project, Patricia, described having a baby as "the most defining of feminine experiences". I agreed with this statement, but could not reconcile my own experience with the next part of her story which involved the boss, a man, saying "you've got time to go home at lunch time and express milk". Men in the computer industry, in my experience, did not acknowledge babies or breast milk.

I was working as a computer programmer/analyst when I became pregnant with my first child in 1982. One day shortly before the due date, I received a puzzling note advising me that I was expected in the conference room at 10am. With some trepidation I left the familiar haven of my office next to the computer room and ventured up to a seldom-visited floor of our office building.

But I need not have worried; I was being invited to a surprise 'baby shower' in celebration of my expected child. It was a very thoughtfully and kindly planned event. I was pampered with attention and received 19 carefully chosen gifts in pastel hues. Cards were ingeniously worded to suit my role: "Hope your new baby is as quiet as a mouse!" and "Best wishes for your new programme."





We ate lavishly, discussing our predictions of a boy or a girl. We debated tentative names.

So why did I feel uncomfortable on this happy occasion? Was it because all these generous people were women? Was it because I barely knew any of these women? Certainly it was a very odd feeling to receive presents from people I regarded as virtual strangers.

No, it was because none of the people I actually worked with every day, all of them men, were there. The message was clear: babies are women's business and women belong in the secretarial or clerical pool. I realised I had been initiated into an important female ritual, but I felt alienated from my colleagues. As Alison Adam (2005, 3) had found some years earlier in her first data processing job, in the male dominated computing profession I was most definitely a "girl".

My memory of this event sat in my subconscious for many years and only resurfaced when I began reassessing my relationship with the computer industry. I recalled the gulf separating me from my colleagues and how lonely it was on my side of the chasm - 19 delightful gifts and no-one to show. I had been relegated to a dichotomous world in which women were associated with bodily functions most befitting the private sphere of the home and were therefore misplaced and unwelcome in the public world of men.

A second defining event occurred in 2001. By then I was a lecturer in charge of a new professionalism and ethics course for computing students. Professor Battye of Massey University had just reported to the institution:

> It is really very good to see a course like this as part of your degree, and especially the ethics part of it. There are serious ethical issues out there, and this course is part of a process of turning activities like IT into a profession. (Battye 2001).

Professor Battye's endorsement was at first heartening, but then I read the students' feedback on the course. Asked to identify what was good about the course, one student was emphatically dismissive: "Nothing – does not apply in the work place." Another was more contrite: "Ethics is a good thing but we can't do it in business." Another set of questions arose. Are computer ethics no more than an "esoteric academic domain" (Adam 2005, 56)? Would IT ever become a profession when my students were so indifferent to the idea? Should it become a profession? Was I wasting my time? Or my students' time and money?

Reflecting on these events some years later began a journey Sidonie Smith (1993, 149, 184) has described as a "process of rethinking [one's] own history" and "a means to greater self-awareness and politicized consciousness". Journeys like this often take shape as autobiographical narratives and are frequently emancipatory and politically empowering, (Smith

1993, 155-156). They often involve the narrator speaking from a position of marginalisation to publicly resist and contest hegemonic discourses (Smith 1993, 158-161). These are daunting goals indeed, and Smith's (1993, 185) cautionary coda provides a further challenge – to avoid an autobiographical narrative which unintentionally perpetuates hegemony.

I make this particular journey speaking for women, but I cannot claim all women. While I challenge the dominance of men in the emerging ICT profession, I am in fact referring to white middle-class men. Speaking as a white middle–class woman, I need to acknowledge, as Aida Hurtado (cited in Smith 1993, 160) noted, that I share the private sphere with such men in a manner which women outside the dominant cultural group do not. Non-white, non-middle-class, women will be aligned with different cultural practices and are even further marginalised in ICT work (Varma, Prasad, and Kapur 2006, 310). I cannot speak for these women.

I also take this journey for free-spirited computer practitioners who would rather avoid the constraints of a regulated profession. Just as Donna Haraway (1991, 205) envisaged the obsolescence of gender and other dualistic orders in today's connected technological world, so too we can imagine that the strictures of professionalism do not fit with this world

So, in making this journey I hope to shed light on developments as the computer industry moves somewhat shakily towards professionalism. I use my personal experience of the industry to trigger questions about the aspirations of those steering what could be referred to as the professionalisation bandwagon, and why, after 50 years of computing in New Zealand women still experience the industry as outsiders.

I left secondary school in 1969 never having heard of a computer and unaware that there were already more than 100 of them in the country (Beardon 1985). My ignorance was not surprising. Technology was definitely not for females at that time, and careers advice for girls typically comprised a standard offering of nurturing roles such as teacher, nurse, and secretary. I began university with a very poor understanding of the options available.

A degree in computing would not have been possible when I started at the University of Auckland in 1972.[1] *I began studying mathematics, and in my final year I heard about an exotic new paper which involved learning a 'language' called ALGOL to write 'programmes' for a machine known as a Burroughs B6700. This allowed calculations in a field called 'game theory'. I enrolled on impulse and so stumbled blindly into the arcane world of computer*

[1] Although the university had acquired its first computer in 1963, the Computer Science Department was not formed until 1981.

programming and mainframe computers.

This was new terrain indeed; a whole new vocabulary was required, and I soon learned that the computer was an unforgiving 'master' only too willing to reject my humble offerings.[2] *I began to have doubts about this strange new world. It seemed insular to me, remote from the anti-Vietnam war protests, long hair, and Pink Floyd music so prominent in other sections of the university at the time. Most other computing students were male, clean-cut, and serious; and they exuded an alarmingly quiet confidence with programming. They appeared to thrive on obscure terminology and all-night sessions punching cards. The 'computer centre' where I must submit my stack of punched cards hummed with male self-belief and efficiency, and I avoided it as much as possible. The computer remained a mysterious, never-to-be-seen, machine. It was totally in control; I felt powerless, and many days would go by as I patiently awaited its verdict. I felt intimidated and isolated. I had unwittingly entered the domain of the 'computer geek'.*

Despite my misgivings I persisted, ALGOL began to make sense, and I started enjoying the precision programming required. In 1975 I decided to find a job in computing. This was an audacious plan; my computing skills were minimal and my brief encounter with programming had hardly prepared me for a career in IT. But at the time computer expertise was scarce, jobs were easy to get, and any experience with computers was advantageous (Bell 1985).

I was employed by an entrepreneurial and wealthy boss who was prepared to invest in innovative computer software projects. I had to learn fast on the job. We were a small team, and I was the only woman. The time-consuming nature of software development meant that costs were high. Our projects were ambitious, and we urgently needed paying clients. We were prepared to promise almost anything to secure a contract. We also knew that most prospective clients were ill-equipped to evaluate computer systems properly, and for some the lure of new technology and automation would be strong. It was exhilarating to be part of this thrilling new digital age, but I also had misgivings concerning professional responsibility and ethical behaviour. We were close to

[2] Writing this sentence I wavered between referring to the computer as a (masculine) "master" or a (neutral) "judge", but decided, as others have done (Zarrett et al. 2006, 60), that for me the computer was definitely male.

entering cowboy territory.

Indeed several years passed before I became aware of my own ethical constraints. I began to realise the impact of my actions on others, and that relationships missing the vital ingredients of honesty, trustworthiness, and respect could not prosper. I found I was motivated by a robust sense of justice as well as a strong sense of duty. I was willing to 'step up' and 'speak up'. Ethics, I firmly believed, was about what we do, not what we might think about doing.

By the early 1980s computers were far more prevalent in the workplace. Working now for a large consulting firm of engineers and architects, I was part of the IT department servicing the various computing needs of the organisation. Work was less exhilarating and more structured. Costs were more carefully controlled. Packaged software was still not widely available and this led to some innovative in-house solutions such as prototype word-processing software running on a mini-computer and home-grown library cataloguing software. Again I worked entirely with men. Morning tea was a daily ordeal as I tried to adapt to conversation about chess, yachting, and gadgets around the tea trolley.

It was during this period that I first encountered the New Zealand Computer Society (NZCS). Copies of the organisation's magazine 'Interface' appeared at work and a colleague mentioned the NZCS professional development seminars. I attended a few after-work functions but felt removed by gender and age from others present. I concluded that the organisation was for prosperous middle-aged men and rejected it forthwith. I remained unaware of the society's code of ethics and its goal of turning computing into a "recognised profession" (Kaiser 1985, 158).

After my first child was born I stopped paid work for three years.

By the late 1990s my teaching duties obliged me to reacquaint myself with the NZCS. I found that 'Interface' had been replaced by 'Direct Info'. NZCS President Howard Woolston (1998, 11) wrote that professionalism and recruitment of members were now a priority. I read the names of new members published in 'Direct Info', and noticed that more than 80% were men. [3] *I committed the (then) 15 tenets of the Code of Ethics and Professional Conduct to memory, a*

[3] See October/November 1998 edition of Direct Info. Interestingly this male-female split closely matches the proportions in my current classes. For example in 2007 25% of my degree students and 19% of my diploma students were female.

feat which always impressed my students. I went along to some breakfast meetings, but although we were now all considerably older, the gender mix remained unchanged from the 1980s.

Over the following few years I experienced a growing sense of outrage that men continued to have such a stranglehold on computing work. At the same time I began to detect a dissonance between the professional claims of the NZCS and my own understanding of the computer industry. Finally I realised there was a connection between professionalisation and male dominance. I began this journey in 2007.

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Chapter 1 – Introduction

"Why should ICT be the only field without professional standards? Is ICT really so immature and so inferior to every other field that it just doesn't need them?" (NZCS CEO Paul Matthews 2010a)

1.1 Introduction

What are we to understand by the label 'ICT professional'? Perhaps technically gifted wizardry or socially awkward geekiness. Possibly morally aware trustworthiness. Then again business-savvy entrepreneurship, credentialism, and elitism are also possible. Men rather than women are a definite likelihood. This thesis aims to clarify these issues in the context of New Zealand's computing industry. To properly understand the label we need to understand its origins.

The first computer arrived in New Zealand in 1960 accompanied by very little fanfare, but for a small group of enthusiasts it was a momentous occasion. With considerable enterprise this group banded together to form the *New Zealand Computer Society* (NZCS) and immediately initiated a professionalisation project. Almost 50 years later, on 6th May 2009, the CEO of the NZCS, Paul Matthews (2009c), announced the introduction of professional certification for ICT workers in New Zealand. This event signalled a significant advance towards an ICT profession, the first real progress since the society introduced a code of ethics in 1978. Slow progress has been a feature of the ICT professionalisation project, despite considerable effort sustained over a long period.

The term 'professionalisation project' signifies the strategic nature of activities used to obtain and retain market control of an occupation. Magali Larson (1977) used the term, and the alternative 'professional project', to refer to the organised means by which occupational groups utilise their collective financial and cultural resources to secure a monopoly of professional practice and institutionalise social privilege.[4] Given the extent of privilege traditionally enjoyed by the professions, the pursuit of professional status is understandable:

> The expansion of the service sector and knowledge work in the developed world and the growth or re-emergence of professions in both developing and transitional societies, indicate the appeal of the concept of 'professionalism' as well as the strength and persistence of 'professions' as an occupational form. (Evetts 2003, 399)

Although professional projects are each unique and historically located, they typically involve a

[4] Throughout this thesis I use the terms 'professionalisation project' and 'professional project' interchangeably.

range of neo-Weberian occupational closure strategies (Witz 1990, 675; Mills 1951, 140). In addition, professional projects characteristically include a range of claims. These, Larson (1977, xii) noted, are often more representative of pretence than reality. Professional projects are often underpinned by a trait based notion that professionalisation can be achieved by accumulating a set of professional traits (Hall 1975, 126); a professional body, a code of ethics, licensing, for example. The recently announced ICT professional certification can be considered both a professional trait achieved and a step toward occupational closure. The ICT industry in New Zealand has thus joined the many other occupations seeking to professionalise: "The quest for fully professional status among the practitioners of various technical occupations is real and earnest" (Moore 1970, 51).

Another recent event (29th November 2010), which although seemingly less noteworthy than the announcement of professional certification, was of great interest to me personally. This was the NZCS President's (cited in Matthews 2010b) delighted reaction to a recent increase in the number of students and young people joining the society. I observed that there had apparently not been an equivalent increase in the number of women joining the society, and speculated: Why had the President not commented on this, expressing concern about the lack of female members? Was he not aware of the gender imbalance in the NZCS?

Low numbers of women can also be traced back to 1960, not only in the membership of the NZCS but also in New Zealand's computing industry generally. My personal experience of this under-representation and the related isolation I felt working in the computing industry in the 1970s and early 1980s were described in the Preface. Many years later, I find it unacceptable that men continue to dominate the industry and women members of the industry continue to be marginalised. If the old patterns continue and the professionalisation project succeeds, then women are also likely to be excluded from the benefits of professionalism. It is an issue of concern for all women, not only those interested in a career in computing, and one the NZCS has a responsibility under its Code of Professional Conduct to address.

The purpose of my research was thus twofold:

1. To enquire into the ICT professionalisation project in New Zealand, and
2. To determine where and how women are positioned in the ICT professionalisation project

In planning my research I was mindful of Eliot Freidson's (1983, 37) advice that studies of the professions should "focus on the aspirations and fortunes of those claiming the title". I therefore

began by conducting a multi-sited ethnographic study (Marcus 1995) of those members of New Zealand's ICT industry who are seeking to establish an ICT profession. I then extended my research to include members of the industry who are not participating in the professionalisation project. In total 44 participants were interviewed. In both phases I also paid attention to gender relations in order to fulfil my second purpose. This approach allowed me to consider two related research questions:

- How do ICT workers in New Zealand perform professionalism, and
- Does it make sense to refer to an ICT profession?

A full explanation of my research methods is included in Appendix A *Reflections on the Research Process* (page 209).

1.2 Timeliness

In comparison to other fields of work, the computer industry is very young. But it is also a field in which rapid change and phenomenal growth have featured since the beginning, so that in a very short timeframe ICT has become a key enabler in the economies of all Western countries, including New Zealand. Interestingly, it is not a field which has been extensively studied by sociologists. In 1979 Ronald Anderson and Jeylan Mortimer (1979, 136) proposed that "the professionalization of computer workers would appear to be a fruitful subject of further study", along with other matters such as gender differentiation in ICT work. During the 1980s, however, computer work was rarely studied and the field remained poorly understood (Orlikowski and Baroudi 1989, 13). Since the 1990s a greater quantity of research has taken place, although this has more often enquired into gender relations than into professionalisation activities.

It is possible that the lack of attention to the professionalisation of computing is linked to a decline in sociological enquiry into the professions generally during the 1980s and 1990s (Hall 1983, 8; Davies 1996, 661) – by unfortunate timing, interest in professionalisation dropped just as a socially significant computing industry emerged. However recent works by scholars such as Andrew Abbott (1998), Steven Brint (1994; 2001), Julia Evetts (2006), and Kevin Leicht and Mary Fennell (2001) suggest that the study of the professions is not "dead", as Herbert Kritzer (1999) and other have also noted.

I began my research in the mid-2000s, a period in which the ICT industry in New Zealand was particularly buoyant (Statistics New Zealand 2007a) and experiencing a serious skills shortage

(Department of Labour 2006). My research also coincided with efforts by the NZCS to reinvigorate the professionalisation project. Alongside these events, a small number of women were drawing attention to women's disenfranchisement in computing work in this country. Thus it was a propitious time for my research. One cautionary note is necessary, however. The ICT professionalisation project is an unfolding story, and as Abbott (1988, 239) noted, there is always a risk in writing about "unfinished" events. Hence this thesis should be regarded as a 'snapshot in time'. It covers events in New Zealand over the period 1960 to 2010, and even as I ceased collecting data, the landscape kept changing. For example, at the end of 2010 the NZCS appointed a new President, Ray Delany (Matthews 2010b), and this appointment could lead to new directions and aspirations for the society.

1.3 Challenges

As expected, my research involved a number of challenges. Some of these related directly to my data collection procedures and are explained in Appendix A. Other more general challenges are noted below.

1.3.1 Dealing with Nebulosity

One challenge I faced in carrying out this research was the nebulous nature of New Zealand's computing industry. The extreme heterogeneity of the industry has led to it often being described in terms such as "fragmented" (Bell 1985) and "multifaceted" (NZCS President, 2008). This problem is also reflected in the lack of data that accurately captures all pockets of the industry (Personal communication Brett O'Riley, CEO of NZICT, 15 November 2010).[5] Therefore one of my first tasks was to characterise the industry, and in so doing, to outline the boundaries of my research.

1.3.2 Terminology

A different type of challenge concerned deciding appropriate terminology. I have often heard strong views expressed regarding this matter amongst the computing fraternity. For example, while many may accept the use of the acronym 'ICT', there are some who claim that the term 'computing' imparts a more holistic image, while others reject the use of acronyms per se. Rather than differentiate between the nuances of the various options, I have chosen to use the terms 'computing', 'ICT' (Information and Communication Technology), and 'IT' (Information

[5] NZICT = New Zealand Information and Communication Technologies Group. NZICT is an industry association representing over 100 of New Zealand's leading technology companies. NZICT's (2010) vision is: "NZICT will be the champion for the leveraging of quality Information and Communications Technologies (ICT) to increase the country's global competitiveness." The organisation now often refers to itself as the 'NZICT Group'.

Technology) interchangeably throughout this thesis.[6] Other acronyms which refer to particular sections of the industry, for example, 'IS' (Information Systems), 'CS' (Computer Science), and 'SWE' (Software Engineering), I use less often and explain as they appear in the thesis.[7]

A further terminology challenge concerned use of the term 'ICT professional'. I did not feel comfortable referring to 'ICT professionals', given that no legally mandated ICT profession currently exists, yet the majority of ICT workers are classified as either 'managers' or 'professionals' for statistical purposes. Besides, as Kritzer (1999, 717) observed, computer programmers have often been referred to as professionals, despite the lack of professional structures. Again I compromised and decided to use the terms 'ICT professional', 'ICT practitioner', and 'ICT worker' interchangeably.

Clarification of my use of the terms "professionalisation" and "professionalism" is also necessary. As would be expected, individuals involved in the professionalisation project do not use the sociological term "professionalisation", instead most often referring to their vision of "professionalism". I have on occasions throughout this thesis chosen to use the language of my participants and in doing so used terms such as "seeking professionalism" in places where "professionalisation" might otherwise be expected.

Finally, there was an issue relating to the heavy use of jargon and acronyms generally in the computing field. Rather than include a glossary, I have used footnotes to clarify meanings where I judged this necessary.

1.4 Thesis Structure

This thesis consists of seven chapters. Relevant literature is introduced in situ and thus there is no dedicated 'literature review' chapter. The Preface has already acknowledged my own association with the computer industry and the personal lens which filters my research findings.

Chapter 1 consists of this introduction.

Chapter 2 confronts the issue of nebulosity. I quantify and define New Zealand's ICT industry, and in doing so, develop a conceptual model of the industry. This contingent model is based on

[6] Alison Adam (2005, 3) adopted a similar approach in her book *Gender, Ethics, and Information Technology*. The New Zealand government uses the acronym ICT in most publications.

[7] As is discussed in detail in Chapter 4, 'SWE' (Software Engineering) already has legally mandated professional status as part of the engineering profession. For this reason, registered professional software engineers are excluded from the range of ICT occupations discussed in this thesis.

a range of statistical measures of the businesses and people involved in computing work, as well as a commonly perceived soft-hard continuum of computing roles. In the second part of Chapter 2 I bring the model to life by describing the reality of ICT work. I use my participants' accounts of their everyday work experiences to present an overview of what it means to be an ICT worker in New Zealand in the latter part of the first decade of the 21st century. This discussion also confirms the heterogeneity of the industry.

Chapter 3 presents the NZCS and its professional claims, and is organised into three parts. The first part is a 'personal vignette' which relates my experience of attending the meetings of two computing associations, the NZCS and the *Usability Professionals Association of New Zealand* (UPANZ)[8], on consecutive evenings in 2008. The purpose of this vignette is to emphasise the contrasting cultures of these two groups. The second part formally introduce s the NZCS and its pursuit of professionalism since 1960. This is a chronological account founded on historical records of the NZCS and the oral history records of a group of 'computing pioneers'. I find that the society's professional claims rest on two main arguments and that these are underpinned by a trait-based notion of the professions. In the third part of the chapter I critically examine these two arguments. Stratification and social closure, as outlined by C Wright Mills (1951) and Frank Parkin (1971; 1979), are key themes of this chapter.

Chapter 4 concerns two essential features of successful professional projects – legitimation of professional claims and the control of professional work. In this chapter I consider challenges to both these aspects of the ICT professional project. Abbott (1988) provided the main theoretical foundation for this chapter. Larson's (1977, xii) observation that professional projects involve both a "struggle" to establish unity within a profession and "persuasion" to assert legitimacy in arenas external to the profession also capture the essence of this chapter.

In Chapters 5 and 6 I turn my attention to matters of gender and the location of women in the ICT professionalisation project. I offer the example of 'Ali', the solitary female member of an award-winning website development team, as an introduction to the gendered nature of ICT work and the marginalised position of women in the ICT industry. Patricia Hill Collins' (2009) notion of women as 'outsiders-within' provides the central conceptual theme for these chapters. Chapter 5 demonstrates the outsider-within location of women in the origins of computing and in contemporary ICT work. It investigates horizontal and vertical patterns of gender segregation within the industry, based on statistical data, historical records, and empirical data obtained from my female participants.

[8] UPANZ is explained in detail in Chapter 3.

Chapter 6 then demonstrates that the marginalisation of women extends to the ICT professionalisation project. The chapter begins with another personal vignette, this time to highlight the invisibility of women in professional activities in New Zealand's ICT industry. Using a similar range of data sources, I examine women's outsider-within location in male dominated professions such as computing. Professional organisations and professional codes of ethics are included in this analysis. I then discuss the various mechanisms women employ to cope with their outsider-within location. I found Anne Witz's (1990; 1992) notion of a female dual closure strategy useful in this section.

Chapter 7 contains my conclusions. Some of my conclusions may be regarded as contentious. Ethnographers undertaking studies of their own society can be seen as questioning the accepted world view, especially when that world view rests on the cultural legitimacy of science, technology, and the capitalist imperative. Sharon Traweek (1988, 161-162) encountered this problem during her study of nuclear particle physicists: "The ethnographer is heard (by readers and informants) as calling into question things that 'stand to reason', and this stance can be read as hostile or subversive skepticism." In this thesis I am questioning the legitimacy of claims surrounding an ICT profession at a time when it might otherwise be taken for granted that an ICT profession is vital. In this respect some of the outcomes of my research may be considered controversial by certain sections of the ICT industry.

Chapter 2 – ICT in New Zealand

"Where does ICT start and finish?" (NZCS President, Don Robertson, 2008)

2.1 Chapter Overview

It is not difficult to determine who is a doctor and who is not, and this holds for other legally mandated professions such as law, dentistry, accountancy, and engineering. But determining who should be regarded an ICT professional is far more challenging, in part because 'computing' is now an activity anyone can do. This presents a problem for the professionalising body, the *New Zealand Computer Society* (NZCS), whose professional claims depend on clear definitions. As the society's President, Don Robertson, asked members at a meeting in 2008: "Where does ICT start and finish? Is a community group setting up its wireless LAN part of the ICT sector?" [9] This is not a uniquely New Zealand issue. As the OECD (2007b, 128) acknowledged: "There is currently no commonly adopted definition of ICT skills and there is no internationally agreed list of ICT related occupations."

This chapter seeks to shed light on New Zealand's ICT industry by considering statistical measures from government and other sources, and by reporting findings from my research. Some historical information and personal experiences of the ICT industry are also included. My intention is to set the scene for later exploration of the professionalisation project, while also introducing my research participants.

I begin by developing a provisional model of the ICT industry in New Zealand. This proposes that ICT work can be conceptualised as a collection of actors working to produce ICT goods and services; namely the businesses, the occupations, and practitioners. These entities are classified and quantified by various tools provided by government and the professional body, and are supported a large number of other organisations and people, for example universities, academics, and industry groups. The model includes notions of a technical-professional hierarchy, specialisation, and a hard-soft continuum of occupations.

I then continue by describing aspects of ICT work in New Zealand, as related by my research participants. These narratives reveal a range of motivations for working in the ICT industry, a variety of work settings for ICT work, and major challenges associated with bureaucratisation and poor communication.

[9] NZCS Auckland Branch meeting 27th February 2008. LAN = Local Area Network.

2.2 Defining the ICT Industry in New Zealand

To clarify what we mean by 'the ICT industry' it is helpful to consider the businesses and the people in occupations involved in that work. They are the main focus of this section. Other entities such as the NZCS, government departments, and educational institutions, which support and influence the ICT industry, are mentioned only briefly but receive greater attention in later chapters.

2.2.1 ICT Businesses

Sales of ICT goods and services in New Zealand in 2008 totalled $19.3 billion, based on the OECD definition: "ICT goods and services fulfil or enable the function of information processing and communication by electronic means" (Statistics New Zealand 2009b).[10] These sales were achieved by 2283 businesses with 2 or more employees, of which 1923 were classified as small (84%), 210 as medium (9%), and 153 as large (7%) (Statistics New Zealand 2009b).[11] A high proportion (41%) of these businesses are less than 10 years old (IDC New Zealand 2005, 8). ICT businesses are further categorised according to *Australian and New Zealand Standard Industrial Classification 2006* (ANZSIC), and their products are classified according to the internationally accepted *Harmonised System* (HS) – a level of data which is not required for this thesis. The industry comprises two sectors: (1) manufacturing, which delivers infrastructure by producing ICT hardware, equipment, and components, and (2) services, which provides products that enable the use of ICTs, for example by producing software and providing Internet services (OECD 2002, 81).[12] In New Zealand, the manufacturing sector is very small, contributing only 3% of the total sales in 2008 (Statistics New Zealand 2009a), and because of this it was not included in my research. The services sector is dominated by sales of telecommunications and Internet access services (approximately 35% of all sales) and sales from computer system design and related services (approximately 17%) (Statistics New Zealand 2009a, 2009b). Businesses providing these services were highly represented in my research.

The brief summary above suggests that the ICT industry is well defined and adequately measured. However the NZCS President's question is not satisfactorily answered by the

[10] The vast majority of these sales ($17.9 billion) were domestic.
[11] Small business: 2 to less than 20 employees; medium business: 20 to less than 50 employees; large business: 50 plus employees. Large businesses contributed 74.5% of sales, and small businesses outperformed medium businesses by contributing 17.7% of sales compared with 7.8% (Statistics New Zealand 2009b). The reason for the slight discrepancy in the breakdown of businesses by size is unclear.
[12] OECD (2009, 32) provided a more formal combined definition to cover both the manufacturing and services sectors: "The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display."

statistics, and there remains an unmeasured quantity of ICT-related activity, some of which could be regarded as an adjunct to the formal industry. The OECD (2009, 33) acknowledged this point: "Businesses that comprise the ICT sector … are not the only entities in the economy to produce ICT goods and services." For example, some ICT goods and services are undoubtedly produced by entrepreneurial self-employed individuals who are not included in official measures. While we do know that 12% of employed people in New Zealand are self-employed and not employers (Statistics New Zealand 2008b, 16), the nature of the work performed by these individuals is unclear. I attempted to establish the number of 'non-standard' entities contributing to the ICT industry but was unable to locate reliable data. Brett O'Riley, CEO of NZICT, sympathised with my problem: "You've just highlighted one of the problems we have, which is the paucity of data we have on the sector… There are definitely hundreds, if not thousands of small entities out there." This comment confirmed that there is indeed a gap in data on the ICT industry, and that there are likely to be a significant number of individuals or small entities also contributing to the sector.

2.2.2 ICT Occupations

Many different ways of naming and classifying ICT occupations are possible. Here I use three measures. Firstly, I have chosen to distinguish between ICT users and ICT specialists in order to acknowledge the users, the beneficiaries of ICT work. Secondly, I consider a professional-technical hierarchy of roles, and thirdly, I refer to a 'soft-hard' continuum of roles.

2.2.2.1 ICT Users – ICT Specialists

Most characterisations of ICT work distinguish between 'ICT users' who use computer technologies as tools in the course of their work and 'ICT specialists' whose work involves designing developing, implementing, operating, maintaining, and managing ICT systems - see OECD (2007b, 128; 2009, 74), Duerden Comeau (2003, 1). An example of an 'ICT user' would be a farmer using computer technologies for record keeping and accounting purposes. 'ICT users' can be extended to include households and individuals who use computers for non-work purposes such as e-commerce (e.g. banking and shopping online) and leisure (e.g. web browsing, playing games, emailing) (OECD 2009, 53; Statistics New Zealand 2007a, 5-14). An example of an 'ICT specialist' would be a computer programmer creating the accounting software used by the farmer or developing the website for online banking.

The range of 'ICT specialist' occupations is growing. During the 1980s Ivan Jackson (1983, Appendix I, 23) identified nine different computing occupations in New Zealand, but by 2006 there were 117 identified in the *Australian and New Zealand Standard Classification of*

Occupations (ANZSCO) (Australian Bureau of Statistics 2006).[13] In the 2006 census a total of approximately 58000 people were identified as working in ICT occupations in New Zealand (Statistics New Zealand 2008a), most of whom fit the 'ICT specialist' definition. My research concentrated on 'ICT specialists' and the professionalisation activities involving these people, and did not include 'ICT users'.

2.2.2.2 Professional – Technical Hierarchy

ANZSCO (2006) classifies ICT occupations into five hierarchies: managers (3 occupations), professional (approximately 25 occupations), technicians (4 occupations), clerical (1 occupation), and sales workers (1 occupation). The professional category is the largest, comprising approximately 39000 individuals compared with around 8000 technicians and 4600 managers (Statistics New Zealand 2008a). The government characterises professionals as creators of ICT goods and services, and technicians as providers of the necessary technical support:

> ICT practitioners are essential to our digital future…We need to promote, develop, attract and retain ICT professionals, such as network architects, application developers and security specialists, to perform high-value and creative digital work. We also need technicians to develop and maintain our ICT systems. (New Zealand Government 2008a, 37)

The categories are not fixed, and occupations may be promoted or demoted in the hierarchy. For example, the previous occupational coding system, the *New Zealand Standard Classification of Occupations 1999* (NZSCO), classified computer programming as a 'technical' occupation (Statistics New Zealand 2001), but ANZSCO classifies it as 'professional' (Statistics New Zealand 2008a).

The terms 'professional' and 'technician' are of particular interest to professionalising groups such as the NZCS due to their significance for professionalisation claims; for example the status stratification implied in their use. As will be seen in more detail in Chapter 3, the NZCS seeks to add a further hierarchy within the official 'professional' category, to distinguish between levels of seniority for each occupation. People working at a senior level in each professional occupation are regarded by NZCS as fitting a 'certified professional' category, while people working below this level are considered 'technicians' despite their being included in the ANZSCO professional category (NZCS Certification Working Group 2009, 10; Matthews

[13] ANZSCO is the occupational coding system used in census surveys in New Zealand and Australia. The large number of occupational titles is due partly to the list of "alternative titles" provided by ANZSCO (for example Web Master is an alternative for Web Administrator) (Australian Bureau of Statistics 2006).

2009a, 10).[14] For example, a junior programmer would be classified as a 'technician' according to the NZCS taxonomy, and would not be recognised as a 'certified professional' until a certain level of competency, experience, and responsibility is reached.

2.2.2.3 Soft – Hard Continuum

Another distinguishing feature of ICT occupations noted by some observers, although not by government statistics, concerns those occupations sometimes referred to as "core IT" (Duerden Comeau 2003, 1) or "IT intellectual core" (Denning 2001, 15), and other occupations which could be termed 'peripheral' or 'non-core'. Peter Denning (2001, 16) cited occupations in software engineering, computer science, and robotics as examples of the ICT 'core', whereas occupations in information systems and others such as computer security, ICT training, and multimedia design were non-core. Denning's distinction between information systems and computer science/software engineering, arguably the main computing disciplines, signals an important difference in the focus of these two fields.[15] Michael Myers (2007) summarised this difference:

> The field of Computer Science is concerned with IT for its own sake. The field of Information Systems is concerned with the development, use and application of information systems by individuals, groups, organizations, industries, nations, and global organizations. IS has a much greater focus on people, and the interaction between people, organizations, and IT.

Thus we may conceptualise ICT work as encompassing some occupations which are primarily focussed on technology and others which are more concerned with the interaction between technology and people. The 'technology' and 'people' orientations underpin the 'hard' and 'soft' dualisms referred to by many scholars (and also practitioners) in relation to technology, science and engineering – see Wendy Faulkner (2007), Joyce Fletcher (1999), Jane Margolis and Allan Fisher (2002), Traweek (1988), Judy Wajcman (1991), and Liisa von Hellens, Sue Nielsen, and Jenine Beekhuyzen (2004). 'Hard' refers to the nuts and bolts of technology, technical skills, and commercial drive, whereas 'soft' refers to the aesthetics of design, social skills, and empathy with people (Faulkner 2007, 340).[16]

In the context of ICT work, those occupations identified by Denning as belonging to the IT

[14] Most people working in occupations classified as ANZSCO 'managerial' would also likely meet the NZCS criteria for 'certified professional'. In addition NZCS has indicated 'para-professional' as a possible alternative term for 'technician' (Matthews 2009a, 10).

[15] In Chapter 3 I discuss the (small) difference between computer science and software engineering. For the purpose of this section they may be considered equivalent.

[16] The terms are also sometimes used to refer to gendered programming styles, 'hard mastery' being most often associated with males and 'soft mastery' with females (Turkle 2005, 104-108).

'core' align closely with the concept of a 'hard' orientation (for example programming, computer engineering). The passion computer programmers typically have for their work illustrates the 'hard' orientation:

> Often we [programmers] are privileged to know that we actually developed the particular system that is humming away at the moment. We are sometimes even more interested in the tool itself than the crafting done with it. We studied for years to enhance programming skills, increase knowledge about operating systems and improve our system development abilities. After all, fluency and effectiveness is [sic] required for the true craftsmanship to create ICT systems, regardless of the purpose of those systems. (Potgieter 2005, para 2)

This outlook, in which the elegance of the tool is viewed as more important than the use of the tool, has led to accusations that the 'hard' disciplines of ICT are frequently oblivious to the needs of people:

> We need to pay more attention to what our systems do to people… Perhaps we could start by trying to understand things like corporate culture, group dynamics, psychology, and all those 'soft' disciplines that our computer science culture looks down on. (Mason 1998, 6)

In comparison, roles identified by Denning as 'non-core', for example ICT trainer, usability consultant, and business analyst correspond with the 'soft' orientation. Usability specialists Peter Bogaards and Ruurd Priester (2005, 23) exemplify this orientation: [17]

> We must take good user experience seriously, looking beyond the superficial and delving deeper into its deeper and more essential qualities. Creating a high-quality user experience involves complex and varied aspects of design. Many digital products fail to meets the real needs of people. They do not make life easier or more enjoyable. Too many products are difficult to use *and* unstable in use. Often products are no more than weak attempts to solve the problems that other even more inadequate products have introduced into people's lives.

Another usability specialist, Janice Fraser (2002, 2), used a rather unusual analogy to differentiate between the hard and soft orientations:

> If developers are a site's heartbeat (pushing out new code on a regular basis), and designers are the lungs (infusing it with fresh, life-sustaining energy), then usability testing is rather like the liver. It's a filter that siphons out the toxic sludge from your interfaces.

This analogy emphasises the importance and interdependence of the different roles, but also portrays programming as a merely mechanical process.

[17] Usability refers to a product's ease of use, easiness to learn, intuitiveness, usefulness, error rate, and satisfactoriness, *as perceived by the user* (Barnum 2002, 6).

It is overly simplistic to equate computer science/software engineering with single-minded technical fanaticism – the increasing interest in HCI (human-computer interaction) as a sub-discipline within computer science illustrates this fact – yet computing curricula often ignore 'soft' topics (Denning 2004, 18), and systems continue to be developed which do not meet users' needs (Barnum 2002,1-2). Likewise it would be incorrect to assume that information systems practitioners consistently empathise with the users of their services. Nevertheless ICT occupations continue to be perceived as fitting along a hard-soft spectrum which illustrates their relative involvement with technology and people. The 'softer' occupations are typically associated with the beginning or end of a project whereas the 'harder' occupations are most often associated with the mid-stages.[18] [19]

2.2.3 Supporting Entities

In addition to the above, a range of other entities and actors participate in and contribute to New Zealand's ICT industry. I am referring to these as 'supporting entities'. The *New Zealand Computer Society* and its representatives have already been identified as being a major focus of this thesis. Other supporting entities include organisations such as special interest groups, industry groups, and educational institutions, and the people working in or belonging to these organisations. Examples include NZSA, TUANZ, NACCQ/CITRENZ, InternetNZ, Agile Professionals Network, ANZTB, NZOSS, and New Zealand's various universities and polytechnics.[20] Some of these appear as minor contributors to this thesis.

In summary, the discussion in this section indicates that the ICT industry in New Zealand can be conceptualised as a multi-dimensional entity. ICT businesses and the people working in ICT occupations produce a range of products for mainly domestic ICT users. ICT businesses are primarily involved in producing ICT services, with manufacturing contributing only a very small proportion to overall sales. ICT occupations consist of a large number of specialist roles which are categorised hierarchically for statistical purposes, with most occupations (and individuals) included in the Professional and Technical categories. Within the Professional category, a further hierarchy of Certified Professional-Technician has been unofficially introduced by the NZCS. The final dimension comprises a Soft-Hard continuum which is

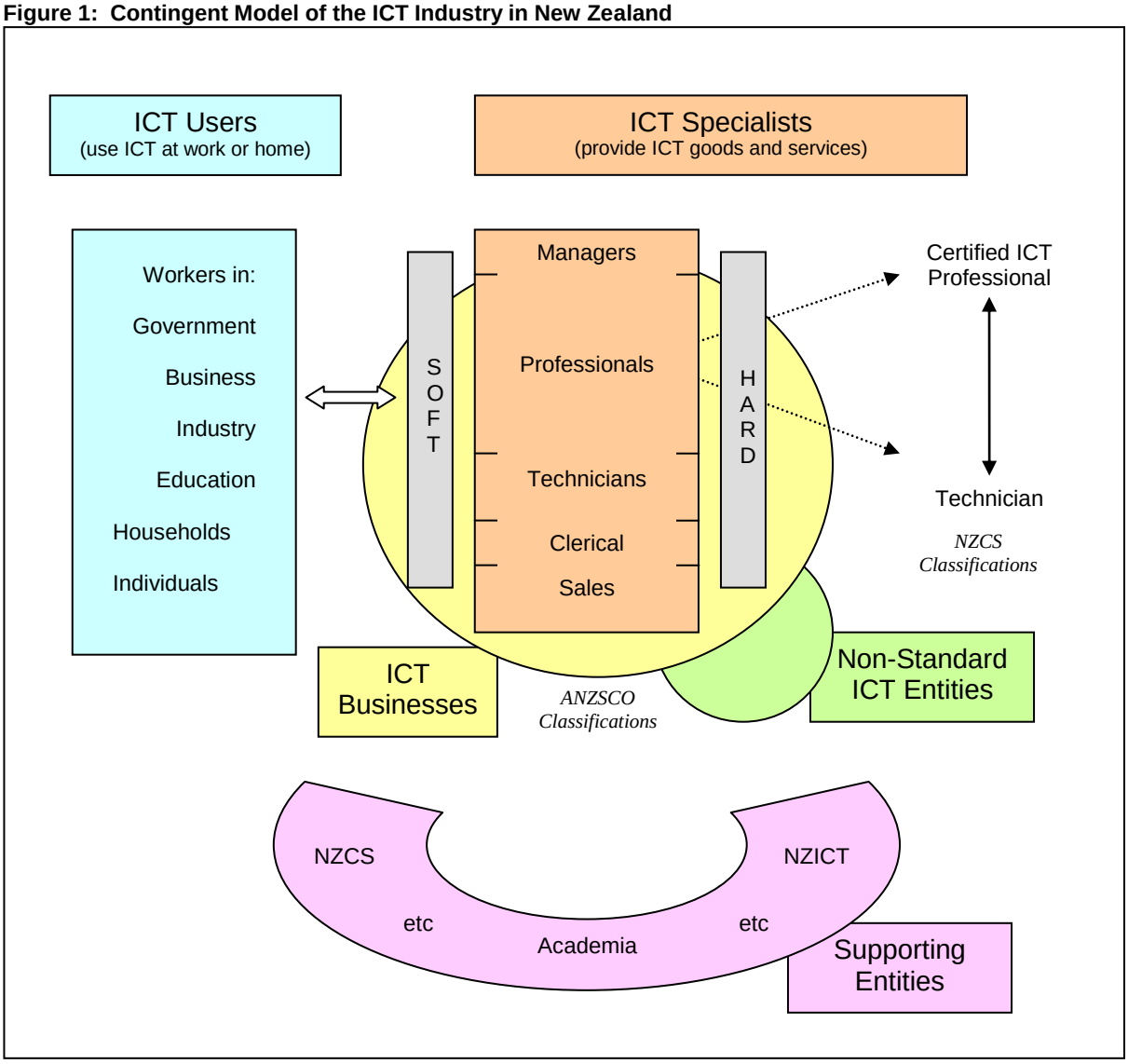
[18] Given that programmers dominate the ICT profession – around one third of all ICT professionals are programmers (Statistics New Zealand 2008a) – the continuing image of computing as a 'hard' discipline is perhaps understandable.

[19] Since most communication with clients and users occurs at the beginning and end of a project, occupations involved at these stages are usually regarded as being 'softer'.

[20] NZSA – New Zealand Software Association; TUANZ – Telecommunications Users Association of New Zealand; NACCQ – National Advisory Committee on Computing Qualifications; CITRENZ – Computing & IT Research and Education New Zealand; ANZTB – Australia New Zealand Testing Board; NZOSS – New Zealand Open Source Society.

thought to apply across all levels of ICT occupations. In addition, some people participate in ICT work as solo-practitioners or in non-standard arrangements which are difficult to quantify. A number of other entities support the industry by providing ICT education, ICT-related research, or by representing the professional and commercial interests of practitioners and businesses. This contingent model of the industry is shown diagrammatically in Figure 1.

Figure 1: Contingent Model of the ICT Industry in New Zealand



Other important information concerning the ICT industry could be overlaid onto Figure 1 to further characterise the sector. For example demographic information such as gender, ethnicity, and age are likely to reveal different and meaningful patterns when superimposed along soft-hard and professional-technical dimensions (in Chapters 5 and 6 I demonstrate that the soft-hard and professional-technical distinctions do indeed align with gender).

2.3 Describing ICT Work in New Zealand

This section provides more details about ICT work in New Zealand, as revealed through my interviews with ICT practitioners and industry leaders. Occasional references to historical events in the ICT industry and to contemporary New Zealand workplace issues are included to provide context.

2.3.1 Career Choice

Although career choice was not a specific focus of my research, my question "Please tell me about how you came to be working in the computer industry" often led to discussion of this issue. Several features of career choice identified by Kerry Inkson (2004, 83-85) were evident in the discourse, including improvisation, discontinuity, and mobility.

Many of my participants joined the ICT industry due to "situational contingencies" (Katz and Martin 1962, 149) which prompted a change from their previous career. Redundancy often triggered the change. For example, Andrea started working on an online documentation project after losing her previous (non-ICT) job and having bills to pay: "I pretty well had to keep paying the mortgage so I had to have a job." Similarly, James shifted into computer work after fortuitously seeing an advertisement at a time when he was having difficulties in his previous career: "It was seeing the ad to start off with." Phyllis also started her computing career on the basis of a timely advertisement:

> I saw an ad in the paper for an aptitude test for programming at Wellington Polytech. I did well and was accepted into the course… didn't know anything about it, it was sheer fluke. I hadn't planned it or anything.

Sharon, who could not easily pursue her original goal of becoming a psychologist while working in a bank, found that "IT was just a natural progression within the bank". For others, a career in ICT resulted from a seemingly "trivial decision" (Caplow 1954, 218); for example Tim, who chose computer science because "it was much easier than chemistry". For this first group of participants, the computer industry was opportunistically appealing; it offered a career change when a previous career had disintegrated or when a different experience was sought. It was sometimes the easiest alternative or the quickest way to earn money. Usually the work 'just happened' to involve computers, and often there was an element of serendipity in the choice.[21]

A second group of participants were drawn by the technology to a career in computing. Despite

[21] Rosemary Crompton (1986, 28) claimed that women's career choices are often more reactive than men's whose choices tend to be more actively planned, but this gender difference was not evident in my data.

Amy Wharton's (2005, 169) observation that childhood preferences rarely indicate adult career choices, it was early infatuation with computers which resulted in IT careers for several individuals. Sam loved programming as a child and later studied computer science at university:

> I've really been a programmer since I was a child… I started with a Vic 20 in 1980… I would have been around 9 or 10. It was a big day when the computer finally arrived. It was this amazing thing, everyone wanted to have a go on it, but within about 6 months it was pretty clear I was going to be the person using it all the time.

Linda's degree in computer science also followed childhood programming experiences:

> I had a little Spectra Video at home…so I had a wee play and did some wee programs but it was very kiddy, you know more like a story, that kind of lead on depending on whether you chose option "yes" the story went this way, or it went that way…
>
> At school I did computer science which was not actually offered in my school. I had to go across to the boys' school which was great fun; there were only two of us girls in the class. And my mum and dad got me to do a couple of aptitude tests which showed I had an aptitude for it, and I loved the subject, so that's what made me choose to go into that at uni.

Kevin was even more hands-on with computers as a child, but his pathway to a computing career was less conventional:

> I've always had an interest in computing from a young age. My first computer was a Commodore 64 when I was about 8 or 9. Initially it was about playing games, then when I was 9 or 10 I started wondering how they're doing this, so I learned a little bit of BASIC. I was interested to learn that you could make games from the command line rather than the normal LOAD *… I then got an Amiga, it had a 40MB hard drive and I upgraded it to 1MB RAM, and it had a basic windows-y system… It was games, and then loading up the OS, and then going into BBSs, bulletin boards. Dialling up into them was interesting because some of them were subscriber based and of course I didn't have any money, so I basically ended up just trying to get into them.

Kevin explained how he later became a hacker, honing his skills by trial and error:

> We [Kevin and his flatmates] got a virus, the computer got wiped, and no-one knew how to fix it. From there it built up, developing the skill set. I learned a lot of different operating systems and we did quite a lot of exploits, sort of naughty things, basically because we didn't have any money… and just upskilled that way.

When he was 20, Kevin was fortunate to be given a casual contract in the IT department of a large organisation, gave up hacking, and is now a very successful systems engineer.

Others in this second group discovered computing much later in life. For example, Emma had no experience with computers as a child, and very little as a young adult. While working for a government department, Emma attended at a short computing course and this triggered her passion:

> I wasn't working in anything to do with IT or the website part of the Ministry but they said did anybody want to do a little two day HTML course. And I said yes I'd like to do it. So there were about 10 of us and we had a book that the instructor gave us and we were each sitting in front of our computer and she was at the front teaching us stuff, and I just picked up this book and ran with it.

After this experience, Emma was committed to a career in computing:

> And so I gave up my full-time sensible, well paid, well, not well paid, but secure job in the Ministry to be a part-time contractor doing web stuff. And within about a week they decided they needed me to contract full-time.

Likewise Pam discovered computers while working as a secretary and being asked to "consider going into the IT department for a year… so purely by chance, and just loved it".

Amongst this second group are some individuals who improvised by turning "hobbies into careers" (Inkson 2004, 85). For example, Ralph started writing programmes initially for fun, but later to support his (non-IT) business: "Then colleagues wanted copies and my hobby grew into work." John originally worked in a different field but shifted into ICT after several years of doing voluntary computing work for his church:

> For about the last 6 years I've been doing it for my church, doing all the computer work. Initially started building a website for them, learnt a lot that way and then started building computers, building servers, set up the whole network there from scratch. So the reason for doing the course was so that I wouldn't make so many mistakes when I'm doing it and to learn how to fix what I've already stuffed up.

An unexpectedly small number of my participants used a "rational" selection process (Pavalko 1971, 45; Crompton 1986, 28) to plan their IT careers. Mandy was one who did. She described her role as "exactly where I wanted to be, which is good", and she had carefully planned it that way:

> I knew at university about business analysis and decided that was what I wanted to do. That's why I took a lot of systems analysis papers. That's why I chose the IS degree that had a combination of commerce and IT because that rounded me out with the business side as well as the technical side rather than going into computer science which would have been 90% technical.

Another feature of many of my participants' careers was mobility. It was very common for participants to have changed jobs often, and to have changed from one specialism to another, often multiple times, i.e. they have followed an "occupational" career pathway in which they focus on perfecting their skills and taking on increasingly responsible positions, often with different employers (Kanter cited in Inkson 2004, 76; Brown cited in Crompton 1986, 30). For example, David, who is in his 40s, has worked in eight different specialist roles during his career, mostly for different organisations. This pattern is typical of the ICT industry which has always included a large proportion of workers who are very mobile (Loseke and Sonquist 1979,

163; Leicht and Fennell 2001, 75). In 1982 for example, 82% of New Zealand IT companies had experienced more than 100% turnover of systems analysts in the previous five years, and 38.5% had experienced over 200% (Jackson 1983, Appendix I, 43). ICT workers continue to be very mobile, and retention of experienced staff is a significant problem for many enterprises (Statistics New Zealand 2007a, 46). Richard Donaldson, President of the NZCS (2005-2007), described the problem:

> They [ICT workers] move around a lot. They're very mobile. You'll see it in any IT organisation, a restructure starts or some little change and everybody starts looking at their options, and next thing you know they're gone. And you've got to get fresh people all over again.

A small number of my participants' careers have been "organisational" rather than occupational (Kanter cited in Inkson 2004, 76; Brown cited in Crompton 1986, 30). For example, Bob left teaching and shifted into a training role which by chance involved computers: "It was training … it was more or less accidental that computers became the major productivity tool." Bob later became a business analyst, a systems analyst, and eventually a project manager, all within the same company and over a lengthy period: "I was the person who was going to work for [ABC Company] until he retired."

A few of my participants had "entrepreneurial" career paths (Brown cited in Crompton 1986, 30) – they have used their skills in self-employed work. One example was Leyton, who appears in the next section.

Career choice is a complex matter deserving of far greater attention than this study provides. For example, the role and nature of qualifications leading to different career planning strategies (and the gendered nature of these) need to be considered (Crompton 1986). However my participants' narratives do indicate that there are many different pathways and motivations leading into the ICT industry. Some people join the industry out of a passion for technology which developed either at a young age or later in life, but a large number join for pragmatic reasons relating to their personal circumstances. These findings are compatible with those of Barbara Crump and Keri Logan (2000, 5-6, 9-10) and Crump, Logan, and Andrea McIlroy (2007, 358).[22]

2.3.2 Settings for ICT Work

Leicht and Fennell (2001, 13) commented that professional work takes place in "increasingly

[22] While Crump, Logan, and McIlroy's findings related to women in ICT, my research found a similar spread of motivations affecting career choice across both genders.

diverse settings" and Abbott (1988, 80) similarly noted a "bewildering variety of [professional] worksites". This study has found that these observations apply to ICT work in New Zealand.

A few of my participants work as solo practitioners and some are employers, but the majority are salaried employees, as are most contemporary professionals (Hall 1968, 94; Hughes 1963, 663; Hall 1975, 82; Abbott 1988, 125; Leicht and Fennell 2001, 11; Larson 1977, xviii). These three modes of working are discussed below.

2.3.2.1 Solo Practitioners – Self Employment

The traditional model of a professional is an autonomous solo practitioner offering services to vulnerable clients (Hall 1975, 82). This model does not fit well with ICT work. While there are undoubtedly some ICT practitioners offering services to the public or small businesses as individual private practitioners (for example hardware repairs), and others undertaking individual entrepreneurial activities, most ICT workers who work individually regard themselves as contractors.

Independent contracting has increased across the high-skilled professions recently (Leicht and Fennell 2001, 73) and has become a feature of the New Zealand labour market since neo-liberal reforms of the 1980s (Spoonley and Davidson 2004, 23-28). New Zealand's ICT industry relies heavily on contractors, although determining accurate numbers of ICT contractors has been difficult. A recent survey initiated by NZICT reported that contractors are used by 76% of ICT companies (Mitchell 2009, 10). An ICT recruitment specialist (personal communication, 2011) confirmed that contractors often constitute a third to a half of the ICT staff in large companies, and that the total number of contractors would be "thousands". Consistent with this estimate, one of my participants in a high-level management role, Pam, stated that her company has "around 100 contractors" compared to "about 200 permanents". Within the Public Service there are 2,009 FTE staff working in ICT professional and technical roles (State Services Commission 2010, 8), and although only 5% of these are currently on fixed term contracts (Jocelyn Vasquez, email to the author, March 17 2011), the government is planning to "clampdown on permanent ICT recruitment in favour of contracting" in order to decrease costs (Watson 2010a).

Leyton is the archetypical contractor. Originally a computer programmer, Leyton later decided he didn't want to be a "keyboard monkey". He knew that documentation supplied with computer systems is often lacking, and so decided to offer his services as a freelance technical writer:

> I hawked my services to IT companies saying I could write your manuals for you… It became quite a good way of making a living. It was 1992 and desktop publishing and laser

> printers had just become popular. I thought I could do this as a home type job and so I bought the hardware. I got a directory of IT companies, and assumed that if they were developing a new system they would need documentation and probably hadn't thought of it. And so I would ring them up and say I'm a technical writer, and they would go, what's that? What do you do? And I would say I write manuals for people. They didn't know what a technical writer was, I barely did myself actually. Probably in most places except the States there wasn't a role called that. I got plenty of work.

Leyton's entrepreneurial approach worked well, and he secured many contracts over a number of years, working mainly from home with considerable independence. Many ICT contractors are able to negotiate similarly flexible arrangements, but some are much more bound to their contracting organisation. Luke explained that his organisation uses contractors extensively, often in arrangements lasting several years:

> There's an awful amount of development work going on … and we can't sustain that amount of work with just permanent staff… It's a relatively short-term thing, maybe two or three years, and then we might not have the same demand… We look to contractors to bring in experience from elsewhere so that we as a permanent group can learn from them. We look to them to bring in expertise that is hard to find, and we don't look for them to stay overly long, so two years would be the absolute maximum.

These contractors must comply with company norms, and their autonomy rests mainly in their capacity to remove themselves at short notice, rather than any autonomy in how and when their work is performed. Bob remarked:

> They [contractors] didn't have any allegiance to the company they were working for… They say I'm a programmer… I work for you temporarily and if you don't pay me enough I'll go somewhere else.

Some contractors perform work for small IT companies on an as-needs basis in more casual arrangements over many years. The contractor has advantages of there often being work available, flexibility, and the possibility of working largely from home, while the company benefits from having a trusted practitioner who will generally work when asked, without demanding ongoing commitment. Kelly is an example. She left her permanent role seven years ago to have children and has been able to combine parenting with contracting for a small documentation and training company, working mainly from home.

The more flexible employment arrangements in New Zealand (for example more self-employment and an increased use of technical consultants who can fulfil "niche-needs") provide convenient flexibility and reduced labour costs for businesses and thus often threaten employee security (Spoonley and Davidson 2004, 23-30), however they do provide agreeable flexibility for some ICT workers such as Kelly and Leyton.

Another recent change in the workplace is the growing importance of "virtual organizations" –

businesses leveraging technologies to form flexible and strategic networking arrangements with each other without geographical constraints (Leicht and Fennell 2001, 3). Since the 1980s this has also become a feature of New Zealand workplaces (Spoonley and Davidson 2004, 25). Some of my participants work in this manner. Although they are solo practitioners, they have close connections with other ICT specialists, so forming small business collectives, or virtual organisations. For example Graham's son Paul has developed a strategic network of specialists:

> He has his own little company, builds websites… He's created a virtual organisation for about 5 or 6 people who all work from their own homes with network connections to equipment at his house and they're building these websites in a business with very low overheads. And so there are new business models. He works in a network of people who are in business of differing sorts and they refer business opportunities to one another. It's like a micro Rotary Club.

Members of the collective determine the norms governing behaviour and how the arrangement will work. They therefore enjoy a high level of autonomy.

The term 'solo practitioner' is not particularly applicable to the ICT industry because most ICT work requires the combined efforts of many specialists. Individuals working as contractors add valuable expertise in arrangements of varying formality but often with little autonomy over the manner in which the work is accomplished. Other individuals are able to negotiate more flexible arrangements which provide greater autonomy, but they seldom work alone.

2.3.2.2 Employers

A few of my participants are employers running successful small businesses of the type which, as was noted earlier, dominate the local ICT industry.[23] Their capacity for creativity and innovation is likely linked to particular characteristics of the New Zealand culture identified by the late historian Michael King (2003, 511): a pioneering attitude, a preparedness to adopt new technologies, and a "No. 8 fencing-wire ability to improvise". Richard Donaldson also noted these attributes:

> The number 8 wire mentality. . . the ability to do something innovative and create a niche market nobody else can get into… We have a reputation for creativity, and from that creativity great things are built.

Standout examples of New Zealand companies that have successfully created niche markets using high levels of creativity and innovation are *Animation Research Limited* (ARL) which in 1991 developed software to deliver real time pictures of America's Cup yacht races to television viewers around the world, and *Sausage Software* which developed a highly successful HTML

[23] As noted, small businesses dominate in number but not by volume of sales.

editor called Hotdog in 1995. A more recent example is *Emendo* which is supplying hospitals in New Zealand, Australia, Britain, and Canada with forecasting and planning software (Pullar-Stecker 2010).

Small ICT businesses face many challenges, and these can lead to early failure or reluctance to expand. Richard Donaldson noted: "There are lots of little entities that you've never heard about… and businesses come and go." Andy explained the difficulties he experienced when setting up his small IT engineering business:

> I always wanted to have my own business… For 3 years I worked on my own, found it very difficult, mainly because I got pushed and pulled in different directions, didn't really know where my business was going and what to specialise in… I was always fighting fires. I didn't have procedures for things, so I was always researching things and trying to keep up with things… I've always been entrepreneurial…doing things on the side; so I thought it would be like that. I didn't realise running a business would be so difficult.

Andy's pitfalls included undercharging for his services, underestimating costs associated with growing the business and employing staff, and later finding it difficult to increase charges with his initial clients. He also struggled with administration, and for several years ran the whole business using Microsoft Excel software. Cash flow was a constant problem, and rapid growth became unsustainable.

Businesses which become very successful are often sold, or their intellectual property is sold, to large offshore corporations. For example, after the success of Hotdog, 40% of Sausage Software was sold to Telstra Australia for $163 million (Bridges and Downs 2000, 92). Richard Donaldson summarised the problem:

> Companies like Sausage Software grow mushroom-like and then get sold off for a huge amount of money to some overseas conglomerate you've never heard of, and so all the equity goes out of the country. The individual does all right. And that seems to be the pattern for so many companies, and there are very few that haven't followed that path. So we build good things here in New Zealand, only to sell them off to somebody else.

Brett O'Riley identified three options for small businesses:

> There are several options. The historical one of trying to sell their services directly. Then there's the partnering option, partnering with bigger players, multi-nationals, because what the multinationals tend to be good at is distribution, and if you're a small company that's what you struggle with. Third option is the cloud, particularly if you're in the software space. We're increasingly seeing 'apps' stores in the cloud, where you can post your application

> and so long as it meets the 'spec' people will start using it. [24]

Some employers choose not to grow their businesses beyond a certain size. Ralph, who has decided this for his own company, attributed such decisions to social stigma associated with wealth and business success:

> New Zealand society has a strong egalitarian bent to it, so while being a prominent sportsman is reason to be thought well of, being a successful businessman is not. It's considered to be somewhat disreputable and certainly not something to boast about. So people get to a point where they've got enough that they can see themselves set up nicely for the rest of their days with everything they could reasonably want, and at that point there's no benefit any longer for them striving any harder.

The failure of successful local ICT companies to expand and remain in New Zealand was a particular concern of the previous (Labour) government which proposed a growth target of 100 ICT companies each achieving over $100 million sales per year by 2012 (ICT Taskforce 2003). This target was widely regarded throughout the industry as nonsensical, and before long was quietly dropped.

Running a small ICT business has the potential for high levels of autonomy and reward, but it also requires vision, commitment, hard work, and risk-taking.

2.3.2.3 Employees

It is often proposed that employed professionals work in three types of work settings. The first two are contrasting types of 'professional organisations': the autonomous professional organisation, in which the professionals set their own norms for work and administrative matters and thus enjoy a high level of autonomy, and the heteronomous professional organisation, in which the professionals have reduced autonomy due to norms being imposed by others outside the profession (Scott 1965, 66-67; Abbott 1988, 125). The third group of employed professionals work in the 'professional department' of a larger organisation, and in this case are often thought to experience even less autonomy (Hall 1975,82). This typology suggests an increasing level of bureaucracy impacting on professional autonomy across the three work settings, but as Richard Hall (1975, 84) pointed out, reality is not so clear-cut and in fact some apparently autonomous professional organisations can be far more bureaucratic than others supposedly far less so. Similarly I found the classifications to be not entirely satisfactory.

[24] Here the 'cloud' refers to the delivery of software applications (apps) to users over the Internet. Users need only a computer and Internet access, and can pay to use applications delivered to them as a service over the Internet; hence the term 'Software as a Service'. The cloud provides small entities with a viable means of distributing their software.

Most of the organisations employing my participants were small or medium sized, but some were large. Several of the organisations were formed over 20 years ago, but many were much newer. This assortment is consistent with the profile of New Zealand's ICT businesses noted earlier. Many of the organisations fit the autonomous professional organisation category, i.e. ICT practitioners decide how the organisation will run. These included a small documentation and training company, a small company which develops scheduling software for transport delivery companies, a small IT engineering and networking company, a medium-sized website development company, and a small software company which develops software for the health sector. Some of the organisations were very large and were structured into several departments; the service department of a large provider of IT services was one example. None of these work settings has externally imposed norms, but this does not mean that the ICT workers within the organisation each have absolute, or equal, autonomy. As will be seen shortly, bureaucratic arrangements are sometimes evident in these organisations.

None of my informants work for organisations fitting the heteronomous typology, and it is unlikely that any ICT work would fit this category in the manner of professions such as nursing or teaching.

Employment within the IT department of a large organisation was the work setting for many of my participants. Examples included a programmer in the IT section of a mortgage company, a systems analyst for the Forest Service, a computer engineer in the IT section of the Railways Department, a systems/projects analyst in the IT section of a large insurance company, and a systems analyst position for the IT team which supports the finance section of a large corporation. As expected, bureaucratic systems were also evident in these workplaces.

Some of the work settings I encountered do not fit tidily with the aforementioned categories, as would be expected given the growth of non-standard employment patterns reported by Paul Spoonley and Carl Davidson (2004, 29). Damian and Sam are an example. These talented software developers have been writing computer programmes since they were friends at school. Damian made a considerable amount of money from a software application he wrote some years ago. Now in a partnership arrangement, Damian and Sam are developing another application which they hope a venture capital firm will eventually buy for several million dollars.[25] Meanwhile they are also working as consultants for a software system which is owned by an

[25] The OECD (2007a) reports that venture capital plays an important role in promoting innovation and entrepreneurship in the computer industry by providing funding for new technology-based firms. Peter Thiel, the venture capitalist who supported the development of Facebook, has previously invested in New Zealand computing companies Xero and Pacific Fibre (Putt 2011, para 7).

American company, but is marketed worldwide from Europe, and is supported and tested out of Australia. Damian and Sam work in their own homes and communicate with each other and with their international colleagues by email or phone, although they meet up once a week to discuss progress. Their work fits Spoonley and Davidson's (2004) non-standard classification in that it serves a niche-market and involves a mix of self-employment, multiple jobs, consulting, entrepreneurship, globalisation, and extensive use of networked technologies. Damian and Sam enjoy considerable flexibility and autonomy, but their work is high risk and involves long and asocial hours.

2.3.3 Specialisation and Teams

Increasing levels of specialisation were a feature of many professions during the 1970s and 1980s; a trend likely motivated primarily by monopoly preservation (Brint 1994, 42). Increased specialisation is also likely linked to increasing technological complexity. The highly complex nature of contemporary computer systems means that ICT work typically requires many specialists working in teams. Teamwork provides a range of skills and experiences:

> Because these teams are typically composed of people in the same profession with different specialities, they are able to bring more knowledge and expertise to bear on a problem than a single individual. (Engel and Hall cited in Hall 1975, 116)

Many different specialists participated in this research, including software developers, technical writers, systems analysts, business analysts, an ICT sales representative, project managers, ICT trainers, a systems engineer, a test analyst, a customer services manager, business consultants, an information architect, IT engineers, usability consultants, a computer support technician, and a few very high level managers.[26] All of these specialists worked in teams at times, and even solo practitioners and contractors seldom worked alone.

Early ICT work was not so specialised and, according to Harry Braverman (1974, 329), had many features of a craft. Programming computers in the 1940s and early 1950s involved physically moving plug boards and control switches (Kraft 1977, 23), and was considered a high level skill that was learned on the job in an apprenticeship model (Braverman 1974, 329). Remnants of craftsmanship continued into the 1970s and early 1980s. For example, in my first position as an 'analyst programmer' in a small software company in the mid-1970s I was required to fulfil many roles, including meeting with clients to determine needs, designing solutions, writing and testing programmes, training users, purchasing and maintaining hardware, performing routine computer housekeeping tasks, and even travelling overseas on a sales

[26] One participant had a data entry role and would therefore be classified as clerical.

mission. My scant exposure to computing at university provided little preparation for this work and I learned mainly on the job.

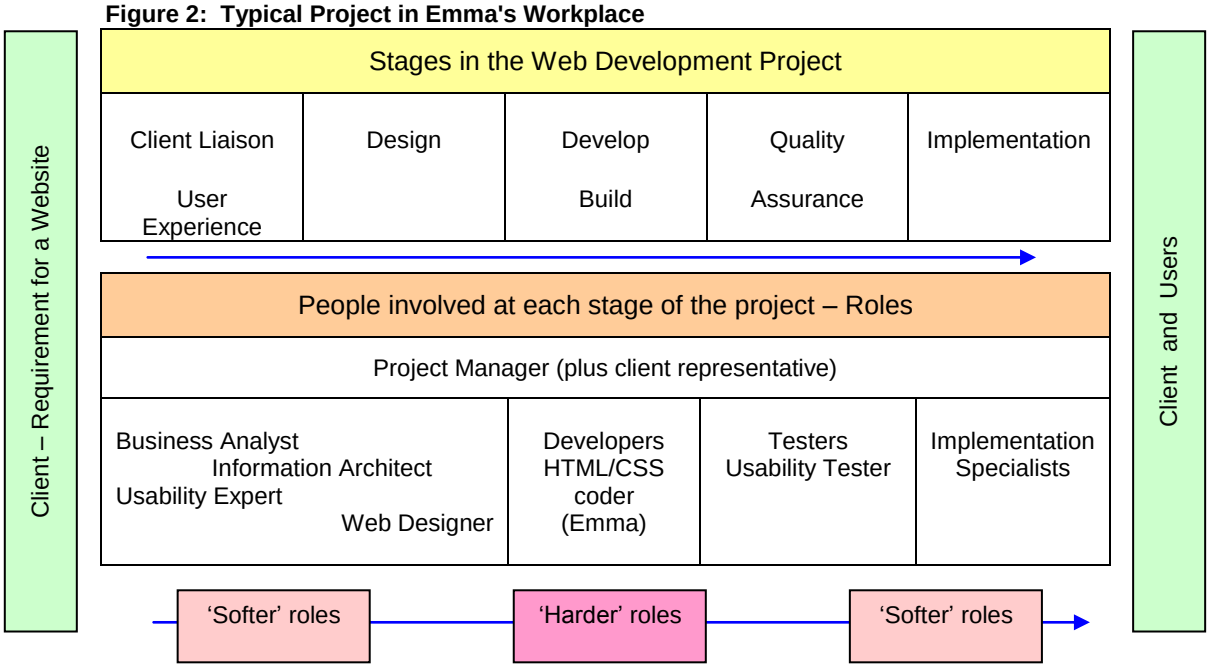
The notion of early computing occupations as crafts has synergy with the concept of a 'cottage industry'. Luke described New Zealand's computer industry in the early 1980s as a cottage industry, much smaller and friendlier than the industry is today:

> It was almost a cottage industry; it was about who you knew… I consider myself very fortunate to have been part of the cottage industry. There was a neat feel about the industry early on. You knew virtually everybody… That feeling will never happen again, because it isn't quite that cottage industry any more.

The cottage industry included mainly people who had no formal qualifications in computing. As Luke said: The cottage industry… How did you learn? Well, I taught myself!

The recent trend to specialisation represents the subdivision of a previously productive speciality – the craft of computing – into a number of "limited operations" (Braverman 1974, 70). Emma had personal experience with this trend. As a contractor web developer during the 1990s Emma was responsible for all aspects of creating a client's website. She needed skills in client liaison, business analysis, information architecture, design, development/coding, project management, testing, and implementation. Here Emma filled a role that Braverman (1974, 109) viewed as typical of both a traditional craftsman and a professional; she was master of all aspects of her speciality. Working in this manner, Emma was also required to span the soft-hard continuum discussed earlier. These days the task of creating websites has been broken down into a range of discrete specialist roles, and Emma is now an employee working as a developer/coder within a team of specialists, under the direction of a project manager who has overall responsibility for the outcome. Figure 2 illustrates the various stages and roles involved in Emma's current projects. Roles are now more distinctly located in the soft-hard continuum.

Figure 2: Typical Project in Emma's Workplace



In some respects working as part of a team is less satisfying for Emma than contracting. She gets frustrated when others, particularly the project manager, are incompetent or make poor decisions which impact on her ability to do a good job:

> The only thing I find frustrating is if I'm provided with a brief by a project manager that is incomplete. Where the project manager doesn't know enough about what they are doing to be able to ask the right questions of the client, and to be able to give me all the information that I need.

As a contractor, Emma had autonomy and did not feel hampered by the inadequacies of others. She also enjoyed immersing herself completely in a project.

> Your job as a contractor is kind of parachute in and hit the ground running. You need to be an absolute expert in whatever you are doing, you need to be able to sit down at a computer, have the project manager talk to you for 5 minutes about what they're doing and what they need you to do and then you need to be able to get on with it by yourself… And from the point of view of being able to focus on one thing at a time, contracting is very good… When you're in the zone you don't want to be pulled out of the zone. That's the real advantage of contracting.

The satisfaction Emma experienced when she was able to remain 'in the zone' was in part due to her feeling of ownership of the complete project. Now she contributes to only one component of the project, and the client is no longer 'her client', somebody who is relying on her from start to finish. The holistic overview of a project has disappeared.

Teamwork varied amongst my participants. Many teams had a very fixed structure with members working in close proximity (e.g. Emma). Some teams were much less formally

constituted (e.g. Paul's small collective), and others extended globally (e.g. Sam and Damian). Contractors brought into projects for defined periods must establish working relationships with existing teams very quickly. Increasingly sophisticated networking and Internet technologies have contributed significantly to the variety of ICT teams seen today. They allow teams to expand their reach, and enable smaller ICT companies and independent contractors to develop new business models to exploit opportunities and decrease costs. Although the ICT industry today is very much larger than it was prior to the mid-1980s, elements of the cottage industry remain. Some individuals operate their businesses from home, and opportunities for innovation by building on hobbyist skills remain.

2.3.4 Bureaucracy

According to Martin Oppenheimer (1973, 213-214) professional work, particularly in the "upper strata of professional-technical employment", is becoming progressively more proletarianised, with a widespread and growing division of labour, and decreasing worker control over the work. Other sociologists have also noted this increased bureaucratisation of the professions, and some have argued that professional work increasingly resembles a factory production line; for example see Mills (1951, 226). Consistent with this observation, many of my participants work under bureaucratic conditions.

Max Weber (1948 (1991), 228; 1978, 957) identified three features of bureaucracies: workers assigned to functionally specialised tasks, a distinctive hierarchy of roles, and a clear separation between the workers' working and private lives. The first of these has already been noted; the second is discussed at length in this section and the third is mentioned briefly.

A hierarchy of roles within the computer industry was first recognised over 30 years ago. In fact the relatively recent division of labour in website development mirrors an earlier fragmentation of programming work. As early computing work was rationalised and put under increasing management control, an escalating division of labour led to a hierarchy of roles; for example programmers became subordinate to systems analysts who took over the design of solutions, leaving the less skilled task of coding to the programmers (Braverman 1974, 330; Kraft 1977, 38). By creating a hierarchy of roles, managers contrived to progressively separate the conception of work from the execution of work, leading to a reduction in the skills of many workers and an associated decrease in costs (Braverman 1974, 330). According to Philip Kraft and Steven Dubnoff (1986, 194) this process continued into the 1980s, by which time software development came to resemble a production process similar to that used in producing "cars and cornflakes". A clear division between higher ranked programmers who made decisions and

wrote specifications but seldom wrote code, and lower ranked coders who wrote code but were almost never involved in decision making, confirmed that the conception-execution separation could occur even within an intellectual occupation such as programming (Kraft and Dubnoff 1986, 192).

Phil was well placed to comment on such labour changes in the industry. He noted that 40 years ago limited computer memory meant that programmes were small and simple. Systems analysts could easily analyse problems and specify detailed solutions for programmers to code, in the hierarchical manner described by Kraft and Dubnoff (1986):

> In the past most computer programmes were relatively small… In the 1960s there was only 4K of memory. But in the 80s with the big COBOL environments we got up to a million lines of code. Writing a large program was not a possibility. When problems are smaller they tend to be much simpler conceptually as well as by necessity…
>
> Because of the nature of the problem, there used to be a relatively strong separation between systems analysis and programming. Although it was called analysis a high proportion of the work was on specifying the solution as distinct from analysing the problem, because the problems were inherently relatively simple - there's no intellectual challenge in what an invoice should look like. So what you were specifying was how this was going to be done. So the specification phase and the coding phase were relatively distinct.

But as computers became more powerful, programmes became much larger and more complex, and this led to a change in the way analysts and programmers worked, resulting in programming becoming a more intellectually demanding and less mechanical task than it was previously:

> These days many of our large apps are in the tens of millions of lines of code. Now, particularly if you are an agile developer, the distinction between analyst and programmer is not so strong. It is common to pass to the programmer specifications that are at the scenario or story level as distinct from something that is extremely detailed. So you are handing someone whose job title might be programmer or software developer the intellectual as well as the mechanical part of the job. [27]

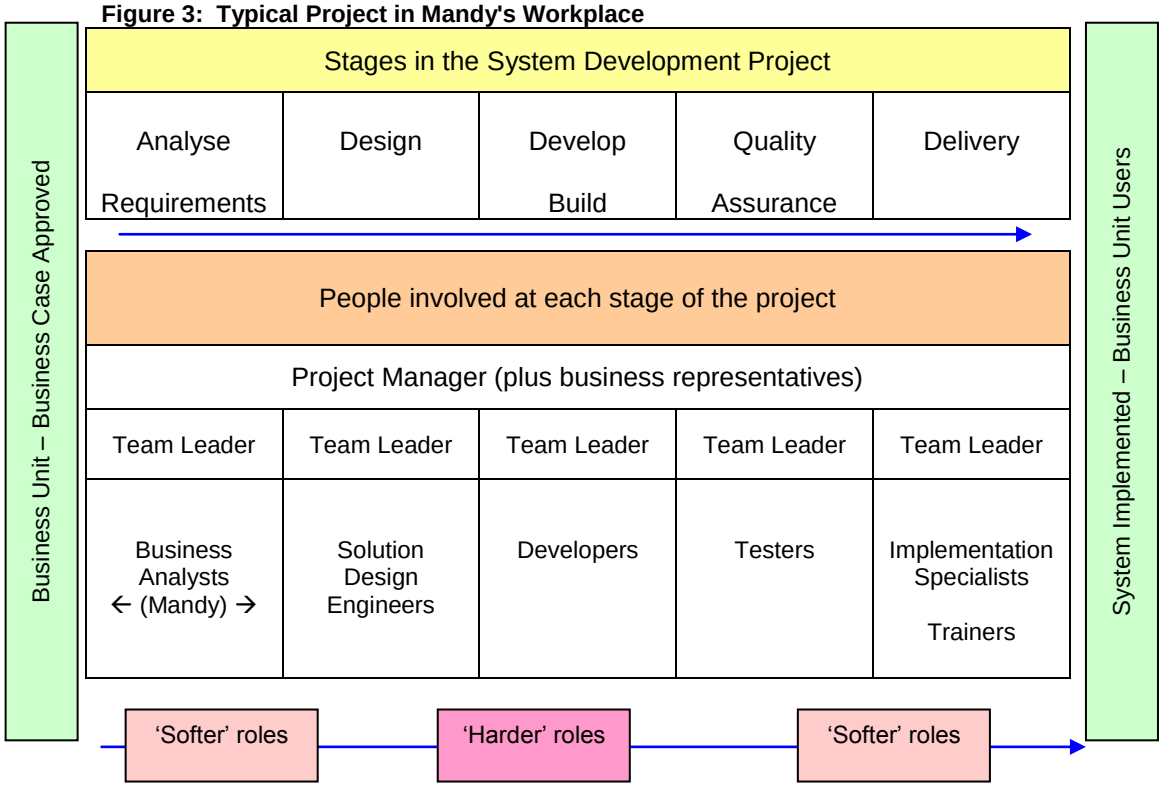
A separation of the conception and execution of work, and an associated hierarchy of roles, can be seen in Emma's workplace (page 28). The conception tasks, the design and functionality of the website, are planned and specified by specialists such as the business analyst, web designer, usability expert, and the information architect. Emma is given these requirements and is responsible for their execution, and although she is responsible for many decisions about how best to do that, she is essentially following a blueprint provided by others. However none of the roles involved in creating websites today can be considered low skill or low cost. Although

[27] "Apps" refers to applications. An "agile developer" is a programmer who uses agile methods to write software; i.e. software is developed in stages in an iterative process, with each stage tested as it is completed, rather than being tested only at the end. Agile development allows for flexibility and is usually conducted in a more collaborative and less hierarchical manner.

Emma now requires a smaller range of skills than previously, her skills are not low level and she is not poorly paid.[28] Nevertheless, hierarchies exist. All team members are subordinate to the Project Manager, and as will be seen later, some roles within the team are considered more significant than others.

Some of my participants are subject to more extensively bureaucratised work settings. Mandy is a business analyst working as a member of one of the large project teams in a big corporation. Each project team consists of specialist sub-teams lead by team leaders, and the entire labour process is tightly controlled by a project manager. Mandy's job is to liaise with people in the organisation's various business units, to understand their needs, to gather their requirements and analyse them so that the technical specialists can develop an IT solution. Mandy's contribution thus comes at the start of a project, immediately after the business case for the project has been approved, and is the first of many stages in the development of a system. A typical project team at Mandy's workplace is shown in Figure 3.

Figure 3: Typical Project in Mandy's Workplace



In this workplace systems are developed using the traditional 'waterfall method', meaning that

[28] Department of Labour (2007) data from the 2006 census showed that the average income for computing professionals was $59,200, a considerably higher figure than the (then) average income of $38,900. The average salary for ICT workers in the Public Service in 2010 was $76,704 (Jocelyn Vasquez, email to the author, 17 March 2011), considerably more than the average salary of $63,655 for all Public Service employees (State Services Commission 2010, 9).

each stage in the project must be signed off before handover to the next. In contrast to agile methodology, this method assumes that all requirements can be defined and articulated in a detailed specification document before development work begins (Townsend 2007, 9). Mandy's job is to prepare the specification document.

A consequence of this rigidly structured approach is that each individual is only involved with their specific task and consequently does not experience the project as a whole. As Oppenheimer (1973, 214) commented, "the gap between what the worker does, and an end product, increases". For Mandy, whose involvement is at the beginning, it is very disappointing to never witness the finished product:

> What I dislike is that in most cases you don't see the finished product, the end result of your work. And that might be for two reasons: One, the project could be scrapped totally once the requirements are gathered because it gets too expensive and it's not feasible, or two, implementation usually takes much much longer and you're simply not around to see the end result. You are usually onto the next project by then.

In this highly bureaucratic environment professional work even more closely resembles the factory production line described by Oppenheimer (1973, 214), Braverman (1974, 330), and Kraft and Dubnoff (1986, 194), albeit without the accompanying reduction in worker skill or cost. In comparison to Emma who may at least view the websites to which she has contributed, Mandy is even more separated from the execution of the work she has conceptualised, and is both physically and temporally remote from the final project deliverables.[29] In this respect Mandy is reduced to "the level of an instrument in the production process" (Braverman 1974, 172) or a mere "single cog in an ever-moving mechanism" (Weber 1948 (1991), 228), a situation to which she seems pragmatically resigned:[30]

> In real life you get projects, and projects are driven by timeframes which are driven by cost so therefore you do your piece of work on a project and there's a very high chance that you get pushed onto another project and therefore you won't have time to liaise with the developers and testers of the previous project.

Features of the Weberian bureaucratic machine are clearly evident in Mandy's workplace. The project team represents a system where individuals are "forged to the community of all the functionaries who are integrated into the mechanism" (Weber 1948 (1991), 228). The project depends on the successful integration of the specialised skills of the individuals. According to

[29] The term 'deliverables' is commonly used in computing work to refer to the items produced at the end of a development project.

[30] Wendy Faulkner (2000, 767) has proposed that software engineers gain a certain status by contributing as "small cog[s]" to large development projects. I did not detect this sentiment amongst my participants. While we may imagine a sense of satisfaction arising from being associated with a grand-scale project, I am arguing that greater satisfaction comes from having ownership of, and completing a project oneself.

Mandy, the organisation believes that having "people with very specific skills, all highly trained and skilled, with ongoing professional development" will deliver a "higher quality project". If there is a shortage of a particular speciality, the project is delayed because other team members cannot fill the gap. There is a clear "chain of command" (Giddens 1989, 287) from the Project Manager who has most authority, to the Team Leaders, and finally the team members. "The mechanism cannot be put into motion or arrested" (Weber 1948 (1991), 228) by Mandy and her colleagues, and they have little real autonomy in their work. They must accept and fit into a rigid structure imposed by others further up the hierarchy.

The third of Weber's characteristics of bureaucracy, a separation of home and working life, is clearly evident in Emma and Mandy's organisations where the workers are never expected to work from home. As we have seen, this is not the case for many other ICT workers who have chosen otherwise, for example Kelly, Leyton, Damian and Sam.

Braverman is sometimes thought to have overstated the proletarianisation argument in relation to white collar work (Giddens 1989, 257). In respect of deskilling in contemporary ICT work, this is largely true. ICT work has not become proletarianised to the extent Oppenheimer (1973) observed happening with many other professions. Nevertheless some of Braverman's and Oppenheimer's other observations about the division of labour hold true in some sections of the ICT industry. For example, the division of labour into specialised tasks results in a situation in which no-one has full comprehension of the whole project, and a distinct hierarchy of roles is evident is some work settings.

2.3.5 Avoiding Bureaucracy

Some of my participants actively seek to avoid bureaucracy. Leyton, the archetypical contractor introduced earlier, is cynical of large, bureaucratically organised computer companies:

> I think a lot of time gets wasted. The small companies doing innovation are good. When they become bigger companies you get more need for process and management… There's a lot of very top heavy companies. There's too many people trying to tell other people what to do and not enough actually getting done. And sort of a very well meaning attempt to plan everything, but getting bogged down in the planning of it. Spending hundreds of hours planning something which comes out with a good looking thing on paper maybe, but actually doesn't get implemented anyway because the programmers don't do it, or because it was flawed.

Leyton explained that he likes "doing [his] own thing" and doesn't like "being told what to do". When psychometric tests showed that his "two strong drivers are autonomy and creativity", Leyton decided he was "unsuitable for a corporate job" and so devised his plan to avoid the bureaucratic quagmire.

Julia is relieved to be no longer working in a large company and now enjoys living in a rural environment. She can often work at home and is not restricted to normal office hours:

> I'm independent, so working on my own, and NOT [loudly] working in corporate IT gives me huge satisfaction. At a very practical level, I don't enjoy commuting. I prefer to live here out of the city, and not having to work 9 to 5 in a corporate environment is hugely refreshing.

Working from home as part of a global arrangement has both positive and negative aspects for Sam. He likes being away from tensions he experienced previously in the workplace which he found to be "brutally confrontational" at times. Now there is little separation between Sam's home and work life, and he seamlessly switches from 'playing' on his computer to 'working' on his computer at almost any hour of any day. His work schedule is very flexible:

> It [work] is definitely much more pervasive into my life than it was before I was working at home. Because it's always there I can always work. I can just nip out and see stuff, and I do. There's a lot of projects where there's things going on that you just want to check on constantly, but I try and stick to working hours. It's one of the things I forced on myself quite early on that I must get up in the morning, it's tempting when you work at home not to get up, sleep in a bit… And not work in the weekends because that's extremely tempting too. I mean I have worked on the weekend a heck of a lot but the general rule is that I won't. I want that to be the default position, I don't want people's assumptions about what I will do.

> [AH: So often it will be a 40 hour week?] Yes, but if the pressure's on it will be 60 hours easily. I'll work through the night or whatever to meet the deadline. [AH: So big peaks and troughs?] Yes, and it's hard to evaluate the hours when they slip into your home time anyway. Exactly how many hours were you working on something if at 5 o'clock in the evening mentally you'd knocked off work and you were sitting there reading the paper online or playing a computer game but every 5 minutes you checked on something that had to do with work. It's a blurry line and then 25 minutes later somebody calls you up and you're stuck on a phone call with them for half an hour. [AH: Do the different time zones mean you're always available?] Absolutely, I regularly get pinged at 2am in the morning if I'm up at that time by people in Germany who say oh, you're there, can I ask you about this?

Sam has had to set boundaries on his availability and personal work schedule in order to find an acceptable balance between work-time and private/family-time.

Ever since Ralph started his software company many years ago, he has limited his working hours:

> I've never been that busy, always believed in the 80-20 rule, I decided in my 20s to cut back even if it cost money. Become more efficient and work 4 days a week.

Ralph has achieved a comfortable lifestyle within a shortened working week, and has never been in a subordinate position.

Thus, while some ICT practitioners are tightly constrained within bureaucratic work environments, others are working with far more autonomy.

2.3.6 People-Focus and Technical-Focus

Figures 1, 2 and 3 identified a spectrum of ICT occupations ranging from 'soft' to 'hard', or 'people-focussed' to 'technical-focussed'. This notion featured prominently in my research.

At a recent 'Evening with Industry' event for computing students sponsored by the NZCS, Chris South, an ICT recruitment professional, urged students to decide if they "like working with people or prefer to focus on technology".[31] Several other speakers emphasised the importance of being a "people-person" and pointed out that there are now few "back room" jobs in ICT. These comments allude to the two ideal types mentioned earlier: the 'technical-people', technically oriented, more inward looking, individuals who fit closely with the notion of the 'hard core' of computing, and the 'people-people', less-technically oriented individuals who are generally more outwardly focused and correspond more with the 'soft' side of computing. Bo Dahlbom and Lars Mathiassen's (1997, 500) concept of an "engineer" focussed on building artefacts, and a "facilitator" focussed on helping people, and Faulkner's (2007, 331) distinction between "technicist" and "heterogeneous" engineers correspond to these ideal types.

Despite industry claims otherwise, ICT work has often been associated with the 'back room' and a range of uncomplimentary cultures, including a "hacker culture" (Turkle 2005, 279-280), an "arid culture" (Stoll 1995, 12), an "isolationist culture" (Matheson and Strickland 1986, 16), an "inward looking culture" (Holmes 2006, 151), a culture of "self-oriented peer professionalism" (Danziger 1979, 215), and a 'geeky culture' (Beardon 1985, 108; Hendery 2006).[32] These unfavourable representations of the culture of computing associate ICT work with technical wizardry and self-absorbed individuals who are blind to the needs of their clients. The possibility of ICT work being creative, fun, and socially aware is rarely recognised.

Some of the ICT workers I interviewed fitted the 'technical-person' typology, but a far greater number more closely matched the 'people-person' profile. The 'technical-people' were typically programmers. They were often individuals who had retained a passion for programming over many years, even though they may now be in different roles. Ralph, for example, remains fascinated with programming after 40 years:

> Anything's possible inside a computer; it's like an artist with a blank screen. You can make the computer do absolutely anything that you can imagine you want it to do. It's the creative nature of it, that there are no limits at all to what's possible. And I would suspect that the

[31] This event, held at the University of Auckland on 29th September 2010, aimed to help computing students prepare for careers in the ICT industry.

[32] A further, profoundly masculinised culture has also been identified by some scholars, and is discussed in Chapter 5.

> applications that are now available are probably no more than 5% or 10% of the applications that are possible. I think we are at the stage that cars were with the Model T, we're just scratching the surface and the big jumps are still to come in IT. To take it further, it's like the industrial revolution; we're at the stage perhaps of the early locomotives, the early trains…
>
> They [programmers] are intense and they're focussed and they aren't thinking about anything else. I mean they find the computer so fascinating that they could spend forever in there, and I still find that.

Ralph can be so engrossed in programming that the rest of the world ceases to exist; he enters another world.

Previously I (Hunter 2007) noted the dangers of regarding computer technologies as tools, especially if the tools are regarded as ends in themselves. To refer to 'tools' (or 'artefacts') suggests that these are neutral devices and eliminates contemplation of associated human issues (Hunter 2007, 1). These risks are more likely to surface amongst 'technical-people'. When I asked Phil what he enjoyed most about working in IT, he responded at great length about the intellectual challenge computing provides, without any mention of people who might benefit from his skills:

> I think the highlights are successful jobs. I did the computation, guided by an engineer, so I did the frame analysis, including dynamic frame analysis, of buildings… Those things are interesting because there's that engineering component where the things you are doing are actually visible, and you can relate to them in visual and graphical and structural terms. I think that gives a lot of satisfaction, particularly for people who have an engineering bent. A result of that is a strong orientation that knowledge is based on models and you have conceptual ideas about how things work, and those concepts are really how one thinks and how one goes through a phase of inductive thinking where you have a lot of cases and you then see that there are patterns, and you recognise a pattern, and then from a pattern you then deductively deduce the solution to a specific problem… One of the problems we have in our education system is that we tend to teach kids to deduce, but to believe the laws or the rules, whereas in the end, certainly for science, the key issue is inductively to deduce the rules, or quote laws. I think that when we get to things like business process management you're getting into this idea of conceptualising the pattern of what people are supposed to be doing, modelling… [much abridged].

Faulkner (2001, 89) has argued that programming allows programmers to "retreat from emotional complexity" and provides them with a "refuge from human relationships and emotional confusion". For my most technically oriented participants, who typically identified 'other people' as being their main challenge, computers and programming provide a safe haven. For example, Phil finds it difficult to cope with bullying and with others' inadequacies:

> I think the challenge in personal terms is dealing with people who don't think very well and perhaps have a domineering or bully component to them. So basically being in a situation where someone is actually saying to you to do something and what they are asking you to do ranges from stupid right through to just not thought through enough, and what they are asking you to do has inherent flaws in it that can't be worked around.

Sam's preference for working from home where he is shielded from the "constant fighting" which he suspects "could just be innate in the business itself" was noted earlier (page 34). And although Ralph now runs a successful software company, his narrative suggests that programming allows him an escape from 'people problems':

> In there [indicating computer] you've got a whole world which is perfect from the angle that you don't have people causing you problems.

In comparison, many of my participants more closely resembled 'people-people'. Most striking was Julia who works as a freelance usability consultant and believes that the ICT industry too frequently ignores the human factors in computing. In her previous role of computer support manager for a large company, Julia noticed that people's needs were often not considered adequately:

> I started thinking about how we roll out applications to people, and what issues people face at a higher level than just "I can't get my printer to work". And it became increasingly apparent to me that something was really broken in the way that we think about technology and how people use it, and how we develop websites and applications and how we introduce these to people.

> I thought, blow, I'll just go out on my own. I'd sort of uncovered this area called usability and I could sense that my background helped somehow with my understanding of people and technology, so it all sort of came together in a way. I could sense there was this sort of opportunity wave crest thing happening and I thought maybe I could have a go at setting my own usability consultancy up and it seems to have paid off. [AH: So this gap you noticed between people and technology, has it got better?] There's some awareness, obviously, but fundamentally and I'm quite extreme in this regard, I think not. I think there are still huge things we need to fix to get around this problem that developing technology isn't a technology problem, it's a social, human problem. And we need to attack it from that end rather than going "Ooh, this is cool technology, let's run away and play with it". There are all these dimensions that are not being accounted for.

The idea that system development should include design principles for usability originated in the 1970s but is still not widely implemented (Barnum 2002, 4), as Julia has observed.[33]

Andrea explained the difference between 'technical-people' and 'people-people':

> I think that IT people are often very focussed on how to make it work whereas we [technical writers and usability consultants] are focussed on how can we make it easy for the users to know what they're doing. So lots of software has a user interface that mimics what our real life model is rather than what the IT model is, but there are still quite a lot of software products that model what the computer is actually doing, so as a user you look at it and you've got no idea what it's doing at all.

Andrea finds that software developers are sometimes more concerned with the logic of their

[33] Julia's role is to promote a user-centred design approach to system development. Her work involves ensuring that websites are pleasing to view, easy and intuitive to use, clear and concise, not overly complex, and accessible to all people (e.g. elderly, people with poor vision or language skills).

programme than its user-friendliness, and gave an example:

> You know, if you press the Client button you would expect a screen to come up saying Client; you wouldn't expect Debtor to come up for example… It's that sort of thing, so it models the real life experience rather than what the computer is doing.

Here a user is likely to be confused by an apparent inconsistency, but from the developer's point of view a client is a debtor and the programme is working well. Another example of mismatch between programme design and user expectation occurs in my own workplace. The institute's student management system prints lists of students in courses, showing their ID number, name, email address, and various status codes for each student. Codes such as *ENR=enrolled*, *PAID=paid*, and *NOT PAID=not paid* are easily understood, but others such as *INT=student has withdrawn* cause confusion (many lecturers assume that *INT= international student).* Poor design arises when 'technical-people' develop systems without input from 'people-people'.

Similar findings of 'technical' and 'people' identities associated with ICT work have resulted in calls for an increased focus on the social dimensions of computing (Klawe and Shneiderman 2005, 28). Likewise Dahlbom and Mathiassen (1997, 507) have called for a shift from mechanistic thinking toward a "romantic use perspective" in ICT education. Further discussion of these findings and their link to the notion of gender dualisms continues in Chapter 5.

2.3.7 Communication Challenges

A consequence of the different orientations amongst ICT workers is poor communication, one of the most serious challenges confronting the ICT industry (Dahlbom and Mathiassen 1997; Klawe 2001; Kavur 2010). ICT workers must maintain relationships with a large number of stakeholders, including clients, users, employers, managers, employees, colleagues, suppliers/vendors, and professional organisations. They are typically involved in many activities which require extensive communication capability, for example: determining and articulating requirements, defining problems, questioning and listening, giving directions to others, negotiating and stating outcomes, presenting plans, stating limitations and evaluation criteria, explaining processes and jargon, and interpreting business processes. Interactions often occur at an interpersonal level, but excellent written and presentation skills are also required. Poor communication leads to misunderstandings and frustration, and is one of the major contributing factors leading to an unacceptably high failure rate of software projects (Gotterbarn and Rogerson 2005; Neumann 1995; Holmes 2006; Gauld and Goldfinch 2006; Denning 2004).

Poor communication between ICT specialists was the most common problematic issue identified by my research participants in response to my question "what is the most challenging

aspect of your work?" Most communication difficulties surfaced between people in highly technical roles and colleagues whose roles are not highly technical. Leyton explained the dilemma. As a technical writer, Leyton benefited from having previous programming experience, but many technical writers do not have such a strong technical background:

> I think that they [technical writers] struggle to get credibility with engineers, and programmers or developers if they can't do it themselves. These people tend to be very, what's the word, impatient. The point of a technical writer in a way is to save the developer time and to write it better than they can. [AH: So impatience creeps in?] Yes, if you can't understand what they're talking about in the first ask. They scribble some things down on a piece of paper and if you have to keep asking what it is. . . They don't want to have to educate you about the whole thing.

Here we see a technical writer struggling to establish credibility with an impatient developer whose hurried jottings are not understood.

Writing documentation suitable for the intended audience, usually the end-user, is the technical writer's speciality. Andrea explained that some companies underestimate the skills involved and avoid employing technical writers, expecting their programmers to produce it instead:

> They say their programmers do it, and I say but do they like doing it? And they say well that doesn't matter; and I say but I'll be good at it, but they don't know what good is.

Leyton and Andrea describe a situation where technical writers and developers do not have a good appreciation of each other's work. Neither can fully comprehend the skills and performance expectations of the other, leading to poor communication.

In her systems analysis role Lyn doesn't always understand 'programmer-speak' and copes by insisting on explanations she can comprehend.

> [AH: What's it like dealing with the technical people?] Sometimes it's hard because sometimes they assume I know more than I actually do and they will explain things to me in a language I don't understand. So I always make sure they understand that I'm not IT and so they need to talk to me in a way that I understand… So I'm not backward in coming forward and saying please don't talk like that because I can't understand it. And they do, technical people do that, programmers, everywhere you work they talk in another language.

Miscomprehension between 'people-people' and 'technical-people' creates a communication gap which is difficult to bridge, but as I found, some individuals have excellent 'gap-filling' skills. Gap-fillers are more formally referred to as "boundary spanners" (Eunson 2008, 567). Although boundary spanners are often people who act as an interface between an organisation and external stakeholders, boundary spanners may also facilitate communication between different sections within an organisation (Eunson 2008, 568; Manev and Stevenson 2001, 198; Tushman and Scanlan 1981, 84). My gap-fillers fulfilled the latter role. Faulkner (2007, 340)

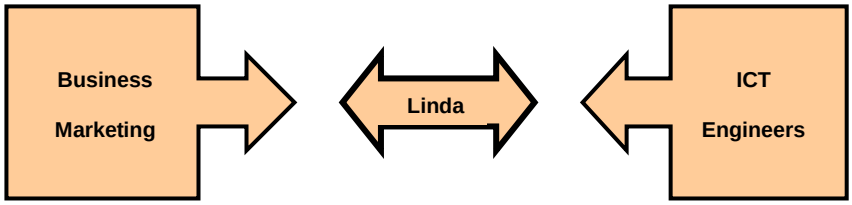
similarly identified a number of "boundary spanners" amongst the engineers she studied.

Linda, a qualified IT engineer, gave a detailed description of the communication difficulties in her workplace and how she came to be a gap-filler in her previous role:

> I came into an IT engineering role doing networking, routing, switching… I was brought in as a consultant to help with certain problems they were having… and they found I tended to bridge the engineering and business gaps that they were having, and my role always ended up being this gap filler. Somebody who could understand the engineering speak and understand the business speak, and as I said, there was a big gap. The marketing people were shouting that stuff wasn't happening as it should be, but they weren't able to articulate what they wanted, and the engineering people were busy building things they thought the marketing people wanted but it wasn't, and so my role came to be the intermediary, and they used to call it literally the 'glue in the gap filler'.

The marketing personnel and the ICT engineers each had their own language and could not understand each other until Linda translated for them. Before Linda's involvement as a gap-filler, miscommunication sometimes led to the engineers building unsuitable products. Figure 4 illustrates Linda's gap-filling role.

Figure 4: Linda's Gap Filling Role



Linda's new role has a marketing component and she has had to learn a language which was initially foreign to her. She also found that sales and marketing people are very different to engineers in their approach to problem solving:

> When I say engineer I'm talking about someone who thinks in terms of plans, project management, design, building things according to plan, and a very structured way of thinking and looking at a whole end-to-end business and process, whereas I find the opposite of that is the sales and marketing people who are fantastic with people skills and talking and they can sell anything to anybody. They put it in such wonderful flowery terms; it's quite subjective as opposed to the objectivity you get from an engineer. And I find they don't have the same structured way of thinking.

From Linda's perspective the sales and marketing people express themselves in a very unstructured and imprecise manner, and do not articulate their needs clearly:

> So when there's a problem they jump up and down and they want it sorted but they don't actually have the brain cycle, they have a very different brain pattern and they don't think to say, look I want it sorted, the issues are here and here and here, and if you want to sort it maybe these are some of the things that could be considered… They just seem to say, it's got to be sorted and then they get upset 3 months later when it's not sorted because they

didn't articulate the problem properly and what they were really looking for as an outcome.

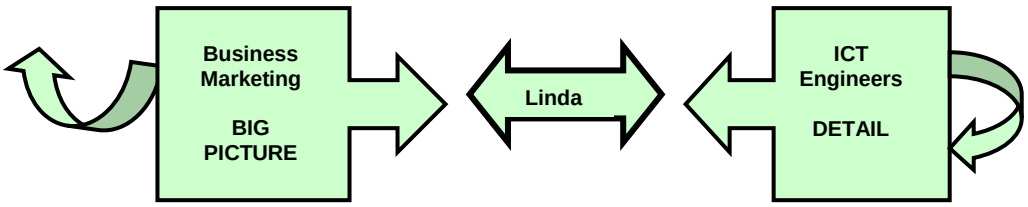
The end result is frustration for both parties, wasted resources, and the original problem still not solved.

Being a gap-filler is not an easy role. When Linda changed to her new position, the replacement gap-fillers were not satisfactory and could not bridge the gap successfully:

> Now I've moved into this new role… so they pulled in two extra people to do my previous role and I don't see them doing it, they're not capable, they're just professional meeting attenders, because they're not actually able to take what people are saying and articulate and say, now look, this is where you need to go. And it's quite key because the engineering people talk all this detail bumpf and the business doesn't want to know that, they want to know what's the business impact, what's the bottom line to the revenue, and are the customers going to walk out? And they don't understand what those guys are saying… I think it's a very hard role to find people to fit.

Linda's explanation portrays ICT engineers as inward looking, focussed on detail, and unable to understand how their contribution fits with business goals; whereas marketing people are depicted as outward looking, focussed on business outcomes, and unable to provide the level of detail the engineers require. Figure 5 illustrates this difference.

Figure 5: Linda Gap Fills for Outward-looking Marketers and Inward-looking Engineers



A successful gap-filler needs to be able to understand both orientations and speak the language of both.

Several other individuals I interviewed had gap-filling roles. Kelly referred to being able to 'talk the talk':

> I was doing some support, documentation, training, liaison with the software developers in Australia. They liked my background because I had been both a user and a programmer, which meant I could talk the talk. I could understand where the developers were coming from, and where the users were coming from, and put the two together and talk to both people.

Anna, who has a degree in programming but is now a systems analyst, described herself as the 'go-between' person in her team:

> I moved into systems analysis as the go-between our business team and our IT team. I know all about the front-end stuff and then we have the IT people who do all the back-end stuff, so I just kind of go between the contracts people this end… and then get the IT people to deal with the data that's coming in… I know the front-end of the system so I can say well that's not going to work and then I can talk to the people in the IT team and I know what to tell them. [34]

Anna has sufficient technical knowledge to communicate the needs of the 'front-end' to the IT people who are responsible for the 'back-end', and she knows whether requests are viable or not.

Bob described his gap-filling role as being a 'hole in the donut':

> We had to deal with technical people, contractors, sort of the donut pattern. I was the hole in the middle. I was the person who knew the business and enough technical stuff to be able to relate to the contractors who actually did the work.

Bob had extensive knowledge of the business and sufficient technical understanding to bridge the communication gap between the IT contractors and the business.

Although Lyn experiences her own communication difficulties when interacting with programmers, her previous experience as a nurse means she is able to bridge the communication gap between health professionals and IT staff:

> I often describe my role as the user interface, because I'm often interpreting clinical things to technical staff, and technical things to clinical people. So I call myself the user interface, the one that can speak and answer and be nice to people, you know, be the one that cares. Puts a friendly face on technology!

Kelly, Linda, Anna, Bob, and Lyn are accomplished gap-fillers, but despite their significant contribution to successful outcomes, their positions may be risky, particularly if they are women, as is the case for four of my five gap-fillers. This issue is associated with the gendered nature of ICT work and is pursued further in Chapter 5.

2.4 Chapter Summary

The ICT industry may have "grown out of mathematics and engineering departments" (Dahlbom and Mathiassen 1997, 517), but it now comprises a heterogeneous group of businesses, occupations, and people, and encompasses an eclectic mix of ideas and motivations. Government statistics provide a profile of the industry which, while quantifying entities and activities as much as possible, is necessarily incomplete and devoid of detail. This chapter has

[34] The 'front-end' is the part of the system the users interact with; the 'back-end' is the part of the system hidden from the user.

attempted to capture the essence of contemporary ICT work in New Zealand. It corroborates the NZCS President's observation that the ICT industry is difficult to pin down, and hence we may suspect that professionalisation will be difficult to achieve. The chapter has provided a backdrop for full discussion and analysis of the NZCS and its professionalisation project which begins in the next chapter.

Chapter 3 – Professional Claims

"It may have taken us 50 years, but we now have the same sort of professional certification, competency framework and accountability as almost all other professions…" (Matthews 2010a)

3.1 Chapter Overview

In 2010 the *New Zealand Computer Society* (NZCS) commemorated its 50th Anniversary. While celebration was appropriate, it was also a suitable time to reflect on the progress NZCS has achieved towards an ICT profession in New Zealand. This chapter traces that progress over the period 1960 to 2010, drawing on archival documents, the recorded oral histories of some 'pioneers of computing',[35] and my research interviews with members of the NZCS and practitioners in the ICT industry.

In the first sections I present a chronological account of the professional claims articulated by the NZCS over the five decade period. These claims are based on a trait-based notion of professions. In the latter sections I analyse these claims and show that they can be reduced to two main arguments. I find Parkin's (1979) concept of dual closure useful when weighing up claims relating to ICT skills shortages. In considering claims about professional trustworthiness I draw on a wide range of works, and also briefly explain two other industries in New Zealand in which regulation has failed to ensure trustworthiness.

I begin the chapter with a personal narrative which contrasts the culture of the NZCS with that of another computing association, the UPANZ (the *Usability Professionals Association New Zealand*).[36] It also introduces the vision of professionalism underpinning the NZCS's professionalisation project. The narrative lays the foundation for my later arguments that lack of unity amongst ICT practitioners and within the NZCS will impede professionalisation and that the professionalisation project represents an agenda of social closure from which women are largely excluded.

[35] These oral history recordings are held in the NZCS Silver Jubilee Oral History collection in the Alexander Turnbull Library, Wellington. They consist of a series of taped interviews which record the recollections of 12 prominent people involved in the introduction of computers into New Zealand during the 1960s.

[36] UPANZ is a local chapter of the international Usability Professionals Association (UPA). There are cluster groups in Auckland, Wellington, and Christchurch, and the organisation has around 50 members and about 200 interested people on a mailing list (Justine Sanderson, email to the author, 1 April 2008). Most members work in the ICT industry; many are involved with the design and development of websites. The UPANZ mission is: "To provide a forum for discussion and sharing of ideas so to ultimately ensure NZ products are designed with customer/user needs in mind, and so that practitioners are able to use the latest advancements in the fields of user-centred design, interaction design, and usability engineering" (UPANZ n.d.). UPANZ is now (2010) called the Technical Communicators Association of New Zealand (TCANZ).

3.2 Personal Vignette: The Story of Two Meetings

3.2.1 The First Meeting - UPANZ

The February 26th 2008 meeting of the Auckland Chapter of UPANZ had a relaxed atmosphere. Committee members, men and women, rushed to place nibbles (bread, cheeses, hummus, salami, fruit) on hastily arranged tables. *It's not just women in the kitchen.* Bottles of wine and fruit juice were plonked unceremoniously next to a pile of glasses on a handy shelf (see Figure 6). We were in the premises of a city business which allows UPANZ complimentary use of its conference room for monthly meetings. Others arrived, paid $10 at the door, and helped themselves to refreshments. *Good, no fuss.* Small groups formed. *I don't know anybody; they look friendly though.* Several members introduced themselves. I spoke to the woman in charge and asked about UPANZ. "Would you like to be added to the mailing list?"

Figure 6: Venue for the UPANZ Meeting

Photographs taken by A Hunter February 26, 2008.

Approximately fifty people arrived. *This meeting is much bigger than I expected.* We were a very mixed group; about equal numbers of men and women, ages ranging from around 20 to 60 plus. *That is surprising too.* One group looked particularly young. *Must be students. Great to see them getting involved.* Everybody else looked comfortably employed. Most were casually dressed; several in jeans and running shoes, one older man had on shorts and sandals, and a couple of men wore suits. *No particular dress code.* But in one respect we were distinctly similar. *We're all white! Wait a minute - those two look like they might come from India, and is that person Chinese?*

The branch chairperson welcomed us. "Is there anybody new here tonight?" A few people responded and were greeted pleasantly. *Nice lady – genuinely warm, articulate, efficient.* A quick round-up of events and matters of interest followed. The meeting began. Three usability professionals spoke on the topic 'Designing for multicultural and multilingual audiences'. We heard about the issues they faced when translating and localising their ICT products for multiple

global audiences. What languages must be provided? How many? Who translates? Should national flags be used to indicate language? How is the French flag received in Canada? The Chinese flag in Taiwan? *So many details to consider.* We learned that translation is not the same as localisation.[37] Best usability practice means planning for localisation right from the start. *I wonder how often this happens?*

The audience peppered the speakers with questions. Soon there were so many questions that the PowerPoint slides were abandoned. *They're all so passionate about usability.* Everybody had something to say, and we heard some personal anecdotes. One person told us about his blunder in creating a black-coloured website for a Japanese client. In New Zealand black is often associated with heroic sporting endeavours, but in Japanese culture black has negative connotations, and his website was not well received. The talks continued, often with technical jargon: UTF8, Unicode, Shift-JIS, single byte and double byte characters. Nibbles and wine were passed along the rows. We ran out of time. Everybody felt we needed to hear more, so next month's meeting would continue the theme. I left, feeling I would probably return. *Friendly people, easy going, and so enthusiastic.* [38]

3.2.2 The Second Meeting - NZCS

The February 27th 2008 meeting of the Auckland Branch of the NZCS was held in the elegant premises of the Auckland Club. I was greeted by an immaculately attired receptionist sitting behind a marble-topped desk and directed up the plush-carpeted stairs to the President's Room. This room had an atmosphere of subdued old-world charm; gilded chairs and chandeliers added a touch of sophistication (see Figure 7). *Looks like a 19th century London gentleman's club.* A perfectly groomed waitress circulated with trays of tiny pastries, miniature kebabs, and fiddly club sandwiches. At the bar a bow-tied young barman served wine or juice. *I feel a bit awkward in these pretentious surroundings.* I recalled some faces, but couldn't remember names. *It's my own fault; I should attend these gatherings more often.* "Hello Alison." Someone recognised me and introduced me to Don. *Who's Don?* Don was the newly elected President of the NZCS. I mentioned the UPANZ meeting of the previous night. "That was a meeting of technicians", Don explained. "This meeting is about professionalism. Professionalism is something else, a higher layer", he informed me, demonstrating a layered hierarchy with his hands. *This sounds a bit like a put-down. Would the UPANZ people agree with Don?*

[37] Translation refers only to changing the language; localisation considers the total user experience.
[38] I later learned that 27 people attended the next meeting.

Figure 7: Facilities at the Auckland Club

Accessed from http://www.aucklandclub.co.nz/club_facilities.html March 19, 2008

People trickled in, twenty in total by the time the meeting started. *Why are there so few of us? They must have predicted this though; it's such a tiny room.* Sixteen men and four women. *Exactly as I remember from the 1980s.* We all looked uncannily alike. *White middle class, mainly over 50.* One man joked about grey hair in the room. Everyone was formally dressed; most men wore suits. *This is a club for older rich white people.*

The topic for the meeting was 'Where to from here? The President's Vision for the Future'. Don was here to inspire the Auckland members; they needed a shake up. The meeting began badly. Despite otherwise fastidious planning at the Auckland Club, no-one had thought about computer projection facilities. *A peculiar omission for an IT organisation.* The President could not use his PowerPoint slides, but he was not fazed; he had plenty of enthusiasm for his topic – ICT professionalism. Don began by reminding us how important it is for the public to be able to trust computing professionals. "When you're in hospital having X-ray treatment for cancer, you need to know who certified the software." *OK, fair enough.* We listened politely and quietly at first. It seemed reasonable that "things get done in a professional way" and that "our kids are kept safe online". It sounded enticing too that "our code of ethics underpins our professionalism" and that "we need to be a professional society of professionals". *Not sure exactly what that means, but it sounds impressive.*

But then, without warning, a challenge came: "We've had a code of ethics for years", one man said, "but has the society ever thrown anyone out?" Suddenly the mood of the meeting changed. Now it became clear that the silent agreement I had assumed was in fact weary disbelief. *These people have heard the same story before and they've given up believing that anything will ever change.* The President seemed unsure, but finally someone helped him out. "No, no-one has ever been expelled from NZCS." Gloomy silence followed, and nobody asked why the code of ethics had apparently failed so miserably. *Perhaps no-one ever believed the code of ethics*

would have any effect.

The meeting continued, but now the President's exposé of his vision was interrupted intermittently by people who wanted to believe his vision but were despairing of its likelihood. One man who stated he had been a member since 1986 interjected:

> But we don't embrace the vision. I've heard this every five years. Look, I work with 20 people, 16 of whom could be members, but they aren't. They aren't interested in professionalism and they don't support NZCS. The Auckland membership is 800, but look how many people turned up tonight.

We all considered the lack of support for NZCS and tonight's meeting. *The topic didn't inspire people.* The President tried hard to respond positively: "It's really a marketing problem. There has to be value for people to want to join." *I thought people were supposed to join because they cared about cancer patients?* "We need to breathe more life into the society. We need to draw the leaders, the movers and shakers, into the society." *Is he saying we're all too passive?* It would be hard, we were told, but we could do it. What NZCS needs, Don said, is certification, internationalised qualifications, and international relationships. And, of course, more members prepared to "get on board and help". The meeting closed in a rather desultory manner. The President was an eloquent speaker, passionate about his cause, and had worked hard to buoy the spirits of members. But it seemed that his efforts were thwarted by the many previous years of unfulfilled hopes. In closing the President reassured us we would hear more about these issues at next week's AGM. *I wonder how many people will attend the AGM?* [39]

3.3 Historical: Tracing the Professional Claims

3.3.1 1960 to 1980s

The idea of an ICT profession in New Zealand originated in 1960 when a small group of individuals met in Wellington and formed an organisation called the *New Zealand Data Processing and Computer Society* (NZDP&CS) (Robinson and Williams 1985, 185).[40] To conceive of a computing profession in 1960 was a visionary notion, given that computers had not yet arrived in the country (Boswell 1985, 9) and forecasting the future with regards to computer technologies is widely recognised to be impossible (Baase 2003, 389; Remenyi 2002,

[39] I later learned that 5 people attended the AGM.
[40] In 1968 the *New Zealand Data Processing and Computer Society* changed its name to the New *Zealand Computer Society* (see page 50).

3).[41] Later that year the first computer was installed in New Zealand, an IBM 650 purchased by the government for use in the Treasury in Wellington (Shailes 1985, 37). Further purchases soon followed, and by 1969 nine government departments had a computer (Shailes 1985, 37). From 1961 the private sector also invested steadily in computers, typically for accounting purposes (Bell 1985, 77).[42] Universities were keen to introduce computers too and by 1968 most had a computer for teaching and research purposes (Cox 1968, 1). Eight years after the first arrival, an estimated 120 computers had been installed (Beardon 1985, 8).

Most New Zealanders were unaware of this modest uptake of computers in the early 1960s, and an even smaller number would have realised how significant computers were to become in the lives of ordinary citizens and to the economy. The banking industry, for instance, entirely underestimated the future importance of computers:

> To spend vast sums as a matter of course on computer systems had certainly not emerged as an acceptable trend in the mid 1960s… Computers were few and far between and not usually very successful. Good hard logic, with benefits on the bottom line clearly ascertainable, was needed to convince a not surprisingly sceptical Bank of New Zealand that the doubtful art of computing was worth pursuing. (Archibald 1985, 54)

The few New Zealanders who did have contact with computers in the 1960s experienced considerable uncertainty:

> A total of 2502 people were recorded as working directly with computers in 1969. For many of these it must have felt as if they were entering uncharted waters, because there was little in the way of training courses or textbooks. Management didn't know what the job entailed and had little idea what qualities to look for, or what performance to expect from their computing staff. (Beardon 1985, 8)

Awareness of computers and their potential was thus very limited at this time. To anticipate the need for a computing profession in 1960, was, it seemed to me, remarkably insightful. At first I was incredulous. I suggested to Ian Mitchell, NZCS President 1994-1997 and member for over 40 years, that the organisation had perhaps started as a type of club. He unequivocally rejected this proposition:

> No, the NZCS was formed to be a professional group, from day one. (Ian Mitchell, personal communication, 22 May 2008)

[41] For example in 1977 in the USA Ken Olson, President of Digital Equipment Corp., stated "there is no reason for any individual to have a computer in their home" and RCA Corporation predicted in 1966 that "the U.S. will have 220,000 computers by the year 2000" (Baase 2003, 389).

[42] Early private sector adopters of computers included Griffin and Sons, Bond and Bond, Shell, Air New Zealand, and Tasman Pulp and Paper (Beardon 1985, 7).

Mitchell's assertion is corroborated in Tolmie Scoular's (1984) oral history interview in which he maintained that the early members of NZCS always saw themselves as a potential professional society. This fascinated me. I could understand a computer club for people with a passion for the new-found machines, but what did these individuals mean by a computing profession in 1960, and why did they consider a profession important? Was their vision similar to the President's vision presented at the meeting I attended? I realised that the story of the professionalisation within New Zealand's ICT industry really does begin in 1960.

For the first few years after 1960, the NZDP&CS flourished. Founding members included university professors, engineers, mathematicians, scientists, accountants, and computer company salesmen; people with overseas experience who saw the potential of computers for New Zealand (Battersby 1968, 12). Initially the organisation provided "a forum where ideas could be discussed and knowledge of computers disseminated" (Battersby 1968, 12-13). But before long rapid developments in the fledgling industry meant that a long term view was needed, and so Gordon Oed, Professor of Accounting at Victoria University of Wellington, a visionary who "saw more clearly than most what might lie ahead", was elected the organisation's first President (New Zealand Computer Society 2006, 8).

One of the first initiatives was to address the dire need for computing education. Organisations had usually purchased computers without staff having the necessary expertise to operate them (Bell 1985, 77); consequently any training opportunities were well supported and over 170 people attended a data processing course organised by the NZDP&CS in 1961 (Battersby 1968, 12). Other early activities included the establishment of study groups and a library, and the development of links with overseas computing organisations such as the *British Computer Society* (BCS) and the *International Federation for Information Processing* (IFIP) (New Zealand Computer Society 1961-1965). These links were nurtured over the following decades and became significant later in the professionalisation project.

By 1965 membership of NZDP&CS had reached approximately 200 and the organisation needed a more formal structure. Over the next three years the society restructured to become a national organisation with branches throughout the country (Robinson and Williams 1985, 186). The year 1968 was particularly significant for the society. Membership reached 730 (Battersby 1968, 12), a surprisingly large number in view of the rarity of computers at that time.[43] Under the leadership of a new President, Bernard Battersby, the society changed its name to the *New*

[43] As noted previously, Beardon (1985, 8) estimated 120 computers in New Zealand at that time.

Zealand Computer Society (NZCS) (Robinson and Williams 1985, 185).[44] Support for the name change was not universal however. In his oral history interview Professor Oed (1988) recalled that he did not approve of the new name, believing it placed an emphasis on the computer itself, whereas the original name had been deliberately chosen to emphasise both the computer and its end product.[45] In August that year the first National Conference was held (New Zealand Computer Society 1968). During his presidential address, Battersby (1968, 13) raised the possibility of a computing profession with the 300 conference attendees:

> If we define a profession as a specialised field of work in which a high level of education, skill, intelligence and creative effort is applied to practical use, it would seem that we have in the development of computer technology all the signs of an emerging profession.

He then outlined developments towards a computing profession in the UK and the USA, and suggested that "urgent consideration should be given now to the future scope of the Society's activities with these overseas developments in mind" (Battersby 1968, 13).[46] The conference heralded a new focus on professionalisation, and shortly afterwards the society rewrote its constitution, introduced a membership grade of 'competent computer professional', and began reporting on issues such as computer education and research (Boswell 1985, 10-11).

During the 1970s the NZCS introduced further measures to boost its professional image. A logo was adopted in 1971 and a *Code of Ethics and Professional Conduct* was instigated in 1978 (Robinson and Williams 1985, 187-189). The possibility of a regulated profession was also intimated in 1978, when, at a special meeting of the society, member Michael Henderson pointed out the implications of professionalisation:

> If the society wishes to move towards a more professional attitude and public image and possibly in some future time to have some kind of registration whether enforced by government or some voluntary constraint it will be necessary to have some standards of knowledge or other test by which an appropriate person can be determined. (New Zealand Computer Society 1978)

But by the end of the 1970s membership had reached only a modest 1500 and the society acknowledged that it had achieved little actual progress toward a profession (New Zealand

[44] In fact there is uncertainty about the society's name. Most texts state that the society's first name was the 'Data Processing and Computer Society of New Zealand' and the minutes of the 4th AGM on 30th June 1965 record a decision to change the society's name to 'The Computer Society of New Zealand (Inc)'. However minutes from the first two official meetings of the society in 1961 record the name as the 'New Zealand Computer Society (Inc)' (New Zealand Computer Society 1961-1965).

[45] It appears that Professor Oed may have been alluding to the tendency for computer enthusiasts to focus on the technology itself rather than the people using it, as noted earlier in Chapter 2.

[46] Battersby was referring to professionalisation activities by organisations such as the BCS with which NZCS had fostered links since 1960.

Computer Society 1980, 2).[47] The *Long Term Plan* published in 1979 noted that the society's professional goals were something "which we may piously support but effectively ignore" (New Zealand Computer Society 1980, 2).[48] However the plan did conclude that the NZCS had left behind its amateur status and could now be regarded as a "semi-professional" organisation (New Zealand Computer Society 1980, 5). The plan laid out targets for the next 5-20 years, including a doubling of membership by 1985, and identified professionalism and social issues associated with technology as important challenges for the society. Although professional status was proving difficult to achieve, it was still regarded as unavoidable: "Professionalism no doubt has its problems, but it is as inevitable that 'information engineers' will be professionalized in the future as it was that electrical or civil engineers were in the past" (New Zealand Computer Society 1980, 6).

During the early 1980s the society worked to "improve the professional standing" of its members by lifting the requirements for professional grade membership and by strengthening its continuing education programme (Robinson and Williams 1985, 192). In 1985 the NZCS celebrated its Silver Jubilee, and in his introduction to the commemorative publication *Looking Back To Tomorrow: Reflections On Twenty-Five Years of Computers in New Zealand*, President Colin Boswell (1985, 12) summarised: "In its first twenty-five years the New Zealand Computer Society has evolved into a dynamic, professional, socially aware body."

3.3.2 1990s to 2008

By the late 1990s no further progress towards a profession had been achieved and NZCS was struggling to attract members: "The challenge for us is to make the society relevant to people in their working lives" (President Andrew Mason quoted in Brislen 1997). The society was not aggressively seeking to professionalise at this time: "I see the function of the society being to foster that sort of thing [professionalism] and assist without muscling in" (Mason quoted in Brislen 1997). In accord with this strategy, NZCS called for IT organisations to support its motto of "Inspiring Computer People to Professional Excellence" by encouraging staff to join the society and adopt the code of ethics (New Zealand Computer Society 1998a, 16). What was meant by 'professional excellence' was not made clear, although the code of ethics was clearly regarded as significant.

A review of the discourse since 2000 reveals an increasingly detailed conception of

[47] The estimated number of computers in New Zealand in 1979 was 1600 (Beardon 1985, 11).
[48] The first *Long Term Plan* was published in 1971, and a revised plan was written in 1976 but was never formally adopted (New Zealand Computer Society 1980).

professionalism and how it might be achieved. NZCS President 1999-2001, Gillian Reid (2001, 1), was fairly explicit:

> Professionalism is about how we behave as people, and how we carry out our work. It is adhering to an ethical and behavioural code. It is about delivering to our customers or our employees a quality of service and personal behaviour that is both technically sound (regardless of what you call technical) and above reproach. It is about honesty, quality, and competence.

Reid's explanation also gave primacy to the role of a code of ethics, this time linking an ethical code to standards of behaviour and competence.

NZCS CEO Doug White (quoted in Bell 2005) emphasised the importance of professional certification, on the basis that certification would "provide a means for a business to judge the competence of computer professionals before employing them".

Richard Donaldson, NZCS President 2006-2007, gave an expanded vision of professionalism:

> One of the things that measures a profession is does it have a code of ethics? And for those who are a member of an organisation with a code of ethics, that's one of the essences of a profession. Some of the others are life long learning, continuing professional development…
>
> There is no certification amongst IT professionals like there is with engineers. So through my association with IPENZ I'm one of the people who's involved with accreditation panels and interview panels for people who go through the Chartered Professional Engineer qualification, which is supported by legislation. There's none of that in the IT industry. There needs to be.
>
> The BCS has a Royal Charter as an engineering entity, and they've made huge leaps and bounds in the last few years. The NZCS is looking to piggyback on some of what's going on there. [49]

An escalation in the requirements for professionalism[50] is plainly seen here. Professionals were now required to meet the behavioural expectations of a code of ethics, belong to a professional organisation, be certified by accredited personnel, meet legislative requirements, and undergo regular professional development. In addition, a profession is deemed quantifiable, and the engineering profession is offered as a suitable model for the ICT industry to adopt, just as it had been in the 1979 *Long Term Plan*.

The most comprehensive vision of a profession was presented by President Don Robertson at the Auckland Branch meeting I attended in 2008. A summary of his vision follows:

[49] IPENZ – Institution of Professional Engineers of New Zealand. BCS – British Computer Society

[50] Here I am using the term "professionalism" – the language of my participants – rather than the sociological term "professionalisation" – see Section 1.3.2 Terminology.

Professionalism ensures trustworthiness
- A code of ethics is the hallmark of a profession
  - Codes of ethics signify trustworthiness
- Members of a profession are certified
  - Certification signifies trustworthiness

Professionals are not technicians; they are high level planners, decision makers, managers
- They provide independent objective advice

A profession has a body of knowledge that should be accessible to, and shared amongst, members of the profession
- Professionals undertake regular professional development

A profession is supported by a professional association, which:
- Is the public face of the profession. It provides expert opinion on professional matters and exerts influence in government and business circles. It should be the first port of call for opinion, independent advice, and complaints
- Is the arbiter of good and bad practice
  - It certifies members, and provides and enforces a code of ethics
- Has links to international professional bodies. These linkages add to the credibility of the local association and to the credentials of certified members

Robertson's explanation is the only one which offers a (claimed) rationale for professionalisation (trustworthiness). It is also the most revealing about motive - Robertson's references to credibility, influence, and credentials, and his emphasis of what professionals are not, are suggestive of exclusivity. Consideration of these themes follows later in this chapter.

3.3.3 2009 to 2010

During 2009 and 2010 the long-held vision of a profession started to materialise.[51] Significant events included a re-branding exercise, the release of a new *IT Code of Practice for New Zealand*, and the replacement of the old *Code of Ethics and Professional Conduct* with a new *Code of Professional Conduct* (New Zealand Computer Society 2009e). NZCS CEO Paul Matthews (2009b, 1) published an even more detailed definition of a profession, based on the 'Professional Maturity Model' (derived from the Carnegie Mellon University 'Capability Maturity Model' (Robertson 2008)). This definition included five levels of professionalism ranging from a minimally organised but unregulated community of practitioners through to a fully established profession regulated by law. Matthews (2009b, 1) explained that NZCS initiatives aim to raise ICT work from its current level 1 (non-professional) position.

As a first step, the NZCS introduced a voluntary professional certification programme *IT Certified Professional* (ITCP) in April 2009 (Matthews 2009a). Certification involves ranking ICT practitioners according to a 'skills assessment' framework called *Skills Framework for the Information Age* (SFIA) developed by the BCS (SFIA Foundation 2005) and endorsed by IFIP (World Computer Congress 2008). The ITCP model requires all certified ICT professionals to have thorough understanding of the 'Core Body of Knowledge' (NZCS Certification Working

[51] After experiencing a serious financial shortfall in 2007 (Bell 2007c), the society was able to access sufficient funds from industry and government to kick-start the professionalisation project (Bell 2008a).

Group 2009, 18) and also to undergo regular professional development (NZCS Certification Working Group 2009, 52). By May 2010 there were 272 people on the ITCP register (ITCP 2010).

The second step was the commencement of detailed planning for ICT degree accreditation (New Zealand Computer Society 2010b; Matthews 2009a). NZCS regards degree accreditation as one of the primary functions of a professional body, and essential in ensuring that ICT degrees in New Zealand meet international standards (New Zealand Computer Society 2010b).[52] [53] Professional certification and degree accreditation aim to raise ICT work to level 2 in the Professional Maturity Model (Matthews 2009b, 1). These two steps represent the first significant progress towards a profession since the code of ethics was first introduced.

3.3.4 Beyond 2010

At some stage in the future NZCS is likely to seek legislation to enshrine an ICT profession in law, as for professions such as engineering, accountancy, and medicine which sit at Level 5 of the Professional Maturity Model. There are indications of this long-term goal in the discourse, including the many references over several decades to IPENZ and the Chartered Engineering profession. According to Brad, one of my research participants with a long association with the NZCS, the society tried to gain legislation for a computing profession during the mid-1990s, but was unsuccessful due to government concerns about monopolisation:

> It was a complete negative that anyone would get legislative protection. The jargon word is 'monopoly profits'. If you were protected you could charge more money and so it was just a no-no.

Despite this setback, NZCS retained the goal, and in a report outlining the certification proposal, Matthews (2008, 8) wrote:

> It should be noted that acceptance [of certification] by Government does not necessarily require the creation of a legislative structure… Having said that, legislative backing may speed up the adoption of certification in New Zealand…

More recently NZCS appears to have pulled back on any attempt to gain legal recognition of an ICT profession. Matthews (2009b, 2) stated that it was not yet appropriate to seek legal standing for ICT certification, and Matthews (2009a, 5) announced more categorically that

[52] Interestingly a survey of certified ICT professionals in the USA concluded that universities should not design curricula to meet professional certification requirements (Fundaburk 2005, 35).
[53] In 2009 NZCS also started planning an accreditation scheme for companies providing ICT services, aiming to ensure that the professionalism of individual practitioners would be matched by professionalism within the organisation (Bell 2009b).

"NZCS have no current plans to seek legal backing for the Certification Programme".

In summary, the discourse over 50 years shows that NZCS plans to achieve professionalisation by adopting characteristics it associates with established professions such as engineering (a code of ethics, certification, accredited qualifications, and legal mandate). The strategy also involves aligning its structures to those of professional computing bodies in other countries with which links were established during the 1960s (the BCS, IFIP, and the Australian Computer Society). It is a strategy which reflects a trait based conception of the professions.

3.4 A Trait Based Approach to Professions

The trait model of the professions has been largely discounted by sociologists since the 1970s (indeed Julia Evetts (2006, 519) referred to it as a "time-wasting diversion"), but as Hall (1979, 126) noted, it survives as a useful construct for occupational groups seeking professional recognition: "I would argue that the professional 'traits' are very much a part of the reality constructions of occupations which are aspiring to the status." In addition, the public, whose endorsement the professionalising group must obtain, also conceives of professions according to traits, albeit "imprecisely" (Hall 1975, 80). Thus the trait model forms the basis of understanding between aspiring professionals and lay persons, regardless of sociological critique. It also provides occupational groups with a convenient means of achieving professionalisation. In line with Hall's observations, the NZCS vision of an ICT profession is largely trait based. For these reasons, the model merits some brief attention here. Besides, as Leicht and Fennell (2001, 27) observed, trait models provide sociologists with a convenient "set of places to look for changes in professional life".

The trait model held that professions could be differentiated from other occupations by a unique set of characteristics (Ben-David 1963-64; Flexner 1915, 904; Barber 1963, 672; Greenwood 1957, 45). The process of acquiring the traits, or "movement toward correspondence with the professional model", is known as professionalisation (Hall 1968, 92). Theodore Caplow (1954, 139-140) and Harold Wilensky (1964, 142-146) argued that professionalisation occurs in a fixed sequence of steps (although their sequences differed). According to their models, key structures in the evolution of an ICT profession would be established in a predictable chain of events. It is not my intention to map here in detail the NZCS progress towards a profession against these models. Previously I (Hunter 2008, 9) have argued that the sequence of events proposed in Caplow's model roughly matches the actual order of events in the emerging ICT profession, although none of the steps has been concluded completely.

One of the criticisms of the trait model was that it represents a Weberian ideal type conception of the professions (Bennett and Hokenstad 1973, 24) and thus does not correspond to any actual group (Toren 1975, 325; Hall 1975, 78; Abbott 1988, 4). Another criticism was that there was no universal agreement about the number of traits or what the traits are (Millerson 1964b, 5; 1964a, 15). Nevertheless there was some commonality in the proposed traits. To contain discussion I will adopt an approach suggested by Hall (1968, 92) who grouped professional traits into two basic types: structural and attitudinal.

3.4.1 Structural Traits

Structural traits refer to the particular structures of an occupation (Hall 1968, 92). They include a professional association which sets the standards for the profession (normative and educational) and thereby controls who can practice in the profession (Caplow 1954, 139; Barber 1963, 672; Carr-Saunders and Wilson 1933, 298-304; Wilensky 1964, 144), and a code of ethics that regulates internal and external professional relationships and is enforced by the professional association (Barber 1963, 673; Carr-Saunders and Wilson 1933, 286; Greenwood 1957, 49; Pavalko 1971, 25; Wilensky 1964, 145; Caplow 1954, 139). Professional work is seen to involve the application of practical skills which are founded on high-level theoretical knowledge (the profession's 'body of knowledge') (Barber 1963, 672; Cogan 1953, 35; Flexner 1915, 902-903; Greenwood 1957, 46; Hughes 1963, 655; Pavalko 1971, 18). Acquiring these specialised skills and knowledge requires lengthy formal education, usually within 'training schools' institutionalized in the universities (Carr-Saunders and Wilson 1933, 316-317; Ben-David 1963-64, 256; Goode 1960, 903; Greenwood 1957, 47; Hughes 1963, 656; Moore 1970, 10; Pavalko 1971, 19; Wilensky 1964, 144). Because professional knowledge and skills can easily become obsolete, ongoing professional development is required (Hall 1975, 117-118).

As we have seen in the historical section, considerable effort has been and continues to be spent by NZCS in attempting to establish these structures.

3.4.2 Attitudinal Traits

Attitudinal traits refer to the way professionals think about and approach their work, and are important if we assume that attitudes influence behaviour (Hall 1968, 92). Three attitudinal traits relevant to this study are professional culture, altruistic orientation, and a sense of calling.

Professional culture refers to the distinctive "values, norms, and symbols" which are shared by members of a profession (Greenwood 1957, 52; Pavalko 1971, 24), and may include particular customs, attitudes, practices, beliefs, special modes of dress, and idiosyncratic jargon. Aspects

of professional culture are sometimes consciously adopted by members of the profession seeking group acceptance; other times they become internalised over time as members learn to conform to group expectations. For these reasons, professions have been described as social movements: "They recruit only certain types of persons, they develop highly elaborate ideologies and supra-individual values, they have their own mechanisms of socialization" (Denzin and Mettlin 1968, 376). Socialisation into the culture of the profession often occurs during training (Barber 1963, 672) and afterward through membership of the professional organisation (Pavalko 1971, 105). It is the solidarity arising from a shared professional culture which lead to professions being labelled "communities" (Goode 1957, 194) and "brotherhood[s]" (Flexner 1915, 904). Solidarity and stability are vital for an occupational group aspiring to become a profession: "Until members of an occupation realize their collective existence as a group, then movement toward professionalization cannot really begin" (Millerson 1964b, 12).

Altruistic orientation refers to a profession's claim that as part of its professional culture members share a commitment to the public good rather than their own individual interests (Barber 1963, 672; Wilensky 1964, 140; Cogan 1953, 36; Flexner 1915, 904; Goode 1960, 903; Hughes 1963, 656; Moore 1970, 15; Pavalko 1971, 20). This implies that professionals act in the best interests of their clients and are compensated with social rewards such as prestige and honour, both of which are regarded as intrinsically more valuable than monetary rewards (Gross 1958, 79, 105; Barber 1963, 673). Codes of ethics articulate and institutionalise this altruistic commitment.

The sense of calling attributed to professionals in the trait model is associated with altruistic motivation and professional culture (Hall 1968, 93; Moore 1970, 8; Bullock cited in Carr-Saunders and Wilson 1933, 421). The various definitions of this trait include: a professional's lifelong dedication to their work (Gross 1958, 202-208; Hughes 1963, 657), "a life devoted to 'good works'" (Greenwood 1957, 53), and even "a quasi-religious sense of mission" (Pavalko 1971, 23). This dedication often leads to a blurred boundary between work and non-work (Caplow 1954, 124; Pavalko 1971, 24).

3.4.2.1 Reflecting on the Attitudinal Traits – NZCS and the ICT Industry

In Chapter 2 I identified a number of unflattering cultures associated with computing work, and linked this to the prevalence of technically focussed people in the industry. The personal vignette at the beginning of this chapter revealed two contrasting cultures within New Zealand's

ICT industry.[54] Attending these two meetings, especially on consecutive evenings, was an unsettling experience due to the cultural divide I detected between the two groups. This suggests a situation far removed from Millerson's (1964b, 12) recommended solidarity; a matter which is addressed in more detail in Chapter 4.

I found the UPANZ meeting to be relaxed, welcoming, and unpretentious. The entry fee was modest, making it possible for people on restricted budgets (possibly students) to attend. The audience was varied in age and gender, and also (I guessed) employment status. Despite the mixed demography of the group, there was a sense of shared vision and commitment within the group, and a willingness to learn from each other. People were outward and forward looking. They enjoyed the meeting and each other's company, and were supportive of the speakers.

In comparison, I found the NZCS Auckland Branch meeting, and other similar NZCS meetings I have attended, to be very different.[55] Within the NZCS I have found the culture to be formal, conservative, and 'gentlemanly', reflecting the mainly older, white, male membership. There is a sense of exclusivity, of 'having to measure up' if one wishes to join. Members project an air of educated success and affluence; also dedication and passion toward their work. They share a view that ICT is important to New Zealand's future and that ICT work deserves greater recognition. Innovation is also valued highly, and the shared sense of contributing to New Zealand's prosperity through ICT gives a "disciplinary solidarity" (Freidson 1973, 52). Hierarchy features strongly in the culture of NZCS as well; certification ranks occupations, and the society regards itself as "top tier of ICT" (New Zealand Computer Society 2008d, 19). Because women rarely attend NZCS gatherings, any above-normal female attendance is frequently noted with a wisecrack.

This culture appears to be largely unchanged since the early days. An audio recording of the NZCS Special Meeting on 18 August 1978 (New Zealand Computer Society 1978) reveals a gathering at which strong views were expressed, but with courtesy and restraint. President Bruce Moon's excellent 'BBC' enunciation of English, equally matched by other speakers, gave the meeting an atmosphere of formality and propriety reminiscent of the British upper-class. All scheduled speakers were male, and the hubbub of voices suggested an overwhelmingly male attendance; only one female voice was audible.

NZCS claims of supporting a culture of professionalism, competence, honesty, and quality

[54] There are likely to be many more cultures within the industry, but this was not the focus of my research.
[55] In one respect the two cultures are very similar; common knowledge, skills, and experiences amongst members mean that they often use jargon incomprehensible to outsiders.

service are assertions of altruistic intent. Likewise Tenet 3 of the *Code of Professional Conduct* (New Zealand Computer Society 2009c, 5) is an altruistic pledge: "Members' responsibility for the welfare and rights of the community shall come before their responsibilities to their profession, sectional or private interests or to other members." How closely individual member's motivations match these assertions is not clear.[56]

I found a high level of dedication to the craft of computing amongst ICT workers. My participants often work very long hours and spend at least some of their leisure time on computer-related activities, and this passion is often retained throughout their lifetimes. Many of them are motivated to create artefacts that will be useful for people and/or will help a business achieve its goals, and they experience much pleasure in doing so. Sam wants to create products which will provide widespread social benefit:

> The work itself, the thing I love the most is that it is constructive, it creates stuff. There's quite a deep-seated enjoyment in producing a good for the world, for people, for customers, particularly if it's something quite new.

Tim is excited about the potential of IT to assist business in new and intelligent ways: "To use technology intelligently to solve a business problem."

Lyn is highly motivated to empower others in their use of IT:

> I love looking at how people can be more effective and efficient in what they do, so if an application can reduce some of the paper or some of the admin side that people are involved with I really like that, being able to make a difference from that point of view. If whatever I do with my applications or whatever I know or understand about them, if I can share that and it makes a difference in somebody's life, then that's really rewarding for me.

Producing a quality product for the client is very important to Andrea:

> We really do try to work using best practice, so we try and make sure our documentation is very very good indeed, we try to always add value with the client, and make it a seamless pleasant process for the client, and we like to have really good results...

These narratives indicate a strong desire to do 'good work', with personal satisfaction being an important reward, but (unsurprisingly) there is no evidence of altruistic dedication extending to self-sacrifice. An element of fervour did enter some of the narratives. For example Julia, the usability consultant introduced earlier, spoke at length about the lack of appreciation of the importance of usability, and concluded:

> I constantly have to evangelise what I do, why I do it, why it's important. It's still unrecognised really… I often get called in not by the CEO for example but by someone

[56] Few of my research participants belonged to the NZCS.

> lower down, and then they've engaged me, but work is still to be done to convince the powers that be.

3.4.3 Professional Autonomy - Both Structural and Attitudinal:

Hall (1968, 93) regarded professional autonomy as both a structural and an attitudinal trait due to the fact that underlying the structural aspects of autonomy is an attitudinal factor – a belief that only professionals are competent to judge each other, and only they have the right to do so. As Everett Hughes (1963, 656) noted: "Professionals ***profess***. They profess to know better than others." Structurally a profession receives a high degree of autonomy by having a professional body that sets standards, controls admission to the profession, and publishes a code of ethics to restrain behaviour (Barber 1963, 679; Carr-Saunders and Wilson 1933, 286; Goode 1960, 903; Greenwood 1957, 48-49; Hall 1975, 115; Pavalko 1971, 22; Toren 1975, 325; Wilensky 1964, 146). Legally mandated autonomy gives a profession the right to self-regulate, to have "control over the content and the terms of work" (Freidson 1970b, 134). Self-regulation is, Freidson (1970a, 71-74) argued, the discriminating characteristic of a profession, and has the effect of legalising monopoly of service.[57]

The NZCS is plainly pursuing autonomy. The President's vision seen earlier (page 53) stated that NZCS is "the arbiter of good and bad practice", the provider of "expert opinion on professional matters", and the enforcer of "a code of ethics". In addition, ICT professionals are "high level planners, decision makers, managers"; the people with the credibility to make professional judgements. Certification and degree accreditation are first steps towards controlling who may work in the ICT industry and the eventual monopoly of service. Full autonomy would require a legal mandate for autonomy - the 4th and final step in Caplow's (1954, 139) professionalisation model.

3.5 Interpretation: Making Sense of the Claims

3.5.1 The Arguments

The various claims put forward by NZCS for an ICT profession are essentially based on two arguments. The first is that trustworthiness in ICT practitioners is essential because ICT is now a global enterprise critical to business, the economy, and the public. This argument holds that

[57] According to the trait model, autonomy also operates at an individual level. Professionals are seen to be in a position of authority over their clients who are vulnerable and have no choice but to accept the superior judgement of the professional (Greenwood 1957, 48; Moore 1970, 14).

an ICT profession will ensure trustworthiness, and is usually couched in altruistic terms.[58] The second argument is that an ICT profession will help reduce the current ICT skills shortage by raising the prestige of ICT work, thereby attracting talented people to ICT careers. This argument emphasises a need for increased status of ICT work. The two arguments therefore demonstrate a curious amalgam of alleged self-less interest and apparent self-interest.

3.5.2 Argument 1: Trust the ICT Profession

Modern society has come to depend on professional expertise: "Many of the institutions of a modern society depend upon an adequate supply of professionals who perform services for corporate bodies: people to plan and build water systems, communications" (Hughes 1963, 667). This has led, Steven Brint (1994, 8-9) argued, to a new form of "expert professionalism" which is closely aligned with business, market demand, and technical expertise. The NZCS President's talk regarding the safety of X-ray treatment (page 47) was based on this reasoning, and laid the foundation for his argument that an ICT profession is needed to provide the trustworthiness expected by consumers of ICT goods and services. This in turn justifies the code of ethics, the certification programme, and degree accreditation. In this context trustworthiness relates to both the practitioner and the products or services delivered.

According to the ideal model of a profession, a professional asks for and is given the client's trust (*credat emptor* rather than *caveat emptor*) (Hughes 1963, 657), and in return is expected to work in the client's best interests without betraying that trust (Hall 1975, 127). "The client… knows that the professional is *obligated* to be trustworthy" (Evan and Levin 1966, 80). Trust is maintained by the disregard typically shown by professionals for the many "exploitative opportunities" they experience (Goode 1957, 196). These notions connect trust with altruistic motivation and the service ideal, central themes of the trait model discussed previously. But trust also requires clients to have confidence in a professional's competence (Pavalko 1971, 21; Moore 1970, 14). Hence trustworthiness claims are based on a professional's assurance of both their skill and their ethical commitment.

Vittorio Olgiati (2006, 543) proposed that contemporary western society comprises a "risk society" and a "knowledge society", and that uncertainties arising from these two opposing frameworks mean that it is insecurity about risk rather than status which justifies professional

[58] The 'Trust the ICT Profession' argument is not unique to NZCS. Other examples from the international ICT community include: Professionalism "develops optimal trust between the professional and his or her constituents" (Radziwill 2005, 23), "A code of ethics holds the profession accountable to the public" and induces trust (Anderson et al. 1996, 877), and "Increased professionalism and, in particular, devotion to the needs of the stakeholders, can improve trust" (Gleason 2003, 9).

claims of trustworthiness.[59] Given the uncertainties of the "dark side of modernity" (Olgiati 2006, 543) it would be appropriate to conceive of professions as "risk managers" (Oevermann cited in Olgiati 2006, 543). The NZCS trustworthiness argument combines the notion of risk management with the traditional professional service ideal.

Trustworthiness claims have several problematic aspects, including: an assumption that trust is required (Goode 1969, 296), doubt whether the public accepts the claims (Hall 1975, 129; Pavalko 1971, 17), and the strong possibility that actual professional behaviour will not comply with the claims (Pavalko 1971, 17; Hall 1975, 78). These issues need to be considered in relation to the ICT professionalisation project.

3.5.2.1 Is Trust Necessary for ICT Work?

ICT work fits with Paul Halmos's (1973, 6) characterisation of the "impersonal service professions"; professions whose primary functions are other than attending to bodily or psychological needs, and which do not have the same requirement for altruistic commitment as do the "personal service professions". William Goode (1969, 297-298) similarly distinguished between the "people professions" and the "technical-scientific occupations", and argued that trust is less important for technical-scientific work. Consequently we might question the need for trustworthiness in ICT work.

Realisation that computers pose a threat to society was slow to emerge. Norbert Wiener (1960, 1358), one of the first scholars to write about possible threats of computerisation, identified the speed of computers and the possibility of computers that "learn" as likely sources of danger. Later Joseph Weizenbaum (1972, 614) identified the dangers of escalating small errors:

> The computer scientist must be aware constantly that his instruments are capable of having gigantic direct and indirect amplifying effects. An error in a program, for example, could have grievous direct results, including most certainly the loss of much human life.

Other attempts to draw attention to the risks of computers during the 1970s mostly went unheeded (Maner 1996, 3).[60]

[59] Olgiati (2006, 540) argued that accounts of professional trustworthiness and technical reliability often fail to take scientific uncertainty into account, even though science provides the legitimacy for professional claims.

[60] Perceived ethical deficiencies in the IT industry eventually led to the introduction of computer ethics courses in universities in the 1990s (Maner 1996, 1). Today dedicated ethics classes are commonplace in ICT educational programmes, and consideration of ethical issues in the context of subject teaching is also encouraged in order to promote ethical conduct by ICT practitioners (von Konsky 2008, 18). Ethics education is thus designed to reduce the likelihood of unethical practitioners and to support professional codes of ethics.

Almost 20 years after these warnings, Peter Neumann (1995) documented hundreds of near and actual computer catastrophes. Many of these involved harm or loss of life and/or substantial financial losses. Some disasters occurred due to seemingly trivial human error. For example a missing hyphen in a rocket guidance programme resulted in the Mariner I Venus probe worth US$18.5 million having to be destroyed (Neumann 1995, 26), and a 'minor' computer data error caused an Air New Zealand plane to crash into Mount Erebus in 1979 killing 257 people (Neumann 1995, 47). Other disasters involved flaws in design or software errors. When the Therac-25 software-controlled radiation-therapy machines malfunctioned in hospitals in the 1970s, some patients received massive radiation overdoses and three people died (Neumann 1995, 68; Baase 2003, 124-128). Other threats posed by computers include the invasion of privacy through the misuse of personal information stored in computer databases and the increasing use of electronic surveillance technologies (Baase 2003, Ch 2; Remenyi 2002, 6). In a more recent event, a "computer glitch" caused a Qantas plane to nosedive abruptly injuring 74 people in 2008 (Veness, Jenkins, and Prichard 2008).

Some scholars also insist that computers have the potential to undermine human dignity and autonomy. Weizenbaum (1972, 611) called attention to the danger of regarding humans as little more than computers, a practice that would exclude the possibility of understanding humans as autonomous beings. These concerns were later echoed by Sun Microsystems Chief Scientist Bill Joy (2000, para 54) who famously suggested that continued development of intelligent computers, combined with advances in genetic engineering and nanotechnology, could lead to a future which "would not be like a human one in any sense that we understand".

In summary, ICT work has the potential to cause serious harm to clients and members of the public, either through loss of life, physical harm, loss of privacy and freedom, loss of human dignity, or financial loss. We may conclude that trustworthiness is necessary for ICT work.

3.5.2.2 Is the ICT Industry Trustworthy?

The notion of professional altruism has been questioned by many sociologists. John Jackson (1970, 6) proposed that "there is no reason to assume that professionals are either more charitable or more interested in their fellow men than others". Likewise Julius Roth (1974, 9) asked "why imagine professionals are any less vulnerable to temptation than other people"? Disbelief in a profession's altruistic claims does not necessarily mean that the professionals are, or are perceived to be, untrustworthy. However there is evidence of a loss of trust in professions generally over recent decades (Bennett and Hokenstad 1973, 31; Empson 2005, 4; Halmos 1973, 6; Haug 1975, 206; Hall 1975, 129; Haug 1973, 204; Holmes 2006, 147; Evetts 2006, 516), and

the public is increasingly wary of altruistic claims from professional groups (Perrucci 1973, 180-181; Toren 1975, 332).

Whether computing practitioners were ever credited with high levels of trustworthiness is unclear (and doubtful), and their present trustworthiness rating is also uncertain. NZCS CEO Matthews assessed the trustworthiness of New Zealand's ICT industry cautiously: "I think it is improving. If we were going to rate it on a 1 to 10, I think on the services side of things I'd still want to put it on a 6 or a 7." NZICT CEO Brett O'Riley was similarly guarded: "I think in general we have quite a patchy reputation with people." Some leading scholars from within the ICT disciplines have argued that computing currently does not have a good reputation. Denning (2001, 18-19) claimed that the IT profession "has a negative identity" and that IT professionals are seen as "avoiding responsibility". Similarly, Neville Holmes (2006, 150) concluded: "Sadly, the computing profession, although certainly not the profession least admired by the public, seems to go out of its way to generate suspicion and engender dislike." He attributed this negative reputation to factors such as unreliable software, rapid obsolescence of hardware and software, spamming and hacking which cannot be controlled, huge IT projects that commonly fail, and unforeseen potential disasters such as Y2K. These comments allude to untrustworthiness in relation to both competence and ethical behaviour.

Competence

It is a fairly common worldwide phenomenon for ICT projects involving millions of dollars to fail completely (Dale 1999, 1; Gauld and Goldfinch 2006, 11; Holmes 2006, 150; Sessions 2009, 1). Estimates of the failure rate of IT projects worldwide vary from around 50% to 80% (Sessions 2009, 3) and 33% to 75% (Thompson 2005, para 7). Many other projects incur serious cost and schedule overruns (Gorla and Wah Lam 2004, 79). Failures and overruns occur frequently in New Zealand too, with only 38% of projects being completed satisfactorily (Small 2000, para 1). As NZCS President in the late 1990s, Andrew Mason (1998, 6) noted, "the annals of government are full of less-than-successful projects (the private sector has just as many, but doesn't have select committees to ferret them out)".

Oral history interviews with some of New Zealand's earliest computing professionals confirm that these are not new problems. Tolmie Scoular (1984) recalled that computer systems were rarely completed on time or within budget during the early period of computing in New Zealand, and failures and disasters were also common. Government departments were particularly prone to costly mistakes. For example, in the mid-1970s the Health Department purchased a $28 million computer system which, when it failed to meet requirements, was

eventually thrown out piece-by-piece over the following three years (Barnard 1984). The private sector also experienced financially damaging episodes. Milne and Choice had installed an IBM 1440 computer to process its debtors-creditors system. When the first debtors 'run' failed due to programming errors, the programmer announced he was leaving immediately and the company was unable to produce invoices (Barnard 1984). Charles Begg and Co. was almost bankrupted when staff erased the master debtors' tape, forcing the company to write off $400,000, and when the introduction of an IBM360 computer muddled the company accounts, Shell took the unusual step of trying to recover lost income by writing to customers and asking them to pay whatever they thought they owed (Harpham 1984).

One of the biggest recent project failures in this country was the collapse of the New Zealand Police INCIS Project with the loss of over $137 million (Justice and Law Reform Committee 1999; Dale 1999, 3; Small 2000, 1; Wilton 2005, 142). Many other failures, usually smaller and less publicised, have occurred. For example, a Health Waikato Ltd information system was abandoned in May 2000 with the loss of $17 million, and Capital Coast Health Ltd reportedly lost $26 million after its partly functioning computer system was dumped in 2003 (Gauld and Goldfinch 2006, Ch 3 & 4). In 2010 a software bug mixed patients' health data at Gisborne Hospital (Jackson 2010, para 1). The cost of these failures is hefty; prominent American ICT expert Roger Sessions (2009, 5) calculated a total annual cost to New Zealand of $5.4 billion (including indirect costs).

Some of my research participants had first hand experience with large project failures. Phyllis recalled the collapse of the IBIS banking system in the late 1980s:

> Databank was putting in a big system called IBIS, and they'd already done a year and a half, two years, work on it… I was employed for that system in a change management role, but in fact after about a year or two they pulled the plug on the system. It was getting to be a HUGE, an ENORMOUS [loudly] system, with bells and whistles and everybody having their say, and so they decided after having spent quite a lot of money, a few million I suppose, that they would pull the plug on it.

Kelly described a system which performed so badly and exceeded the budget so drastically in the 1990s that it probably should have been abandoned:

> So we got this system and it didn't come in on time, and it was only part of the system, and the billing was very very basic, not what we'd asked for, and the whole thing was a disaster. And then we'd get these upgrades… they were always late, and I'd have to test them and the users were desperately needing it, and I'd find that they'd changed something here but it had affected something over there that did something strange. The whole system would have to be tested every time. It was an absolute nightmare; a $1.5 million dollar project. In hindsight we should have pulled it because of the costs. It cost us about $4 million.

Collectively, these reports of project failures suggest that the ICT industry in New Zealand cannot be trusted in terms of competence.

Ethical Behaviour

Incidents involving unethical behaviour are also likely to damage perceptions of the industry's trustworthiness. The oral history interviews with Arthur Henley (1984) and Norma Moffett (1985) related an incident which may have been the first ethically dubious incident involving computers in New Zealand. When the Treasury decided to purchase a computer in 1960, Jack Wills, a Treasury official, was sent overseas to investigate. On his return, Wills recommended an IBM 650 which was duly purchased. Twelve months later Wills left the Treasury and became the head of IBM New Zealand. This defection, plus the fact that some people believed the 650 had not been the best choice, was described as a "scandal" in an article in the weekly newspaper *Truth* (Moffett 1985).

Notwithstanding my participants' desire to do 'good work', my research has found that unethical behaviour does occur in New Zealand's ICT industry. Brett O'Riley, assessed the ethics of the industry as 6 out of 10 (although he rated his members 8 out of 10). Pam, who is in a very senior position in a large company, thinks that ethical standards come under pressure when New Zealand organisations are influenced by differing ethical standards in other countries:

> I think there are some companies that operate very ethically, and I think there are some that I would question… I think some of them are very driven by global demands and requirements. And I think that can sometimes compromise what we as New Zealanders expect as ethical versus what an organisation governed by US or Asia or India, and I'm not just targeting one nation. But I think the drivers around cost or revenue can sometimes create some ethical questions and boundaries… I think there's some grey areas, and I think there's sometimes some lines that get crossed.

Most of participants attributed unethical behaviour to people involved in sales and marketing, and/or people commonly referred to as 'cowboys'.

Sales and Marketing People

Mills (1951, 161) proposed that selling has become a "pervasive activity, unlimited in scope and ruthless in its choice of technique and manner". In New Zealand's ICT industry the most common dodgy sales practices appear to be 'over-promising' and 'over-charging'. These ethically questionable practices began in the 1960s. In his oral history interview, John Robinson (1984) recalled: "I've had salesmen sitting in my office swearing absolutely that something could be done on their equipment which I knew from fact couldn't."

Many of my research participants (not involved in sales and marketing) reported having similar experiences more recently. Tim said: "There's still a lot of snake-oil salesmen out there… Salesmen always say bullshit stories. The number of people who've turned up on our door telling us they can have a system running in six weeks." And Lyn explained that the worst part of her job is: "Dealing with software vendors. Not meeting expectations, promising the world and giving you a tiny little island."

Linda was also very uncomfortable with sales people who blur the facts:

> I look at what people tell customers that they're providing, but they're not really providing, but it's kind of implicit that they're providing those things… when they're not. They don't say outright, I'll give you this and then they don't, but they tend to just let the customer believe that they're getting these things.

One of my research participants who did work in sales, Mark, also agreed that sales practices are often unethical, and attributed this to the pressure associated with small profit margins:

> At the end of the day it's the salesperson and the company behind the salesperson that says we can make a solution for this price to do that job. So they go out there and over-sell and over-promise, and that's partly because nobody in the company actually knows the detail of what is required. There's always 'unexpecteds' come into it… It's a little bit of getting the sale at all costs because for whatever reason… there has always been an over-supply of computer suppliers or solution providers. Therefore they tend to be carving profits out of it all the time to get business. So the profit margins are relatively small and when you get down to having to win business you tend to say, well I'm not sure how that's going to work, but let's just go with it. You know, we're better to get the business, even if we work out later that it's not going to work as we planned.

Andy has observed dishonesty relating to over-charging:

> A lot of the new schools being built, they're being absolutely ripped off by cabling companies. An example would be a school in [ABC]; they were putting in fibre-links and were quoted $50,000, which we thought was just ridiculous. We suggested they bring in some other companies, so they brought in two other independent companies and they both quoted around $25,000. Those guys were just hiking up the bills.

Andy raised a further ethical matter. Many IT companies use a business model which he believes is founded on an unacknowledged conflict of interest:

> The problem in the industry is, I believe, there's a major conflict of interest. Companies like [XYZ]... they try to be a one stop shop, where you go to them for everything and they lock you in. So an example of an ethical issue from my point of view is - an IT company would give a business owner advice on what they should buy and then they go and sell it to them. I hear it all the time; talk about 'locking a client in', 'lock them down with contracts', 'lock them down with warranties'… Once you're in with an IT company it's very difficult to change.

Cowboys

Many of my research participants used the term 'cowboys' when talking about ICT practitioners who lack a sense of ethical responsibility or purport to be skilled but are actually incompetent.

As Luke explained:

> We still have a lot of cowboys in the industry, people who don't follow due process, due methodology, and say exactly what the business wants to hear. We don't need to dot all those 'I's and cross all those 'T's; we can do it for you at a quarter of the cost. When in fact they can't. And so they end up selling something they can't deliver, and the business ends up having a poor experience…

Sam thought that cowboy-ism is about dishonesty as well as incompetence:

> I think there are real cowboys, people who will just tell lies as long as the day is long to get a bit of money. Then there's people that don't know what they're doing and create the same problem just in a different way of failing to satisfy people's needs because they thought they could achieve it but couldn't.

For John, being a cowboy means disappearing so as to avoid accountability:

> The cowboys tend to be the ones that run the computer shops that are here for 6 to 12 months and then disappear, and then they open up another one somewhere else, and they do more damage than good for the industry.

Andrea described another method cowboys use to avoid accountability:

> I'll tell you a story about a training course I ran. I was saying "this is how you do the documentation"… I said you've all got the idea of structure and sequencing well, and you've all got the idea, but when I look at what you've actually written it's not a bit like that. And they said, no, because it's not in our interests for everybody to know what we're doing because of litigation. They deliberately wanted it all unclear. And I'm thinking that's not very ethical.

David pointed out that cowboys are not always individuals, and nor are they unique to ICT:

> I don't think the IT industry is any different from any other industry to be perfectly frank. You can find a small one man band who will go out of his way to fix your home PC, deliver an excellent service, very equitable price, great result. You could take the same PC with the same symptoms to a large repair organisation who would change components that didn't need replacing, charge you for more time than had actually been spent, and yes, fix your machine, but actually not do it in a professional manner.

Don Robertson, linked cowboy-ism directly to a lack of professionalism:

> We've all seen the fly-by-night, the cowboys who do a very bad job leaving people in the lurch, projects are failing for a lot of reasons and everything else. So there are, if you like, the so-called vendors out there who are causing all kinds of issues and problems for people and not doing the right thing in advising people, so they're not being professional.

Cowboys are also opportunists, and many took advantage of the lucrative openings created by Y2K. As one small business owner commented in 1998: "You don't have to be an IBM salesman to work out that some people and organisations are making an awful lot of money out of what may be the biggest scam in history" (New Zealand Computer Society 1998b, 12). One

of my research participants, Bob, recalled ethically doubtful Y2K practices in the late 1990s:

> There were a lot of cowboys around for the Y2K fiasco, being paid huge amounts of money without any specialist skills. There were a few key contractors who were basically mainframe professionals and it used to be said that they just revolved around the main big four companies in Auckland, so they all knew each other by name and reputation, and they just circulated. Most of them went contracting because that's where the big money was. But there were a lot of people who were really doing organisational methods, disaster recovery, that kind of stuff and they were making it up as they went along, basically.

Some cowboy behaviour is illegal. The Chief Information Officer (CIO) of the Otago District Health Board, Michael Swann, was sacked for gross mismanagement in 2006 when the Serious Fraud Office started an investigation into expenditure of $16 million by the board on ICT projects over a six year period (Hedquist 2006; New Zealand Herald 2006). Swann was later convicted of fraud and sentenced to 9 ½ years imprisonment (Otago Daily Times Reporter 2009).[61]

Each of the examples outlined above could result in the ICT industry being labelled untrustworthy. Some of the incidents involve dishonesty; others, a lack of skills. Often the vulnerability of people with little knowledge about ICT is exploited for personal gain. However, as Ronald Pavalko (1971, 17) noted was the case for many professions, it is not clear how the general public regards the trustworthiness of the ICT industry. Denning (2001, 18) and Holmes (2006, 150) do not provide support for their claims of a poor reputation, and the NZCS has not published data confirming public concern about the trustworthiness of New Zealand's ICT practitioners. A *New Zealand Herald* (2003) statement that "public credibility has already been severely tested in recent years by the 'Y2K' computer failure that never happened" was editorial interpretation of public opinion regarding exaggerated threats. Recent (2010) persistent failures of the Telecom XT 3G network in New Zealand do, however, appear to have negatively affected public perceptions of the telecommunications section of the ICT industry.[62] Interestingly, 'Trust Polls' commissioned by the *New Zealand Reader's Digest* (2008; 2010) which asked the public to rate the trustworthiness of forty professions did not include the ICT profession. It thus remains uncertain how many New Zealanders would agree with the small business owner who wrote to the NZCS: "Maybe I'm being naive, but the computer industry in my humble view has been responsible for more hard-earned dollars going down the gurgler than

[61] Swann's fraudulent activity involved a system whereby the hospital paid for non-existent computer services such as software licences and hardware maintenance.

[62] For example, an online forum received many postings from people who believed that the Telecom brand was seriously damaged by the ongoing network outages. One subscriber wrote: "If the 67 years old tea lady at work, who has never owned a cellphone in her life, says to me 'Everyone hates Telecom now, because they have had so many problems in a short time' this shows how much the bad media has penetrated through to the absolute lay person". See website http://www.geekzone.co.nz/forums.asp?ForumId=39&TopicId=57679&page_no=1

any other enterprise I can think of" (New Zealand Computer Society 1998b, 12). But perhaps public perception is not that important; if the ICT industry acknowledges its own untrustworthiness, then the NZCS has a legitimate concern.

3.5.2.3 Does a Profession Curb Untrustworthy Practices?

The NZCS 'Trust the ICT Profession' argument proposes that a code of ethics and certification will eliminate unethical behaviour and incompetence. Since the 1970s sociologists have largely dismissed these lofty claims. Citing studies of the medical and law professions, Roth (1974, 15) concluded that professional structures such as codes of ethics provide little protection for clients and the public: "Peer control is almost completely ineffective in protecting quality of service and in enforcing those ethical strictures designed to protect the client and the public." Similarly Freidson (1970a, 186) maintained that there is no relationship between codes of ethics and "the actual behavior of members of the occupation", an observation which led him to suggest that codes of ethics are little more than "publicly waved banner[s] of good intentions" (Freidson 1970b, 135). Jeffrey Berlant (1975, 81, 126) further argued that codes of ethics are devices professions employ to enhance monopoly and maintain privilege, and Jerome Carlin (cited in Elliott 1972, 124) described them as "a front to forestall criticism". Scholars from other disciplines have expressed similar doubts. For example, engineering ethicist Brad Kallenberg (2002, 5) declared: "codes not only fail to compel moral behavior, they even are of limited use for inspiring or exhorting moral behavior", and prominent US writer Albert Carr (1968, 148) regarded them as "self-serving calculation in disguise".

Let us consider these conflicting views in relation to some real life examples from the ICT industry. Recently Television New Zealand (2008b) reported an inadequate health computer system which led to the loss of millions of taxpayer dollars. For at least five years foreign patients were receiving subsidised medicines because the HealthPAC computer system used to write prescriptions did not allow doctors to identify foreigners. But would the outcome have been any different if Medtech employees, the developers of HealthPAC, were certified and bound by a code of ethics? Similarly, would a fully-fledged ICT profession have prevented the collapse of the INCIS project? And would professional structures have curbed Michael Swann's fraudulent inclinations? We must consider whether professional structures such as codes of ethics actually do enhance trustworthiness in terms of ethical conduct and quality of work.

Do Codes of Ethics Ensure Ethical Behaviour?

Ethical behaviour requires a sense of commitment to others, in particular selfless commitment

(Curtis, Hoey, and Matthewman 2001, 142; Rachels 1993, 13; Ross 1939, 139). It also requires recognition that an ethical problem exists. Elsewhere I have argued that a sizeable proportion of ICT workers are pathologically unable to understand ethics (Hunter 2010, 55). Certainly other scholars have noted marked ethical unawareness amongst computing practitioners. For example Walter Maner (1996, 2) found that "computer professionals simply do not recognize when ethical issues are present", and Donald Gotterbarn (1999, 3) described a "limited and under-developed sense of responsibility" prevalent amongst software developers; a lack of regard for the consequences of their actions on others. These observations suggest that the necessary ingredients for ethical behaviour are missing in at least some ICT professionals.

Although individual characteristics may explain some ethical oblivion, many other circumstances are thought to contribute to a lack of ethical responsibility. Robert Merton (1947, 82) argued that engineers and technologists are typically unaware of the social implications of their work, and attributed this to three factors: specialisation (division of labour encourages individuals to focus only on their specific task), codes of ethics (which limit ethical responsibility), and bureaucracy (individual ethical responsibility is abdicated to the administrator). These factors, he argued, result in engineers having a "trained incapacity for dealing with human affairs" (Merton 1947, 82). Some of these possible explanations for there being insufficient ethical consideration amongst ICT practitioners featured during interviews with my research participants.[63]

Individual Lack of Empathy

Previously I have presented findings from this study indicating that many of my research participants regarded computer technologies as tools; either tools as means to an end, or tools as ends in themselves (Hunter 2007). People in the latter group were passionate about the seemingly endless possibilities of technology, but, as I argued, were liable to be unaware of the consequences of their work.[64] Tim explained this point:

> There are multiple areas where they [computers] can negatively impact, probably one of the areas that has more got more formal recognition these days is the privacy implications, but IT people don't tend to normally have that kind of mind, particularly technical - "this is great, we could invent this new service and do these new things", and forget to think what the consequences could be down the track if it was misused.

[63] Merton's (1947) second point that codes of ethics exhort engineers to focus on their specific task and fail to alert them to subsequent events, may reflect ethical codes of that period. The current NZCS Code of Professional Conduct (New Zealand Computer Society 2009c) states that ICT professionals must place their duty to society and the public before all other interests, and that they must consider all the consequences of their work. Thus Merton's claim that ethical codes limit ethical obligation appears contrary to the current situation.

[64] The former group typically wanted to use computers as means to good ends, but were often constrained by commercial pressures that placed their work into ethically grey areas.

David's observation was similar: "IT people tend to be focussed on the technical pieces and not so much on the application of the technology in the workplace." Kevin demonstrated this lack of empathy and limited sense of responsibility towards the end user: "I don't get involved with the deployment of applications, I just write them."

To explore this issue further I asked my research participants whether computing work ever puts society at risk. Many participants had trouble answering this question.[65] For example Sharon's response revealed bewilderment:

> It depends on what the product was, if it was like an automatic door opening and that screwed up, that could hurt people. Is that what you mean?

Several other participants also identified minor risks, but after lengthy pauses, some did identify more significant possibilities (usually relating to aeroplanes or nuclear power plants). For example James commented:

> I don't have any examples of it, I could probably think of examples perhaps. If you look at computer systems in aeroplanes that are flown by computer; that could potentially put people at risk. Computer systems controlling manufacturing plants, water treatments plants… You do potentially put people at risk.

Few participants related my question to their own work, but Anna did:

> It depends on what kind of data they work with. Here we're working with people's names, addresses, and home phone numbers, and I'm sure some people work with much more personal data than this.

My conclusion was that my participants rarely, if ever, considered the wider social implications of their work. They mainly associated risk with safety critical systems; areas of IT remote from their own. Ralph was an exception, as we will soon see.

Lack of Ethical Responsibility within Specialised Teams

Merton's (1947, 82) reasoning was that individual members of specialised teams can easily abrogate ethical responsibility, and this was a theme which arose repeatedly in my participants' narratives. James attributed the common industry practice of releasing insufficiently tested software to a lack of accountability associated with teams of ICT specialists:

> The development arm could safely say, oh it's released now, chuck it over the wall to the support people and say, it's your problem, we're onto the next release! You are not held accountable for it.

[65] This perhaps indicates that my question was poorly worded.

Bob described a shared 'laissez-faire' in IT teams which replaces individual accountability:

> In IT there's safety in the team. In IT it tends to be a bit of, get it done, doesn't matter how, so long as you get the result, and if it all turns to custard it's probably not your fault anyway, and we'll all share the blame.

Leyton also thought that individual responsibility is reduced in large teams:

> Information systems tend to be huge so no one person is ever responsible. Often glitches in computer systems are due to unforeseen incompatibility of one part with another, so nobody was actually overseeing the interaction of the two parts, and therefore nobody really thought they were responsible for it.

I concluded that individual ethical responsibility is indeed subverted by team membership, and that this problem is exacerbated when specialists from different domains work together. Ralph observed a gap between ICT practitioner assessment and understanding of risk, and that of their clients (in his example pharmacists). Each group was operating within their own 'silo' and neither had a realistic understanding of risk. The ICT specialists did not equate known risk with possible death, and the pharmacists did not comprehend the computer's fallibility.

> They had very knowledgeable pharmacists, and system integrators who were very knowledgeable of computers, and so everyone had their own silo of knowledge…The IT people thought the chance of a patient getting the wrong prescription was about one in a million, and [they] thought that was as good as you're going to get. The pharmacy people thought surely the computer wouldn't ever make a mistake. But I said yes it will, and it isn't going to be acceptable. One in a million for fifty million prescriptions a year could mean Baby Brown gets Mrs Smith's heart pills once a week.

Bureaucratic Norms Replacing Individual Ethical Responsibility

As was seen in Chapter 2, some of my research participants work in large bureaucratic organisations. For these individuals, it is the organisation which sets professional and ethical standards, not themselves (and not the NZCS). Several participants described having to comply with a corporate code of ethics. David explained:

> Certainly most of the employers I have worked for have [had a corporate code of ethics]. I can cite our environment here. We have a thing called [XYZ] which is expectations of our staff, and it's quite specific in terms of what you can and can't do… They're the values that we stand for as an organisation, and [XYZ] translates those values into tangible ways [of working].

Merton's (1947, 82) argument was that technologists subjected to bureaucratically imposed codes typically adopt a "subaltern role" and regard themselves as mere "technical auxiliaries", absolved of ethical responsibility. This appeared to happen in James's workplace. James, who worked for a very large ICT corporation, believed that it was the company, its policies and procedures, which 'made' everyone professional:

> [ABC Company] culture ensured the professionalism. Everyone was professional because the company made it so… The professionalism came from the checks and balances they made sure happened...

However since this claim contradicted James' earlier comment (page 73) regarding the lack of accountability in ICT teams, it seems likely that the company-inspired professionalism was not of the high standard he described. In this case bureaucracy combined with division of labour resulted in reduced personal ethical commitment.

Other Considerations

There are some other factors which might influence the efficacy of codes of ethics. Some scholars have challenged the fundamental concept of a code. For example, Judith Lichtenberg (1996, 13) noted that codes of ethics are often considered superfluous because ethical people don't need them, and unethical people (the 'cowboys') will ignore them anyway. Patricia is someone who finds codes of ethics irrelevant and prefers to maintain her own ethical standards: "UPANZ has a code of ethics; it's really had no actual effect on my behaviour." When I asked whether she had ever experienced any ethical dilemmas in her work, Patricia replied:

> I will not work on Sky City [casino] or some other prospective clients such as in the UK a tobacco company… At times I've had to tell clients that something is being misrepresented, for example if they're biased in charities. I don't hesitate to point that sort of stuff out at all. I'm also very upfront with my own biases. [66]

Ralph, who we saw is well aware of risk, is similarly unimpressed with codes of ethics: "I've never even looked closely at the NZCS code of ethics because I just sort of skimmed it and thought oh yeah it's just the usual sort of stuff."

David once left an organisation due to the unethical actions of some of his colleagues; a decision we can imagine had little to do with a code of ethics:

> The business ethics of some people really astounds me… I suppose I saw that most in [JKL Company]… Some things that happened there that were pretty bad… Things that should never have been touched, and I just walked away from it and said listen, I'm just not having a bar of that. If you guys want to do that, all power to you but…

While David appears to have been influenced by his own set of ethical principles, it seems that his colleagues were not controlled by any personal, organisational, or professional ethical codes. Likewise it is hard to imagine that a code of ethics would have restrained Michael Swann.

There is another possibility. Even if a code of ethics does not induce ethical behaviour in unethically inclined individuals, perhaps its sanctions will; individuals may follow the code out

[66] Patricia explained that she will not support organisations involved in gambling or smoking.

of self-interest. The NZCS has four levels of sanction for breaches of its code: a formal warning, a fine not exceeding $5000, suspension of membership, and forfeiture of membership (New Zealand Computer Society 2010a). Since none of these penalties leads necessarily to a loss of career, they are likely to have little dissuasive impact. Importantly, as was revealed at the Auckland Branch meeting I attended (page 47), the NZCS has never expelled anyone for a breach of the code. Either there have been no serious ethical misdemeanours by members since the code was introduced over 30 years ago, an unlikely scenario, or the code has not been implemented when it should have been. Such (likely) failure to enforce disciplinary measures for breaches of the ethical code occurs frequently amongst the professions (Carlin cited in Elliott 1972, 124), especially amongst the emerging professions (Barber 1963, 676-677). Failure to discipline members is a significant matter, since as Freidson (1970a, 361) observed, it is the enforcement of the code of ethics rather than the code itself which demonstrates ethicality.

If sociologists are disbelieving of the altruistic claims relating to codes of ethics and certification, it is also possible that not even the NZCS leadership truly believes their own claims. Earlier we saw the two most recent NZCS Presidents refer to the code of ethics as "the hallmark of a profession", something that "measures a profession" and is "one of the essences of a profession". These comments suggest that the code of ethics was adopted as ethical "window dressing" (Bowie 1979, 235) to impress the public and progress professional claims rather to express genuine altruistic commitment. In addition, the NZCS emphasises the direct benefits of certification to ICT practitioners, employers, the ICT profession, and New Zealand's economy, rather than the public and/or clients, for example see 'Benefits of Professional Certification' in Matthews (2009a, 11) and 'Benefits and Outcomes' in Robertson (2008). Seen in this light certification also appears to be oriented towards monopoly and privilege rather than public good. At a more fundamental level, codes of ethics are of little consequence if members are unaware of them. When a straw poll was held at a recent NZCS members' 'breakfast meeting', none of the members present even knew how many principles the society's code of ethics contains (Bell 2008b) - a situation which Pavalko (1971, 30) noted is not uncommon for professions.

Do Professional Structures Ensure High Quality Work?

The stated aims of the NZCS *Code of Professional Conduct* (New Zealand Computer Society 2009c) and *ITCP Certification* (Matthews 2009a) are to ensure that appropriately competent practitioners will carry out their work diligently in the interests of their clients and for the benefit of society. Whether these structures would prevent mistakes and failures such as

HealthPAC and INCIS is doubtful. The inadequacy of regulation (even legislated regulation) in ensuring quality service is evident in recent incidents in two other sectors in New Zealand.

The Aged Care Sector

The purpose of Section 9 of the *Health and Disability Services (Safety) Act 2001* is to make sure that elderly people living in rest homes in New Zealand will be appropriately cared for. The Act requires all aged care residential service providers to be certified and to follow specific service standards against which they are regularly audited (Anderson-Bidois 2006). Despite these apparent safeguards, the aged care sector is described as being in crisis (Donnell 2009; Television New Zealand 2008a; HealthCare Providers NZ Inc 2009). Reports of incidents such as an elderly woman having her mouth taped shut (NewstalkZB Reporter 2009), poor quality food being given to residents, 'superbugs' spreading through rest homes, and intimidation of residents (Donnell 2009) suggest that certification and industry standards are failing to ensure quality service in this sector.

The Building Sector

In 2002 it became clear that a large number of privately owned houses in New Zealand were not weathertight, even though they complied with the *1991 Building Industry Act* (legislation which aimed to regulate construction through a building code) (Easton 2010, 1-2). The repair cost of the 'leaky buildings' was initially estimated to be between $120 million and $1.8 billion (NZ Parliamentary Library 2002, 1), but by 2009 this figure had grown to $11.1 billion (NZPA 2009). The enormity of this cost for a small country prompted economist Brian Easton (2010, 2) to describe the episode as a "major test of regulatory failure in New Zealand". Legislation and associated building regulations had failed to protect the owners and inhabitants of around 89,000 homes (NZPA 2009). As the report to members of parliament noted: "Compliance with individual procedures and standards may have been achieved, while the overall result is a building which is not weathertight" (NZ Parliamentary Library 2002, 1).

It is likely that regulation in the ICT sector would be similarly ineffective. Many of the risks associated with ICT development projects are well documented, but disasters continue to happen (Dale 1999, 1). Robin Gauld and Shaun Goldfinch (2006, 17-21) proposed that system failures are often due to "four pathological enthusiasms" inherent in the people involved in system development: idolisation of technology, technophilia, unwise or naïve trust in sales-talk, and managerial faddism. These enthusiasms lead to a situation in which projects can easily get out of control. Other risks include the complexity of ICT projects (Dale 1999, 2; Holmes 2006,

163; O'Riley 2009, para 7; Sessions 2009, 6; Small 2000, 1; Maner 1996, 12), the inadequacy of project methodologies (Townsend 2007, 9), project management inadequacies such as poor communication between stakeholders (Wilton 2005, 143; Levinson 2008, 4; Small 2000, 3; Sessions 2009, 5), a lack of planning (Levinson 2008, 1), insufficient testing of software (Baase 2003, 155), and the large sized teams involved in many ICT projects (Genova, Gonzalez, and Fraga n.d., 6; Holmes 2006, 163).

We can imagine that a regulated ICT profession would introduce measures intended to address each of these risks, however further mistakes and failures are likely. Charles Perrow (1984, 5) argued that most high-risk technologies have characteristics which make accidents inevitable; in fact we might even consider these accidents "normal". Perrow identified two characteristics which lead to 'normal accidents', technological complexity and rapid processing speed, and although his comments related to technologies such as nuclear power generation and marine transport of toxic chemicals, his ideas can be applied to computer systems since they involve the same two characteristics. Francis Small (2000, Section 9.1, para 4) reasoned similarly: "Risks cannot be eliminated altogether. Large IT projects can be extremely complex, and whilst generally accepted practice may be followed, some will continue to fail."

This analysis of the NZCS 'Trust the ICT Profession' argument supports the assumption that there is a need for trust in ICT work. A belief that the ICT industry is currently not sufficiently trustworthy is common within the industry, and is substantiated by my research findings, but the views of the public on this matter need to be clarified. The implication that the code of ethics will improve ethical behaviour and reliability of service is not confirmed. Certification may cause greater attention to ethical standards and quality of work, especially if legally supported, but will not eliminate the risk of project failure. If you are in hospital, codes of ethics and certification will not guarantee the safety of the X-ray machine.

3.5.3 Argument 2: Reduce the ICT Skills Shortage

The NZCS argument that an ICT profession will help reduce the skills shortage is threefold: (1) ICT work is poorly understood by the public and hence suffers from a lack of status, (2) These issues lead to people not choosing a career in ICT, resulting in a skills shortage, and (3) Professionalisation will raise the status of ICT work, and this will lead to more people taking up ICT careers. The argument proposes that a profession will *increase* the number of competent

ICT practitioners.[67]

This rationale is seen throughout the discourse. For example NZCS CEO Matthews (quoted in O'Neill and Paredes 2008, 1), described the skills shortage as "extreme, nine on a scale of 10" and reported that he had "talked to parents who would rather have their children do an accounting degree because they think it is more exciting than ICT". Similar comments from the NZCS were:

> We need to bring the relevance of ICT to the attention of parents. ICT is not seen as a credible career by parents. Parents aren't aware of $100,000 plus salaries. (Don Robertson, Auckland Branch Meeting, 27 February 2008)

> The community, and in particular, the parents of talented school students and potential entrants to the profession, must see ICT as a profession on a par with Law, Accounting, Medicine, Dentistry and Engineering. (New Zealand Computer Society 2008a)

> The link between the skills shortage and the lack of professional recognition of ICT as a profession (and consequent drop in ICT tertiary enrolments)… (New Zealand Computer Society 2008b, 6)

> There are huge shortages of IT people… We've got on the one hand a growing demand and on the other hand a diminishing pool of people being educated. I think the dot-com crash didn't help; for a while it was glamorous. I think amongst a lot of young people it's seen as a bit geekish… and they find other options more attractive. (Richard Donaldson, personal communication, 20 November, 2007)

When asked about the skills shortage, the (then) Minister of Communications and Information Technology, David Cunliffe, agreed with the NZCS argument:

> The profession does not have in the eyes of the public or in the eyes of potential students quite the mana that it deserves.[68] Now only an idiot would ignore the fact that the economy is going to need more IT professionals than it currently has, therefore demand will exceed supply, therefore incomes will go up. Now I'd be saying to my kids, this would be one of the smartest things you could be doing by way of training. But a lot of people don't have that impression and professionalisation might well help in the sense… You know how mums and dads say to their kids, look you could be a doctor or a lawyer or an engineer, and they've all got a certain cachet, but IT doesn't share quite the cachet, so I think building up a professional body a bit like engineering might well help…

References to insufficient glamour, mana, and cachet in these passages allude to a lack of

[67] For the purposes of this thesis I will accept that a skills shortage exists. Statistics New Zealand (2007b) reported that a serious shortage of qualified and/or experienced workers threatened New Zealand's ICT industry. A *New Zealand Herald* article (Bland 2007, 24) described the ICT employment market as "chaotic" and "under crisis", and the NZCS (2008b, 3) described the shortage as "reaching epidemic proportions". A survey of ICT recruiters in 2008 reported widespread difficulty in filling ICT vacancies (Department of Labour 2008). Between 2001 and 2006 a decreasing number of students enrolled for ICT qualifications (Ministry of Education 2006, Table ENR 40). As of 2010, many ICT occupations remain on the Department of Labour's (2010) Long Term Skill Shortages List.

[68] Mana is a Māori word that has become part of the ordinary language of New Zealand. In this context mana refers to prestige or status.

prestige associated with ICT work. However evidence for the argument that professionalisation will be a solution to the problems of lack of public understanding, lack of status, and dropping student numbers appears to be anecdotal. NZCS has not provided data to demonstrate a connection between status and the career choices of young people, or to support the claim that public understanding of ICT work is poor. However the omission of ICT work from the *New Zealand Reader's Digest* (2008; 2010) Trust Surveys indicates a general lack of profile in the community.

The issue of status is an important sociological concept which requires further analysis. It is also associated with the matters of exclusion and monopoly identified briefly earlier. Collectively these factors relate to systems of social stratification.

3.5.3.1 Stratification and the NZCS Vision of Professionalism

Anthony Giddens (1989, 206) defined stratification as "structured inequalities between different groupings of people". Class and status are two systems of stratification relevant to the NZCS professionalisation project. Stratification would result in some groups within the ICT industry wielding more power and enjoying more rewards than others, and would also lead to a *decrease* in the number of ICT practitioners rather than the claimed increase.

3.5.3.2 Stratification by Class

Many ICT roles are highly skilled and they increasingly require a minimum of bachelor degree qualifications (Career Services 2011).[69] Further, most ICT work is well remunerated - the higher than average income for computing professionals was noted in Chapter 2.[70] The educational credentials and high salaries suggest that ICT workers constitute a Weberian professional class (Giddens 1989, 212). Since class is determined objectively (Giddens 1989, 212), a professional group is itself able to influence to a large extent the formation and maintenance of its class position. The introduction of certification, for example, has added a further credential supporting the professional class position of ICT work, as would accreditation of degrees. These steps constitute a form of "communal action" by a group sharing a common class aspiration (Weber 1948 (1991), 183). The NZCS is well satisfied, we may assume, with the class aspects of most ICT roles (notwithstanding the public's lack of awareness of them).

[69] Vendor qualifications such as MSCE (Microsoft Certified Engineer) and CCNP (Cisco Certified Network Professional) are acceptable alternatives for some ICT occupations.

[70] Further indications of high income levels in the computing industry include a report on the *TradeMe Jobs* website in 2008 which identified three ICT occupations amongst the top five highest paid professions in New Zealand (Computerworld Staff 2008), a report on the same website in 2011 which identified IT jobs as having the highest pay of all occupational groups listed, with a median pay of $85,000 (Trademe Jobs 2011), and a survey of IT employees in 2010 which reported a median total salary package of $78,000 (Watson 2010b).

3.5.3.3 Stratification by Status

Unlike class, achieving higher status is something NZCS has less control over. Parkin (1971, 30) noted that there is often a close correspondence between high earning and status, and Mills (1951, 136) drew attention to the high regard society typically has for educated skill and high income. NZCS leaders (and the previous Minister David Cunliffe) subscribe to these notions; the discourse reported earlier reveals a belief that more prestige is deserved because ICT work is both highly skilled and highly paid. The problem for NZCS is that material rewards do not always lead to privileged status: "Status honor need not necessarily be linked with a 'class situation'" (Weber 1948 (1991), 187). In addition, prestige cannot be asserted on one's own: "Prestige involves at least two persons: one to claim it and another to honor the claim" (Mills 1951, 239). The level of prestige awarded an individual or group of individuals depends on the particular status system of a society (Mills 1951, 239-240). For a status claim to be successful others in society must be persuaded that the people concerned belong in that social stratum; thus status is subjectively determined according to social perceptions. Prestige is a significant factor; besides influencing earning potential, it also influences how the public interacts with a profession (Hall 1975, 245).

Investigations into the status of occupations in other countries have either not rated ICT work very highly or have omitted ICT work altogether. For example, the Harris Poll (2009) asked the public to rate the prestige of a range of occupations but did not include any computing occupations. A different type of status assessment, the Socioeconomic Index (SEI), which linked occupational prestige with education and income levels, awarded "Computer Systems Analysts and Scientists" the 89th highest score out of 144 Professional Speciality Occupations (Nakao and Treas 1992, 24). Comparable figures are not available for New Zealand, nevertheless the NZCS appears puzzled that the status it believes is warranted has not been granted, and so to counteract this unsatisfactory situation is introducing a range of prestige-boosting, or usurpationary, measures: "The development of status is essentially a question of stratification resting upon usurpation. Such usurpation is the normal origin of almost all status honor" (Weber 1948 (1991), 188). At the same time, the NZCS is also introducing a number of exclusionary measures. Together these measures constitute a dual closure strategy which Parkin (1979, 102) has observed is a common feature of occupational groups seeking professional status.

3.5.3.4 Dual Closure: Usurpation

NZCS currently has several usurpationary actions underway. The code of professional conduct,

ITCP certification, and degree accreditation, in addition to strengthening the professional class position of ICT work, can also be considered 'badges of honour' befitting members of a high status group. The choice of the prestigious Auckland Club for NZCS meetings in Auckland, together with a tacitly followed formal dress code, presents a status-raising image of prosperity and privilege. Alignment with eminent organisations such as the BCS, the ACM, and IFIP, is also an usurpationary tactic based on the idea that prestige can be 'borrowed' from privileged groups (Mills 1951, 140).

3.5.3.5 Dual Closure: Exclusion

NZCS is also implementing a number of exclusionary strategies. The membership fee of $295 and event costs of around $45 exclude some younger and/or less wealthy people (and as will be discussed in Chapter 5, women are also excluded). A defined body of knowledge shared amongst NZCS members and used as a basis for certification and accreditation excludes all people without access to that knowledge. Certification could have the effect of excluding all non-certified people from at least some ICT work, including some current ICT workers, and can thus be regarded as an attempt to monopolise ICT employment opportunities and the provision of ICT services.

Recently NZCS was reported to be "looking forward to the day when the government sets an example by employing only certified professionals on its ICT projects" (Bell 2009a, para 1). The State Services Commission and the Ministry of Economic Development have reportedly both said "they will look to making it [certification] not a requirement for people but a preference for people that are contracting to do government work" (Matthews quoted in Bell 2009a). This policy would have a significant negative impact on non-certified practitioners, given that the government is the largest consumer of ICT goods and services with total expenditure of $1.73 billion in 2006 (Statistics New Zealand 2007a). The comment by Matthews (2009a, 9) that "it is expected that certified professionals, especially early adopters, will gain considerable competitive advantage over those that have not been accredited" echoes this theme. Likewise degree accreditation is a first step towards controlling the content of ICT education programmes, and to controlling and limiting the number and type of ICT education providers and students. In combination, these measures are more likely to decrease rather than increase the number of people working in ICT.

Another exclusionary strategy is to separate ICT occupations into two categories, professional and para-professional (or technical). The *ITCP Certification Model* (Matthews 2009a, 10) includes this separation and serves to disassociate 'high level' occupations from others deemed

merely 'technical level'. This ranking of occupations featured in my brief discussion with the NZCS President when he judged UPANZ members to be beneath professional level (page 46). A number of official NZCS statements reiterate this position:

> Basically, 'ICT' has an image problem. There is a clear line between a practitioner and a professional in most other professions…. [for example] there is a difference between an Accounts Technician and a Professional Chartered Accountant (Matthews 2008, 4).
>
> Certification will "clearly define an 'ICT professional' (as distinct from a para-professional)" (Matthews 2008,4)
>
> The Certification Programme will be designed to rank ICT professionals… (Matthews 2008, 6).

These recent moves to exclude particular sections of the ICT community echo similar actions in the past. After the rapid uptake of personal computers in the 1980s, NZCS decided that the new breed of computer hobbyists would not be allowed to join the society. As one long-time member recalled at the NZCS Auckland Branch meeting I attended in 2008:

> Do you remember 1983, when we had to decide if we would allow PC people to join the society? And how, when we said no, they all went off and formed the Auckland Computer Club and became much more successful than us? [71]

It seems that this decision backfired in terms of future growth of the society. Denied access to the NZCS, hobbyists quickly banded together and formed their own clubs. The November 1982 edition of *Bits & Bytes* magazine listed 32 micro-computer clubs in the 'Club Contacts' section, and by November 1983 this number had grown to 79.[72] During 1981-1987 around 25,000 adults attended community education 'general interest' computer courses, and by 1984 there were 100 user groups around the country (Bibby 1989, vi). At the time NZCS membership was around 2500 (Robinson and Williams 1985, 192).

The dual closure activities by the NZCS have served to exclude women and people who are young, non-white, or not wealthy, even if this was not a deliberate strategy. We may presume that a homogeneous group of aging, wealthy, white males at NZCS meetings is not appealing for people who do not fit that profile. The Auckland Club is likely to intimidate some potential members and may be considered pretentious or culturally inappropriate by others. Parkin (1979, 95) believed that exclusionary criteria are never arbitrary and would not be surprised to find

[71] PC= personal computer. At that time most NZCS members would have been employed by companies using mainframe or mini computers.

[72] Bits & Bytes was one of the first magazines for personal computer enthusiasts printed in New Zealand. It was published monthly (except in January) by Neill Birss and Paul Crooks of Christchurch. The first issue appeared in September 1982.

women and ethnic minorities excluded from NZCS, since both these groups have previously experienced state-sanctioned marginalisation: "The groups singled out for exclusion by the labour movement of the culturally dominant group are therefore those that *already* suffer the disabilities of marginal political status" (Parkin 1979, 96). Although the state may no longer condone overt discrimination against women and ethnic minorities, these groups remain vulnerable to the closure practices of white men. For example, members of ethnic minority groups may have fewer resources to obtain necessary credentials, and women may be disadvantaged in career progression or salaries, regardless of equal pay legislation and equal opportunity policies.

The NZCS professional claims are not surprising. Status is, after all, usually considered highly desirable, and as Goode (1957, 195) noted, "professionals stand at the apex of prestige in the occupational system". Consequently it is worth noting Mills's (1951, 249) comment regarding 'status proletarianization': "If everybody belongs to the fraternity, nobody gets any prestige from belonging." Now that computers are ubiquitous and all computer users are loosely connected to the ICT industry, it is likely that any prestige associated with early computer work has diminished.

The specialised knowledge of a profession often has an element of mystique (Horobin 1983, 89; Hughes 1963, 655; Jackson 1970, 7; Wilensky 1964, 149; Toren 1975, 329; Lortie 1969, 14; Larson 1977, 237), and this was particularly true of computing in the early days. Weizenbaum (1976, 124) likened computer programming to entering a "magical world", and Kraft (1977, 64) noted that computer work was often thought to have a magical quality: "It was not so long ago that programmers were made out to be a tribe of magicians who performed mysteries hidden from the understanding of ordinary human beings." It is likely that practitioners benefited from the mystery surrounding early computer work by accruing status associated with the unknown.

Although my research participants did not speak of magic, several of them described choosing IT work because it was 'special', only to later lose that feeling of 'special-ness'. Kelly chose a programming career because of its uniqueness:

> It was a programmer I wanted to be… Now programmers are a dime a dozen and anyone can become a programmer, but in those days it was quite different and I think I wanted to do something different, a bit specialised.

Tim lamented that IT work used to be "better paid than lawyers and accountants and people like that [but] it's now become an ordinary job, it's not special anymore".

Similarly Luke noticed that as IT work became more commonplace the rewards reduced:

> I think that there were some high rewards that have disappeared. It think it's become more mainstream, and as it's become more mainstream then its been seen to be not so rare a commodity so therefore those high rewards are maybe not seen so appropriate anymore.

Bob was regarded as a 'guru' in the early 1980s and enjoyed having skills and knowledge others didn't have:

> I was the spreadsheet guru… I had to build all kinds of macro-driven spreadsheets for senior management... I was the guy who knew things.

A loss of status associated with the proliferation of computers may partly explain NZCS efforts to (re)gain status. President Don Robertson's (cited in Bell 2008b) comment that "ICT's professional status needs to be emphasised – not downgraded as a result of computing becoming pervasive" supports this reasoning. The impact of a loss of mystery associated with ICT work is further explored in Chapter 4.

3.6 Chapter Summary

This chapter has demonstrated that recent professionalisation activities of the NZCS stem from a strongly held belief which first originated around 1960 amongst a core group of NZCS members that ICT work deserves to be recognised as a profession. A commitment to achieving the goal of a regulated profession has shaped the actions and practices of this core group since 1960. Strategies adopted exhibit a traditional trait-based notion of the professions which aim to mirror professional structures adopted earlier by the engineering professional body IPENZ. With the accumulation of resources since 2008, NZCS has been able to implement professional structures more quickly than previously, and the professionalisation project has sped up.

Brint (1994, 8-10) has argued that newer 'expert' or 'specialist' professionals seldom acknowledge any societal responsibilities, yet the NZCS claims for an ICT profession rest on two arguments which masquerade as public good undertakings. The 'Trust the ICT Profession' argument, based on the notion of risk, holds that structures such as certification and degree accreditation will increase the trustworthiness of the industry. The 'Reduce the Skills Shortage' argument proposes that increased status will lead to a larger and more competent ICT workforce. Both arguments legitimate the exclusion of 'cowboys', amateurs, and anyone else who NZCS deems unsuitable. Goode (1960, 904) noted that it is common practice for emerging professions to make claims to certain levels of competence and behavioural standards, and then "label those outsiders who fall short of these levels and standards as 'charlatans'". In the case of

NZCS it is not just charlatans who are to be excluded, but also people in ICT roles classified as ‘technical’ – web designers are a likely example. The dual closure strategies employed could lead to a decreased number of ICT practitioners, as well as privileged access to ICT work for NZCS-aligned practitioners. However before this happens, NZCS faces some serious hurdles in its efforts to institutionalize an ICT profession. These are discussed in the following chapter.

Chapter 4 – Legitimation

"Legitimation justifies what professions do and how they do it" (Abbott 1988, 184)

4.1 Chapter Overview

Chapter 3 described the NZCS professionalisation activities since 1960 and examined the arguments put forward to support these actions. Collectively the steps comprise a strategy which, as Hall (1979, 125) observed, is common to aspiring professions: "As professions seek to survive, and even prosper, they construct a reality about themselves which they hope will be accepted by their environments." The occupational group must be recognised as a profession both subjectively (members believe themselves professionals) and objectively (others consider them professionals) (Millerson 1964b, 9). A professionalising group thus seeks legitimacy, or acceptance of the moral rightness of its claims, and this provides a "mandate" or "license" for a range of professional freedoms (Hughes 1963, 656-657). Since professional claims around ICT work are unlikely to be recognised as inherently legitimate in the manner Abbott (1988, 185) noted was the case for medicine, NZCS will need to secure legitimacy of its professional claims in several relevant arenas, including the wider ICT industry, the public arena, the state, and most importantly, within its own organisation.

Legitimacy paves the way for professional autonomy, a characteristic Freidson (1970b, 134) defined as having "control over the content and the terms of work". Autonomy, or control of work, is often thought to be the distinguishing characteristic of a profession (Abbott 1988, 84; Johnson 1972, 45; Freidson 1970b, 134; Elliott 1972, 151; Freidson 1970a, 83). Abbott (1988, 59) referred to claims to autonomy as jurisdictional claims, full settlement of which is the ultimate aim of most professionalising groups. Settlement requires state confirmation of the claims, but jurisdiction must first be successfully negotiated in the public arena (Abbott 1988,70-71). Occupations may evolve into professions if they are able to effect and maintain jurisdiction, for example by controlling education for the profession and administering licensing or by shutting out competing occupations (Abbott 1988, 8). Professionalising groups must also be able to control the "abstract knowledge" which underpins professional practical skills (Abbott 1988, 8). To establish an ICT profession, NZCS will need to secure control of ICT work.

This chapter comprises two sections. The first reports on the progress achieved thus far towards successful legitimation of the professional claims by considering each of the arenas identified

above. The second considers barriers impeding progress towards the control of ICT work.

4.2 Legitimation of Professional Claims

Legitimation of professional claims may be achieved by various means, including professional authority (Halsey 1970, 25), charismatic authority (Weber 1948 (1991), 245), and cultural authority (Abbott 1988, 16; Brint 1994, 35). NZCS efforts to establish legitimacy by exerting professional authority (whereby claims are legitimated by the professional group asserting them to be so) were outlined in Chapter 3. Charismatic authority and cultural authority also feature in the ICT professionalisation project, and are considered in the following sections.

4.2.1 Charismatic Authority

Professionalisation requires change, and as Steven Seidman (1998, 79) observed, the power of change is manifest in Weber's charismatic authority. The notion of charismatic authority underpins Marie Haug and Marvin Sussman's (1969, 58) contention that professionalisation is fundamentally a marketing exercise:

> 'Selling' the newly-minted profession to the general as well as to specialized publics. Here the profession must take on some of the quality of a social movement, with charismatic leadership, and a dedicated membership, for the sales pitch is essentially ideological.

Weber (1948 (1991), 245-247) described a charismatic leader as someone who, through their determination and inner strength, inspires followers to unite in striving for a certain vision, including a vision relating to an occupational group. For an occupational group seeking professional standing, a charismatic leader can help legitimate professionalisation activities.

The current leaders of NZCS, the President and the CEO, both of whom demonstrate unmistakable passion, commitment, and determination, are utilising aspects of charismatic authority in their campaign to achieve their vision of an ICT profession. Charismatic leadership is important for NZCS as it has the potential to inspire approval of the worthiness of the vision amongst members, the government, the public, and ICT practitioners who are currently not members of NZCS. One risk for NZCS, however, is that charismatic authority is intrinsically unstable, and can diminish or even disappear if the loyalty of followers is not retained (Weber 1948 (1991), 248-249). Whether NZCS is able to boost, or at least maintain, support for the professionalisation project over the next few years will in part be a test of the charismatic power of the leadership.

4.2.2 Cultural Authority

Professions may also legitimate their claims by establishing cultural authority for their work; by demonstrating the alignment of their expertise with culturally endorsed values such as rationality, efficiency, and science (Abbott 1988, 16). Many scholars have noted that professions exploit the primacy of science and knowledge in modern society (Parsons 1939, 459; Larson 1977, 242; Wilensky 1964, 138; Rueschemeyer 1983, 52; Elliott 1972, 41). More recently Brint (1994, 8) proposed that professional legitimation increasingly rests on the "virtual unquestioned legitimacy" of expert knowledge in post-industrial societies, especially expert knowledge in the applied science and engineering disciplines. Similarly Leicht and Fennell (2001, 25) noted the social power awarded to professionals, in particular "those who produce knowledge (especially science) and use it (in technology) over those who have no such knowledge and perhaps both need and/or fear it".

Abbott (1988, 145) observed that "the rise of technology embraces a technological frame of mind, one that insists on measuring its world". ICT work epitomises this technocratic ideology, further characterised by veneration of objectivity, knowledge, science, technology, and rationality. As a result, establishing cultural authority for ICT work should be a straightforward task. The NZCS argument that society's dependence on computer technologies necessitates an ICT profession is a claim based on cultural legitimacy.

4.3 Challenges in Establishing Legitimacy of ICT Work

Findings from this research suggest that legitimacy of claims for an ICT profession will not easily be established in any of the arenas identified earlier. Discussion of each arena follows.

4.3.1 NZCS Members

The need for solidarity and stability for an occupational group aiming to become a profession, and the "solidaristic" tactics typically employed as part of usurpationary closure activities (Parkin 1979, 98) were discussed in Chapter 3. When solidarity exists, professionalisation is typically the result of "collective volition"; the members of a professional body fully support the professional project (Leicht and Fennell 2001, 9). Abbott (1988, 83) additionally commented that professions require a strong national organisation in order for public and legal claims to be met, and since this appears to be the case for the NZCS, we might conclude that legitimation should be most easily achieved within the ranks of the NZCS. On the contrary, this research has found a lack of solidarity within NZCS and my findings align more closely with those of Wilbert Moore (1970, 160-161) and Robert Perrucci (1973, 183) who observed that professional

associations are often disunited, and are particularly so when not all members are supportive of "bread-and-butter professionalism" (Gilb cited in Moore 1970, 161). Disunity and patchy support for professionalisation activities have been, and continue to be, a feature within NZCS.[73]

The second President of the NZDP&CS,[74] Bernard Battersby (1984), recalled in his oral history interview that by 1965 a debate had arisen whether the organisation should remain an association of computer enthusiasts or become a professional society. The debate heightened at the society's 1968 conference where some people did not support the idea of a professional organisation, and others doubted that computer work involved any professional skill (Battersby 1984). Nonetheless Battersby was given the mandate to move the society to a professional structure, and "from then on people saw themselves as full-time professional computing people" (Robinson 1984). These early concerns dwelt on whether a professional organisation *should* be encouraged. More recent concerns, for example doubts expressed at the NZCS 2008 Auckland Branch Meeting I attended, focussed on whether a profession *would* ever eventuate; not surprising after there being little progress towards a profession in 50 years.

A recent survey of NZCS members indicated a high level of support for the notion of professionalism, with 83% of respondents selecting "developing professionalism in IT" as one of the main roles of the society (New Zealand Computer Society 2008d, 5). In contrast, the most common main reason for joining the organisation was "networking opportunities" (64%), rather than "agree strongly with the Society's stated aims" (29%) (New Zealand Computer Society 2008d, 12). This is unsurprising, after all we would expect most members to join for self-interested rather than altruistic reasons, and does not necessarily indicate disunity. However, it does suggest that most 'ordinary' members may not share the leadership's passion for the professional project.

A lack of agreement amongst NZCS leaders about important matters relating to professionalisation does indicate disunity. For example, the NZCS National Council was reported to have a "North-South" divide both geographically and philosophically, with Northern councillors being more open to change and more willing to collaborate with other ICT

[73] In 2010 the NZCS has a Head Office in Wellington and five branches across the country – three in the North Island and two in the South Island. Since 1991 the society has operated under the rules of an incorporated society, with governorship being the responsibility of the National Council (which consists of the President, Deputy President, and five branch representatives). Operations are managed by a small group of employees in the Head Office under the leadership of the CEO. The society's Executive, a triumvirate consisting of the President, the Deputy President, and the CEO, is the core leadership team. The Wellington branch is described as the "most active branch" (New Zealand Computer Society 2009b) and Wellington could be considered the seat of power of the organisation.

[74] As noted in Chapter 3, the NZCS was first known as the NZDP&CS (page 48).

organisations than their Southern, more traditionally oriented, counterparts (Bell 2007d).[75] The division manifest in a debate over whether the NZCS Council should consult with members on the advisability of NZCS joining the Government's new (in 2004) industry umbrella body *ICT-New Zealand* (ICT-NZ) (Bell 2007d). This split lead to the resignation of a long term Northern Council member who objected to members being denied a referendum (Bell 2007d), and the eventual resignation of CEO Doug White (Bell 2007a).[76]

One of my research participants and long-time member of NZCS, Eric, described another incident indicative of disunity. The Northern branch (Auckland) planned to hold 'grass roots' events for students to encourage interest in NZCS, but the Head Office (Southern - Wellington) insisted on controlling these initiatives to ensure their 'professionalism', which meant they did not eventuate.[77] These incidents are reminiscent of the "bickering" Larson (1977, 227) noted is common within professions.

Very few of my research participants are (current or past) members of the NZCS, but amongst the small group who are, professionalisation was mostly endorsed. Keri's response was representative and demonstrated considerable familiarity with NZCS claims:

> I think that it [ICT work] has not grown as a profession as fast as it should have, and by a profession I mean that standards are met and that ethical practices are put in place. I think that we've been around long enough now that we should be where the accountants or the engineers … are with their professional bodies. I think that the Computer Society and the work that it's been doing in the last year is a real step in the right direction. I think that there is a general acceptance now that … we need to have professional certification, and that we need to start looking more like a profession than a bunch of cowboys.

Support was not unanimous though. One long-time member, Ralph, was not supportive of regulation, which he believed would be introduced as an inevitable, politically-driven, knee-jerk reaction to some future disaster. This would stifle innovation whilst failing to ensure safety, he maintained:

> Eventually, one day someone will bang two 747s together because they left a comma out of a computer programme, or a lethal supply of fluoride will get squirted into the water. Already people have been killed by computers … but none of them have caught the public attention. Eventually someone will make a mistake which gets big publicity at that point the

[75] In Bell's article "Northern" refers to Auckland, and "Southern" refers to Wellington and South Island centres.
[76] ICT-NZ was a forerunner to the current industry body NZICT identified in Chapter 2. The New Zealand government formed ICT-NZ in 2004 in an effort to unite the ICT industry. ICT-NZ aimed to become a single national organisation which would develop, grow, promote and represent ICT people, ICT companies, and the ICT industry in New Zealand (ICT-NZ 2005). But the organisation did not thrive as intended, partly due to concerns that individual organisations would lose their identity if they joined, and towards the end of 2007 when ICT-NZ had failed to establish its position, it was clear the organisation would not survive. In November 2007 the NZCS withdrew support for ICT-NZ, and the government announced that ICT-NZ would be superseded by a new organisation in 2008 (Bell 2007b).
[77] Eventually, around 2 years later, they did eventuate, under the control of Head Office.

> politicians will say we must make changes to ensure this never happens again. And they'll bring in licensing and it won't make any difference, the disasters will still happen because they do happen and they won't happen at any less rate, but you know the political thing is 'we must do something'…
>
> When licensing and regulation happen ... the IT industry will lose most of its drive and slow right down, and countries like NZ and America which will have those things will lose out to places like India and China that don't. We'll be bypassed and we'll lose the leading edge.

David (an ex-member) was similarly sceptical, citing the taxi and building industries as examples of regulation that failed to achieve standards:[78]

> I think about the taxi industry. Theoretically there are standards for taxi drivers. I use taxis a lot. I can tell you there is no consistency across taxi drivers … But whether you could get to the point of having… an equivalent of the Master Builders Association for the IT industry, I think that would only be a benefit to the consumers if those organisations had some teeth. And what I see happening from the Master Builders Association, you take this leaky homes thing, there is a complete culture of denial and non-accountability going on there.

While Ralph and David are dubious about the effectiveness and consequences of imposed regulation, they may be more supportive of individual responsibility and personal commitment to standards. This was a possibility I did not explore.

Ralph and David are representative of the majority of members who joined the society for networking opportunities:

> I joined NZCS fairly early on because I figured that it was good to be able to get the continuing education things. Even more than that, it's just the regular meetings you get to mix with others in the same area and talk about things; it's very beneficial … You hear the war stories, things that worked and things that didn't work. (Ralph)
>
> The purpose it served for me at the time was it was principally a way of networking, being able to share information, to touch and sort of outreach to other people in industry and understand what they were up to and how things were working. (David)

Others may have joined because their employer paid their membership fee; for example Sharon was a member, but left when her employer ceased paying her subscription. Approximately 31% of NZCS members had their membership fee paid by someone else (New Zealand Computer Society 2008d, 13).

These findings provide some evidence that commitment to an ICT profession is not strong amongst all NZCS members and that some tensions within the organisation exist. The leadership's attempts to legitimate claims through professional authority have not (yet) been successful, perhaps due to a lack of charismatic authority. Unsurprisingly, many members have

[78] David and Ralph's comments are consistent with Perrow's (1984) notion of "normal accidents" discussed in Chapter 3. The failure of regulation to prevent 'leaky' homes was considered on page 77.

joined the organisation for utilitarian reasons rather than professionalisation. Nevertheless, the leadership is proceeding with the professionalisation project in the oligarchic manner Moore (1970, 160-161) noted was common to professional bodies.

4.3.2 ICT Practitioners (Non-members)

Professional claims would ideally be legitimated amongst all ICT practitioners, but practitioners who are not (current or past) members of NZCS are likely to be either unaware of or unsupportive of the professionalisation project. My research has found little support for the NZCS as an organisation amongst this group, as would be expected amongst non-members, but some support for professionalisation.

In an article in *Computerworld* Bryan Dollery (2002) surmised that very few of the readers (mostly ICT practitioners) would contemplate joining the NZCS: "How often do you think of the New Zealand Computer Society? I'm willing to bet that the vast majority of you rarely, if ever, think about it at all." Dollery was referring to the difficulty NZCS has had attracting members over the last 10 to 20 years. The early support for the society was outlined in Chapter 3; for example in 1968 membership of the society totalled approximately 30% of the computing workforce.[79] But by 2006 this figure had dropped to around 13% or perhaps even less than 2%.[80] By 2008 the number of individual members was 1485, or approximately 3% to 4% of the ICT workforce (New Zealand Computer Society 2008d, 4). These low membership rates are consistent with computing professional bodies elsewhere (Holmes 2006, 147).

One of the reasons for there being limited interest in NZCS amongst practitioners is the large number of ICT associations in New Zealand; more than 90 were reported by ICT correspondent Stephen Bell (2008b).[81] The large number of associations is not uncharacteristic – Abbott (1988, 79) pointed out that mature professions "typically have hundreds of professional associations" – but does partly explain the description "fragmented industry" which is commonly applied to New Zealand's ICT industry (Bell 2007d). Some of the rival associations are flourishing. For example, journalist Ulrika Hedquist (2008) found that the Auckland 'Web Meet-up' regularly has around 200 (mainly young) web developers attending the monthly meetings (out of 450 members). A poll taken at one of these meetings found that only three attendees also belonged to the NZCS and only two to Software New Zealand, leading Hedquist (2008) to question

[79] Calculation based on NZCS membership of 730 (Battersby 1968, 12) and a computing work force of around 2500 in 1968 (Beardon 1985, 11).
[80] Calculation based on NZCS membership of 7716 (T Bailey, NZCS, personal communication via email 28 November 2006) and 59000 total ICT workforce in 2006 (Statistics New Zealand 2008a). If only the 716 "professional grade" members (T Bailey, 28 November 2006) are included for 2006, the 13% drops to 1.6%.
[81] As Bell noted, only NZCS claims to be the professional body.

"whether these bodies are fulfilling their purposes". Young, entrepreneurial developers, are particularly disinterested in joining the formal IT lobby groups such as the NZCS, she concluded, a remark consistent with Perrucci's (1973, 181) observation of dissatisfaction amongst young members of professions.

Most of my participants have never belonged to NZCS, and I wanted to find out the extent to which these people were aware of the NZCS and their reasons for not belonging.

The majority had some awareness of NZCS but had decided against joining, choosing instead an association more relevant to their work. Julia gave a typical response:

> I have heard of NZCS but I haven't joined. I know a couple of years ago I went around all the organisations, or many of them, trying to work out who was who, and who was doing what… UPANZ was more relevant for me and I belong to the IAI as well. [82]

For Linda, enjoyment was as important as relevance:

> I have [heard of NZCS]. I've actually been along to one of the talks… and I wasn't very impressed with the value I got out of it. I'm a member of the PMI… I love to go to their seminars. Even though I've moved out of PM, a lot of what they do … really applies with what we do here. [83]

Others did not belong to any other organisation, and they offered a range of different reasons for not joining NZCS. Bob believed NZCS was: "More like a money making exercise than a real effort to control the profession." Tim suspected NZCS would attract geeks: "No, never really thought about it … Now that's where I've got an interpretation of smoke filled rooms and geeky looking guys talking about cutting code." Luke similarly has the impression that NZCS is dominated by representatives of the 'core' ICT occupations: "The organisation has really been about development and the industry is larger than that." Leyton admitted a personal dislike of such organisations: "I'm not someone who's into committees and societies in any part of my life, professional or otherwise." Pam was representative of several participants who claimed to be too busy to join NZCS (or any other industry body): "To be honest I haven't really considered whether I'd join any organisations, for me it's more a personal time thing." Mark thought the organisation has no identity:

> I'm very aware that probably for the best part of the last 20 years they've [NZCS] wanted to become the professional arm and watchdog … If somebody speaks on behalf of the Computer Society it's invariably somebody different every time, so there's no real identity built up.

A minority of participants, even a few who have worked in the industry for 15 years or more,

[82] IAI = Information Architects Association.
[83] PM = Project Management; PMI = Project Management Institute.

had either never heard of NZCS or knew very little about it. James, who worked for a very large IT company: "Wasn't aware of anyone who joined NZCS." Sam said: "I've heard of it, yes, but I don't know what it is. The name rings a bell." Asked about NZCS, Marion had: "No idea." Emma also had: "Never even heard of it. Wouldn't be at all interested in joining, well I might I suppose, it would depend on what it was about." John had: "Never really thought about joining." Kevin said: "I believe I've probably come across it and gone, oh yeah, cool, and moved on."

Having determined that there was little enthusiasm for NZCS amongst most of my participants, I wondered whether this would also mean there was little support for the notion of a regulated ICT profession.

Interestingly, some participants did approve of the concepts underpinning NZCS professional claims, despite being unfamiliar with the details. James believed that there needs to be a body which protects the public:

> We need to be very vigilant, we can't let the technologists have full rein. We can't use technology just for the sake of using technology; we've got to make sure that it's applied for the good of humanity as it were. And there will be cases when we have to say no. [AH: Whose job is it to say no?] One would hope the NZCS.

Bob thought that ICT work needs to be regulated as for other professions, but felt that NZCS doesn't have any 'teeth' to make this happen:

> I saw it [NZCS] as a sort of a club that didn't have any particular teeth to it. It doesn't have a set of guiding principles or body to set regulations as to what's good practice and what's proper behaviour. If you are a doctor, dentist, or engineer you have a professional body behind you and a set of expectations.

Some participants drew comparisons with regulatory bodies in other industries, although more positively than David had earlier. Kelly thought: "It's like a Master Plumber, someone who's accredited, if they belonged to an association and had some level of competence and it didn't work, you'd have some sort of comeback." Andrea was aware of the frailty of regulatory bodies: "It's like the Motor Vehicle Dealers' Association, they're not all perfect but it at least helps."

Leyton, who dislikes formal organisation, reluctantly concluded that accountability and credentials would eventually become mandatory:

> I guess that [regulation] is inevitable. Just like it has been in engineering, because people probably should be held accountable and should be only employed to do the job if they have the credentials.

Sam wondered why professional certification is necessary when there are already many vendor

certification options available, but did think that certification should be required by law:

> There are a lot of certifications already and that may be part of the reason why no particular one has dominated … So you have MSCE for example, and CNN, which have very high standards… I think they're a good idea generally. The only real problem is unlike with law, you can still get someone who doesn't have them; you can always get any old guy who can pull a network cable out and plug it in again somewhere else, and fiddle around with it. There's no legal requirement anywhere along the line.

Although unsupportive of the professional body, these participants were unwittingly supporting the 'Trust the ICT Profession' argument discussed in Chapter 3.

In contrast, an equal number of participants were not supportive of professionalisation. Tim questioned the need for regulation, believing that in comparison to engineers, IT workers have little potential to cause harm (thus challenging the 'Trust the ICT Profession' logic):

> You can see why engineers are regulated because there is a real public harm component; so you've got a bridge and when it collapses third parties are very badly impacted. I think the IT industry is a lot more buyer beware, so if the government chooses to buy an INCIS computer system that costs it millions and millions of dollars and doesn't actually deliver, although there is some harm done … the general public is not directly harmed and lying under the bridge in pieces.

Tim also felt that established vendor certification options make NZCS certification superfluous:

> MSCE and CISCO CE have been given a lot more credibility in the market as a gold standard rather than the Computer Society which doesn't seem to be that relevant. [84]

Some participants thought that implementing certification would be hopelessly difficult in such a fast-paced and varied industry. Mark commented: "The business is so diverse and covering such a range, I don't think they [NZCS] will succeed in being the voice of IT." Similarly, Julia said: "There are so many ways you can become a usability consultant, or web designer, or IT fixer-upper, or business analyst, I'd say it's about impossible", and Emma noted that credentials would quickly become outdated:

> That would be quite hard to do because the industry moves so fast and the technology moves so fast ... It would mean that any assessment would have to be updated all the time to keep up… Otherwise you'd be being tested on stuff that was two years out of date which is like 200 years as far as web stuff is concerned.

Luke recognised a problem on behalf of "the older ones in the industry". He suspected the certification criteria would be too onerous for this group: "It's really difficult to transition from the position we've been in to a totally certified environment, and that transition, often in my experience,

[84] Tim and Sam's comments reflect the confusion between professional certification and technical (vendor) certification which I found to be fairly common in the industry.

people don't think of." [85]

Finally, of all my participants, Sam was the only one to detect the exclusionary nature of certification: "Where you could exclude people on the grounds of not having the right qualifications, so to speak?"

These findings indicate that legitimation of professional claims amongst the wider pool of ICT practitioners has not been achieved; there is no universal subjective recognition that computing work constitutes a profession or that a profession is necessary. The great majority of ICT workers I interviewed were not interested in the NZCS or its professionalisation activities, or were too busy to become involved. Most practitioners, if they join any ICT association at all, would rather choose one directly related to their work, and since these organisations work in a manner which the NZCS CEO described as "siloed" (Hedquist 2008), any attempts to bring these groups together will have difficulty. Neither charisma nor professional authority has established legitimacy in the arena of ordinary ICT practitioners.

4.3.3 The State

Freidson (1970a, 80) described professionalisation as a "political process" involving a number of strategies employed by an occupational group to advance its interests. For the professionalising group, the most important strategy is arguably to seek legal recognition for the profession since this typically provides privileges such as monopoly of service provision, legal protection of title, control of licensing, regulation, and education for the profession, and the right to discipline defective practitioners (Carr-Saunders and Wilson 1933, 352-419; Berlant 1975, 302-305; Pavalko 1971, 23; Greenwood 1957, 49; Larson 1977, 223; Freidson 1970b, 83; 1970a, 44). Legal endorsement also confers power (Goode 1969, 269; Hall 1975, 70; Greenwood 1957, 48) and status (Mills 1951, 138), as well as respectability and economic advantage (Brint 1994, 34). Collectively these freedoms and privileges constitute professional autonomy. Given the benefits of state legitimation, it is not surprising that political campaigning to seek legal protection is a common feature of exclusionary closure (Parkin 1979, 98) and has occurred regularly throughout the history of occupations (Goode 1969, 275; Caplow 1954, 139-140; Greenwood 1957, 49; Wilensky 1964; Carr-Saunders and Wilson 1933, 305; Mills 1951, 139; Barber 1963, 677; Pavalko 1971, 22).

For the state, legislation may be seen as having the potential to close any gap between

[85] Here Luke is reflecting a comment by Barber (1963, 677) that "grandfather clauses" often need to be provided for older members resistant to professionalisation. In fact the NZCS certification model provides a "fast-track route" for established ICT practitioners working at a senior level (Matthews 2009a, 22).

professional ideal claims and actual professional service (Gilb cited in Moore 1970, 59; Millerson 1964b, 31; Brint 1994, 34). In awarding autonomy, the state expects that the public interest will be upheld through high standards of ethical conduct and professional service (Watkins, Drury, and Preddy 1992, 50). However, the state is also in a powerful position to block professionalisation efforts (Klegon 1978, 272) and in recent years there has been a marked reduction in state sponsorship of the professions (Kritzer 1999, 725).

This model of the profession-state relationship places the state in a passive, "reified", and omnipotent role from which the aspiring profession actively seeks favour (Fielding and Portwood 1980, 24-26). The state may, if it stands to benefit, decide to sponsor the occupation in achieving professional goals (Mok cited in Fielding and Portwood 1980, 26). In this respect, professions may be regarded as dependent on the state (Larson 1977, 53). But the state sometimes plays a more active, "maintenance" role, for example in providing a steady pool of clients (Fielding and Portwood 1980, 27). Furthermore, the state is not a single entity and comprises administrators and politicians both nationally and locally, and professions may develop relationships with any or all of these entities (Fielding and Portwood 1980, 27). Thus the profession-state relationship can take many forms: "While all professions are related to the state, and for the majority this relationship is crucial, the form it takes varies considerably" (Fielding and Portwood 1980, 26). Moreover, the state's role in legitimising professional work is not static (Abbott 1988, 166). Johnson (1982, 207) concluded: "The relationship of state to professions presents itself as one of constant struggle and seeming hostility while at the same time constituting an interdependent structure."

Political agitation for professional recognition of ICT work has occurred elsewhere, usually unsuccessfully. For example, Wanda Orlikowski and Jack Baroudi (1989, 17) described persistent but unsuccessful lobbying for professional status by Information Systems bodies in the USA, with one court ruling stating that programmers were "ineligible for classification as professional". Later, John Knight and Nancy Leveson (2002, 87) argued that software engineers should not be licensed in the manner of professional engineers, despite this happening in some parts of the USA and Canada (McConnell and Tripp 1999, 16). In 1984, the *British Computer Society* (BCS) opted for Royal Charter status (rather than legislation) to secure professional standing, and in 2004 created the rank of *Chartered IT Professional* (CITP) (British Computer Society 2010).

In Chapter 3 we saw that the NZCS has periodically considered the possibility of a legally sanctioned ICT profession, although recently CEO Matthew (2009b, 2) commented that it would

be some time before this is pursued. But it is also clear that legal regulation, identified as the final (fifth) level in the Professional Maturity Model to which the NZCS aspires, remains the ultimate goal (Robertson 2008, 7). Findings from this study suggest that state legitimation of an ICT profession by legislation in New Zealand is unlikely.

In 2008 I interviewed (separately) the President and the CEO of NZCS, and enquired into the association's plans for legal mandate. President Don Robertson replied somewhat ambiguously, commenting that whilst a traditional-type profession is needed, legislation would best be avoided due to public dislike of government 'meddling':

> We need to make ICT into a profession just like law, medicine, architecture, and so on. So the ultimate goal of this [certification] and the IFIP is to get an international profession in place … [AH: Does certification require legislation?] No, it doesn't. Legislation takes 5 to 7 years. [AH: Is that part of the vision?] We looked at that a while back and thought we possibly could do that, but that's a big task … We looked at New Zealand and said if we went in and got it legislated we'd get a fair bit of resistance because us kiwis [86] hate mandatory legislative stuff and government controlling our lives right? So we said, if we can do this properly we don't need to get it legislated...

The ambiguity was resolved by CEO Paul Matthews who revealed the strategy. The first step will be the introduction of chartered status under licence from the BCS, and then once the notion of a profession is firmly embedded, legal sanction will be sought:

> An act of parliament … is quite a long process; you're probably looking at a minimum of 4 years. So one of the options NZCS is looking at is circumventing that process and bringing the chartered status to New Zealand without having to go through the legislative process initially. And then once it's established and becomes accepted, assuming it becomes accepted by the sector as a whole, then you can look at the legislative backing. We're not looking at legislative backing over the next 1 to 2 years.

To investigate government support for an ICT profession, I questioned two incumbent Ministers of Communications and Information Technology and one ex-Minister over the period 2008 to 2010.[87]

In 2008, the (then) Minister, David Cunliffe (Labour), claimed to be open-minded about the possibility of a legally mandated ICT profession, and explained (perhaps implying some connection) that he had previously supported legislation for the engineering profession:[88]

> It's not a matter of government policy yet because we're waiting on proposals from the Computer Society and we will certainly look at those with a very open mind. [AH: You're not ruling legislative protection out?] No, no, not at all. I mean there's a chartered professional engineer's bill that I helped get through the House and we will do whatever we need to do to get a good idea through.

[86] Robertson was using a colloquialism by referring to New Zealanders as 'us kiwis'.
[87] In the November 2008 election a National government replaced the previous Labour government.
[88] At the time of my interview with David Cunliffe, ITCP Certification had not been established.

In response to my comment that NZCS has envisaged an ICT profession since around 1960, Cunliffe was circumspect:

> Mmmm hmmm, that's right. I'm not going to comment on the internal mechanics of a sector group. That is quite a long time. All I can say is that perhaps it's an idea whose time has come.

As noted in Chapter 3 (page 79), Cunliffe's primary concern was to address the lack of status affecting ICT work. He did not identify public safety as a possible concern requiring a 'professional solution'.

In 2010, the (present) Minister, Steven Joyce (National), responded in a guarded manner to my query regarding the likelihood of an ICT profession:[89]

> It is not presently a priority for the Government to establish through legislation a new ICT/computing profession along the lines of engineers or lawyers.

Joyce similarly chose to focus mainly on the status-raising benefits of ITCP certification, commenting that the government believes it will: "Help raise status of ICT careers, make ICT a more attractive career option, and improve the quality of ICT practitioners." He then noted that: "There are a number of initiatives underway aimed to develop and supply the ICT skills needed." [90] Joyce did not emphasise public safety and the need for risk minimisation as possible reasons for a profession.

Thus both Ministers were (predictably) guarded about their willingness to support legislation. They also both demonstrated support for the NZCS 'Reduce the ICT Skills Shortage' argument, but appeared to be unaware of the 'Trust the ICT Profession' argument, possibly due to a lack of understanding of ICT work.

Widespread ignorance about the nature of computing work amongst politicians was mentioned by one of my participants, Hilary, a prominent figure in the ICT industry:

> [AH: Can you envisage legislation establishing an ICT profession?] Not in the near future. Simply because most parliamentarians don't actually understand the difference between an IT practitioner and someone who's using MS Office on their desktop.

Ex-Minister Maurice Williamson (National, in opposition in 2008), who once worked in the computer industry, was well aware of NZCS certification plans and believed that: "What they are

[89] Steven Joyce declined my request for an interview in 2010 but did respond to one question by mail. This was: *Would the National government support legislation enshrining in law an ICT/computing profession (along the lines of the Engineering profession). Why or why not?*

[90] This was a set response which echoed the Minister's earlier letter to NZCS thanking the society for introducing ITCP certification (New Zealand Computer Society 2009a).

looking to do has some merit." But in contrast to Cunliffe, he did not see a correspondence between computing and engineering, and was unsure that the traditional professional model suits a 'new' occupation such as ICT:

> There are very few professions around today that are new. Doctors, dentists, lawyers, even engineers; they've all been around for some time. When I started at Auckland University in the early 70s they didn't even have an ICT programme… So it makes sense that you would want to treat it differently. This is something new, it's very recent.

This observation is in accord with Moore's (1970, 62) expectation that "latecomers to the professions" would not follow the same path as "earlier arrivals".

My conclusion is that neither a right nor left wing government would support legislation for an ICT profession in the near future. While the state has been willing to pass laws regulating some sectors, for example the *Real Estate Agents Act 2008* [91] (New Zealand Government 2008b), legislation enshrining a new profession would be a much bigger step. Cognisant of this fact, the NZCS is seeking to first embed the notion of a profession within the industry and consumers of ICT services, particularly lucrative government consumers, to smooth the way for future political lobbying.

My research did not investigate the relationship the NZCS has with local government, but I did enquire briefly into the relationship between the NZCS and the administrative sections of the state most relevant to the ICT industry. Earlier Paul Matthews had indicated that NZCS works closely with and has the support of two government departments which are major consumers of ICT services:

> We've got pretty solid backing [for professional certification] from government through MED and State Services, both have said that if they're comfortable with the way it's been implemented then they'll look to promote it across government. [92]

The Minister, Steven Joyce (2010), had confirmed this support: "The Government through the Ministry of Economic Development has supported the development of this programme [certification]."

However two key government officials I questioned about this matter were rather more muted in their support. Bradley Ward (telephone interview, 10 December 2010), Manager Digital Development, MED, explained that NZCS is one of the ICT organisations the MED is "obliged to consult with". He could not foresee "certification becoming mandatory" for government ICT

[91] This Act aims to protect the public in relation to real estate transactions and to promote public confidence in the real estate sector. It introduced compulsory licensing for real estate agents and an independent disciplinary process to provide accountability (New Zealand Government 2008b).
[92] MED = Ministry of Economic Development.

contracts, but would "look at the Computer Society along with other options". However he was supportive of improved standards: "Anyone who's trying to improve standards – that's a good thing." Brendan Boyle, CE of the Department of Internal Affairs and newly appointed New Zealand Chief Information Officer, is a member of the ICT Strategy Group, currently working to develop a 'roadmap' to outline how the government's *Directions and Priorities for Government ICT* can be realised. Boyle (telephone interview, 10 December 2010) explained the status of NZCS in relation to this project:

> We have dealings with lots of industry groups, there's no particular pecking order. NZCS are able to have any input they want… We are only too happy to have their input into the roadmap, [but] they're not formally part of it. NZICT has the same ability to participate in the consultation process.

These comments are not suggestive of enthusiastic backing of the professionalisation project.

Since professionalising groups require relationships with significantly powerful bodies in society in order to achieve state sponsorship (Klegon 1978, 274; Johnson 1972, 45; Larson 1977, 226), I wondered which bodies would provide that assistance for the NZCS. NZICT was a possibility, I initially thought, but CEO Brett O'Riley quashed that prospect. He explained that although his organisation "works closely with them, there's no formal tie-up", and added:

> I'm sure they would have a very strong view that there is an IT profession, and they're looking to underscore that with certification. And certainly I think that certification is useful in terms of demonstrating that someone has a capability, but I just don't know whether in the long term there is a profession in the same way that there is with, say, accountancy, just because of the diversity [of roles in the ICT sector].

The CIO of one of New Zealand largest companies was another possibility, I imagined. But when interviewed, Alex was not supportive of professionalisation, preferring individual responsibility instead. Regulations are an affront to personal integrity, Alex suggested:

> I'm not sure what they [NZCS] want to do. One of the things we've been really successful with is taking away traditional rules and regulations; we challenge the norm. If people have policies and guidelines and they know what's expected of them, but at the same time they're really supported well to do their job, without having to sign 20 different pieces of paper, or do a regulatory course; now don't get me wrong, if it's a regulatory course in say electrical, absolutely, safety is paramount, but do I want to put unnecessary boundaries and pressure on my team that they don't need? We're all adults; we're not children, we don't need to be treated like we're at school. People need to be treated with respect, and you have to make an assumption that people will operate with integrity and take action if they don't, and understand if it was deliberate or not, but don't assume that everyone coming in here is a criminal that needs to be reformed before you send them back out.

The comments from these significant stakeholders led me to conclude that the state sanctioned privileges sought by the professionalising group are a distant prospect. This conclusion is

consistent with Edgar Burns' (2007, 77) and Suzanne Heward's (2005, 1-2) observations of decreasing levels of professional autonomy in New Zealand since neo-liberal reforms were instigated in 1984. In the past, occupations in Britain which were able to demonstrate the centrality and/or the public safety nature of their service were awarded professional regulation by the State (Carr-Saunders and Wilson 1933, 306; Brint 1994, 33). To date neither of these conditions, although prominent features of the NZCS arguments for an ICT profession, have produced the desired result. While the relation between the political arm of the present government and the NZCS appears mainly cordial, there is some antagonism. For example, in 2010 the NZCS lost charity status because the Charities Commission deemed that its main purposes were to promote and protect "the Society, the IT profession and the IT industry" rather than serve the public good (Putt 2010).[93] [94]

4.3.4 The Public

Whether or not an occupation becomes recognized as a profession depends crucially on public acceptance (Haug and Sussman 1969, 58; Hall 1975, 80; Rueschemeyer 1983, 50; Abbott 1988, 60). Legitimation in the public arena involves convincing the public of the importance of the work and the need to allow only the professional to do it: "Professionals usually have a monopoly because they have persuaded the society that no one else can do the job and that it is dangerous to let anyone else try" (Goode 1969, 279). Community sanction of professional self-regulation was a common feature of trait models of the professions (Greenwood 1957; Hall 1975; Pavalko 1971), and remains a significant factor today. As Roth (1974, 9) noted, "all occupational groups" would like the power associated with community sanction.

Convincing the public that professional claims are legitimate is not easy, especially given the current hostility towards professions noted earlier (Halmos 1973, 9; Perrucci 1973, 180; Bennett and Hokenstad 1973, 31; Brint 1994, 39). Besides, how the public determines which occupations should be deemed professions is unclear. Hall (1975, 80) referred to the public's "imagery of occupations" based on "imprecise criteria", and Freidson (1983, 27) noted that understanding how society distinguishes between professional and non-professional work entails a "folk concept". Abbott (1988, 61) maintained that public discourse of professions relates to archetypes, and Haug and Sussman (1969, 63) similarly found stereotypical views

[93] This ruling meant that NZCS lost the right to considerable tax exemptions. The engineering professional body, IPENZ, also lost charitable status for similar reasons, but the Medical Council did not after successfully arguing public good service (Putt 2010).
[94] The NZCS appealed this decision in the High Court (New Zealand Computer Society 2010d), but in March 2011 the Court dismissed the appeal (Bell 2011).

amongst the public rather than detailed knowledge of the work, but also noted that a favourable stereotyped image generally assists professional claims. Thus as Barber (1963, 678) and Abbott (1988, 61) observed, professionalising groups usually foster public support and work to construct a fitting public image (for example by informing the public about their services and public good commitment) when seeking public jurisdiction. These carefully crafted images may or may not be believed (Barber 1963, 678; Pavalko 1971, 17).

I reported in Chapter 3 that ICT practitioners and professional bodies often claim that ICT work is poorly understood by the public and/or has a poor public image. Certainly the President and the CEO of the NZCS both hold this view:

> I don't think they [the public] actually understand it, to the point that when you have a conversation with somebody and they say what do you do for a job, and you say I work in ICT, they change the subject and move onto something else because they don't know what you are talking about… The majority of people probably think it's people in a back room, a dark room, fiddling away with programmes or something like that, if they've got much view of it at all. (President, Don Roberston)

> There's a lot of misunderstanding or lack of understanding about what ICT is, both as a thing and as a profession, and as a career. (CEO, Paul Matthews)

Brett O'Riley agreed, and further commented that the use of acronyms can be detrimental to public image.

> I don't think they [the public] have any idea what ICT is. You fail quite miserable if you have to use an acronym to describe your industry. All an acronym does is underscore the fact that it's quite technical; immediately it's saying it's a little bit mysterious.

Most of the practitioners I interviewed felt that their work is poorly understood by the public (especially older people), despite generally being regarded as well paid and highly skilled. For example, Ralph and Mandy commented:

> They realise that the knowledge is not easy to acquire. People know you're not stupid if you're in IT, they know that some people have made a lot of money. (Ralph)

> They think that IT is well paid. They think you must be smart, clever… I wouldn't want to use this term, but probably the older generation don't tend to understand my job at all. (Mandy)

Patricia believed that the public's frustration with IT systems is often due to lack of understanding:

> I think there's a failure to understand the complexity and difficulty of predicting work on large IT projects.

Some participants believed that the public stereotypically, and unfairly, considers them geeks:

> I think today you mention IT and people think geeks. (Kelly)

> The computer is like a black box. People feel a bit awed by the geeks who speak a language they don't understand. (Ralph)

> Most people probably don't realise how big it is and how many different roles there are. They see IT people as being generally the same kind of geeky guy, but a software project has people right through it, from all different personality types, trainings and backgrounds… But I think the perception is that IT people are geeky, not people people; they work with machines and they understand machines much better than they understand people. (Sam)

Several participants commented that there is a widespread, and mistaken, view that 'anyone can work in IT', probably because so many people use computers in their personal or working lives:

> There's the perception that if you surf the net you're IT. (James)

> The general response [when I tell people what I do] is, oh how cool! Wow, that's really interesting! Hey, how do I get to do that? And then I have to say well twelve years ago when I started it was pretty easy, anybody could do it, now you have to do massive amounts of training … So I think people see it as a job that they would be interested in doing, perhaps because it seems as though everybody's got their own website these days, possibly there's a perception that what we're doing is a bit easy. So there's two sides to it. People go, ooh that's cool, and that sounds really interesting, but then I think there's a perception, oh I could do that, but they can't. (Emma)

These comments suggest a somewhat conflicting public perception. On the one hand ICT workers are considered clever and highly skilled (albeit geeky), on the other, there is a belief that 'anyone' can do their work. This paradox raises issues of mystique and amateurism; issues which are discussed later in this chapter. But it also suggests a lack of understanding of ICT work by the public (the work is either too complex or too simple).

My research did not involve collecting data from members of the public to determine their understandings of either professions or ICT work, but some brief comments are possible.

Public conceptions of the term 'profession' are unclear – Millerson (1964b, 1-2) provides an amusing account of the confusion the term causes. Burns' (2006, 7) research into the everyday usage of the term in business settings in New Zealand found no match with the professional characteristics proposed by trait theorists (although vague notions of "goodness and expertise" were often implied). Certainly much debate is generated amongst my students when they are required to explore their own interpretations of professionalism, and their views also seldom match the traditional professional traits.

Public conceptions of ICT work are also uncertain (Barker and Aspray 2006, 14). In New

Zealand the omission of ICT occupations from the 'Most Trusted Professions' surveys (New Zealand Reader's Digest 2008, 2010) may indicate that the survey designers believed computing occupations to be less understood by the public than occupations such as teaching, dentistry, and plumbing which were included. A similar omission in a survey of career choices of Year 11 school girls (Gender and Diversity Research Group AUT University 2010) also points to ICT occupations having little profile, particularly since this survey specifically investigated male dominated occupations.[95]

It is also likely that members of the public do not regard ICT work as 'professional' given that they are not as personally affected by ICT practitioners' work as they are by the work of doctors and other occupations sometimes referred to as the "personal service professions" (Halmos 1973, 6). People-oriented professions, also known as the "people working professions" (Bennett and Hokenstad 1973, 22), the "humanistic, welfare, person professions" (Toren 1975, 328), or simply the "people professions" (Goode 1969, 303), are directly concerned with the welfare of people's bodies and minds (Halmos 1973, 6), and this necessitates a high level of client trust as well as the likelihood of emotional involvement by the client (Goode 1969, 298-299). ICT work, in contrast, fits more closely with Halmos' (1973, 6) notion of an "impersonal service profession" such as engineering, and as such does not incur the same expectation of personal concern by the client. Goode (1969, 298-303) made a similar point that the "technical-scientific occupations" do not require high levels of trust, and the professional-client relationship for these occupations is more "contractual" than "devotion[al]". These ideas propose that members of the public are less intimately concerned about a bridge collapsing than a doctor misdiagnosing, and if Tim's comment (page 96) is typical, they are even less troubled by a computer system crashing. Hence there is little demand from the public that ICT practitioners are accountable for the quality of service they provide. Furthermore, it is unclear the extent to which the public recognises or values the contributions of ICT workers towards technical efficiency and technical progress, factors which Abbott (1988, 190) and Terry Johnson (1972, 56) noted professions often emphasise to legitimise their work.

Clearly empirical data is needed to clarify the public's views of ICT work and the professions generally. Until such time that individuals feel personally affected by ICT work, professional claims in the public arena will likely have little traction.

[95] The survey did include "Computer Operator" as one of the occupations; this outdated terminology is not appealing and is not representative of ICT occupations.

4.4 Challenges in Asserting Control of ICT Work

This research has identified six barriers to the NZCS (or any other body) achieving control over ICT work. These are: challenges in securing control over a body of knowledge, the diversity and uncontrolled nature of computing education, the impossibility of eliminating amateurs, the impact of specialisation on professionalism, the effect of bureaucracy on professionalism, and globalisation.

4.4.1 Body of Knowledge

A 'body of knowledge' features in most characterisations of a profession, although different terminology is sometimes used; for example "expert knowledge" (Brint 1994, 3-5) and "abstract knowledge" (Abbott 1988, 8). Having control of a body of knowledge is necessary for successful defence of professional jurisdiction (Abbott 1988, 102). Thus the development of a body of knowledge is a key strategy for occupational groups seeking to professionalise (Hughes 1963, 659), and often involves inventing or inflating a body of theory to further professional goals (Freidson 1970a, 187). A body of knowledge, especially if it can be shown to have mystical qualities, becomes a powerful tool for exclusion and monopoly: "Esoteric and exotic knowledge does provide a social distance mechanism of great importance for professional groups. It serves as a major basis for autonomy" (Hall 1975, 118). Once a body of knowledge has been established, an equilibrium of abstraction must be maintained, since too little abstraction results in knowledge appearing commonplace and skills which are too easily routinised, and too much abstraction leads to generalities and a lack of specific content (Abbott 1988, 103-104). The problems of insufficient abstraction were also noted by Wilensky (1964, 148):

> If the technical base of an occupation consists of a vocabulary that sounds familiar to everyone... or if the base is scientific but so narrow that it can be learned as a set of rules by most people, then the occupation will have difficulty claiming a monopoly of skill or even a roughly exclusive jurisdiction.

4.4.1.1 Problems Establishing and Controlling an ICT Body of Knowledge

Control of a body of knowledge was first achieved by the medical profession and since then other occupational groups have pursued a similar model, often with difficulty (Elliott 1972, 41). Certainly the computing occupations have struggled to establish recognised bodies of knowledge (Iivari, Hirschheim, and Klein 2004, 314; Pour, Griss, and Lutz 2000, 3; Knight and Leveson 2002, 89). Rapid technology changes and a diverse range of ICT disciplines make defining a body of knowledge for an 'ICT profession' very difficult, and this presents a

significant obstacle which threatens the professionalisation ambitions of organisations such as NZCS.

A body of knowledge is a requirement for Level 2 of the Professional Maturity Model (Robertson 2008, 9); consequently the NZCS has recently been working to develop an ICT "Core Body of Knowledge (CBoK)", as are other computing societies elsewhere (Robertson 2008, 63; Matthews 2009a, 18).[96] The difficulty of this task was noted by NZCS in various fora. For example Paul Matthews (2009a, 19) commented:

> Whilst the current international approach [to developing a CBoK] is rather fragmented and not well coordinated, NZCS remains dedicated to assisting the international ICT community in the creation of a globally adopted CBoK.

And at the *NZCS Consultation Workshop on Professional Certification* on 10th March 2009, David Wood admitted: "The problem of defining the CBoK is a major issue." [97]

Even when bodies of knowledge are established, controlling them can be difficult, due to dissemination of information on the Internet (Kritzer 1999, 720) and commodification of the knowledge (Abbott 1988, 146; Kritzer 1999, 721). Both these problems confront the ICT industry. Computer technologies have been instrumental in bringing about a commodification "revolution" (Abbott 1988, 147), and the ICT industry is acutely affected by this trend. Commodification of ICT knowledge is seen in the widespread availability of products such as plug and play hardware (which allows computer users to connect devices without intervention), website authoring tools (which enable small businesses to create their own websites), and off-the-shelf software such as *MYOB Business Basics* (MYOB 2010) (an accounting package for small businesses which enables business operators to manage their own accounts without the need for professional ICT support). Through commodification the ability to perform tasks is devolved from the IT practitioner to ordinary individuals. As Abbott (1988, 36) noted: "The passage of once esoteric system knowledge from high-level programmers into the hands of lay microcomputer owners" is an example of experts discarding "old problems". In a similar manner, ICT knowledge is widely disseminated on the World Wide Web. For example, the Microsoft Developer Network (MSDN) provides information on tools and products for software developers, including sample code and technical hints, and 'white papers' which are published

[96] The ACS and the BCS are also creating and/or updating their bodies of knowledge (Matthews 2009a, 19). Apparently, perhaps due to technology changes, the body of knowledge previously defined by the ACS (1997) is no longer adequate.

[97] This workshop was open to anyone interested in certification, not just NZCS members (New Zealand Computer Society 2009d). David Wood assisted CEO Paul Matthews and Paul Alexandra in delivering the workshop. I attended the workshop in Auckland and counted 32 attendees, including 7 women.

regularly on the Internet by companies such as *silicon.com* provide information on a wide range of technical topics. For these reasons, the NZCS and its counterparts overseas will have trouble establishing and controlling the computing CBoK.

4.4.1.2 Maintaining Equilibrium of Abstraction

Maintaining equilibrium of abstraction should not be so difficult. Abbott (1988, 103) identified business management as a "task area" with abstraction so excessive that it lacks specific content and hence suffers weak jurisdiction. ICT does not experience this problem. The other extreme, too little abstraction, may affect the ICT sector's ability to claim jurisdiction – at least in the perception of some laypersons. The public's view (as reported by my participants) that 'anyone can work in IT' suggests that at least some of the vocabulary of computing is now familiar amongst the population. Of course this does not mean that ICT work really does have too little abstraction; it simply alludes to the difficulty of legitimating ICT work in the public arena. Routinisation, the other upshot of insufficient abstraction, is unlikely to impact on ICT work. I have already argued in Chapter 2 (page 30) that Kraft and Dubnoff's (1986, 194) depiction of routinised coding carried out by lower tier programmers in the 1980s does not now apply. Sustaining equilibrium, then, should not be an issue. A different problem, that ICT knowledge changes so rapidly, is far more challenging for bodies aiming to control a professional body of knowledge. This problem was acknowledged by David Wood at the NZCS consultation workshop: "The CBoK will constantly evolve. People will need to be re-certified every three years."

4.4.1.3 Loss of the Mystery Element

I noted in Chapter 3 that professionals were traditionally thought to possess esoteric knowledge, to the extent that professional work was viewed by the public as magical, or imbued with mystery. Having a body of knowledge with mystical elements assisted with exclusionary ambitions, and also allowed professionals to assert charismatic authority over their clients (Horobin 1983, 94). This meant that professional decisions were often "quite opaque" to laity, and hence were exempt from public scrutiny (Halsey 1970, 25). To preserve these advantages, mystique is frequently fostered in order to create an "élite" that renders clients dependent and disabled (Davies 1996, 669). But as educational levels have increased, mystique surrounding professional work has largely faded (Wilensky 1964, 150; Haug 1975, 203) and professions are now subject to increased levels of scrutiny and judgement. Routinisation, codification, and wide circulation of professional knowledge each reduce occupational mystique (Toren 1975, 330; Kritzer 1999, 721; Haug 1975, 205).

I also noted in Chapter 3 that early computing work was frequently ascribed magical qualities (Kraft 1977, 105). Some scholars argue that this mystique endures – see Denning (2001, 15, 19) and Lecia Barker and William Aspray (2006, 14). But as already noted (page 105), I have found divergent views regarding this matter amongst the public. In one sense the ubiquity of computers appears to have vastly reduced their mystery, and in an environment where anyone can access a computer and make it perform useful tasks, professional claims of esoteric knowledge are not convincing. But it is also true that for many people, computers remain a mysterious 'black box' accessible only to geeks. This apparent conundrum is perhaps best explained by Abbott's (1988, 92) notion of a "succession of computer 'professions'" whereby new occupations replace old ones as new technologies appear and create new areas of expertise, and old skills become commonplace. A personal example of this occurred in my workplace in 1981 when the computing department was asked to write a programme to carry out routine word processing tasks for the organisation; a programming job which would of course no longer be necessary.

As for other professions, a certain loss of mystique reduces the credibility of professional claims to esoteric knowledge, in this case in relation to the CBoK. This jeopardizes the NZCS professionalisation project.

4.4.2 Education

Professional work is typically portrayed as requiring an extended period of intellectual learning or formal academic education (Greenwood 1957, 47; Moore 1970, 11; Hughes 1963, 656; Carr-Saunders and Wilson 1933, 316; Wilensky 1964, 138; Ben-David 1963-64, 256; Goode 1960, 903; Pavalko 1971, 19; Freidson 1973, 52). Importantly for the autonomy of a profession, this education is controlled by the profession (Caplow 1954, 140; Freidson 1970b, 134; Berlant 1975, 50; Freidson 1970a, 80).

Education for the traditional professions typically occurred within universities (Brint 1994, 34-35), but more recent "technical occupations" have developed alternative educational systems, for example within "colleges of technology" (Elliott 1972, 63). Abbott (1988, 205) summarised the current position: "With few exceptions … professional education takes place in institutions controlled by the professions, which *may* be affiliated with a university but usually are not." Consequently universities are now not the sole providers of professional education. Academia does, however, play a key role in formalising, rationalising, and advancing the body of knowledge of a profession, and also serves to legitimise professional work by demonstrating a culturally valued basis for the work (Abbott 1988, 53-54). Professions and universities are

therefore often depicted as being inextricably linked - see Wilensky (1964, 144), Jackson (1970, 4-9), Brint (1994, 34).

In New Zealand, there is no professional body controlling education for ICT work, and there are numerous training options available, the majority of which are not university-based.[98] A brief summary of post-school computing education during the last five decades reveals the multiplicity of educational offerings over this period.

When computers were first introduced into government departments in New Zealand in the early 1960s staff had no option but to attend short training courses offered by computer companies such as IBM (Sherring 1968, 7; Offenberger 1984, 3). In 1963 Wellington Polytechnic became New Zealand's first educational institute to offer computer training; a twelve week course taught jointly by Treasury experts and computer company staff (Offenberger 1984, 3). This led to the introduction of a one-year full-time course, the *New Zealand Certificate in Data Processing* (NZCDP), in 1967 (Offenberger 1984, 4).[99] The NZCDP was especially successful, and quickly spread to polytechnics in other centres (Offenberger 1984, 3). By 1968 most universities in New Zealand had a computer for research and teaching purposes, although Dr B. Cox (1968, 2), Director of the University of Otago Computing Centre was cautious in his predictions of their importance:

> There is the need to provide Computer Science specialists. These are the people who will go on to write the specifications and compilers for new languages and design new computers. I frankly see only a small demand for such people in this country. We are bound to export most of them, and we are unlikely to develop our own computer construction industry. On the other hand we do not need to consider software the prerogative of others, and could well do some useful work in selected areas. Hence we should not ignore this area entirely.

In 1979 the NZCS (1980, 6) described computing education in New Zealand as "somewhat behind" other comparable countries, despite there now being a wide range of educational opportunities. For example, at this time computer education was offered by the University of Auckland (Departments of Accountancy, Management Studies, Mathematics, and Theoretical and Applied Mechanics, and the Board of Computer Studies),[100] the Auckland Technical Institute (Mathematics and Data Processing Section), and computer manufacturers (including IBM, Burroughs, Control Data NZ Ltd, and NCR) (Boswell and Melhuish 1978, 5-11, 43-46, 58-74).

[98] An exception is education for software engineering, discussed later in this chapter.
[99] Note that according to Potter (1985, 97) NZCDP was not established until 1972.
[100] A Computer Science department was established at the University of Auckland in 1981.

Current offerings of tertiary ICT education are even more numerous and varied. The *Kiwi Quals* (2007) website listed 141 registered providers of IT qualifications, and a search for qualifications in 'Information Technology' identified 45 bachelor degrees, 109 diplomas, and 138 certificates offered by these providers. Numerous other qualifications such as graduate diplomas and master degrees were also available.

Maria Charles and Karen Bradley (2006, 184) argued that in today's market applicants for "high-status" ICT jobs are expected to be highly trained. Contrary to this claim, my research has found that many ICT workers in roles classified as 'professional' in New Zealand have either no computing qualifications or very few (although they may be highly qualified in other fields). It is even reasonably common for them to have no post-school qualification at all. Table 1 provides an overview of qualification levels of people in five ICT occupations in 2006.[101]

Table 1: ICT Workers' Highest Qualification in 2006

	Computer Application Engineer	Systems Analyst	Systems Manager	Computer Programmer	Computer Operator*
No Qualifications	2%	3%	4%	2%	11%
School Qualifications	22%	30%	34%	21%	44%
Post-School Qualifications	75%	66%	61%	76%	43%

Source: Labour market information (Department of Labour 2007)
*Computer Operator is not classified as a 'professional' role but is included for comparison.

Most of my research participants had tertiary qualifications, and these covered an eclectic mix of disciplines, including literature, nursing, engineering, pharmacy, psychology, finance, education, teaching, physics, secretarial, and languages. Some had degrees in computer science or information systems, but a small number had no tertiary qualification at all (including people in very senior positions).

A lack of qualifications has not hindered my participants. Damian and Sam, who were introduced in Chapter 2, provide an example. Damian wrote his lucrative software as an unqualified entrepreneur. Sam studied computer science at university and worked for several IT

[101] More recently the Department of Labour (2009) reported that 45% of systems analysts and 57% of computer programmers employed in the computer services industry have 'degree and higher' qualifications, but (as in Table 1) whether ICT was the major subject area is unclear.

companies in New Zealand and Australia before teaming up with Damian again. Sam reflected on the value of his university education, and decided that Damian's decision not to go university had some advantages. While Sam was studying and beginning his first job, Damian was working in industry, learning from experienced practitioners and starting his own business:

> You learn the art of programming from experienced programmers rather than picking it up and making little projects and so on [as at university]. Which is probably actually the best way to do it and that is how Damian started and continued because he never went to university. He made a considerable fortune from it during the time when I was just doing well, earning a salary. He was starting a business and selling his software.

Sam's comment reveals a problematic feature of the ICT industry – that academic study of computing does not always lead to employment and wealth, and is not always a requirement for a successful career in ICT. Damian and Sam's narrative also illustrates the variety of pathways into ICT work.

Graham's sons Jason and Paul are further examples of these matters. Because the computer industry had been very rewarding for Graham, he encouraged his sons Jason and Paul to pursue IT careers. Jason did not complete his qualification but flourished quickly by having practical experience:

> Jason went to university, started a Computer Science degree, got a part-time job, the job grew, the study shrivelled, he never finished his degree. But he's now a guru in networks and the like. So he hasn't any formal qualification but at the same time he could name his own price.

In comparison, Paul (whose small virtual organisation was introduced in Chapter 2) completed his degree but could not get a job, and so struggled to set up his own business:

> My other son Paul builds websites. He finished his degree, couldn't get a job because he didn't have any experience. He has his own little company, builds websites.

We suspect that Jason is equally, if not more, successful than his qualified brother.

As an employer, Andy believes mandatory qualifications in ICT are unnecessary. While qualifications can be useful indicators of dedication, they need not be ICT-specific:

> This is the one industry, because things are moving so quick, you can jump in with no qualifications and in three years you're very experienced and you're very good at what you're doing. And you don't need a degree. In this industry, what a degree means is commitment. When I employ somebody I would hope that they have some qualifications but all it means to me is that they've gone after something and they've completed it.

The NZCS is very aware of this educational paradox and the difficulty of controlling ICT education. This may explain why the NZCS certification programme is based on an

internationally recognised skills framework rather than any particular university qualification pathway. As the NZCS (2008b, 7) explained in a submission to government:

> ICT, however, is different from most other professions in that many people have attained a high professional-level status within ICT without having completed an accredited degree… It is important that New Zealand moves away from a 'degree-based only' approach and to a competency-based approach.

Nevertheless, as we have seen in Chapter 3 (page 55) NZCS is pursuing accreditation of computing degrees, and this may indicate a long term goal of control over education for ICT work.

Universities in New Zealand do, as expected, play a significant role in advancing the academic foundation and cultural legitimacy for ICT work, but a large amount of research also takes place within industry (sometimes in conjunction with academia). For example, Microsoft Corporation has funded a research division since 1991 and now has over 800 researchers working in 55 different research areas (Microsoft Corporation 2008). In 2006 Microsoft spent US$6.18 billion on research and development, followed closely by IBM which spent US$5.84 billion (Wolverton 2006).

4.4.3 Amateurism

Robert Stebbins (1992, 40), in his investigation of the relationship between professionals and amateurs, has pointed out that professionals often started out as amateurs, and in some cases even as hobbyists (Stebbins 1992, 14). Work that 'anyone can do' is open to infiltration by or competition from amateurs, and this presents a significant problem for professionalisation. A professional is often considered to be the antithesis of an amateur (Moore 1970, 6; Kritzer 1999, 716; Millerson 1964a, 16; Stebbins 1992, 20), and it is therefore common for professionalising groups to distance themselves from amateurs (Hughes 1963, 659). Often they do this by demonstrating their ability to perform more effectively than amateurs through superior skills and knowledge (Toren 1969, 147). However, despite these efforts, many occupations are subject to competition from amateurs (Moore 1970, 7; Hughes 1963, 659).

ICT work is particularly subject to amateurism; indeed many scholars have noted that the industry's roots are firmly coupled with the computer hobbyist's passion for tinkering, electronics, and programming - see Roy Allan (2001, 2/14), Paul Ceruzzi (2003, Ch 7), Steve Wozniak and Gina Smith (2006, Ch 6&7). Today's amateurs are likely to operate as sole practitioners offering services such as website design, home computer network installation, and PC repairs, perhaps from their garage or home office. Some will have no credentials relevant to

the services offered. Precise numbers of amateurs are unknown – as noted in Chapter 2 a significant proportion of the ICT industry is not captured by official measures. But if we consider that in 2006 64% of all enterprises in New Zealand had no employees (Ministry of Economic Development 2007, 5), then it is very likely that a reasonable number of ICT enterprises are sole practitioner operations, and some of these will be run by amateurs.

A few of my research participants began ICT work as amateurs, including Damian (page 112) and Ralph. Ralph became interested in computers after purchasing a PC in the late 1970s, taught himself programming, and soon turned his hobby into a viable career by starting his own niche software development company which now employs 13 people.[102]

> In the 1980s microcomputers hadn't become so complicated that you couldn't make the jump from a hobbyist to a professional.

A lack of formal ICT qualifications has not hampered Ralph's success.

> In 1984 when I was by that time selling commercial software I thought perhaps I better calibrate myself and see where I'm at, so I did a Stage 1 Computer Science paper that was available by then and I was obviously up to a good standard.

Ralph considers himself very fortunate: "How great to have a chance to do something with your hobby."

Damian and Ralph are examples of amateurs who used their skills to build successful and reliable ICT businesses. However some amateurs cause problems for the ICT industry by delivering shoddy work at either vastly reduced rates or excessively high rates. Emma explained her frustration with amateur web designers:

> It pisses me off. We build beautiful websites and we really take a lot of time to build them and we do all the information architecture and we do the strategy… and we've got logic behind it, and when it comes to the design it's beautiful and the code is perfect and valid and accessible and e-government compliant… and it's an amazing website. And then you'll get someone else who will call themselves a web designer and… they might have FrontPage and sit in their basement and do it, and they charge an outrageous amount of money for something that's crap. And then they don't even follow up in terms of client service…
>
> We're a little sheltered from that here because we're a high end development company, so we're not generally redoing sites that have been cowboy-ed to begin with, but privately I have. [AH: People come to you in despair?] Yes, absolutely. They've lost a lot of money and lost confidence in the industry. It affects all of us. And as a contractor it used to affect my price as well because it's very hard to explain to a potential client why you're worth 75 dollars an hour when they can get next door's boy to do it for 20 bucks… It's like if you pay peanuts you'll get monkeys, but if you get the boy next door to do it, he will do it to whatever

[102] Six of these people are employed part-time. In addition, contractors are also used when needed. Ralph's company also employs some staff in Australia, all of whom are contractors.

> level, but if you get me to do it for you, you will have a professional expert who's been working in this field for 12 years and is at the top of their game. You choose. For $75 an hour you get me, you'll get a perfect product and I'll be fast. $20 an hour for the kid next door, who knows, it might be all right. You might be really lucky, or you'll never get anything online, or it will look like shit, or it won't work properly.

There is some inconsistency here, since many of the older practitioners in the ICT industry, including Emma, began their careers as amateurs. Julia recognised this contradiction:

> In my area there's lot's of talk about should usability consultants be accredited. I don't pay a lot of attention to that, but it is frustrating. Anybody can set up shop as a usability consultant, and when I was trying to set up as a usability consultant and people used to say well anybody can set up as a usability consultant I used to say well yes, of course, because any number of fields and aptitudes and skills can lead you to being a worthy, reliable usability consultant. Now that I've been doing it a few years and I see the young whipper-snappers coming along I think, hang on a second, what could you contribute to being a usability consultant? So I realise I've got double standards there.

It seems that amateurs sometimes develop into responsible and successful ICT practitioners, but others do not build up the requisite skills and operate irresponsibly, thus bringing the industry into disrepute. As we have seen in Chapter 3, elimination of these 'cowboy' amateurs is part of the rationale behind the NZCS 'Trust the ICT Profession' argument. Until such time that legislation restricts ICT work to credentialed practitioners there is no way of eliminating amateurs, and this creates a barrier for the NZCS professionalisation project.

4.4.4 Specialisation

The traditional notion of a profession is of a homogeneous occupational group (Goode 1957, 194), and specialisation within the group would therefore seem to weaken professionalism (Johnson 1972, 53). But in reality professions are far from homogeneous (Perrucci 1973, 184; Abbott 1988, 18), and specialisation is growing at an increasing rate, especially specialisation based on claims to expert technical knowledge (Wajcman 1991, 69; Brint 1994, 42). This trend towards "intensive and narrow specialization" results largely from technological advances which require specialist handling (Mills 1951, 112).

Professionalising groups often employ specialisation strategically. For example, sub-groups within an occupation may seek to differentiate themselves and assert dominance over subordinates in order to advance towards professional status (Hall 1975, 70; Moore 1970, 16; Klegon 1978, 275; Hughes 1963, 659; Brint 1994, 42). Only those specialty groups with sufficient resources will succeed in achieving professional goals (Klegon 1978, 275). Alternatively, specialist groups may amalgamate to strengthen professional claims, and if this is successful, a unified or "federated" profession may develop (Abbott 1988, 105). Examples of federated professions include librarianship (Abbott 1998, 441) and the electrical engineering

specialities federated under the IEEE[103] in the US (Abbott 1988, 167). Blaise Cronin (1987, 398) also noted the federated nature of librarianship and information workers, which he conceptualised as heterogeneous occupational groups finding a "niche" within a single inclusive profession. Abbott (1988, 167) predicted a rise in the number of "loosely linked" federated professions, but also noted that amalgamation frequently fails, due to power imbalances amongst groups or irreconcilable differences in traditions and work practices which impact on social and cognitive unity (Abbott 1988, 105).

4.4.4.1 Software Engineering

New Zealand's engineering profession could be regarded as a federation of engineering specialisations united by their professional body, the *Institute of Professional Engineers of New Zealand* (IPENZ). Included in this federated group is software engineering, which enjoys the legally mandated professional standing of all professional engineers in New Zealand. In 1999 IPENZ accepted software engineering as a recognised engineering specialisation and added it into the IPENZ portfolio of accredited degrees (Andrew Cleland, CEO IPENZ, personal communication, 2010).[104] One of my research participants, Anton, an engineer and senior academic, explained how this came about. He explained that computing in universities originated from two "wellsprings": (1) Electrical Engineering Departments (in Engineering Faculties) in which computing developed in the context of relays, valves, transistors and an "ethos of practicality and applied-ness", and (2) Mathematics Departments (in Science Faculties) in which computing developed more theoretically from an "interest in Boolean logic and compilers". Software engineering (SWE) degrees developed in the former and computer science (CS) degrees in the latter, and each had their own culture (SWE being "more practical and delivering what employers and customers want", CS being more theoretical with "real applications being very few and far between"). However Anton also noted that in other countries CS degrees are sometimes located inside Engineering Faculties, and they then have a more practical focus, so that labels "can get you into trouble".

The reason for this diversion is to consider the relationship between software engineering and other ICT occupations in New Zealand. Anton's account suggests that software engineering obtained its professional standing by the usual process of evolution of disciplines within the Engineering Faculty. However he also divulged deliberate professionalisation intent:

[103] IEEE = Institute of Electrical and Electronics Engineers.
[104] A range of other computer engineering degrees are now available, for example Electronics and Computer Engineering, Telecommunications and Network Engineering (see http://www.ipenz.org.nz/ipenz/Education_Career/accreditation)

> SWE really was a label that was invented to get the word engineer in the title so you could have reference back to that whole professionalism… I think it was a marketing ploy.

Thus it appears that those pushing for software engineering to be legally recognised as a profession took advantage of their serendipitous location within the Engineering Faculty, and opted to strengthen their historical ties with the well established and resource-rich engineering profession rather than forge links with other, less-organised, computing disciplines. This situation results in there being one ICT occupation which has legislated professional recognition, while all others do not. This presents a significant threat to the unity of ICT occupations, and although SWE cannot be regarded as having asserted dominance over other ICT occupations, hints of superiority are evident in Anton's comparisons of software engineering and computer science. When I questioned him about how the third major computing discipline, Information Systems, fitted into this picture, an even stronger sense of hierarchy and superiority emerged: [105]

> All my engineering friends and SWE people really sneer at the Information Systems people in the Business School because they think they're totally shallow and don't really understand the technology.

Thus we have one section of the ICT industry which operates separately from the collection of occupations under consideration in this thesis, and as noted previously is not involved in the NZCS professionalisation project. Throughout this thesis references to ICT occupations and ICT specialisations exclude registered professional software engineers. I now return to the main discussion.

I have already noted the large number of specialties contributing to the ICT industry and the heavy reliance on teamwork in ICT work. If we regard ICT work as a collection of niche occupations which support each other in the performance of tasks, then the emergence of a federated ICT profession similar to the federated engineering profession seems possible. However significant cultural differences between specialist ICT groups and strong specialisation allegiances make this unlikely. The emphatic preference my participants expressed for separate specialisation-related associations rather than the NZCS is an example already noted. The conspicuous cultural differences between specialist groups observed during my interviews and experienced at the two meetings (described in Chapter 3), suggest that specialist groups would not wish to unite.

Specialist ICT groups would, it seems, prefer to build up their own professional standing rather

[105] Although Anton's comment may have been partly tongue-in-cheek, it likely does reflect real sentiments.

than commit to a federated ICT profession. A relatively new specialisation currently seeking to establish itself as a profession (in the US) is Information Architecture (Morrogh 2003, 129). Establishing a body of knowledge is a priority (Morrogh 2003, 129-134). Information architects in New Zealand keep abreast of developments through the combined Australian-New Zealand chapter of the *Information Architecture Institute*.[106] Similarly, project managers in New Zealand track professionalisation initiatives of the US-based *Project Management Institute* (PMI) through PMINZ, the local chapter of the PMI.

At the 2008 NZCS Auckland Branch meeting, the President described the ICT sector in New Zealand as "multi-faceted" (which he felt was a more positive term than "fragmented"). Commenting on the "siloed" nature of the industry, the NZCS CEO remarked: "The challenge in the sector is to get groups to work together" (Hedquist 2008, para 21). The NZCS professionalisation project is an ambitious plan to bring together the diverse range of specialisations as a single, large, federated profession, but strong cultural ties within specialist groups are likely to impede progress towards this goal.

4.4.5 Bureaucracy

As we saw earlier, today's professionals increasingly work as employees of large corporations rather than self-employed practitioners (Abbott 1988, 125; Elliott 1972, 100; Millerson 1964b, 7; Hughes 1963, 664; Abbott 1998, 432), and they typically work in teams comprising different specialities so as to broaden the range of skills available (Engel and Hall cited in Hall 1975, 116). Indeed Abbott (1998, 441) has argued that many projects are now so complex and so vast that they require the resources of large organisations and could not be attempted by individual professionals.

Whether professionalism can survive within bureaucracies has long been debated. Until the early 1970s sociologists largely supported the view that professions and bureaucracies are paradoxical: "Profession and bureaucracy were thought to be antithetical both at the level of structural principles for organising work and at the level of motivation and compliance" (Davies 1983, 177). The view held that professionals working in a bureaucracy would lose their autonomy and service ideal due to a shift in loyalty from the profession to the organisation (Wilensky 1964, 146; Hall 1968, 93-95; Pavalko 1971, 180; Kritzer 1999, 722; Goode 1969, 294-295). An example concerning the IT industry was provided by Orlikowski and Baroudi (1989, 19-20) who argued that computing workers have little autonomy since their work is chiefly decided by the employer to meet the demands of the organisation, and in addition they

[106] See http://lists.iaiinstitute.org/listinfo.cgi/iai-aunz-iaiinstitute.org .

are seldom held accountable for defective work.

There is now little support for this 'conflict theory'. Hall (1968, 104) and Philip Elliott (1972, 140) proposed that the difference between profession and bureaucracy is not as marked as first appears, and Davies (1983, 185) found the focus on conflict "especially barren as an explanatory framework" and recommended a more dynamic approach using a richer conceptual vocabulary when studying work in organisations. Abbott (1988, 151) concluded that professionalisation can still occur within bureaucracies, albeit differently than the traditional model, but more recently argued that professional expertise often now resides in organisations rather than people, and accordingly organisations constitute a "more substantial threat to professionalism" than other factors such as commodification (Abbott 1998, 434). Organisations also threaten professionalism through their wide coverage of expertise, and the fact that they are often controlled by outsiders and are usually subject to commercial imperatives (Abbott 1998, 434). They all agreed that professions today are increasingly dependent on organisations due to the high cost of professional education, equipment and facilities, and the increasing burdens of government intervention.

Nevertheless some questions remain. The relevance of professional codes of ethics for practitioners working in organisations is not clear (Abbott 1988, 151). How these practitioners manage different performance standards also needs clarification - as Elliott (1972, 102) noted: "The literature abounds with cautionary tales about the havoc commercial considerations can wreak upon professional standards." Hughes (1963, 665) also noted this ambiguity; pointing out that it is often unclear whether authority lies with the profession or the employing organisation, and whether obligations should be to the client, the profession, or the employer.

We have already seen in Chapter 2 that employment within organisations is the norm for most computing workers, and a number of findings from this research are indicative of organisational-professional tension these workplaces. The bureaucratic nature of Mandy's work, the explicit division of labour in her workplace, and her lack of autonomy were noted in Chapter 2 (page 32). Likewise in Chapter 3 I identified a range of issues prevalent amongst employed ICT workers which signify organisational commitment rather than dedication to supposed professional ideals. These included:

- a lack of personal ethical responsibility within specialist teams
- the organisation regarded as the source of professionalism
- corporate codes of ethics having prominence over professional codes

- commercial pressures impacting on the integrity of sales and marketing pitches

Bob (whose narrative is repeated here for clarity) provided a clear example of this professional-organisational tension. When questioned about which term, practitioner or professional, best fitted his role, he replied:

> Definitely not a professional, the contractors were the professionals. They didn't have any allegiance to the company they were working for; they had had an allegiance to the profession… I was the practitioner; I was the person who was going to work for [XYZ Company] until he retired…

Bob saw himself as a 'company man', and in his opinion corporate employees are not professionals. They have company-specific skills acquired on the job and their allegiance is to the organisation.[107]

I concluded that there are sufficient organisational expectations and restrictions placed on employed ICT workers to consider bureaucracy a threat to the NZCS professionalisation project.

4.4.6 Globalisation

Technology-assisted globalisation is another factor weakening professional jurisdiction. Globalisation provides a benefit of an expanded market for professional services, but also a risk in that work which occurs collaboratively across continents cannot easily be controlled. As Kritzer (1999, 731) noted, "Once it becomes difficult to control competition from players beyond a professional group's area of political influence, the ability to maintain the group's professional monopoly is doomed".

Contemporary ICT work is frequently a global enterprise in which companies seek to exploit networked technologies and the global pool of expertise in order to spread their services worldwide or reduce costs by outsourcing routine work and/or research and development to cheaper locations.

Much ICT work in New Zealand is conducted globally, and several of the people I interviewed were involved in global initiatives. Damian and Sam's consultancy work spanning four continents was noted in Chapter 2. Leyton explained that he once worked as the sole New Zealand employee for an American Company collaborating as part of a worldwide team on a large technical writing project. David works for a multinational corporation which has operations in India, North America, Europe, and the Philippines, and so he was very mindful of

[107] Bob's comment that contractors are committed to 'the profession' in all likelihood refers to commitment to the craft of computing, rather than the traditional ideals of professionalism.

issues related to globalisation, particularly the cultural issues associated with outsourcing:

> Most of the German companies are outsourcing their work to Poland because most of the people there can speak German and it's about 50% lower employment costs. But there's the same issues [for us] in terms of cultural awareness. We have a whole program around what we call enculturation, so [XYZ company] is one of our clients in Australia and they're supported out of the Philippines. We bring all of the staff down to Victoria, we need to teach them what an AFL[108] game is; we have to help them to understand what it's like living in Australia because they have no idea. We have big monitors that show webcams of what's happening out the window, so if you're working on the Brisbane team your wall is actually a projection of the Brisbane skyline, so you can say to the customer "oh, it's sunny outside today isn't it" and you're actually 10,000 km away.

> The Philippine culture is very different to the NZ culture, their native language is different, it's heavily skewed towards the Roman Catholic… and that influences how they work. So for example, trying to roster people over Easter is almost an impossibility. If you talk to the average retail person in NZ, working on Easter Monday is kind of just goes with the deal… In the Philippines, no… And so we've had to be quite sensitive to those sorts of issues.

Globalisation clearly introduces extra dimensions into ICT work, enculturation being one example (further discussion is beyond the scope of this thesis). The NZCS regards globalisation as justification for ITCP certification, arguing that ITCP will put New Zealand ICT professionals "on a similar standing to those of other countries" (Matthews 2009a, 8). However it is also widely recognised that there are vastly different standards and legislation relating to ICT work across the world, making regulation of global projects near impossible (International Telecommunication Union 1999; NZICT Group 2011; World Information Technology and Services Alliance 2010).[109] While ITCP will provide a portable credential, this does not ensure that ICT workers involved in global projects can be controlled in performing that work.

4.5 Chapter Summary

A reasonable conclusion to this chapter is that NZCS professional claims will not be successful, at least in the near future. My argument has been that professional claims relating to ICT work in New Zealand will be difficult to legitimate, despite the seemingly supportive cultural authority associated with the computing industry. Currently the NZCS does not have sufficient internal strength to mobilise existing members, attract new members, or influence key external agencies. Participation in the NZCS is low across the industry, and commitment to professional goals is not universal amongst the NZCS membership. Professional claims have also not been legitimated in the arena of non-member ICT practitioners, most of whom were dismissive of the NZCS, although some did believe that ICT work should be regulated. As these practitioners

[108] AFL = Australian Football League
[109] For the range of different legislative acts governing ICT industries around the world see http://www.ictparliament.org/legislationlibrary .

become more aware of NZCS activities and the organisation perhaps gains credibility, support for professionalisation may increase. Around the world state legitimation of professional claims by legislation has not eventuated (apart from the software engineering profession), and is unlikely to happen in the near future in New Zealand. Consequently the NZCS is intending to entrench the notion of an ICT profession by introducing voluntary professional certification followed by chartered status adopted from Britain. Legitimation by the state first requires legitimation in the public arena, but there are no indications that this is imminent, perhaps due to a lack of understanding of ICT work amongst the population and the apparent impersonal nature of ICT work.

I also argued that there are significant barriers preventing control over ICT work. Determining an ICT body of knowledge is proving difficult for professional bodies across the world, and rapid change, commodification, and internet-facilitated distribution of ICT knowledge threatens control of any body of knowledge. Loss of mystery associated with computing work further weakens body of knowledge claims. Education for ICT work is not contained within the universities and is not controlled by professional bodies. Qualifications in ICT are not a pre-requisite for working in the ICT industry. The NZCS has adapted to this situation by introducing competency-based criteria for certification, but may also be planning for greater control of education by introducing degree accreditation. Amateurism has always played a role in the computing industry, often positively, but incompetent or unscrupulous amateurs threaten the integrity of the industry. Inability to exclude amateurs from ICT work limits NZCS jurisdictional claims. The highly specialised nature of ICT occupations presents an opportunity for a federated ICT profession, but cultural differences between specialisations and strong allegiances to specialist groups are a major barrier to federation. The majority of ICT workers are employed by organisations and loyalty to the organisation together with commercial imperatives detract from professional control of ICT work. Globalisation is a further barrier impeding success of jurisdictional claims.

These barriers are unlikely to diminish. After all, we can be fairly certain that globalisation and the rate of change in the ICT body of knowledge will only increase; accreditation of degrees will not devalue industry certification; specialisation in ICT work will persist; and entrepreneurial individuals will continue to create innovative artefacts, regardless of qualifications and/or professional certification. Even if the government was to require certification for its ICT work, this would not necessitate a profession since an estimated 95% of ICT practitioners do not work

for the government.[110] Government plans to reduce the numbers of permanent ICT employees and rely on contractors instead (Watson 2010a), will likely reduce interest in professionalisation, given that contractors are often the least bureaucratically inclined individuals. Likewise increased reliance on multinational ICT companies by government (McEntee 2010) will reduce the significance of local professional accoutrements.

Indeed, it may be that only an ICT induced disaster causing significant and widespread harm would bring about a legally mandated profession. Meanwhile we should take heed of Blaise Cronin and Elizabeth Davenport's (1988, 279) comment that: "A profession is like a corset: it confers an appearance of order on a flabby mass... Professions are an attempt to impose a unitary character on a varied population." In the case of the ICT industry in New Zealand currently, the flabby mass is simply too varied.

[110] Estimate based on figures of approximately 2000 ICT professionals employed by government (State Services Commission 2010, 8) and approximately 50,000 ICT professionals in total (Statistics New Zealand 2008a). A number of other ICT professionals, although not employed directly by the government, will be working on government projects, and certification could be required for these individuals, thus reducing my estimate.

Chapter 5 – Women in ICT Work

"When I went into IT I thought, naively, that all that was wanted was my brain" (Hilary, research participant, 2010)

5.1 Chapter Overview

In the previous chapters I have at times alluded to but not addressed the gendered nature of the ICT industry in New Zealand. I now focus on the position of women in ICT work and the professionalisation project, starting in this chapter and continuing in Chapter 6.

In this chapter I follow Celia Davies's (1996, 663) advice and draw attention to the manner in which women are included in ICT work in New Zealand, rather than focussing on how they are excluded. I explore the experiences of women working in the ICT industry and argue that their position is best understood in terms of an 'outsider-within' location rather than that of either an 'outsider' or an 'insider'. My argument is that women's location as outsiders-within can be traced back to the earliest days of computing, and is evident today in phenomena such as gender segregation in ICT occupations and discriminatory reward practices in the industry. Although I refer at times to the 'under-representation of women in ICT' my argument is not the liberal position that equal numbers would imply equality (Faulkner 2001, 92); rather I subscribe to the view that the social processes of gendering result in women being positioned as outsiders-within even when there is a 50% or more female representation in any ICT occupation.

In the following chapter I argue that the current professionalisation project also places women in an outsider-within position.

I begin this chapter with a brief portrait of a quintessential 'outsider-within' – a woman named Ali.

5.2 Ali the 'All-Rounder'

Ali was the sole female member of a team of seven web designers who won a 24-hour trans-Tasman website building competition in 2007 (see Figure 8). Ali was given the title 'all-rounder', a designation which appears to suggest that she helps-out where needed, does the running around, attends to the client, and perhaps makes coffee, while the male experts do the real work. By this interpretation, Ali is portrayed as a *less credible* team member than her male counterparts. On the other hand, the designation may imply that Ali is vastly experienced and has multiple skills, and is thus capable of undertaking any of the team's tasks as required. This

interpretation would appear to bestow Ali with *equal (*or perhaps even *more) status* than her male colleagues. However as this chapter will show, it is likely to be Ali's communication and negotiation skills rather than her technical skills which are in demand during the competition. As a woman, Ali will be expected to support the male 'experts' and act as the team's boundary spanner. As such she will be awarded *lower status* than her male colleagues.

Figure 8: Website Building Competition Winning Team

The winning team L to R: Thomas (project manager), Mark (programmer), Steve (designer), Ali (all-rounder), Jeffrey (HTML/CSS coder), the client, Peter (writer), Zef (information architect)

Source: http://www.shift.co.nz/news/entry/kiwi_geeks_win_trans_tasman_24_hour_website_building_competition/ [Accessed August 29 2007]

Figure 8 encapsulates many of the issues which confront women who are located as outsiders-within in the ICT industry. It gives a message that ICT work is mainly for men and that it is men who are the experts in ICT. Women may join in, preferably in low status roles which support the activities of men, but if women are in fact experts too they will be awarded lower status anyway. Further, clients of ICT professionals are likely to be women who need men to solve their computing problems. Women are useful to have on the team because they are 'good communicators' and consequently will take responsibility for relationships with clients and within the team.

5.3 The Gendered Nature of ICT Work

Women are significantly under-represented in ICT work in New Zealand, as they are in many Western countries (Bartol and Aspray 2006, 377; Zarrett et al. 2006, 55; Byrne and Staehr 2005, 12; Griffiths, Moore, and Richardson 2007, 339; McKinney et al. 2008, 81; Panteli, Stack, and

Ramsay 1999, 52; von Hellens and Nielsen 2001, 46; Wilson 2003, 127; Panteli et al. 1999, 170; von Hellens, Nielsen, and Beekhuyzen 2004, 104; Trauth 2002, 98). Despite this under-representation suggesting otherwise, ICT work is often considered by people in the industry (and my students) to be gender-neutral. Several of my research participants commented: "There's nothing stopping women doing IT work; they just don't apply." For example, Andy, who runs a networking company, said: "I personally don't believe the industry is shutting out women, I think women are just not really that interested."

But it is apparent to many scholars, and some participants in the industry, that ICT work is in fact significantly gendered. Hilary, one of my female participants with over 30 years' experience in the ICT industry, articulated this point clearly:

> Most of my life in ICT I have been working almost entirely with men. When I went into IT I thought, naively, that all that was wanted was my brain; my gender didn't actually make a difference. That is untrue. Your gender does make a difference. And it really is quite difficult for a woman to be treated truly equally with men.

Gender is not only an individual characteristic, it occurs throughout the social milieux and it is often the basis for inequality (Wharton 2005, 23). Hilary's experience of different and often unequal treatment relates to the people, the interactions, the processes, the institutions, and the social expectations that impact on her work, all of which continually produce and reproduce gender (Wharton 2005, 7). Gendered practices and relations in the workplace often result in a female member of a mainly male occupation feeling that she is an 'outsider'. As Ann Oakley (2002, 3) noted, "Women are outsiders in a system which often appears to them to come from another planet." Many women in the ICT industry have this feeling of alienage (Trauth 2002, 115; Webster 1996, 39). "Women have been found to describe themselves as 'different' and not accepting or feeling part of the male culture of computing" (Wilson 2003, 129). This suggests that there are conditions serving to either to keep women out of ICT work or to contribute to their unease when they are in that work (Wright 1997, 80). Thus we can consider circumstances of both exclusion and inclusion for women in relation to computing work. Women who are included in ICT work could be considered 'insiders', but they often feel more like 'outsiders' (Zarrett et al. 2006, 60).

The notion of women as 'outsiders' in relation to the field of computing has been explored by several prominent writers from the field of feminist technoscience.[111] Margolis and Fisher (2002, 3) referred to a "boys' clubhouse" of computing education which robs women of their

[111] Some female scholars from the computing disciplines have also explored this theme; see Trauth (2002), von Hellens, Nielsen, and Beekhuyzen (2004).

interest in computing and relegates them to an outsider position. The "boys' clubhouse" is manifest in the way in which computing is taught and in the masculine culture of computing classes, both of which are counter to the interests of most women and lead to many women either not pursing computing or losing confidence if they do (Margolis and Fisher 2002, Ch 5). Wajcman (1991, 164) also described a masculine culture surrounding technology and claimed that women often pay a "high price" when they enter this foreign territory; namely their femininity. As a relatively new technology, computers had the potential to develop alternative gender relations (for example gender neutral or female-dominated) but failed to do so and instead "slotted into a pre-existing male subculture and took on its masculine face" (Wajcman 1991, 155). More recently Wajcman (2007, 295) noted that women's standing in the computer industry has barely improved, despite their recent enthusiastic uptake of new computer technologies.

The 'masculine culture' of ICT derives from the dominant cultural ideal of masculinity as being intimately linked with technology (Wajcman 1991, 137). It includes notions of aggression, compulsive dedication, domination, control, and competitiveness (Wajcman 1991, Ch. 6; Cohoon and Aspray 2006, 145), together with isolationism, mastery, non-sensuality, and omnipotence (Turkle 2005, 187-216). Underpinning this culture is society's reverence for rationality, a quality also associated with men (Wajcman 1991, 145). The culture of ICT work is often expressed in terms of gender dualisms reflecting the polarities of hard/soft, mind/body, things/people which honour masculinity and which serve to exclude women from technical work (Faulkner 2000, 759; Wajcman 1991, 145-146; von Hellens, Nielsen, and Beekhuyzen 2004, 108). This masculine culture is off-putting for many women (Wilson 2003, 128; Wright 1997, 80; von Hellens, Nielsen, and Beekhuyzen 2004, 105; Panteli, Stack, and Ramsay 1999, 58), while for those women who do become involved, several outcomes are possible; for example their work may be "rendered invisible" (Light 1999, 455) or they may become associated with lower status or lower paid roles (Zarrett et al. 2006, 60).

5.3.1 The Notion of Women as Outsiders-Within in ICT Work

Collins (2009, 13) used the phrase "outsider-within social location" to describe the contradictory situation black women traditionally experienced as domestic workers for wealthy white families in the USA. The women often developed strong insider relationships with the families and children they cared for, but could never truly become part of the families and remained permanently exploited outsiders within the family.

In this chapter I argue that women who work in ICT are also located as outsiders-within. In

doing so I do not suggest that these women experience an equivalent level of marginalisation Collins' women endured and rallied against. While acknowledging their struggles, I apply Collins' (2009) insights to my observations of the position of women in the IT industry. I am reminded by Collins (2009, 8) that I do not speak for all women and that I may be "promoting the notion of a generic White middle class woman". This cautionary reminder is particularly relevant when discussing the computer industry in New Zealand where the numbers of Māori and Pacific women are very small indeed.[112] My research has not investigated the experiences of these groups of women, and I make no conclusions about their low participation in ICT work. Commonsense suggests however that if White women feel excluded from computing, then Māori and Pacific women may feel even more so, as has been reported for Black American women (Varma, Prasad, and Kapur 2006, 310). For practical reasons I refer simply to 'women' throughout this thesis. The potential pitfalls in treating women as a homogeneous group have been clarified by Eileen Trauth (2002, 114), however Wajcman's (1991, 11) observation that women universally experience marginalisation and subordination supports my decision to refer to 'women' collectively throughout this thesis. This does not deny that there are individual differences amongst women.

My preference for Collins' (2009) concept of 'outsider-within' location rests on the powerful image she presents of a woman who belongs yet does not belong; is wanted but is also not wanted. She is a woman who contributes, but her contributions are not truly valued. But importantly, she is a survivor. Although oppressed and seemingly powerless, this woman is in a unique position to observe her oppressors and to develop connections with others who are similarly positioned (Collins 2009, 42). I find this image more robust than others which promote a straightforward insider-outsider segregation. The 'outsider-within' image emphasises the insider's tenuous position and asks us to question the authenticity of her apparent insider status.

Linda Stepulevage and Sarah Plumeridge (1998) found the imagery of women as outsiders-within useful in understanding the pressures women students experienced when they entered a university computer science course. The course was conducted within a scientific discourse in which white males dominated, and although these women were physically inside this masculine

[112] For example data from the 2006 Census of Population and Dwellings show that of the total number of Developer Programmers, 0.9% were Māori women, and 0.3% were Pacific women (Statistics New Zealand 2008a). The proportion of Asian women (and men) is generally higher in most roles, but nevertheless it is clear that computing occupations in New Zealand are in most cases heavily dominated by European men (Statistics New Zealand 2008a). The lower numbers of Māori and Pacific people in ICT in New Zealand are matched by low numbers of African American and Hispanic people in the USA, a situation which leads Margolis and Fisher (2002, 10) to state that "the shortage of people of color in the computing profession is even more dire than the shortage of women".

domain, they were actually situated as outsiders in the "enterprise of knowledge creation" (Stepulevage and Plumeridge 1998, 315). As outsiders-within the women students sought creative ways to navigate and find alternatives to the dominant discourse, and thus were not concerned about their marginalised location. The authors proposed that this was due to the women's shared history and common experiences of exclusion (Stepulevage and Plumeridge 1998, 314).

I wish to widen the scope of this discussion to include other aspects of computing besides education in which women are located as outsiders-within. There are many such aspects. Elsewhere I have argued that media advertising signals to women that they are not authoritative participants in the IT industry (Hunter 2009a); women are often portrayed as outsiders-within in advertisements of computer technologies. In the following sections I present arguments concerning the outsider-within position of women in the origins of computing and in current ICT workplace practices.

5.4 Women as Outsiders-Within in the Origins of Computing

In her study of female design engineers working in a highly masculinised workplace, Fletcher (1999, 91) found that women's work frequently "disappeared". This was due to organisational value systems underpinning the definition of "real work" and workplace cultural norms of "self-promotion, autonomy, and individualism" (Fletcher 1999, 90). When women worked in a manner which deviated from these norms, their contributions to successful work outcomes went unrecognised. Other scholars have noted that even when women perform the *same* work as men, their work can 'disappear'. For example Jennifer Light (1999) and Denise Gürer (1995) have drawn attention to the fact that women's significant contributions to early developments of computer technologies in the USA and Britain have largely been overlooked in historical accounts of the industry.

Light (1999, 471) offered the example of 200 female mathematicians employed as human computers during World War II and six women who programmed the ENIAC computer in 1945, all of whom were labelled low status clerical workers by the US Army despite the intellectual demands of their work. In comparison, the work men undertook designing hardware was considered high status work and worthy of acclaim in media reports at the time. While men were credited with "fathering" the ENIAC, women's contributions were omitted: "Women seem to have vanished from the ENIAC story, both in text and in photographs" (Light 1999, 474). The ENIAC women did not work differently to men, it was the same work men came to

do later; the work 'disappeared' because women did it (Light 1999, 482). This matches a general tendency for women's work to be labelled unimportant or low skilled, regardless of the nature of the work, simply because women are doing it (Caplow 1954, 233). Women were permitted to programme the ENIAC computer because programming was initially regarded low status clerical work, but as awareness of the intellectual rigour required to write programmes grew, programming came to seen as men's work (Wajcman 1991, 158; Kraft 1979, 141).

Gürer (1995) recorded the involvement of a large number of pioneering women who were key participants in the early days of computing and whose contributions remain largely unacknowledged. Only two of these women are well known and have lasting recognition of their work: Augusta Ada Byron Lovelace, a pre-computing 19th century mathematician commonly regarded as a visionary conceptual programmer, who has the programming language Ada named in her honour, and Grace Murray Hopper, one of the first programmers in the 1940s, who was remembered in an 1994 international conference, the Grace Hopper Celebration of Women in Computing (Gürer 1995, 46-47).[113]

During this early period of computing women worked alongside men as insiders, but the lack of recognition for their skills and contributions suggests they were essentially outsiders. Thus women's location as outsiders-within can be traced back to at least the 1940s when the first computers were designed and built.

Records of contributions of women to the origins of computing in New Zealand are rare. The NZCS Silver Jubilee Oral History collection contains only one recording for a woman, Norma Moffett. Moffett (1985) explained that she broke the expected pattern for women in the 1950s when she became an applied mathematician rather than a teacher or nurse, and later a computer programmer for the Treasury computer. Although her work was exclusively within male dominated domains, Moffett never felt she was treated differently as a female, and believed women limited themselves by putting up "mental" barriers. It seems that Moffett did not regard herself as an outsider-within, however some of her comments suggest otherwise. Moffett's career was interrupted by child rearing, and she had much catching up to do when she returned to work (Else 1985, 171). Others (men) were now in far more senior positions, and although Moffett could have sought advancement, she chose not to, stating that she felt more comfortable working in a team "and preferably in the second place" (Moffett cited in Else 1985, 171).

[113] In addition the Grace Murray Hopper Award is presented annually by the ACM (Association for Computing Machinery 2009).

Moffett's narrative alludes to three phenomena common to women located as outsiders-within in ICT. Firstly, she denies her own and other women's marginalised position; secondly, the interruption to her career makes it difficult for her to advance; and thirdly, although she is very capable she prefers not to seek promotion to a higher level. Unfortunately Moffett's oral history does not explore these issues further, but we are left suspecting that although Moffett is an insider, she remains an outsider in terms of career advancement. These factors relate to a 'glass ceiling' for women in ICT, a topic discussed later in this chapter (page 146).

Light (1999) and Gürer (1995) called attention to the lack of recognition of women who participated in the development of computing. Another group of women who made a different type of contribution in the early days of computing are also unrecognised. These were women who were not personally involved in the emerging industry, but supported their husbands whose demanding work schedules meant they worked very long hours and were seldom at home.

When computers were first introduced into New Zealand people regularly worked very long hours, often through the night, and sometimes 24 hours in a stretch (Barnard 1984; Harpham 1984; Henley 1984; Moffett 1985). According to a well known saying at the time, "the mark of the true professional computer man is one who's seen the dawn rise over his projects" (Barnard 1984; Williams 1985). Since those working with computers were mainly men, it was women who were left largely alone to cope with home and children. Percy Harpham (1984) recalled that "the wives" never complained, "probably because we never saw them". An oral history interview with one of these wives, Edvige Peko (1984), revealed the considerable contribution these women made to support the male insiders of the developing computer industry. Her story follows.

Edvige Peko's husband Lorin worked for the EDP[114] unit of the Treasury in Wellington. Lorin was never home for dinner and often came home at 5am in time for an hour's sleep and breakfast before returning to work. He usually worked in the weekend and family holidays were often cancelled. Edvige appeared to accept these conditions with forbearance, but the effect of her husband's long absences on his wife and five children must have been considerable. She commented mildly that her husband's promises that "next week will be better" were never fulfilled. We can imagine that Edvige was a very busy woman, with more than enough to do around the home, but she was also expected to assist with Lorin's work at short notice. He would often telephone her in the middle of the night with instructions to transport computer punch cards from one location to another. On one memorable weekend Lorin sent Edvige to

[114] EDP = Electronic Data Processing

Palmerston North at 1am on the Saturday night to collect a young computer programmer from a wedding and drive him back to Wellington to fix a computer problem (a round trip of 290 km).

Edvige appears to have been extremely accommodating in these demanding circumstances. Asked how she managed, Edvige replied that she "coped because she always had to", although later she admitted that "at the time it was quite stressful". Edvige was not an outsider-within, rather she was a (female) outsider supporting a (male) insider. With excessively long working hours for men featuring so often in the oral history narratives, we may assume there were many other wives like Edvige in the 1960s. Acclaim for the pioneering men who worked hard to introduce computers into New Zealand should, I suggest, acknowledge the domestic and work-related help they received from their wives and which also appears to have 'disappeared'.

5.5 Women as Outsiders-Within in Contemporary ICT Work

The fact that women do participate in ICT work appears to classify them as insiders, however when women's work is confined to a limited range of occupations which are awarded lower status and lower pay (Zarrett et al. 2006, 60), it is more realistic to describe them as being located as outsiders-within.

The segregation of men and women into different occupations is a well established feature of the labour market (Wajcman 1991, 21; Braverman 1974, 231) and generally match social stereotypes of femininity and masculinity (and the gender dualisms) (Panteli, Stack, and Ramsay 2001, 82; Wharton 2005, Ch 6; Panteli et al. 1999, 171, 179). Early computer programming quickly demonstrated a gendered division of labour (Kraft and Dubnoff 1986, 195) and, as I observe in this chapter, a similar segregation now occurs in most contemporary roles in the ICT sector. A gendered division of labour is associated with the gender-typing of occupations (Wajcman 1991, 33); an essentialist view in which occupations are regarded as being inherently more suitable for one gender than the other (Wharton 2005, 182). For example data entry work requires attention to detail, and because many women do this work, attention to detail is seen to be a feminine characteristic; consequently women are seen to be inherently more suited to data entry roles. Occupations gender-typed as feminine are typically less valued in terms of status and pay than occupations gender-typed as masculine (Wharton 2005, 190-197; Wajcman 1991, 37). Since gender-typing is both a cause and a consequence of the sex composition of an occupation; gender-types perpetuate (Wharton 2005, 182).

Gender segregation, gendered divisions of labour, and gender-typed occupations are salient

features of the ICT industry and provide further evidence of the outsider-within location of women in ICT.

Reports of a two-way (horizontal and vertical) segregation of women in ICT roles are widespread (Griffiths, Moore, and Richardson 2007, 342; Loseke and Sonquist 1979, 174; Orlikowski and Baroudi 1989, 26; Panteli, Stack, and Ramsay 2001, 8-9; 1999, 53; Strober and Arnold cited in Wright and Jacobs 1994, 517; Panteli et al. 1999, 173; Webster 1996, 34-37). Horizontal segregation is manifest in the clustering of women in occupations associated with the 'soft' side of ICT, for example administration, marketing, sales, customer service, training, help-desk support, and a corresponding predominance of men in technical occupations associated with the 'hard' aspects of computing, for example programming and network engineering (Panteli, Stack, and Ramsay 1999, 53; 2001, 9-10; Panteli et al. 1999, 173-174). Vertical segregation (or gender stratification) within occupations is evident in women's higher representation in the lower echelons of most occupations (Panteli, Stack, and Ramsay 2001, 8; 1999, 53; Panteli et al. 1999, 174-175; Whitehouse and Diamond 2006, 78). For example, data from the UK showed that although 22.6% of programmers were female, only 8.3% of principal programmers were female (Panteli, Stack, and Ramsay 2001, 9). Vertical segregation relates to the glass ceiling operating in ICT, discussed in detail on page 146.

These are not new phenomena; as noted already, gendered patterns of employment developed during the early period of computerisation, and have continued since then – as has occurred in the fields of engineering (Faulkner 2007) and science (Traweek 1988). In a 1980s study of software work in the USA, Kraft and Dubnoff (1986, 195) concluded: "Women are used as educated, highly trained labor assigned to support roles and low-level work." More recently Gillian Whitehouse and Chris Diamond's (2006, 81) study of the Australian ICT industry found complex patterns of gender segregation which did not always follow the purported hard/soft dichotomy, although it did identify a marked vertical segregation. Widespread notions that men were more suited to technical roles and women to support and analyst roles were also found.

The gendering of roles in New Zealand's ICT industry can be traced back to a "sexual division of labour" that first developed in the late 1960s and accelerated during the 1970s and early 1980s (Beardon 1985, 115). During this period women came to be employed in lower paid, lower status occupations, particularly occupations classified as non-professional, and often found it difficult to get promotion (Beardon 1985, 113-115). Women were frequently left to pick up work men had discarded, which meant the women's work was seen as less valuable: "Jobs have been de-skilled down to the level where women are allowed to do them" (Beardon

1985, 115). The distribution of women in ICT roles in New Zealand at this time is shown in Table 2. The data in Table 2 show a gender segregation in which women were greatly over-represented in data entry positions (the lowest paid, lowest status of all the occupations), and under-represented in systems analyst, systems programming, and engineering roles (the highest paid, highest status occupations) (Beardon 1985, 114). Women were reasonably well represented in operator roles, an occupation Beardon (1985, 110) described as "non-professional" and "falling further behind" other IT occupations in pay. While women appeared to be well represented as higher status applications programmers, in reality they were often borderline non-professionals in this occupation, with men occupying the more senior programming positions:[115]

Table 2: Percentage of women in ICT occupations in New Zealand in 1982

Occupation	% of Women
Systems Analysts	19%
Applications Programmers	46%
Programmer/Analysts	30%
Systems Programmers	8%
Database Programmers	12%
Operators	43%
Data Entry	97%
Clerical	33%
Engineers	1%

Source: Jackson (1983, Appendix I, 23)

> Senior programmers are still predominantly male, command high salaries and have reasonable opportunities for promotion to analysis, while junior programmers are more likely to be female, their salaries are lagging behind, and they have poor prospects of promotion. (Beardon 1985, 104)

Similar more recent gendered employment patterns in New Zealand were revealed in Crump, Logan, and McIlroy's (2007) research interviews with 70 female ICT professionals. In that study men occupied most technical roles and women were mainly represented in 'softer' occupations requiring effective communication and management skills. The women did not perceive their work to be less valued or of lesser status than the traditional male roles (Crump, Logan, and McIlroy 2007, 349), but this may not have been the perception of their male colleagues.

5.5.1 Horizontal Gender Segregation in Contemporary ICT Occupations

The large number of ICT specialisations was noted in Chapter 2, and claims of horizontal segregation suggest that women will be more often employed in some specialities than in others. The current gender distribution across these occupations in New Zealand is shown in Table 3.

[115] The comparatively high proportion of female applications programmers at this time is consistent with H Offenberger's (1984, 12) data showing that twice as many women than men enrolled in the New Zealand Certificate of Data Processing during the years 1967-1978.

Table 3: Number Employed and Gender Frequencies in ICT Occupations in New Zealand in 2006

	Male	Female	Census Total*	% Male*	%Female*
1 Managers					
135111 Chief Information Officer	54	0	54	100.0%	0.0%
135112 ICT Project Manager	3627	1053	4680	77.5%	22.5%
Total (Managers)	**3681**	**1053**		**78%**	**22%**
2 Professionals					
212415 Technical Writer	138	159	297	46.5%	53.5%
223211 ICT Trainer	351	465	813	43.2%	57.2%
225211 ICT Account Manager	6	3	12	50.0%	25.0%
225212 ICT Business Development Manager	27	3	27	100.0%	11.1%
225213 ICT Sales Representative	1260	345	1605	78.5%	21.5%
232411 Graphic Designer	2628	2568	5199	50.5%	49.4%
232413 Multimedia Designer	66	15	81	81.5%	18.5%
232414 Web Designer	423	216	642	65.9%	33.6%
261111 ICT Business Analyst	165	243	408	40.4%	59.6%
261112 Systems Analyst	4989	1686	6675	74.7%	25.3%
261211 Multimedia Specialist	30	15	42	71.4%	35.7%
261212 Web Developer	693	297	990	70.0%	30.0%
261311 Analyst Programmer	585	219	804	72.8%	27.2%
261312 Developer Programmer	5730	1194	6924	82.8%	17.2%
261313 Software Engineer	162	48	210	77.1%	22.9%
261399 Software & Applications Programmers	4539	597	5133	88.4%	11.6%
262111 Database Administrator	645	984	1629	39.6%	60.4%
262112 ICT Security Specialist	285	66	354	80.5%	18.6%
262113 Systems Administrator	1668	1074	2742	60.8%	39.2%
263111 Computer Network & Systems Engineer	840	42	882	95.2%	4.8%
263112 Network Administrator	933	255	1191	78.3%	21.4%
263113 Network Analyst	129	24	153	84.3%	15.7%
263211 ICT Quality Assurance Engineer	117	33	150	78.0%	22.0%
263212 ICT Support Engineer	372	198	573	64.9%	34.6%
263213 ICT Systems Test Engineer	201	66	270	74.4%	24.4%
263299 ICT Support & Test Engineers	111	24	132	84.1%	18.2%
263311 Telecommunications Engineer	465	21	486	95.7%	4.3%
263312 Telecommunications Network Engineer	390	246	639	61.0%	38.5%
Total (Professionals)	**27948**	**11106**		**72%**	**28%**
3 Technicians and Trades Workers					
313111 Hardware Technician	81	12	93	87.1%	12.9%
313112 ICT Customer Support Officer	4539	1374	5913	76.8%	23.2%
313113 Web Administrator	129	150	279	46.2%	53.8%
313199 ICT Support Technicians	1047	792	1839	56.9%	43.1%
Total (Technicians)	**5796**	**2328**		**71%**	**29%**
5 Clerical and Administrative Workers					
532111 Data Entry Operator	855	3918	4773	17.9%	82.1%
532113 Word Processing Operator	87	1887	1974	4.4%	95.6%
Total (Clerical)	**942**	**5805**		**14%**	**86%**
6 Sales Workers					
621211 ICT Sales Assistant	117	36	153	76.5%	23.5%
Total (Sales Workers)	**117**	**36**		**76.5%**	**23.5%**
Total (All Occupations)	**38484**	**20328**	**58821**	**65.4%**	**34.6%**

Source: 2006 Census of Population and Dwellings (Module 6: Occupation) (ANZSCO Coding System). * Note: due to confidentiality rules of Statistics NZ totals are not additive and percentages will not always add to 100% when frequencies are small.

The data in Table 3 demonstrate continuing gendering of ICT occupations in New Zealand, and several patterns of horizontal segregation amongst the occupations are evident.[116] Although women occupy approximately 35% of all positions in the ICT industry they are not evenly distributed throughout the different categories of occupations. Women are under-represented in four of the five categories: managerial (22%), professional (28%), technician (29%), and sales (23.5%), and are markedly over-represented in clerical positions (86%). Further, women are least represented in the highest paid and highest status category (managerial), and are most represented in the lowest paid, lowest status category (clerical and administrative); in fact women are not represented at all in the most highly paid, most high status occupation of Chief Information Officer.[117]

The professional category employs the largest number of ICT workers (approximately 66%) and also includes the greatest number of occupations. The large number of professional occupations reflects the expansion of the computer industry, its growing diversity, and the increased specialisation of contemporary ICT work noted earlier. Women occupy 28% of these roles, but their participation across roles is uneven. There are some (usually newer) occupations in which women are either equally or slightly overly-represented: technical writing (53.5%), training (57.2%), business analysis (59.6%), database administration (60.4%), and graphic design (49.4%). Conversely women are significantly under-represented in all other roles, including the traditional computing roles of systems analysis (25.3%) and programming (16%)[118] which employ by far the greatest numbers.[119] This segregation follows the soft/hard dualism noted previously, although interestingly it differs from an alternative finding of high representation of women in "analysis-programming work" (Von Hellens et al. cited in Bartol and Aspray 2006, 394).

The fact that women are distributed unevenly across the professional ICT roles is not sufficient to show that these women are located as outsiders-within. This claim requires evidence that the roles women occupy are paid less, are valued less, and have lower status. As will be discussed shortly, these are difficult issues to pin down with certainty in New Zealand. However there is evidence from other countries that the 'soft' roles in ICT, those in which women are most highly represented, are associated with lower status and are seen as less valuable (Panteli, Stack, and Ramsay 2001, 8; Weber and Gilchrist 1975, 417).

[116] Vertical segregation within occupations would not be revealed in this data.
[117] See page 148 for further discussion of the lack of female CIOs.
[118] Calculation based on all four programming occupations (261311, 261312, 261313, 261399).
[119] A comparison of data in Tables 2 and 3 shows that there has been a slight increase in the proportion of female systems analysts, but a dramatic decrease in the proportion of female programmers.

The matter of status and pay associated with ICT work was raised by Donileen Loseke and John Sonquist (1979). These authors used Braverman's (1974) notion of the separation of the functions of conception and execution in the division of labour to argue that different ICT occupations could be classified and rank ordered. They proposed four "techno-metier" categories of ICT work: "(1) design; (2) implementation; (3) maintenance; and (4) operation" (Loseke and Sonquist 1979, 160). The highest ranked category, "design", the work associated with the function of conception, was more highly paid and was associated with greater prestige than the other three categories. Further, women were increasingly channelled into the lower status and lower paid non-design roles, as predicted by Braverman (Loseke and Sonquist 1979, 174). A similar prestige hierarchy of roles was identified (but not linked to gender) by Joan Greenbaum (1976, 47) who described programmers as being at the intellectual and skill "pinnacle" of computing work.

Although the range of ICT occupations has increased markedly since Loseke and Donileen proposed their "techno-metier", their broad categories remain useful today when considering the relative value placed on different ICT occupations. Of the professional occupations listed in Table 3, those fitting most closely with Loseke and Donileen's higher status "design" category are systems analysis, programming, and the various ICT engineering roles – all occupations with low proportions of women.

5.5.1.1 Pay across ICT Occupations

An outsider-within location for women would be reflected in a concentration of women in lower paid specialisations in the ICT industry, particularly if it was demonstrated that these roles are paid less because women do them.

Finding reliable data concerning pay rates for computing occupations in New Zealand has proved difficult; identifying causal factors is even more challenging. Privacy restrictions hinder investigation into pay parity in this country and statistical information often refers to total income rather than actual salary. Nevertheless, in a previous study of the incomes of men and women in New Zealand's ICT industry, based predominantly on data from the Census of Population and Dwellings in 2001 and 2006, I found that of the occupations investigated, the two occupations with the highest proportion of females in 2006 (computer operator and systems manager) were also those with the lowest median incomes (Hunter 2009b). The two highest paid occupations in 2006 were Systems Analyst and Computer Programmer, both of which were dominated by males. I also found that during the period 2001 to 2006, increased participation by females in an occupation was linked with smaller increases in income, whereas increased

male participation in an occupation was associated with larger increases in income (Hunter 2009b). This finding provides some support for the claim that the feminisation of roles in ICT is associated with relatively decreased pay. Overall, my findings were consistent with a reported gender pay gap of 7.6% across ICT occupations within the Public Service (State Services Commission 2010, 21). Further data and analysis is required to progress the issue of pay discrimination throughout the industry.

5.5.1.2 Status across ICT Occupations

If some occupations are paid less because women do them, this would be linked to the lower status awarded to women generally in society. Cecilia Ridgeway (cited in Wharton 2005, 57) referred to a gender "status characteristic" which shapes social expectations. In society "men are generally regarded more positively than women" (Wharton 2005, 57). In the workplace, people with low status characteristics (e.g. women) are typically disadvantaged.

I have personal experience of a status hierarchy of ICT roles, and as expected this is perpetuated by men. In my institution a senior student who undertakes a final year project in technical writing will almost never receive an A grade, regardless of the quality of the work, because technical writing is regarded by male academics as inherently less intellectual than programming and therefore a lower status sub-discipline. The highest status is attached to programming projects, usually undertaken by male students and supervised by male academics. Technical writing, taught by female academics, is viewed by men as an easy option for students who are 'unable to programme'. This observation is consistent with Faulkner's (2000, 767) observation that "development work" accrues the greatest status.

Some of my research participants were very aware of a status hierarchy in ICT occupations, but they usually did not associate this with gender. Julia was one who did. Julia believes that all the specialities involved in creating a computer system are important, but has found that the roles most often undertaken by women - roles she describes as 'peripheral' to development (programming) - are frequently regarded as less important. Julia suspects that discrimination contributes to this gender segregation, but is unsure whether women choose these peripheral roles or are 'pushed out' of 'the hard' ones:

> Software is actually more than just development of the software. There's all these other [skills] that need to be brought in such as marketing, usability, design, and it would appear that women are more in these outer peripheral type things, and whether they've been pushed out because they couldn't quite make it in the hard or whether they're just more attracted to those other areas, I'm not quite sure. So there's discrimination because they tend to be more populated by women and tend to be perceived as less important than the development work... The touchy feely, the marketing, the usability, tends to be more female

> oriented.

Leyton's experience matches mine above. He has found that technical writing is not highly valued by other ICT professionals who seem to consider it a secretarial task, a "poor sister":

> It's still sort of a poor sister, you know. There's sort of lip service paid to getting started at the beginning of a project, and finding someone who can write, and user interface design, someone who's got an idea about user friendliness.
>
> Respect? Not enough, because the skills are so broad to do it well, and there's a bit of perception that it might be just a typist, secretary, type job where you're just typing it up for somebody who's really got the brains, but in fact that isn't really the case.

Sharon found that her earlier occupation, software testing, was often not highly regarded, and neither is her present speciality, business analysis (BA):

> When I was contracting as a tester I was on the other side of the fence, and yeah some people think that testing isn't important. But testing is, I think, very important… And I think people who haven't worked with BAs don't realise how important BAs are as well.

Sharon's comments match those of other software testers reported elsewhere:

> "If you had a diagram with God at the top, the engineers [developers] would put themselves above that"… Another tester said, "We have to fight to keep ourselves equal; we are continually doing things to make ourselves feel just worthy". (Cohen et al. 2004, 79)

Collectively these observations are compatible with previous findings that higher status is awarded to 'pure' computing work involving abstraction and mathematical analyses, and lower status to more concrete user-focussed computing work (Hacker cited in Faulkner 2001, 87; Grundy cited in Webster 1996, 43). The importance of 'peripheral' roles is often overlooked. As Andrea explained, if they are not performed properly, the computer system will likely fail:

> The statistics show that if you catch errors prior to go live, especially go public, it's hugely less, it's like 10 times less [likely to fail].

It is mainly women who perform these peripheral tasks, but in highly masculinised workplaces preventing problems, as these women do, is less highly valued than solving them (Fletcher 1999, 90).

5.5.1.3 Other Views – Soft Skills

Many of my research participants were aware of the horizontal segregation of ICT roles, but they usually did not associate this with status or pay. Rather they expressed views suggesting a female aptitude for soft skills. For example, Keri was aware of women shifting away from

programming roles and into 'softer' areas:

> They're getting out it [programming]; even if they're trained into it, they get out of it really rapidly, and … get into management, analysis, training instead. My friend's daughter went to university and ended up with a computer science degree. But of the girls that went through with her, after 2 years she was the only one still coding. They had all branched off and gone into in quotes softer areas.

Some participants offered essentialist explanations for the segregation. Don Robertson, NZCS President, thought women are inherently more suited to some roles more than men:

> They [women] make really good sales and marketing, they do very good business analysis, there's a whole pile of stuff, and women are actually suited to some of those roles better than men quite frankly because of the skills women have dealing with people and that sort of stuff, way better than men.

Mandy's explanation for there being more female than male business analysts included both essentialist reasoning and acknowledgement that expertise is a subjective measure:

> Soft skills. Women can be stronger on this. You need a lot of patience. You need to have the whole people skills and you know be able to relate to people, sometimes in an emotional way rather than just facts and numbers, whereas I find guys might not have that much patience to do that sort of thing… I think women probably can be stronger on the soft skills side than men. Men are in project management, they are, you know, good at the quantitative sort of roles or technical roles where men are perceived to be better than women.

A more comprehensive picture came from Luke who explained the personal qualities his organisation looks for when recruiting for different roles. He considered the relative importance of soft skills and technical expertise for each role, and decided that although communication is important for all roles it is most important for business analysis (an occupation with 60% female incumbents):

> So in terms of recruitment for the business analysis role for example, we look very much for the softer people skills, the conflict management, negotiation skills, things like that, as much as we do the more formal side of things. So it's about having a balance. Clearly we won't be successful if we have a business analyst who's great at talking to people but doesn't know how to do the job; likewise we won't have success if we have a BA who's great at doing the technical side of the role but can't talk to people.

> Our solution design engineers, communication is just about as important. It's a slightly different level because it tends to be a little bit more technical, and the developers, it's even more technical again. QA starts to get back into the business communication again a little bit more. And the PM of course plays a similar role in terms of liaising with both technology and business. So I think communication is key to the success of anything we do.[120]

Luke appears to be arguing for a multi-skilled person who has both technical and soft skills. A

[120] BA = Business Analyst; QA refers to Quality Assurance and Testing roles; PM = Project Manager.

similar "'hybrid' style of worker" was found to be increasingly in demand in Australia (Whitehouse and Diamond 2006, 82-83).

In Chapter 2 (page 39) I noted that poor communication skills amongst ICT practitioners frequently result in the need for 'gap-fillers'. That four of the five participants who described themselves as gap-fillers were women is unsurprising. After all, gap-filling requires emotional labour, and roles requiring this capability are likely to be gender-typed as female (Wharton 2005, 184). This, plus the tendency for professions to reward technical skills over interpersonal skills (Williams cited in Wharton 2005, 210), means that gap-fillers are in jeopardy of becoming marginalised. Just as Faulkner's (2007, 340) boundary spanning engineers risked being considered not 'real' engineers, my gap-fillers may also not be seen as credible ICT specialists.

Deborah Tannen (1990) offers further reasons for there being more female gap-fillers and their potential marginalisation in these roles. Since women are more oriented than men towards establishing connections in relationships (Tannen 1990, 38) they will often have excellent gap-filling capability. However since men tend to dismiss connection as indicative of dependence, insecurity, and inability (Tannen 1990, 39), women gap-fillers in a male-dominated environment such as ICT are likely to be seen as deficient. Gap-filling requires sharing information with and explaining information to others, but as Tannen (1990, 62) also noted, men are more likely than women to withhold information as this signals superiority, and this is a significant matter for men who tend to negotiate relationships hierarchically.

It is also possible that some women will be pressured into gap-filling roles against their wishes. A study into the status of women in the ICT industry in the UK found that employers perpetuate gender segregation by stereotypically assigning women to roles requiring superior communication skills, despite the women's preferences for more challenging and interesting tasks (Panteli et al. 1999, 178-179). Importantly, these roles were valued less highly than roles with higher proportions of men (Panteli et al. 1999, 179).

It was not possible to determine the fate of gap-fillers in New Zealand's ICT industry from my data. Certainly my gap-fillers were happy in their roles and believed that they contributed beneficially to their organisations - consistent with women's commitment to effective relationships. For Anna, who had been unable to establish a career as a programmer, gap-filling provides some compensatory confidence-boosting status:

> It makes you think, which is good. It makes it more interesting. And I know it's something that I can do that other people in the team don't do, and so they come to me. I use it as a bit of a confidence boost, to help them out…They come and ask can we do this, can we pay

> it this way, and I'll be like, we can do it this way or yes, give me a few minutes and I'll figure something out.

5.5.1.4 Other Views – Demanding Work Schedules

Demanding work schedules also contribute to horizontal segregation of ICT occupations. Some of my participants offered the long hours programming jobs often involve as a reason for there being fewer female programmers. David explained:

> I led a team of 50 developers and some of our clients were all there at midnight. You know, beavering away on projects. I don't know whether it's a lifestyle thing, whether they just didn't want to get into those maverick sort of hours that some of the … I don't know, maybe the girls have got more sense, they don't get sucked into that all that bloody working at midnight crap that some of us martyrish blokes do.

Ruth commented similarly:

> People sitting up all night trying to finish things. One of the companies I'm working with is trying to get their programmers to work for nothing, you know, you go in at night because its needed to be done and there will be rewards later on, but that's not necessarily what happens.

Anna had initially wanted a programming job, but in hindsight was pleased not to have to work long hours:

> Some of the people on the IT team… work very long hours sometimes, and when there's problems it's 24/7. I don't know if I would be able to cope with that…

Whitehouse and Diamond (2006, 81) and Juliet Webster (1996, 42) noted a similar difficulty for women trying to develop careers in ICT, particularly highly technical roles. Not only were long working hours problematic for women with family responsibilities, the long hours required to keep-up-to-date and perfect skills also presented a barrier for women. In fact long working hours are expected in most ICT roles. Tess Nicholson (cited in McVitty 1996), a senior account manager for a large IT company in New Zealand, commented:

> There are probably no jobs in this industry that are 9-to-5. There's a lot of after-hours work. In this industry, if the client wants something done … you have to stay until it is.

5.5.2 Vertical Gender Segregation in Contemporary ICT Occupations

If female participants in an occupation or profession are rewarded less for their work than their male colleagues doing *the same* work, this is further indication of women being located as outsiders-within.

Dan Lortie (1969, 33) identified three different types of work-related rewards: extrinsic rewards

such as money and prestige, ancillary rewards such as job security and an agreeable work calendar, and intrinsic rewards such as job satisfaction. Extrinsic rewards for meritorious achievements at work include pay (and other financial benefits), career progression, and professional recognition by way of awards. In the following sections I report my findings on the distribution of each of these primary means of reward, and argue that this distribution demonstrates an outsider-within location for female members of the industry.

5.5.2.1 Pay within ICT Occupations

The previous section focussed on the relative pay rates for men and women across different ICT occupations. This section considers pay inequity for women within occupations. Pay inequity for women results from the greater value society places on male achievements and the fact that men negotiate their pay more effectively than women (Wharton 2005, 199-200; Tannen 1994, 31). Pay inequities are common in the ICT industry, as they are in other sections of the workplace.

Reports of women being paid less than men holding similar positions in the ICT industry in the USA and the UK have appeared for the last three decades (Kraft and Dubnoff 1986, 195; Hemenway 1995, 56; Weber and Gilchrist 1975, 417; Wharton 2005, 191; Isaacs 1995, 59; Strober and Arnold cited in Wright and Jacobs 1994, 517; Webster 1996, 35,37). Contemporary reports of pay discrimination against women in computing come from the USA (Klawe, Whitney, and Simard 2009, 70), the UK (Holland 2009; Panteli, Stack, and Ramsay 1999, 53; Knights 2009; Tattersall, Keogh, and Richardson 2007, 5; Panteli et al. 1999, 175), and Australia (Byrne and Staehr 2005, 15; von Hellens and Nielsen 2001, 47; Whitehouse and Diamond 2006, 79). A current gender pay gap of 7.5% for ICT professionals and 10% for ICT managers exists in the UK (Griffiths, Moore, and Richardson 2007, 342).

In New Zealand pay discrimination in the ICT sector was claimed early on by Beardon (1985, 114) who reported men being paid on average 5% more than women for identical work, in addition to men receiving considerably more 'perks' than women at that time. Beardon (1985, 114) concluded: "To a large extent, the more men there are in any job category, the higher the salary." Preliminary investigation of data from the 2006 Census of Population and Dwellings suggests that this gender based pay discrimination in the ICT sector continues. In an earlier study I selected five ICT occupations for analysis and found a significant difference in total personal income between males and females for each of the occupations, with males

consistently earning more than females (Hunter 2009b).[121] Further analysis indicated that a difference in the full-time/part-time employment status of men and women did not adequately explain the gender differences in total personal income. More research in this area is required.

Empirical research into this matter has also not produced firm conclusions. Due to the de-regulated nature of New Zealand's labour market and privacy legislation in the workplace, ICT workers are often not aware of the pay their colleagues receive (Belgorodskiy et al. 2010, 16). This could mean that women's perceptions of pay inequities are misguided.

Results from previous New Zealand studies of female ICT workers' perceptions of pay parity are contradictory. One study found that women believed their pay compared equitably with that of their male colleagues (Crump, Logan, and McIlroy 2007, 349), but a later study report that women believed their pay was not "in line" with the men they worked with (Belgorodskiy et al. 2010, 13). Men were generally regarded as better at negotiating pay than women (Crump 2008, 26; Belgorodskiy et al. 2010, 15; Crump, Logan, and McIlroy 2007, 361), just as they were in the UK (Tattersall, Keogh, and Richardson 2007, 3).

It has been suggested that statistical analyses of roles and pay need to be supplemented with empirical data gathered directly from individuals in order to capture the complexity of gendered working conditions (Adam, Howcroft, and Richardson 2004, 228). This proved to be the case in my study.

I did not specifically raise pay as an issue with my research participants, but some women mentioned pay, either as a positive or a negative aspect of their work. Phyllis and Kelly were both very satisfied with their pay and did not mention comparability with men's pay. The sizeable salary Phyllis received as a programmer gave her the independent income she needed to support herself and her children after a divorce. Kelly revelled in being the highest paid of all six siblings and was thrilled to be earning "all this big money". Similar satisfaction with pay amongst women in ICT work in New Zealand was reported by Crump and Logan (2000, 9). After all, as Rosemary Wright and Jerry Jacobs (1994, 520) noted, one factor likely to appeal to women is that women's earning in ICT tend to be considerably higher than the average female wage.

Two of my participants mentioned discriminatory remuneration practices in their workplace.

[121] The occupations selected included those employing the most people (Systems Analyst, Programmer), as well as those employing a higher than usual proportion of women (Graphic Designer, Database Administrator, Data Entry Operator).

Mandy felt that in her organisation men were often paid more than women for the same work, and sometimes even for inferior work. Further, the men appeared to receive automatic pay increases, whereas women would be overlooked unless they were prepared to press their case, something the women found difficult and so rarely did. It seemed that women were required to reach a higher standard than men to gain recognition. Mandy was clearly unhappy with the unfairness of a gendered pay review system which did not recognise true worth:

> With peer reviews and salary reviews, in a male dominated company you do need to speak up and step above board and prove yourself more than men if you were to get what you wanted to get, and I thought that was not fair. It was a commonly recognised thing across the company, that men would do the same job and would get more money. I don't know if it was perception or what, but it was there.
>
> You could clearly tell that there are some really hardworking women there who are very knowledgeable and very talented, better than some of the guys, but their [male] colleagues, their peers, would get a much higher salary than them, and why, because they wouldn't go out there and speak up and fight for it. The men don't have to fight much, they just get given it.

Anna was more resigned to the inequalities in her workplace, and showed remarkable patience and lack of resentment with a recent large pay rise which, after six years employment, finally brought her salary up to an acceptable level:

> I guess it's like anywhere; women are generally paid less than their male counterparts… [AH: Are you paid fairly?] I think I am now, prior to that, well when I first started I was quite naive and I didn't really fight for [myself] and I was on a fairly low pay packet. When I got this promotion in my current role, it was a 25% pay rise, which brought me up to about market rate, so I'm quite happy.

Women in Crump, Logan and McIlroy's (2007, 361) study believed that men are more aggressive and more confident, qualities which make them superior negotiators in pay reviews. Mandy and Anna's observations that women have to "fight" for pay increases while men appear to effortlessly receive them corresponds to this idea. The issue of masculine aggression is raised again in the following chapter.

5.5.2.2 Career Progression within ICT Occupations – the 'Glass Ceiling'

A glass ceiling, or set of barriers women face in reaching higher positions in organisations, is exemplified by disproportionately low numbers of women in managerial and leadership positions. It is one consequence of "gender queuing" in the workplace which positions men at the front of the hiring and promotion queue (Reskin and Roos cited in Leicht and Fennell 2001, 86). Glass ceilings reflect the lower status of women in society (Wharton 2005, 187).

A glass ceiling for women in the ICT industry is reported in the UK (Griffiths, Moore, and

Richardson 2007, 342; Knights 2009; Panteli, Stack, and Ramsay 1999, 53; Panteli et al. 1999, 174-175), the USA (Hemenway 1995, 55; McKinney et al. 2008, 81; Dubnoff and Kraft cited in Orlikowski and Baroudi 1989, 26; Isaacs 1995, 58; Weber and Gilchrist 1975, 417; Klawe, Whitney, and Simard 2009, 70), and Australia (Whitehouse and Diamond 2006, 78). Vinita Gupta (2010, para 7), CEO of Digital Link in the USA, commented:

> Women entrepreneurs confront an incredibly tricky road at technology companies… It becomes doubly hard when your intent – and your commitment – are questioned because you happen to be a woman who has a small child at home. Or God forbid, you are suffering morning sickness.

Explanations for the glass ceiling vary. Some writers attribute the glass ceiling to the long working hours ICT work frequently requires (Knights and Murray cited in Panteli, Stack, and Atkinson 1997, 97; 2005, 8; Whitehouse and Diamond 2006, 81; Panteli et al. 1999, 178). Demanding work schedules create a role conflict for women who are socialised to associate their femininity with motherhood and domestic responsibility (Carter and Carter 1981, 498; Trauth 2002, 113). As Clem Herman and Debbie Ellen (2005, 8) noted, "ICT work is antithetical to family and domestic life", and some women will choose their families over a demanding career. Most often the glass ceiling is presented as a range of discriminatory barriers imposed by employers (Griffiths, Moore, and Richardson 2007, 343; Hemenway 1995, 56; Panteli, Stack, and Ramsay 1999, 54). These barriers may be overt, but they are often subtle forms of discrimination which occur accidentally, unintentionally, or covertly (Hemenway 1995, 56; Trauth 2002, 114). Examples include a tendency for men to choose their own kind when hiring new staff (Hemenway 1995, 57) – an example of homophily (Wharton 2005, 59), men having more effective networks through which many top positions in ICT are filled (Goodwin 2006; Wharton 2005, 176-177), stereotypical assumptions about women which lead to women being paternalistically overlooked for challenging roles (Hemenway 1995, 56; Whitehouse and Diamond 2006, 81; Panteli et al. 1999, 179-180) or women's work and women's conversation styles being seen as deficient (Hemenway 1995, 56; Tannen 1994, 136), and corporate masculine cultures that women find off-putting (Hemenway 1995, 58; Whitehouse and Diamond 2006, 81).

In New Zealand a glass ceiling in the IT industry was apparent in the 1980s when women often experienced discrimination and difficulty gaining promotion (Beardon 1985, 113-115), and there are indications that a glass ceiling remains in place today. The data in Table 3 (page 136) show that although women currently hold 35% of all ICT roles, no Chief Information Officer

(CIO) roles are held by women.[122]

This scarcity of women participating at the highest level of ICT in New Zealand can be seen in Figure 9. This photograph shows an almost exclusively male audience at the CIO Awards Summit in Auckland in 2009.

Figure 9: CIO Awards Summit 2009

Source: O'Neill and Paredes (2009)

Table 3 does show that women occupy 22% of ICT Project Management positions, but the nature of these roles is not clear. Faulkner (2007) found that women who moved into management roles in engineering tended to get stuck in lower-levels of management. Whether this is the case for these female ICT project managers in New Zealand is not clear from my study.

The glass ceiling has received some attention from researchers in this country. In a study of 95 women in middle to senior ICT roles in New Zealand, Logan and Crump (2007, 6) found that most of the women believed they had not observed or experienced an overt (organisational) glass ceiling, and many thought "there were no barriers preventing them from promotion to senior positions". However the women did identify a number of "personal agendas" affecting their career advancement, including not feeling confident to take on a more senior position, not having promotion as an ambition, and planning to have a family (Logan and Crump 2007, 6). In addition, women observed that men were more aggressive negotiators than women and appeared more "innately confident" when seeking promotion (Logan and Crump 2007, 7). It seems that Logan and Crump's research participants regarded the difficulties they faced in gaining promotion as personal challenges rather than institutional barriers relating to a glass ceiling.

During my interviews with ICT workers I did not ask specifically about a glass ceiling, however my question "is it easier being a man or a woman in ICT" did prompt some discussion relating to this issue.

Bob was very conscious of the glass ceiling and thought it unfair, having benefited from it himself in the past:

[122] The zero number of female CIOs reported may reflect rounding of data by Statistics New Zealand to preserve confidentiality when numbers are small or it may indicate that at that time there were in fact no women CIOs. More recently a *New Zealand Herald* article by Gill South (2009) identified a small number of women in CIO and other senior management ICT roles. Julia Raue is currently (2010) the CIO of Air New Zealand.

> I worked with some very competent women, and some of the best programmers and analysts were women, but many of them didn't get promoted beyond supervisor or the technical level. It was still pretty much male dominated in terms of promotion, and I benefited from that a couple of times when there was a women who was actually much more experienced and better at it than me, but I got the nod because I was a man. So I don't think it's so good from a career point of view, there's still a male bias, there's a glass ceiling.

My participants offered various explanations for the glass ceiling and how to overcome it. Some of the more interesting comments came from men.

Measuring up to Male Expectations

David was one of the few men who experienced working under the leadership of a very senior woman in ICT. This woman measured up well according to David's criteria for leadership: she had courage, she could handle complexity, she was technically very competent, she had business know-how, and she had vision. Having these qualities meant she was well respected:

> I look at [Bella Gates] who is a woman I admire intensely. She was leading the programme at [XYZ Company] to replace our mainframe and that was not a project for the faint of heart, I can assure you. There's a lot of function points hiding in that baby I can tell you. And she had the total respect of the IT management team and the business. From a competency perspective she was right up there; she had the business acumen; she had a really good grasp of the technical subject matter and the vision of what it was we were trying to do. So, you know, she was off like a robber's dog.

This woman overcame the glass ceiling very successfully, a feat not many women achieve in environments where men heavily outnumber women, as they did in David's organisation. The men accepted this woman because she met their expectations of a leader.

Women managers who do not meet expectations have problems. Julia explained the difficulties her female boss faced by having insufficient technical expertise. The woman's effective management of and attention to people did not compensate for her lack of technical knowledge in the eyes of the 'male geeks', and she was not respected. Julia commented rather unsympathetically:

> I had a very cookie female boss, very cookie, and she was probably the epitome of what male geeks don't like in a woman, she was so non-technological. She was very good at the people stuff and I guess that's what managers are for really. She was good at making sure everybody was happy, and trained up and working along nicely. But didn't have a clue about technology and then tried to, but spoke in very strange metaphors, using the wrong words, or words in the wrong context. It was quite comical at times. But she was a people manager, not a technology manager. So yeah, going along to meetings with her and thinking oh god!

Being Overlooked as Women

Women in leadership roles can face challenges simply because they are women. Kathleen

Hemenway (1995, 56) referred to a "gender-based deafness" where men hear only ideas put forward by other men. Similarly Gupta (2010, para 13) commented that in meetings men frequently overlooked women's valuable contributions and were unaware they had done so. Tannen (1990) referred to conversation between men and women as cross-cultural communication, and noted that men often dominate meetings in the workplace and frequently interrupt women. Since men "jockey for status" in conversation (Tannen 1990, 38), ignoring women effectively negates any threat to men's dominant position.

Hilary, who has held many senior positions in ICT, described how men will often discount suggestions made by women:

> It was not superbly obvious but there were subtle things of a recommendation being made, a comment being made, if one of the guys made it, it was taken more seriously than if a woman made it. So you actually had to fight for equal recognition.

Luke manages one of three teams in his workplace. One of the teams is managed by a woman. Luke has noticed that staff members tend to ignore the female manager and defer to him instead:

> There are three managers here in Auckland and one of them is a woman. I've noticed that people might talk to her but they don't really take any notice until they talk to me. It really annoys me.

Having one's contributions discounted or being ignored are clearly barriers for women hoping to break through the glass ceiling, but they are also demeaning experiences for women with lesser ambitions. Marion, who has always held low-level positions, described a typical meeting in her workplace:

> They [men] just looked down on you as if you didn't know what you were talking about. They made you feel as though you were stupid. Because you were a woman they didn't hear you speak or anything. And I would get tongue-tied trying to explain things.

Marion has also noticed men receiving credit for women's work, a situation where the women's work 'disappears' and the women are overlooked:

> Two people can be exactly the same but preference is made to the male, even if the female is the one who's trained the male. The female might be the one who ends up doing the job but the male gets the accolades for it.

Needing to be Extra-Determined

Women who wish to break through the glass ceiling in ICT need to be very determined. Hilary is an example. She explained the difficult environment for women who wish to advance up the career ladder. Only the most determined will strive to break through the glass barrier which

expects them to constantly out-perform men and never make a mistake:

> If they're going up the career ladder that eats up such a lot of your time and energy because you're just having to do more, quite often, just to be treated the same as men. All the women I know who are high achievers are constantly working really hard to do that because they get no favours. They're never allowed to have a bad day at the office. Guys can have a bad day at the office. A woman has a bad day at the office; everybody's talking about it for ever afterwards. So there's still an expectation on our performance that isn't the same as on a man's performance.

Bob knew one woman who eventually became a CIO and credits this to her remarkable determination:

> Two of the co-managers were women, and my boss was a woman. But that seemed to be as high as they could get; they couldn't become CIO, that had to be a man. My co-manager at [XYZ Company] is now CIO at [ABC Company], so she has made it in the end, but she was a pretty determined lady.

Pam explained the pressure she felt after being appointed to a very high-level position in a large company:

> I guess I didn't want to be shown up and I had a huge spotlight on me… Initially I think I was [long pause], intimidated is not the right word, but will I say something that will make me look stupid, or would they [men] look at me and think what's she on about.

To begin with Pam assumed her own skills would be inferior to those of her male counterparts and it took a while for her to re-establish her sense of self-worth:

> So initially what I did notice was how much I thought I could learn from other people [men], and then once I started going to things I realised I knew more than them.

Long Working Hours

Long working hours have already been identified as contributing to horizontal segregation in ICT work. They also contribute to the glass ceiling if women are not able and/or choose not to accept roles where long hours are common. Many of my participants (men and women) identified this aspect of ICT work as being problematic, especially for women with families. Bob thought the situation for women has worsened recently:

> I think over the last 5 years or so the conditions of work have deteriorated. So the working hours are longer and more fixed than they were. In the 90s there were a lot of companies doing flexi-time. In the last few years it's got more intense and more restricted, and I think that would affect women most. Women get hit the most because they generally carry the burden of running the house and the family and so on.

Kelly realised that long work hours during peak times would be incompatible with raising a family and so she tried to negotiate part-time work. When her boss refused, she left:

> I don't think IT is a perfect career when you have young children, because every job I had there were times when there were deadlines or you had to get something fixed and it wasn't a 9-5 role. When I got pregnant I said to my boss I'm prepared to come back part-time, but they said you can have one year maternity leave and then you come back full time or that's it. So I left which was a shame because they lost a lot of experience.

Griffiths, Moore and Richardson (2007, 347) identified the ICT industry as being particularly challenging for 'workaholic' women who are highly committed to their work. Pam's senior role means she often works long hours, but she maintains that these are manageable due to her particular child-sharing arrangements:

> Normal week, 8 to 6.30 at office, functions at night… One week on with children, other week without… Child week, 9 to 5, then after children are in bed, work in evening.

Pam appears satisfied with her demanding schedule, but other women's experiences can be far more stressful.

Of all my female participants, I found Linda's story the most distressing, due to the clear anguish she was experiencing and the graphic account she gave of the difficulties women can face managing family and ICT work. Linda spoke at length about her acute feelings of guilt at being an inadequate mother (in her view) to her two children. She blames herself for her daughter's numerous problems, and although grateful to have parents who help with childcare, Linda feels they are not ideal care-givers. She struggles to find an acceptable balance between work and family, especially with a third child due soon:

> I have an 11-year old daughter, and a son who is 2, and the little one on the way. It's been very tough. I have to say it's been very tough because I'm very career focussed, I have a huge guilt complex about not having enough time for my children. My daughter has a lot of issues, we've been seeing psychologists, paediatrician, counsellors, and to be honest with you it always comes back to me. It's my fault because the more time I spend with her the less issues she has. The less time I spend with her the more she's brought up by other people. Mum and Dad live with me so that helps me tremendously. Most people are not so fortunate as me, but they are grandparents. No matter what you say they are grandparents and they don't apply the same rules…

With the new baby arriving shortly, Linda has decided to work only five hours a day.

> So that's left me with a tremendous amount of guilt. I've tried to balance it. I'm not a good balancer because somehow you always see the outcomes at work a lot quicker than you do in the children and so I tend to end up dropping the ball on them. I do give them a lot of quality of time, I do, but it's not the same as the day-to-day quality of time that they should be getting. To the point that with this next baby I've decided that I'm going to work 5 hours a day. I want to pick them up from school, from kindy every day… I do think that's very tough, and I definitely think that it is more so for a woman than for a guy.

Previously Linda had not found her employer supportive when she tried working from home when a child was sick (something Linda rarely did):

> My manager dumped on me from high heavens because I was doing some work from home, because my mum and dad were away. They very seldom go away… and my son wasn't well and I needed to work from home, and I was very surprised with my manager coming down on me about that. He told me this is not a work from home kind of role, and I'd never been in that situation before. I don't ask for a lot of time… The only time I've taken time was when it's been serious illness like pneumonia and in hospital kind of thing or when my daughter broke her arm… that sort of thing. It's very few and far between.

This has made Linda anxious that the five hours a day she has negotiated may not eventuate:

> I'm very concerned about what will happen when I come back because my role is very pressurised, it's going to be very difficult to fit it into 5 hours. I'm not sure how long he's going to let me do that. Already he's nagging, when are you coming back, when are you coming back? So that's going to be interesting and I'm just going to stand my ground… I've already told him I'll be coming back for just 5 hours but he assumes that's just an interim thing, I haven't told him it's a long term thing…

These excerpts from Linda's interview, reduced to workable size, illustrate the intense pressure and anxiety she was experiencing in trying to maintain a senior position in IT. Linda describes herself as very ambitious, very career-focussed, and despairs that success in her career comes at a cost to her children.

Not all my participants described workplaces which are unsupportive of working parents. As noted in the Preface (page iii), Patricia has a number of women friends who have given birth recently and have been well supported:

> They've had really supportive work environments. One of them has done quite an unusual thing of going straight back to work full-time at 3 months, and her work has said you've got time to go home at lunch time and express milk, you can work at home sometimes when you're not on client sites.

Likewise, Emma's workplace is sympathetic to the parenting responsibilities of both women and men:

> It seems to be equal numbers of men and women who need to juggle children at work and we have a very family friendly kind of an environment. So if you need to be at home looking after a sick kid then you can be at home looking after a sick kid. But it's as often the guys who are emailing in saying I've got to be home with a sick kid, got a sick wife, or going home because kid fell out of a tree… It's just as much the guys as it is women in here.[123]

5.5.2.3 Awards

Ceremonies and the bestowal of awards are examples of the symbolic component of an organisation's culture (Bolman and Deal 2008, 254-257). They serve to strengthen commitment to an organisation and its shared values and to entrench organisational culture (Bolman and Deal

[123] Neither Emma nor Patricia has children, and they are therefore unable to speak from personal experience of parenting.

2008, 267-287); thus they play an important role in confirming the status and commitment of organisational insiders and in signalling to those not included that they are outsiders. Extending these ideas to an occupational group, award ceremonies can be regarded as significant symbolic markers of who does and does not belong to the group. Consequently, if women really are accepted as insiders in the computer industry we would expect their outstanding achievements to be recognised. As we have seen, this did not happen in the initial stages of computing. This pattern of non-recognition continues, and women are still frequently overlooked when awards for meritorious achievement in ICT are conferred.

For women in computing, if professional recognition comes at all, it often does so slowly – over 100 years in the case of Lovelace (Gürer 1995, 46). One of the original six ENIAC programmers, Jean Jennings Bartik, gained recognition for her pioneering work 63 years afterwards when she received a 2008 Fellows Award from the Computer History Museum and was inducted into the museum's Hall of Fellows (Ross 2009, 17). Few contemporary female ICT professionals have received recognition at the highest level, and again lengthy delays are common. It took 40 years for the prestigious A. M. Turing Award to be first awarded to a woman, Frances Allan, in 2006 (Association for Computing Machinery 2007).[124] Allan, a long-serving employee of IBM had previously been named an IBM Fellow in 1989, 32 years after joining the company, and in 2002 was promoted to Fellow Emeritus (IBM 2002). Earlier Allen had received two company awards: a research prize consisting of a pair of cufflinks and a tie clip, as well as an award certificate which referred to "his accomplishments" (Pham 2007). Not only must women wait patiently for recognition, they must also be prepared to receive an award clearly designed for men.

In New Zealand there are a range of awards recognising achievement in the ICT industry, although interestingly there was very little awareness of these amongst my participants. Even people in high profile positions and/or with long association with the sector were usually unable to name even one ICT industry award. This suggests that professional recognition through awards is a far less valued extrinsic reward for work performance than salary and career progression.

The 'New Zealand Hi-Tech Awards', the "TUANZ Innovation Awards', and the 'Computerworld Excellence Awards' are arguably the leading industry awards in this country. The gender distribution of recent recipients of some of these awards is identified below:

[124] In 2009 another woman, Barbara Liskov, became the second woman to receive the A. M. Turning Award (Association for Computing Machinery 2009, 25).

- The New Zealand Hi-Tech Hall of Fame recognises outstanding contributions to hi-tech industries (not only ICT). Between 2003 and 2009 there have been 12 members of the Hall of Fame, none of these have been women (New Zealand Hi-Tech Trust 2009a) (see Figure 10).

Figure 10: Members of the Hi-Tech Hall of Fame

- The Hi-Tech Young Achiever award has had 11 recipients between 1997 and 2007, 1 of these was a woman (New Zealand Hi-Tech Trust 2009b). The recipient of MaxNet Young Achiever award in 2010 was a woman (Computerworld Staff 2010b).

- The winner of the TechNZ Inspiring Individual Award in 2010 was a man (Computerworld Staff 2010b).

- The TUANZ ICT Innovator of the Year award was awarded to three men and one woman during 2007-2010 (TUANZ 2009; Computerworld Staff 2010c).

- The CIO of the Year award has had three male recipients and one female recipient between 2007 and 2010 (O'Neill and Paredes 2009; Computerworld Staff 2009, 2010a).

- The inaugural Computer Business Analyst of the Year award 2009 was awarded to a woman (Computerworld Staff 2009).

There are clearly some women amongst these recipients, but the majority are men. Significantly, no woman has been included in the Hall of Fame, and only two women have won a Young Achiever of the Year award over a 12 year period. These proportions of women are

clearly well below the proportion of women working in the sector; although they are consistent with the lack of women in leadership positions. In contrast, the first Business Analyst of the Year award went to a woman, in accordance with the gender-typing of that occupation. The recognition of Julia Raue's contribution as CIO of Air New Zealand is a rare acknowledgement of women working at high levels in ICT. We may conclude that award ceremonies in New Zealand's computing industry are a manifestation of a masculine culture which symbolically as well as numerically signals to women their outsider-within status.

5.6 Chapter Summary

Many women in New Zealand choose not to join the ICT industry, but there are approximately 20,000 who have. These women are positioned as outsiders-within in an industry which since the beginning has valued the contributions of men more highly than those of women. New Zealand's ICT industry exhibits significant horizontal and vertical gender segregation, with women clustered in lower status occupations across the horizontal segregation and in lower status positions within the vertical segregation. Further, the lower status arises because women occupy these roles. There are also indications that lower pay for women accompanies their lower status positions, and that even women who are not in low status positions experience pay discrimination, although further research is required to give better understanding of this matter. The segregation patterns match the disparity in value placed by society on qualities perceived as being masculine or feminine, so that women are more often employed in occupations associated with 'soft' skills. Alarmingly, comparison of data in Tables 1 and 2 indicates that since the 1980s, the proportion of women involved in the higher status, higher paid, 'hard' area of programming has decreased.

A woman who enters the ICT industry faces many challenges in addition to probable pay inequity and a glass ceiling. She is likely to be resented by men if she is technically capable, yet scorned if she is not. She will need to be twice as capable as men in order for her ability to be recognised. Demanding work schedules mean she will struggle to find a satisfactory work-life balance, particularly if she is ambitious. When she voices her views, they are not likely to be heard, and she is unlikely to receive an industry award.

The findings reported in this chapter support my claim that women participate in New Zealand's ICT industry as outsider-within. This marginalised location of women is likely to be further entrenched as professionalisation infiltrates the industry. Support for this argument is presented in Chapter 6.

Chapter 6 – Women and ICT Professionalisation

Either no ticket or "a ticket to ride after the gravy train has left the station"(Carter and Carter 1981, 475)

6.1 Chapter Overview

In the previous chapter I presented my argument that women participate in New Zealand's computing industry in the marginalised position of an outsider-within. As the professionalisation project is pursued ever more energetically (refer Chapter 3) it is relevant to ask where women fit in that process, and how women are likely to fit in the proposed ICT profession.

In this chapter I consider the gendered nature of professions and professional bodies, and find that these also relegate women to an outsider-within location. I then describe the various mechanisms women implement to cope with their marginalisation. I argue that the position of women will not improve should an ICT profession become formalised; at best women will continue to be located as outsiders-within, and may even be further disenfranchised.

I begin with a personal vignette; a narrative which draws attention to the gendered relations entrenched in professions and their professional bodies, including the fledgling ICT profession.

6.2 Personal Vignette: An Evening with Industry

Disconcerted, I looked around the room. *Was anybody else feeling my unease? What did the young women sitting alongside me think? Had they even noticed?*

It was a wet and cold August evening in 2009 and I was attending the NZCS sponsored event 'Evening with Industry' at the University of Auckland. Around 150 aspiring young IT students had turned up to listen to industry representatives talk about careers in computing. I estimated that 25% of the students were women. I had just glanced at the programme. Nine speakers were listed but as I read through the brief biographies I felt disheartened. *Why were there no women on the list?*

The talks proceeded and we learned that careers in IT are exciting and rewarding, but obtaining our first position would be difficult. We must demonstrate effectively our soft skills and must exploit all networking opportunities. In order to get noticed we should nurture our 'point of difference' and ensure that our passion for IT stands out. The audience listened politely, perhaps a little daunted by the prospect of having to so overtly sell oneself. Question time generated little spark, and nobody queried the gender imbalance of the programme. The talks

came to a quiet end.

Once again women had been rendered invisible in the masculine world of computing. I was embarrassed to have brought my students to this event.

Figure 11: Invite to the 2010 NZCS Evening with Industry

The following year I again attended the 'Evening with Industry' event. I felt more hopeful. The lack of women had been identified as a critical issue in a debate titled "ICT Skills and Capability in New Zealand: What's the Vision for the Future" organised by the NZCS (2008c, 768). Surely this had prompted some change by now. The appointment of a dynamic young woman by the society in 2009 to foster student and young professional groups would also have brought about increased female involvement, I assumed.

This time the event was held in a more impressive large lecture theatre and the audience was bigger (the host proudly announced there had been 210 pre-registrations). I counted roughly 29 females.

Eight speakers addressed the audience, again all of them men. The talks were essentially the same as the previous year. Again we were reminded that we must 'stand out' and 'differentiate ourselves'. The all-male panel reminded us that 'IT is a team sport' and that IT is about 'delivering solutions for real people'. *Was this deliberate irony?*

One thing was different in 2010, however, and I was delighted when a female student questioned the lack of women on the panel. The chairman appeared flustered and replied: "We positively encourage women to get involved in the Auckland Branch."

Nothing had changed since 2009, and in some respects the situation seemed to have deteriorated since my first involvement with NZCS in 1975. Thirty-five years ago the computer industry was not well organised and the under-representation of women was not widely acknowledged. Today the industry is more structured and the lack of women is well documented. It was no longer acceptable, I believed, for the professional body representing the IT industry to present

such an unwelcoming invitation to women to join its ranks. The young women in the audience were consigned to outsider status by the boys' clubhouse of computing and I could only conclude that only the most determined of them would seek to belong.

6.3 Women as Outsiders-Within in Notions of Profession

Although the proportion of women in most professions has increased recently, this has not altered the fact that professions "are still overwhelming male", particularly the engineering and scientific professions (Leicht and Fennell 2001, 137). Over 50 years ago Caplow (1954, 230-231) similarly noted that women's participation in professional work is usually limited either to particular professions which are monopolised by women (for example teaching and nursing) or to semi-professional roles which are subsidiary to major professions (for example a dental hygienist is subordinate to a dentist). Caplow's (1954, 232) comment that "every skilled trade - including blacksmithing - has a tiny representation of women who indulge a self-conscious eccentricity by following what is regarded as a man's calling" was rare for a period in which studies of the professions typically omitted gender considerations. For example Ernest Greenwood (1957, 53) noted that professions characteristically regard colleagues who do not fit the stereotypical notion of an "ideal colleague" as "deviants" and "peculiar", but did not mention that it was men who were assumed to be the norm. Similarly, Wilensky (1964, 144) noted a "pecking order" of professions that routinely accompanies professionalisation, for example doctor – nurse – nurse aide, but did not comment that the ancillary professions are usually those undertaken by women. The common view was that "a profession is a brotherhood", just as Abraham Flexner (1915, 904) had claimed years earlier.

During the 1970s and 1980s sociological critique of the professions focussed most often on issues of domination, monopolisation and status (Berlant 1975; Larson 1977; Goode 1969), and autonomy and control (Freidson 1970b; Johnson 1972; Rueschemeyer 1983). But as Witz (1990) and Celia Davies (1996) observed, gender relations remained neglected in the sociology of the professions, and theorising about the professions generally continued to take place within an unacknowledged androcentric framework.

Although gender issues received little attention, they sometimes did. Hall (1975, 122) saw inconsistency between professional discourse and the lived experience of professional women, and argued that the professions' treatment of women disproves their claims of fair-mindedness and inclusiveness: "There is both official and unofficial discrimination against half of their potential membership." Michael Carter and Susan Carter (1981, 478) argued that although there

were more women entering the professions, they would become increasingly consigned to lower status, poorly paid, roles within the professions. Abbott (1988, 126-128) explained processes by which professional work sometimes becomes degraded to lower status non-professional work, accompanied by feminisation. He cited computer programming as an occupation which had become subordinate to systems analysis, but did not explore the gender composition of these particular roles (Abbott 1988, 127).

Some sociological commentary on women's involvement in the professions during this period has become notorious. For example, Richard Simpson and Ida Simpson's (1969, 231) portrayal of semi-professional women as lacking scholarly zeal and ambition, and readily accepting their place as compliant "handmaidens" of male professionals has been widely rejected (Hall 1975, 119; Witz 1990, 688). Amitai Etzioni's (1969, xv) claim that women are "more amenable to administrative control" and "less conscious of organisational status and more submissive in this context than men", and are thus more suited to semi-professional work was also firmly rejected (Witz 1992, 60).

A direct call for the consideration of women's participation in the professions came from Davies (1983, 184) who advocated for new questioning about the professions, including questions concerning the sexual division of labour and the associated "problems of domination and subordination". Later Davies (1996) strongly reiterated the need for gender to be included in sociological theorising about the professions, and pointed out that professions (and also bureaucracies) uphold and entrench culturally defined notions of masculinity such as impartiality, emotional detachment, autonomous agency, and hierarchical authority. Professions, Davies (1996, 672) claimed, "valorise the masculine". Davies (1996, 672) further argued that women's work in the professions is often unacknowledged and undervalued; women's inclusion in the profession is "hidden" yet essential.

Similar calls for greater scrutiny of the relationship between gender and the professions came from Witz (1992, 39) who pointed out that "the generic notion of profession is also a gendered notion". Witz objected to the commonly cited explanations of professionalisation based on neo-Weberian closure concepts because of their inherent sexist and androcentric assumptions which effectively ruled out the possibility of a female professional. Davies and Witz were joined by other scholars who also highlighted the gendered nature of the professions. For example Tannen (1994, 167) claimed that the authority projected by professions is associated with masculinity, and Wharton (2005, 210) noted that professions typically reward career patterns which are more commonly and more easily followed by men.

Outsider-insider professional segregation is usually expressed in neo-Weberian theories of social closure. Parkin's (1979, Ch. 6) portrayal of dual closure activities which serve to exclude women and ethnic minorities was presented in Chapter 3. Witz (1990; 1992) later extended Parkin's ideas to focus more specifically on the position of women in the professions. Witz (1990, 675) suggested that professions would be more accurately understood as "professional projects" in which "class-privileged male actors" seek to monopolise the provision of a set of occupational skills, thereby excluding women altogether or consigning them to connected, but frequently subordinate, occupations often referred to by others as semi-professions. Importantly Witz (1990, 685) argued that women who are in subordinated occupations need not be considered victims of male dominance in that they may, and often do, implement their own dual closure strategies which are in fact female professional projects. With this comment Witz (1990, 688) offered women a more empowering understanding of their location in the "so-called semi-professions".

This brief literature review provides the basis for my claim that that women participate in the professions as outsiders-within.

6.4 Challenges for Women in Male Dominated Professions

There is general agreement that women who choose to work in male dominated professions experience many difficulties. One of the few early writers to consider women's marginalisation in the professions, Margurite Zapoleon (1950, 21), identified several challenges for the few women who entered male dominated professions after World War II, including pay inequity and a glass ceiling:

> Women who seek employment in professions in which women are a small minority are often handicapped by the lack of experience employers have had in employing women, and, in some cases, by definite prejudices not only on the part of the employer, but also on the part of the men employed. World War I and World War II did much to break down the fears behind these prejudices, but the women who seeks [sic] employment in a so-called man's field must still be ready to meet prejudice and to dissolve it by her performance.

In the previous chapter I identified a number of challenges facing women in ICT, including balancing work and family, and being over-represented in lower-status ICT specialities. Other obstacles for women who enter predominantly male professions include prejudice (Zapoleon 1950, 23), becoming isolated (Caplow 1954, 242), being treated as de-facto men (Caplow 1954, 242), experiencing resistance from male colleagues (Caplow 1954, 241), and coming under "intense scrutiny" (Griffiths, Moore, and Richardson 2007, 345). Many of the women I

interviewed described challenges similar to these, and they are considered in the following sections.

6.4.1 Inter-gender Conflict - Resentment from Men

Women who are successful in IT are sometimes vigorously resented by their male colleagues (Glastonbury, Murray cited in Wilson 2003, 130). There are at least two explanations for this resentment. Firstly, technical expertise in a woman is an affront to the male ego. Because notions of masculinity and expertise are closely linked, men resent women who have superior knowledge and skills in the workplace (Tannen 1990, 69, 128). Secondly, social conditioning results in men and women dealing with conflict differently (Caplow 1954, 243; Tannen 1994, 58). Men are trained to derive ego-satisfaction from competitive performance and colleague approval, whereas women do so from affectional relationships (Caplow 1954, 243; Tannen 1990, 25). This makes inter-gender conflict and competition difficult for both genders. These tensions are heightened when there is an unequal number of each gender in the workplace. Rosabeth Kanter (cited in Wharton 2005, 62) referred to the minority group as "tokens", and noted that the dominant group often feels threatened by the presence of tokens and consequently reacts with hostility. This hostility is worse for female tokens located within a mainly male group.

Keri provided an example of the first explanation. Keri described an occasion in the early 1980s when she had managed to correct a simple programming problem that meant the overnight processing reduced from 10 hours to 7 hours. From then on, Keri was resented by her male superiors who had been unable to find the solution:

> They had two systems programmers sitting in their own special office who, you know, played the lord over everybody else, but this most basic thing they didn't know. And of course they didn't like me after that…

Working in a data entry role, Marion felt patronised when her male supervisor insisted on doing even the most basic technical task for her:

> He moved me to another area and he got this other guy to come and move the PC, and I said "I can do that - all you have to do is plug it in". Oh no, he didn't like that, didn't like the fact that I offered to plug the PC in, even though I told him I have my own network at home. I wasn't allowed to touch it…

Bob alluded to the second explanation when he explained why he didn't like having a female boss. In Bob's experience, men will carefully avoid denting other men's egos, whereas women are far less mindful of this in their relations with men:

> I had a number of different women bosses over the years and I have to say in most cases I didn't enjoy working for women. In general women's communication style is different. Men, when they disagree with each other, often don't actually say it straight out; there's a set of rituals you go though and you get the message. Silence gives the message, but women always want to tell you straight out what you're doing wrong in front of everybody else, and a man won't do that. If a man is supervising you and you've done something wrong, he will take you into his office and break the news to you gently. But a woman is likely to come out and tell the entire room that you've fouled up – again!

At first Bob's observation appears contradictory to Tannen's (1994, 146) claim that women's conversations involve face-saving rituals which often extend to a woman forsaking her own credibility in support of others. However when we consider that saving others' faces and downplaying one's own authority are expected behaviours of women (Tannen 1994, 171-179), it is possible that Bob is reacting negatively to women bosses whose leadership styles do not fit the stereotype. As Tannen (1994, 186) and Caplow (1954, 239) noted, men are particularly sensitive to women issuing orders or reprimands.

When I mentioned Bob's comment to Hilary, she quickly pinpointed the issue. Hilary has been a female boss in charge of many mainly male teams. She felt that it wasn't that men disliked being rebuked in public (anyone would dislike this she pointed out); rather she felt it was that men did not like the rebuke coming from a woman:

> I think it might also be not that it's happening in a public arena, it's just the fact that for some reason they're being told that they're not doing as good a job as they should be by a woman. That was not an easy thing for me to deal with. It's not easy doing performance reviews if you have to make some negative comments to a woman, but men do take it hard.

6.4.2 Needing to be Twice as Good - Lack of Respect from Men

In addition to resenting women who have superior knowledge (Tannen 1990, 128), men also show a lack of respect for women they perceive as having inferior knowledge. This presents a double bind for women in that they are either too knowledgeable or too un-knowledgeable.

Trauth (2002, 114) has noted that women in ICT are typically held to "higher standard[s]" than their male colleagues and often need to "earn their place" in the profession. Several of my women participants reported finding they need to be 'extra good' to be judged adequate in the eyes of their male colleagues. Until they do, women are treated with less respect. Hilary commented that women need to be twice as good as men in ICT, and experience a far more difficult journey through their career than men do:

> Women have to be twice as good as men to be considered equal… An analogy would be the guys were always on the nice tar sealed road and I and the other women were on the unsealed dirt track, and it was just a little bit harder for us to get along, to look as good, to move as quickly…

Julia noticed that women programmers needed to work harder to prove themselves to male counterparts:

> It's extremely hard to be a woman in technology, extremely hard. There's discrimination for the women who are hard core geeks, the real programmers… The women are just going to have to work harder to prove themselves.

In Anna's experience men assume women will perform inadequately, and are surprised when they excel. This means women have to prove their competence in order to gain respect from men, and until they do are not considered equals:

> [AH: Is it easier being man or woman in IT work?] Probably being a male, you probably would have a lot more respect than being a female, although I think if you can prove you know your stuff they will respect you. But to start off with, if you are new you would have many more chances being a male in your job.
>
> I think just proving that you are just as good as the guys, and once you've done that they will treat you as an equal. I suppose it was a little bit like that when I started the degree and there were heaps more guys than there were females. It was like, "Oh, you got that mark!" "Oh, she does know what she's doing!" And then they would start talking to you, get to know you, and treat you more like an equal.

An expectation that women will be inadequate can lead to a dismissive attitude toward women. Kelly said, somewhat contradictorily, that although she was always treated respectfully, she felt she was not taken seriously:

> We [the two women programmers] were treated with respect, it wasn't a problem. It always considered, it was never said, but it was always considered that the serious IT people were the guys.

6.4.3 Either Emotional, or Technical and Boring

Women who work in male dominated professions are often caught in a no-win situation of conflict between social expectations of appropriate feminine behaviour and appropriate professional behaviour (Epstein cited in Hall 1975, 121; Fletcher 1999, 107-109; Tannen 1990, 244; Trauth 2002, 110). If women behave according to stereotypical expectations of femininity, for example emotionally, this is seen as inappropriate professional behaviour; but if they behave according to professional custom, for example rationally, they are regarded as unfeminine. In either case the woman is classified as deficient (Fletcher 1999, 118; Tannen 1990, 244).

One of my male participants, Tim, illustrated the dilemma women face in this regard. He classified women who have chosen technical roles as either introverted and boring (i.e. not feminine), or deliberately unconventional. Either way, he appeared to disapprove:

> Some of the women have been really technically competent but they've had almost no

> personality. Whether women who go into the more technical side of the business are the ones who are more introverted or something like that, whether they're choosing to do that because it's a non-traditional kind of role…

Tim apparently did not find technically competent men introverted or boring. As Fletcher (1999, 109) and Tannen (1994, 201) have noted happening elsewhere, Tim sees his female colleagues as women rather than colleagues.

Tim further suggested that men purposely challenge women, often expecting an emotional reaction, which they then disapprove of for its lack of rationality. He acknowledged that emotional involvement with one's work can be regarded positively, but noted that it is not a quality men respect:

> I think there's that problem of not being taken seriously; guys will challenge their [women's] technical knowledge and maybe try to get an emotional reaction out of them rather than… A couple[of women] that I've worked closely with suffer from being more emotionally attached to a problem than being factual and detached about it.

> It's a strength sometimes because they are maybe perceived well by other people because they have that emotional relationship with the job, but other times it tends to be a barrier because they will react emotionally to something and the guys they will just switch off and you'll lose their respect you'll lose their attention.

Sharon experiences this dilemma. She thinks that (unlike men) women tend to react personally to criticism at work, and she sees this as a failing. She doesn't approve of her own tendency to get upset, and thinks she should suppress her emotional reactions lest they make her appear weak. Men may exploit any perceived weakness:

> We [women] take things more personally than men do. Well, I personally, if someone critiques my business requirements, I take it a little personally even though I shouldn't, and then you try to improve it next time, which is a good thing though, because next time around you produce a better document. But you take it too emotionally as well, it makes you upset. [AH: Do men take advantage of this?] Sometimes they would, yes.

Here we see Sharon trying to suppress her way of working in order to conform to the masculine conception of appropriate workplace behaviour. This is a common phenomenon - many women are troubled by their tendency to take things personally, and typically view it as a weakness (Fletcher 1999, 108).

Hilary was also concerned about emotion. When she started a new job leading a team of men, she suspected that the men might expect her to react emotionally.

> The 29 men at [XYZ Company] had never had a woman boss before. So that took some time to work through those issues of, is she going to be the same as the men we've reported to before? How's she going to be different? Is she going to get all emotional on us if we don't do the right thing?

Later in our conversation Hilary explained how over time she came to behave more like men: "I absorbed that culture from always having male bosses. So their way of working had rubbed off on me." This suggests that she suppressed any tendency she may have had towards emotional responses.

Sam added another dimension to the role conflict for women. Since women are not expected to be technically competent, they are not regarded as credible; and this applies even more so to women who are regarded as physically attractive: "A girl, particularly a good looking girl, is not believed to start with. They have to fight quite a lot of internal stereotypes about that."

This is another example of female colleagues being judged as women, rather than colleagues. Being 'good looking' makes a difference if you are a woman and further discredits your technical credibility.

6.5 Women as Outsiders-Within in Professional Organisations

The outsider-within location of women in male dominated professions generally and in the emerging ICT profession specifically, is matched by a similar marginalisation of women in the professional bodies of male dominated professions.

Women have a long history of exclusion from the professional bodies of professions which are culturally defined as masculine (Hall 1975, 121; Witz 1992, 35), and this is associated with the exclusionary closure strategies employed by men (Witz 1992, 46). Data reported by Viola Klein (1966, 186-187), and partially reproduced in Table 4, illustrates the gendered nature of many professional bodies in the UK during the 1960s.

Table 4: The proportion of women in professional associations in the UK in 1963

Low Female Representation		High Female Representation	
Institute of Mechanical Engineers	0.02%	Association of Psychiatric Social Workers	86%
Institute of Electrical Engineers	0.2%	General Nursing Council for England and Wales	92.5%
Institute of Chartered Accountants	1%	Institute of Almoners	99.5%
Chartered Insurance Institute	1.2%	Moral Welfare Workers' Association	99.6%
Institute of Physics and the Physical Society	3.5%	Association of Occupational Therapists	99.8%
Royal Institute of Chemistry	3.9%	British Dietetic Association	100%

The data in Table 4 reveal a marked high/low split with women highly represented in low status professions associated with nurturing and moral wellbeing, and barely featuring in high status scientific, engineering, or commercial professional work. This split is associated with the

"doctrine of separate spheres" in which women were considered to be most suited to supportive roles requiring emotional commitment and compassion (and men to roles entailing rationality, competition, independence, and achievement) (Cancian cited in Wharton 2005, 86). This sexual division of labour provided the basis for the notion that women were unsuitable candidates for high status professions controlled by men (Carter and Carter 1981, 479).

The proportion of women in a range of professional bodies in New Zealand in 2010 is shown in Table 5.

Table 5: The proportion of women in professional associations in New Zealand in 2010

Low-Medium Female Representation		High Female Representation	
New Zealand Institute of Quantity Surveyors [8]	~5.0%	Pharmaceutical Society of new Zealand [20]	58.2%
Institute of Professional Engineers of New Zealand [1]	10.7%	Technical Communicators Association of New Zealand [9]	66.4%
New Zealand Computer Society [19]	13.1%	New Zealand Association of Psychotherapists [3]	78.0%
New Zealand Institute of Chemistry [11]	~ 16%	New Zealand Teachers Council – Registered Teachers [12]	78.3%
New Zealand Institute of Physics [6]	16.7%	Aotearoa New Zealand Association of Social Workers [13]	82.2%
Project Management Institute of New Zealand [17]	27%	New Zealand Institute of Medical Radiation Technology [7]	85.0%
New Zealand Medical Association [15]	39.0%	New Zealand Educational Institute [10]	88.6%
New Zealand Institute of Chartered Accountants [2]	39.0%	Nurses Society of New Zealand [14]	~94%
New Zealand Law Society [18]	~44%	New Zealand Association of Occupational Therapists [4]	94.2%
Auckland District Law Society [16]	~ 45%	New Zealand Dietitians Association [5]	94.5%

Note: For some of these professions membership is compulsory; for others it is voluntary. While this may affect the overall membership numbers, it is unlikely to affect the gender proportions.

Sources: Data provided by each professional body via personal communication to the author (email), except where otherwise stated.

[1] Michele Boniface, 3 February 2010, includes student members
[2] New Zealand Institute of Chartered Accountants (2009, 41)
[3] Elaine O'Keefe, 8 February 2010, 2008 data
[4] Shirlee Cantwell, 8 February 2010, full members only
[5] Jan Milne, 8 February 2010 – excludes students and retired honorary life members
[6] Owen Watson, 9 February 2010 – excludes students; females identified by name or designation
[7] David Morris, 9 February 2010
[8] New Zealand Institute of Quantity Surveyors (2010), only registered quantity surveyors
[9] Roy McKone, 11 February 2010
[10] Steve Coates, 12 February 2010
[11] Richard Rendle, 8 February 2010, female membership between 15.6% and 18.9%
[12] Meg Jamieson, 16 February 2010, all registration categories
[13] Jacqui Christian, 22 February 2010, all membership categories
[14] David, 24 February 2010 (by telephone), approximate figure
[15] Susan Page, 23 February 2010
[16] Marcus Martin, 24 February 2010
[17] Matt Minor, 1 March 2010 – not all are ICT professionals
[18] Lisa Attrill, 2 March 2010
[19] Paul Matthews, 8 March 2010, professional members only
[20] Fran Horsley, 16 December 2010

The data in Table 5 reveal a less marked difference between the two columns than was seen in Table 4.[125] Comparison of data in the left hand column of each table shows significantly

[125] Because the tables originate from different countries, it is not possible to make definite claims based on the data, but it is possible to comment on general trends.

increased female participation in the fields of science, engineering, and business over the period 1963 to 2010. But comparison of data in the right hand columns shows little increase in male participation in the caring and nurturing professions, suggesting that these female dominated professions remain unappealing to men. These data are consistent with other reports of increased representation of women in the professions since the 1970s (Webster 1996, 108), although gender stratification often relegates women to junior positions in the male dominated professions (Leicht and Fennell 2001, 86-87). Importantly, Table 5 shows that female membership of some professional bodies is currently very low in New Zealand.

Of particular relevance to this study is the disproportionately low proportion of female members of the NZCS (13.1%) shown in Table 5. This figure is well below the percentage of women in ICT occupations classified as professional (28%) or managerial (22%) noted previously (see Table 3 page 136). It is also lower than the female membership proportions of 15.7% for the *British Computer Society* (Sharon Newman, email to the author, 20 January 2011) and 16.8% for the *Australian Computer Society* (Anthony Ellard, email to the author, 11 January 2011).

Women's lack of interest in joining the professional body is a long-held feature of New Zealand's ICT industry. Historical records of the NZCS reveal a striking gender imbalance, indicating low participation rates of women in the organisation and activities of the emerging ICT profession. For example, the first formal general meeting of members of the society on 12th April 1961 was attended by 12 people, all males. The first 50 applications for membership, approved on 22nd April 1961, included only one female, and the following 15 applications, approved on 30th May 1961, also included only one female (New Zealand Computer Society 1961-1965). It is an issue the NZCS has been aware of since at least 1981 – writing in the society's magazine *Interface*, Auckland Branch Committee member Ian Mitchell (1981, July, 17) noted the disproportionate low number of women in computing in New Zealand, and identified discrimination, hierarchical organisational structures, and the masculine culture of computing as possible causes. Having recognised likely reasons for women's disengagement with computing careers, Mitchell then called on women to respond proactively in order to survive in the male dominated industry. Women were thus seen as having full responsibility for bringing about change.

One indication that women really are insiders of a profession is female leadership of the professional body. The pre-eminent professional association in IT, the Association of Computing Machinery, was formed in the USA in 1946 but did not elect its first woman

president, Jean Sammet, until 1974 (Gürer 1995, 52).[126] During the period 1960 to 2010 the ACM has had 24 presidents; five (21%) were women (ACM Press Room 2010). The NZCS was formed in 1960 and since then has had 27 presidents, only one (4%) of whom was female (Gillian Reid in 1999) (New Zealand Computer Society 2010e).[127] The society did, however, appoint a woman (Beverley Pratt in 1996) as its first chief executive (Keenan 1996). Pratt apparently did not believe she had any particular responsibility to increase the participation of women in her new role: "It would be interesting to look at what women's membership numbers are like, but I probably won't. I don't see it as a big issue at all" (Keenan 1996, para 3).

The five branches (and one sub-branch) of the NZCS each has a committee. In total there are 48 committee members; eight of these are women (17%) and none of the branch chairpersons are women (New Zealand Computer Society 2009b). As we have seen, the current President and Chief Executive are both men.

Further indications of the outsider-within status of women in relation to the NZCS are the distribution of honorary titles and the adoption of certification: NZCS bestows the title 'Honorary Fellow' on individuals who have made outstanding contributions to the computing profession in New Zealand. At present there are 20 Honorary Fellows, 2 of whom are female (10%) (New Zealand Computer Society 2010c). The first 140 applicants for professional certification (ITCP) included 17 women (12%) (ITCP 2009). These data indicate a much lower than expected involvement of women in the affairs of the NZCS than would be expected, even taking into account the under-representation of women in ICT generally. England (cited in Wharton 2005, 69) claimed that organisational practices which result in "disparate impact" for men and women are sufficient for an organisation to be considered gendered (i.e. it does not need to have policies or practices which explicitly treat the genders differently). On this basis, the NZCS can be regarded a gendered organisation.

I asked Gillian Reid, ex-President of the NZCS, why there had been no other female presidents. She thought that perhaps women are simply too busy, given that they typically have considerable domestic responsibilities in addition to their professional responsibilities. Even though she had good support from her family, she found the role very demanding:

> I really don't know the answer to that… The fact that there hasn't been another one since then I find interesting, and to a certain extent disappointing, because I know that there are some very good, very competent women around who have been part of the profession. But I get the sense that perhaps they're just spread so thinly with all their other responsibilities…

[126] ACM presidents are elected by members.
[127] NZCS presidents are appointed by the NZCS Council.

> We're all working very hard; women still carry a lot of domestic responsibility… It was tough and I'm not surprised that more women don't put themselves forward for that sort of role outside of what they can do in their direct professional role.

Amongst other women I interviewed there was little interest in or support for the NZCS, and only two currently hold individual membership. Phyllis was a member in the 1980s and enjoyed the experience:

> I used to go along to their meetings once a month or something. I used to read their magazine. There was also the bonhomie amongst colleagues, not necessarily people working in your area. One was always interested in technical developments. I was always interested to hear what the others were doing.

Some of the women had never heard of NZCS, and several had decided against joining, usually because they did not see NZCS as relevant to their work. Kelly's response was typical:

> We used to get the Computer Weekly, so I probably heard of it [NZCS] through that. But it had no relevance at all to what we were doing.

Most of the women explained that they belonged to some other 'more relevant' organisation. For example Mandy belongs to the local chapter of the *International Institute of Business Analysts* (IIBA), and discounted NZCS as appealing more to 'geeks' and older people:

> I have heard of it, but no, I've not considered joining it, because, my perception of it was that it was more of a geeky society, so I wasn't sure what it had to offer me. What is it, what do they do? ... No-one at my work even talks about NZCS. Maybe older people would join.

Andrea attends some NZCS functions through corporate membership and finds them useful for keeping up-to-date and targeting potential clients. She wouldn't pay for her own membership though, but would for a different organisation:

> I'm a member through [XYZ company] so I go to their breakfast meetings fairly regularly. [AH: what benefit do you get?] Keeping up to date but they are also my target market. [AH: Would you join if it wasn't paid for?] I'd go as a non-member, but I would probably consider joining the Software Society.

Patricia was very dismissive of the NZCS:

> It's a pain in the arse. I attended some of the meetings. I think there's a couple of rather boring people who dominate it, and that the topics I've been to were sometimes fairly low interest and the amount of money they charge is excessive given that the presenters aren't being paid, so I think that they probably spend too much on their infrastructure as well… I'd rather go to the web design meet up or the UPA.

We may conclude that NZCS membership holds little appeal for women working in ICT in New Zealand. By choosing not to belong to the NZCS women are also not becoming involved in the professionalisation project. Turning this around would require a conscious effort by the NZCS.

Events such as the 'Auckland Evening with Industry' described at the beginning of this chapter will not help NZCS recruit more women.

This section has been critical of the NZCS' lack of attention to both the under-representation and the outsider-within location of women within its own organisation. The failure to address these issues further demonstrates the exclusionary nature of the social closure activities discussed in Chapter 3. It also demonstrates that the NZCS is not acknowledging its role in endorsing gendered practices in the ICT industry. As Wharton (2005, 68) explained, "institutions are an important source of cultural beliefs about the social world, including beliefs about gender. Institutions provide scripts that become guides for action". Unless a conscious effort is made to change the status-quo, gendered beliefs and practices entrenched within institutions (often unconsciously) will continue (Wharton 2005, 68-69; Wilson 2003, 137). The NZCS is failing to register its potential to bring about change in the sector. Gillian Reid's comment that "it raised the profile of the society to have a woman as the president" indicates the potential benefit for the NZCS from increased female involvement.

6.6 Women as Outsiders-Within in Professional Codes of Ethics

In Chapter 3 we saw that a code of ethics has featured predominantly in the NZCS professionalisation project since 1978 and continues to do so (although interestingly the title *Code of Ethics and Professional Conduct* was reduced to *Code of Professional Conduct* in 2009, a decision which had the effect of de-emphasising ethics in favour of professionalism). Given that only 13% of the members of NZCS are women and few women are office holders in the society, we may assume that women have had little input into the content of the code.

A small number of scholars from within the computing disciplines have argued that codes of ethics in the ICT profession tend to emphasise ethical dimensions such as rights, justice, impartiality, moral rules, and universal standards. Further, these notions of ethics are inadequate for a profession which is (or at least should be) focussed on clients and users rather than technology, and which relies on effective relationships - see Ian Stoodley and Christine Bruce (2008, 9), Larry Stapleton (2008, 406). These authors proposed that the practice of computing involves ethical dilemmas which cannot be resolved by existing codes and require instead an 'ethic of care' (Gilligan 1993) (although they did not accentuate the essential gender dimension of Gilligan's argument).

Carol Gilligan (1993, 19-23) was critical of traditional conceptions of ethics based on masculine

ideals of fairness, individual rights, and moral rules, and which had the effect of devaluing women's ethical concerns of building relationships and fulfilling responsibilities. As an alternative Gilligan (1993, 62-63) offered the 'ethic of care' which gives precedence to the building and maintenance of non-hierarchical relationships in which all persons are valued and considered. An ethic of care involves doing, rather than not doing; acts of care, rather than restraint of action (Gilligan 1993, 38).

A few scholars (also from disciplines other than sociology) have attempted to investigate Gilligan's assertions of differing moral reasoning amongst men and women, with mixed results. For example in a study of 485 undergraduates, Kathleen Galotti (1989, 486) found no difference in the nature of moral reasoning between men and women and another study of 86 male and female computing students reported inconclusive results (Ashari et al. 1996, 10). A further study, which noted Freud's claim of men's greater moral conscience but did not mention Gilligan's (1993) rebuttal of this view, reported that in a study of 134 students women were more proficient than men at detecting unethical actions (Khazanchi 1995, 744).

A different type of claim was that computing codes of ethics operate under an assumption of gender neutrality and fail to call for responsiveness to gender issues in the computing workplace (Panteli, Stack, and Ramsay 1999, 57). Adam (2005, 81) also regarded the marginalisation of women in ICT an ethical matter.

My study did not attempt to explore differences between men and women in ethical reasoning, and this is an area for further investigation. However as mentioned previously, I did find that awareness of the NZCS code of ethics was almost non-existent amongst my participants, and even amongst long-time members of the society there was little credence paid to the code. It may well be that an 'ethic of care' would be more suitable for ICT work and would resonate as more workable for ethically inclined ICT practitioners - although as I also noted in Chapter 3, some computing practitioners, mostly men, are not ethically inclined - see also (Hunter 2007, 2010). An ethic of care has been found to be necessary in some ICT work (Hedstrom cited in Stapleton 2008, 426), and does operate in some instances (Stapleton 2008, 424). Julia, who did not believe in outsourcing call centre operations, best illustrated an ethic of care approach to her work:

> You need a fellow employee to empathise with a fellow employee and you don't get that if it's another company. You don't get that same level of engagement and care.

How widely this approach exists and is needed in the New Zealand ICT industry is unclear and

requires further investigation.

The NZCS (2009c) *Code of Professional Conduct* consists of eight tenets which give less prominence to relationships and the care of individuals than is evident in the Nursing Council's (2009) *Code of Conduct for Nurses*, as would be expected given that nursing is generally regarded a 'helping' profession. Women have had little input into the NZCS code; a code written by women may have been quite different. As Collins (2009, 14) observed, outsiders-within are in a unique position to "foster new angles of vision".

6.7 Coping with Outsider-Within Location

Margolis and Fisher (2002, 91) referred to women who enter and remain members of the boys' clubhouse as "persisters" and identified a range of coping strategies these women develop in response to their marginalised position. These include denying their marginalised position, adapting to and surviving the situation, resisting the marginalisation and exclusion, and opting to join the club. Many of these coping mechanisms were observed in my study.

6.7.1 Denial

Women in computing often fail to recognise their position as outsiders-within and when prompted to consider the prospect, deny that this is their experience (Hunter 2006, 100; Wilson 2003, 137).

After studying reported cases of discrimination in IT organisations in Australia by conducting interviews and focus groups with a large number of female IT workers, Rosemary Hunter (2006, 99-100) reported that although the women were aware of widespread discriminatory practices directed against them in their workplace, most of them denied that discrimination occurred. Denial manifest in various forms; some women simply accepted discriminatory practices as "how things are", others passively denied any discrimination by remaining silent or deflecting questions relating to this issue, while a third group actively denied any discriminatory practices and sought to defend the 'benefits' of working with mainly male colleagues (Hunter 2006, 99).

Fiona Wilson's (2003, 137) research produced similar findings, with female students in computer science in Scotland also not acknowledging inequitable conditions for women. Wilson (2003, 137) suggested this might be due to the women wanting to believe in a just world, and their reluctance "to be seen as different or 'other'". The women were adamant they did not want to be treated differently to men.

In a study to determine whether women have the same type of experience as men in IT work in the USA, Vicki McKinney, Darryl Wilson, Nita Brooks, Anne O'Leary-Kelly, and Bill Hardgrave (2008, 83) surveyed 815 IT professionals about their experiences and attitudes, and reported positive experiences for women over a range of indicators, including "fair treatment". This led the authors to conclude: "Meanwhile the IT workplace appears to be a positive place for female professionals. [This is] "good news for a profession that has been and remains male dominated" (McKinney et al. 2008, 84). These authors did not comment on the apparent denial by their women respondents, even though their findings appear contrary to reports of pay discrimination and a glass ceiling in the USA (National Science Foundation cited in Klawe, Whitney, and Simard 2009, 70; Hemenway 1995, 55-56).

Denial of the outsider-within location of women in IT in New Zealand was evident in an article which appeared in business magazine *the channel*. Journalist Jess Meyer (2007) interviewed several successful women in top level IT roles and concluded that New Zealand's IT industry is nonconformist and does not follow traditional stereotypes; thus it is different from other countries. For example, Suzanne Hansen, regional manager for Cisco, recognised the possibility of women being judged differently than men but claimed that this does not happen in this country:

> Women are very much respected for their capabilities here. No one is overcompensating for women. Women are successful in their own right in New Zealand, which is not the same everywhere else. The country is advanced that way. (Meyer 2007, 12)

The women interviewed by Meyer typically offered positive views of the IT industry. One appreciated the equality in New Zealand and the fact that being a woman had never made her role more difficult, and two others mentioned the friendly business atmosphere of the IT industry in New Zealand which they described as quite different to the "boysie-network" in Australia (Meyer 2007, 12).

Hunter (2006, 103) used the term "active denial" to refer women's vigorous assertions of gender equity in IT. This is a suitable term for the women Meyer interviewed. Their comments are paradoxical given the low numbers of women in IT work, particularly at the highest level, and indications of pay inequity in the industry. They are also contradictory to the women's own later comments. For example two of the women acknowledged the challenge for women trying to balance work and family responsibilities: "Women often ask themselves, how can I take that promotion and still have children? How many men have to ask that question? It's not even part

of their conversation" (Shirley Wigley cited in Meyer 2007, 11), and "What's amazing about women is that we have become incredibly resourceful with our time" (Carol Lee Anderson cited in Meyer 2007, 11). The risks some ambitious women feel they must take, and which men do not need to take (or at least tend to avoid), in order to propel themselves up the corporate ladder were also noted: "There isn't so much a glass ceiling as there is a glass cliff" (Carol Lee Anderson cited in Meyer 2007, 12).[128]

Similar active denial of the outsider-within location of women was evident in a *New Zealand Herald* article which also reported the views of several high profile women in IT. Although claiming there are no barriers for women in IT, the women noted the gender imbalance across the industry, with women highly represented in some roles and not others (South 2009).

In order to explore this issue, I asked my research participants whether it is easier being a man or a woman in IT. My female participants were fairly evenly split between believing that IT work is easier for men and believing there is no difference between the genders; none thought it is easier being a woman.

Amongst the women who thought that it made no difference whether you are a man or a woman in IT, contradictory statements indicating denial of the outsider-within location of women were frequently made, although the women did not claim there is no discrimination. This is passive denial (Hunter 2006, 102). Sharon noticed challenges for women balancing work and childrearing duties, but did not connect this with IT work being more difficult for women:

> I think for some [women] when they go on maternity leave; that means there's a lapse, there's a break in their career and then they have to come back and perhaps play catch up. So in that way it's different for women.
>
> [AH: Is it a struggle for women to balance work and home life?] Yes it is. I know a few women who start at 6 o'clock in the morning just so that they can pick their kids up after school.

Even Linda, who as we saw earlier struggled greatly to balance a responsible job with mothering duties (page 152), did not think IT work is any easier for men or for women.

> [AH: Do you think its easier being a man or a woman in IT?] I don't think either way to be quite honest with you. I think it's who you are, it's not to do with whether you're male or female, it's to do with how you treat people, I think it's the outcomes that you deliver, I think those are the important things.

[128] The 'glass cliff' relates to the tendency for women to take on leadership roles in risky ventures, which all too often leaves them "carrying someone else's bag" (Anderson cited in Meyer 2007,12).

Phyllis also believed gender made no difference in IT, but then explained that in her experience men were reluctant to admit their mistakes whereas women would quickly own up to theirs. This suggests a situation where women are expected to accommodate and acquiesce to masculine styles of negotiation and communication in the workplace:

> There was one thing about men. We all make mistakes and the males were never very good at coming out and saying look I cocked up there, it's my fault; sorry I did a wrong thing. There always seemed to be a working around it. Women were much better at saying look I'm sorry I've made a mistake. I've found women much more upfront about admitting mistakes than males. It's like bullshit factors, but women didn't do that.

Although Andrea also believed there is no difference whether you were a man or a woman in IT, she felt that women tended to avoid pressured roles such as programming and instead preferred people-oriented occupations:

> I've noticed quite a few women who have been programmers and hated the pressure and didn't want to be one any more, so technical writing is one thing they will come into, and another one is training. I think they quite enjoy a little bit more people contact.

Patricia felt that it doesn't "greatly matter" whether you are a woman or a man in IT. However she did think that women lacking confidence might struggle, and even though she is extremely confident she felt she probably would not like to work as a solitary woman amongst men.

> Maybe if you come across as less confident you get more challenges, I'm not sure… I might be reluctant to go into a work environment where there wasn't another professional woman there.

These narratives all point to denial of outsider-within location.[129]

Hunter (2006, 101) offered two possible explanations for women's lack of recognition of discriminatory practices they experience: (1) they unconsciously conform to and reproduce male hegemony and so perpetuate the discrimination themselves - a "structural explanation", and (2) they refuse to see themselves as victims, possibly because they never actually expected otherwise - a "psychological explanation". After all, as Trauth (2002, 112) noted, some women "take unequal treatment for granted". Instances of both these phenomena are seen in my study.

The senior women interviewed by Meyer (2007) show signs of conforming to and reproducing male hegemony. Their assertion that New Zealand's ICT industry is different, is not discriminatory and has no glass ceiling or 'boysie-network' supports the prevailing male

[129] It is also possible that my participants did not interpret my question 'is it easier being a man or a woman in IT' as I expected them to. For example, they may have been answering as they think the situation should be, rather than as it is.

dominance. These women could be construed as having been assimilated by the dominant group.

Anna and Linda are examples of women who refuse to see themselves as victims. Anna did not regard herself as a victim when paid poorly (page 146); she never really expected better pay because she knows that women are usually paid less. She never felt entitled to more. Linda also did not regard herself as a victim, despite the severe stress she was experiencing coping with work and children, probably because she felt this is a normal state for working mothers.

6.7.2 Joining the Club

The under-representation of women in computing suggests that there are significant social and cultural factors influencing many women away from a computing career. Reasons for women ruling out IT as a career choice include rejection of masculine culture, the 'geeky' or 'nerdy' image of computing, anxiety about mathematics, exclusionary teaching methods, gender-role identification, lack of female role models, isolation, and a desire to work with people rather than things (Gadalla 1999, 140-141; Lagesen 2007, 69; Rommes et al. 2007, 306-312; Margolis and Fisher 2002, 113).[130] These women are avoiding the outsider-within location.

One of my male participants, Andy, commented that women don't seem to want to engage in IT work:

> I think women in this industry is not an issue of the industry. It's an issue of women don't seem to want to be in this industry. If there were more of them they would be employed. I've never really had a CV from somebody who's gone out and worked in the networking world or out on site. There's not many women wanting to be in the industry.

However there are approximately 20,000 New Zealand women who have chosen a career in IT (see Table 3, page 136). Margolis and Fisher's (2002, 91) use of the term "persisters" to describe these women suggests that they struggle to survive in the masculine domain. But as we saw previously, some women are in denial of any struggle and regard themselves as fully fledged members of the clubhouse rather than mere 'persisters'. They are adamant that they are members of the clubhouse in their own right and have equal status with their male counterparts. They are comfortable joining the club and "take pleasure in learning to walk the walk and talk the talk" (Margolis and Fisher 2002, 103). They would not regard themselves as outsiders-within.

But even for women who actively deny any discrimination, admittance to the clubhouse does in

[130] As Margolis and Fisher (2002, 54) pointed out, some women choose a career in computing precisely because they believe it will enable them to address "social concerns" and "caring for people".

fact require some effort. Carol Lee Anderson, one of the founders of *Women in Technology* (WIT)[131] in New Zealand, advised women to "learn the rules that men play by" and to "understand the playing field" (Feature writer 2006, 15). Following this advice, a woman is able to transform herself into a quasi-male member of the club.

Most of the women I interviewed can be regarded as persisters. Persisters are women who have "resisted in some way the influences that discourage young women from entering IT and have persisted in developing their IT careers" (von Hellens, Nielsen, and Beekhuyzen 2004, 105). Margolis and Fisher (2002, 94-95) argued that 'persisters' may come from vastly different backgrounds; for example from a family of computer geeks or from families with no computing experience at all. Making a slightly different argument, Trauth (2002, 105) claimed that women's decisions regarding an IT career depend on their sense of "what is normal". Earlier Paula Roberts (1997, 107-108) found that women in computing tend to have gender-free upbringings and come from homes without gendered roles, leading her to raise more controversially the concept of an androgynous woman in computing.

Amongst my female persisters there are a wide range of backgrounds. As we saw in Chapter 2, some of the younger women joined the ICT industry directly after completing school and (sometimes) computing education at university. They had chosen a computing career early on. Kelly, who didn't have a computer at home as a child, described her early passion for computers:

> I just knew at school that I wanted to get into computers. That was it. We had one computer when I was at school and computers had this mystique, I thought oooh I want to get into computers… It was tucked away in a little careers guidance office which I never went into, I saw it sitting there whenever I went past, I never got to use it.

Kelly needed considerable persistence to realise her goal, as her first job only brought her 'close' to a computer:

> I left school and found a job as an EDP officer at a Borough Council and I was the liaison person between the rates department and the computer bureau, so close to computers… I left there after 2½ years, because I said to the boss I really want to get into computers.

Kelly's next job was as a trainee computer operator and she eventually became a programmer, thus fulfilling her childhood dream.

Others came to computing after several years' experience in other professions, including teaching, laboratory work, and nursing, or after years of travelling and casual work. For these

[131] See page 188 for more information on WIT.

women the decision to take up ICT work was sometimes pragmatic (they needed a job which paid well), but other times resulted from the women unexpectedly developing a passion for IT. For example, Emma (mentioned on page 17) came to ICT by accident and was instantly 'hooked':

> It was like I was sitting there going, ooh, wonder what's on the next page, oooh, OK, tap, tap, tap, type, type, type. Ooh, cool! I'm doing this! And it was just like I had found my thing. It wasn't something I'd been looking for, I was quite happy at the Ministry blah, blah, blah, but this was like a revelation. It fitted my way of thinking, my brain type, absolutely perfectly.

These persisters belong to the clubhouse, at least for the time being, although as I argue in this chapter, they belong as marginalised members of the club. As noted earlier, persisters face many challenges, and if they wish to remain in IT they must learn to adapt and survive.

6.7.3 Surviving and Adapting

Women who pursue a career in computing will need to develop a range of survival strategies; in particular they need to be self-confident and assertive. IT recruitment manager Annabelle Klap (cited in South 2009, para 23) commented, "If you are a meek and mild female you won't survive", and Trauth (2002, 109) similarly noted that women in ICT need to rely on their "inner strength and self-confidence". The process of adapting to the masculinised culture of IT work is typically dispiriting for women (von Hellens, Nielsen, and Beekhuyzen 2004, 103).

One of my research participants, Anna, is an example of a young woman who almost didn't survive. Anna completed her computing degree in 2001, a point in time when New Zealand was experiencing a serious shortage of ICT professionals (Department of Labour 2002, 2). Nevertheless Anna found it very difficult to get her first job, mainly, she thought, because the (male) interviewers could not imagine a young woman succeeding as a programmer. One was more interested in her sexual attributes than her academic credentials:

> When I was going to job interviews I said that [programming] was what I wanted to do. I went on a few interviews and I think they sort of almost took one look at me and thought oh, young woman, that's the impression I got. That they weren't interested. One guy basically looked down my top the whole time I was at the interview… I just felt so humiliated…

In desperation after months of rejection for programming jobs, Anna accepted a temporary position well below her skill level:

> It was mainly working with the data and collating it. That was a three month contract to start with, and then they moved me into another role which was more just processing data, more sort of data entry stuff…

With this ignominious introduction into the industry, together with Anna's acknowledged lack

of confidence, it is not surprising that Anna struggled in her first role under the direction of an unhelpful and bullying male boss. She felt demoralised and demeaned:

> The first three months, the guy I was working under, just completely squashed all my self confidence that I had, which wasn't a lot… He was a little bit impatient, he'd say can you do this and this and this and wouldn't tell you how, and I wasn't quite sure when I first started, I'd ask can you just show me what you want, and he'd say I haven't got time, I might as well do it myself, and what did they teach you on your course? Just remarks like that the whole time. It just wears you down after a while; it's quite belittling. I'm sure there's a lot more people out there just like him, that take advantage if you're young and female.

It wasn't until the unpleasant boss left and she shifted to another team under the supervision of a motherly female team leader that Anna's confidence began to grow. Without this change it was likely that Anna would not have persisted in IT.

> And then after he left and I moved into this other team, the lady I was under was very much a mother to her team so it was a very good growing experience. And now that I know the people and I know the processes it's a lot easier…

A previous study of persisters in New Zealand's ICT industry investigated how women perceive and experience working in a male dominated environment (but did not specifically identify survival strategies). The authors concluded that the women "did not allow this [masculine] culture to influence them", and suggested that this may be due to "the personalities of the women interviewed; many of whom displayed determination, perseverance and doggedness" (Crump and Logan 2000, 9). These qualities were typical of the women I interviewed, but I also identified a range of survival strategies employed by the women. Five strategies are discussed below.

6.7.3.1 Toughing it Out

One survival strategy is to just 'tough it out' – tolerate the situation and any unpleasantness or discrimination; as Trauth (2002, 111) described it, "completely accept that [one] has entered a male domain". This was Anna's approach, as related above. My own experience of toughing it out in the mid-1970s and early 1980s involved mainly enduring the isolation of being a sole female amongst many men, but it also involved feeling powerless as I endured the occasional sexual harassment of men in senior positions.

Toughing it out was the approach taken by Patricia's cousin throughout her university study and subsequent ten year career in IT:

> My cousin did computer science a few years before, and she used to say the computer science department was smelly, all the unwashed boys cooped up in the labs and the air-conditioning wasn't good enough, but she stayed in the IT environment and is working in [XYZ company], been there 10 years, so I think she's pretty tough.

Precisely what Patricia meant by her cousin being 'pretty tough' is not clear, but could involve a number of actions, including distancing herself from her male colleagues so as to avoid their unsavoury company, or ignoring as much as possible any unpleasantness.

'Toughing it out' can involve both acceptance of the situation and compromise. This is Sharon's method of survival. Sharon's current business analyst role is non-technical, but she often needs to discuss issues with technically-oriented male developers. Frustration arises for both parties due to communication differences, but Sharon did not mention her own frustration until prompted by me to do so. Sharon is more conciliatory than her male colleagues:

> If there's things I don't know I just ask. Sometimes they get frustrated that I don't actually talk on the same level that they do and they need to explain to me things, but you just accept it. [AH: Do you feel frustration too that they're not speaking the same language as you?] Oh all the time, yes, all the time. But you just have to compromise.

6.7.3.2 Taking Refuge in Dualisms

Another survival strategy commonly seen amongst ICT workers is to represent work in terms of gender dualisms (Faulkner 2000, 759; von Hellens, Nielsen, and Beekhuyzen 2004, 108). Dualisms provide women with a form of refuge: "The unselfconscious reference to and representation of traditional dualisms allows women to operate without continual self-consciousness or anomie about the nature of the work" (von Hellens, Nielsen, and Beekhuyzen 2004, 109). Acceptance of the status-quo and dualisms such as 'men are typically assertive, women are usually not' or 'women have superior soft skills, men are more technically oriented', give women an ongoing "ontological security" which allows them to cope with an alien environment (von Hellens, Nielsen, and Beekhuyzen 2004, 109).

Most of my participants (male and female) represented their work or their work colleagues in terms of dualisms. Mandy and Phil provide two typical examples.

Phil identified differences between men and women dualistically:

> I believe there are differences between men and women, I think you will find more boys have this engineering, operational, build it, component in their desires, and women have the more broader generic, attention to detail, components in their lifestyles.

Mandy used dualisms to explain why there are few male business analysts:

> Soft skills. Women can be stronger on this. You need a lot of patience. You need to have the whole people skills and be able to relate to people, sometimes in an emotional way rather than just fact and numbers, whereas I find guys might not have that much patience to do that sort of thing. …I think women probably can be stronger on the soft skills side than men. Men are in project management, they are good at the quantitative sort of roles or technical roles where men are perceived to be better than women.

Almost all of my participants spoke about men and women's abilities and preferences in terms similar to those used by Phil and Mandy. The dualisms identified in my participants' narratives are shown in Table 6.

Table 6: Gender specific dualisms in participants' narratives

Most often Associated with Men	Most often Associated with Women
Technical skills	Soft skills
Operational	People skills
Quantitative	Relate to people
Facts and numbers	Dealing with people
Building things/ Fix it	Pick up on body language
Engineering	Touchy feely people stuff
Meccano/ Playing with toys	Sociable/ Social
Introverted	Meeting people
Poor communicators	Talking
Nerdy	Patient
Detached	Caring
Impatient	Understanding
Aggressive	Self-effacing
Assertive	Emotional
Confident	Broader
Logical	Generic
Problem solving	Attention to detail
Factual	Creative
	Multi-tasking
	Family/ Children/Home

Participants (both men and women) usually invoked the dualisms to explain why, in their view, men are more suited to roles such as programming, project management, and network engineering, and women are more suited to roles such as business analysis, sales and marketing, training, client-liaison, management. The dualisms in Table 6 match closely with those identified in other studies of technology-related work (Faulkner 2000, 759; von Hellens, Nielsen, and Beekhuyzen 2004, 108). They reflect the dichotomous manner in which gender is conceived and valued in society; with the behaviours and orientations socially defined as masculine receiving greater social esteem (Faulkner 2000, 760-764; Wharton 2005, 57).

Although ICT workers typically use dualisms to describe their work, it has also been noted that the dualisms are often not reflected in practice: "People tend to gender their *descriptions* of what they do more than they gender their actual *practice*" (italics in original) (Faulkner 2000, 784). For example, Faulkner (2000, 767) concluded that male software developers claimed to be technically-focussed rather than people-focussed due to the greater status associated with technical competence, rather than any real lack of consideration of people. In contrast, female developers tended to downplay their enjoyment of the technological aspects of their work (Faulkner 2000, 768). In their study of 32 female ICT professionals in Australia, von Hellens, Nielsen, and Beekhuyzen (2004, 110) found that men were thought to have superior formal and informal networks, even though women were seen as being better communicators and were

increasingly setting up their own support networks. The same study also found that the women regarded themselves as "different from other women", which lead the authors to suggest that this indicated the women were challenging the gender dualisms (von Hellens, Nielsen, and Beekhuyzen 2004, 110).

My study also demonstrated some inconsistency between women's dualistic representations of their work and their lived experiences. In particular I identified a number of women who viewed themselves as 'different'. These women detached themselves from the generic female and presented their personal experience as distinct from that of 'other women'. Several women described themselves as being confident and assertive, and/or being passionate about problem solving, logical processes, and intellectual challenge – and then qualified this by stating they were different to other women. For example, Patricia and Andrea believed they were very confident whereas other women are not, and Emma identified herself as acting more 'like a guy' than other women:

> Because I think in those ways I act like a guy. Guys think they are great and they tell you. Women, a horrible generalisation, but women are a little more self-effacing, but I'm not in my job.

In this respect these women were similar to Trauth's (2002, 110) female participants who also viewed themselves as "set … apart from other women".

I tend to disagree with von Hellens, Nielsen, and Beekhuyzen (2004, 110) that these women are challenging the gender dualisms. An alternative conclusion is that they are endorsing the dualisms, and by distancing themselves from other women are presenting an "I can cope even if other women can't" attitude which lacks empathy for other women.

A further (unsurprising) observation of my participant's discourse is that while some women readily acknowledged 'behaving like a guy', no men said they 'behaved like a girl' or volunteered having female gender-typed characteristics. While some men distanced themselves from aggressive behaviour (for example Luke was clearly uncomfortable with "the constant fighting that often happens" and "the brutally confrontational" nature of some ICT jobs), this was not linked to claims of 'being caring' or having 'good people skills'. This observation relates to the primacy given to the masculine side of the dualisms.

Later I refer to women 'taking a personal stance' against their location as outsiders-within. Challenging gender dualisms is an important aspect of this. My study has found that very few women are doing so; most women (and men) continue to conceptualise ICT work in terms of

gendered dualisms, without challenging that conceptualisation.

6.7.3.3 Suppressing Femininity

A third survival strategy is to suppress one's femininity and/or make one's gender invisible (Hunter 2006, 104; Griffiths, Moore, and Richardson 2007, 345). Rather than challenging gender dualisms, women taking this approach are avoiding any disadvantages associated with being a female working in a socially defined masculine field (Griffiths, Moore, and Richardson 2007, 345; Hunter 2006, 104; Wajcman 1991, 164). In Hunter's (2006, 104) study for example, women avoided identifying as women in mixed-gender focus groups, but were comfortable doing so in female-only groups. As I had no mixed-gender focus groups in my study this issue did not arise, but other examples of suppressing femininity did. For example, we saw earlier that Sharon suppressed her emotional responses and tried to curb her habit of taking things personally (see page 165).

Hilary found that in meetings, men often discounted the recommendations made by women – an experience which is common for women (Tannen 1994, 284). In order to counteract this, Hilary would separate herself from her comments, thus gender-neutralising her contribution:

> It was not superbly obvious but there were subtle things of a recommendation being made, a comment being made. If one of the guys made it, it was taken more seriously than if a woman made it. So you actually had to fight for equal recognition. And it would have been a big surprise if I had confronted any of the men about this because they wouldn't have recognised that they had considered more seriously the same words coming out of a male colleague's mouth as coming out of a female colleague's mouth. So I chose never to take that battle on but to either present such compelling business cases detached from me as a person that they just looked at the case and not at the person delivering it. So there were strategies I discovered I needed to do.

By choosing not to challenge her male colleagues about their habit of disregarding women's recommendations, Hilary was adapting to the situation but was not openly resisting it.

Collins (2009, 287) has observed that women who suppress their femininity at work can end up dichotomising their behaviour to the extent that they become different people at work than they are elsewhere. Managing these dual identities is typically extremely stressful (Collins 2009, 287). It is beyond the scope of my research findings to claim that Hilary is a different person at work than she is elsewhere, but Hilary's narrative suggests that the many years she has spent associating with men have shaped how she functions at work (see page 166).

6.7.3.4 Becoming more Assertive and Aggressive

A fourth survival strategy is to adopt masculine characteristics. Women tend to be more secure

in their gender identity than men; consequently men feel a need to "prove their masculinity" more than women do their femininity (Wharton 2005, 37). In a male dominated workplace this can manifest in a hierarchical masculine culture in which men "jockey for status", try to "maintain the upper hand", and adopt "oppositional stances" (Tannen 1990, 38, 25, 187). Key characteristics to successfully achieve or maintain superiority are assertiveness and aggression. As a result women entering technological/scientific/engineering industries are often exposed to an assertive and/or aggressive manner of relating (Faulkner 2001, 89; Traweek 1988-75; McIlwee and Robinson cited in Fletcher 1999, 90; Grundy cited in Webster 1996, 40). One way for women to survive and adapt to such an environment is to become more assertive and aggressive themselves (Tannen 1994, 199).

Several of my female participants referred to having to "fight" for equality or recognition. Hilary's comment above, "you actually had to fight for equal recognition", matches a similar comment from one of Trauth's (2002, 113) female informants: "Everywhere, it was simply a fight against a man's world." The word 'fight' suggests a contest involving power and courage, as well as winners and losers. Fighting was something the women had to learn to be good at.

Mandy found that unless she learned to 'fight' for better pay she would continue to earn less than men (see page 146). This meant she had to learn how to be more aggressive and assertive so as to match the men's negotiating style, something she felt very uncomfortable doing:

> [AH: Did you fight for it?] Initially I didn't because I just believed in fairness, I thought you do a good job you will get what you deserve, but something I have learned is that just doing a good job does not mean that you will get what you deserve, which I don't like. You should be recognised for doing a good job. I hate reviews and things like that. I don't like having to speak up for myself.

Mandy's discomfort is linked to the fact that confidence, negotiation skills, and assertiveness are socially constructed as male attributes. When women adopt these characteristics they are typically seen as aggressive and arrogant (Tannen 1990, 240-241; 1994, 203) and may experience "negative reinforcement" (Trauth 2002, 110) . When I asked Marion whether she would have a preference for a male boss or a female boss in a new job, she commented:

> Male boss, because a female boss would be bitchier, to put it plainly. She would be bitchier because she would have to be a lot more… [long pause], she would have to be tooth and nail to get anything done. She would have to be even bitchier for them [men] to even take notice of her, because males can be so boy-clubbish.

Marion recognises the challenges facing a female 'boss' in a male dominated workplace and immediately assumes that in order to succeed the woman must have become more aggressive

and assertive ('bitchier'). But for having these qualities, whether real or perceived, the female 'boss' is rejected.

6.7.3.5 Capitalising and Exploiting

The fifth survival strategy I identified, rather different from the others, is for women to capitalise on their minority gender status. Some women enjoy their exclusive position and "take pride in being one of a special few" (Margolis and Fisher 2002, 85).

In their study of women in New Zealand's ICT industry, Crump and Logan (2000, 7) identified some women who enjoy being "rare" and "special" in a male dominated environment. Similar views were reported by some of my participants.

Linda and Julia both thought that despite it being hard to be a woman in IT, there are some advantages. A solitary woman amongst men is in a unique situation which she can enjoy and may be able to exploit:

> It's always been very much a man's world I've found, and even now I'm the only lady in the team I'm in. In most of my jobs I've been the only lady in the management. To be honest I've quite enjoyed it. I've found depending on how you interact with the team I've actually found it can be quite an advantage. (Linda)

> Well you do get the advantage of being a big fish in a small pond. You get noticed more because there are so few of you. I must admit I quite like that, to be honest. I quite like being cutting edge, slightly different. But no it's extremely hard to be a woman in technology, extremely hard. (Julia)

WIT chairperson Carol Lee Andersen extended this idea suggesting that women should learn to utilise their "natural advantages and skills such as intuition, social skills, and strong bonds with other women" (Feature writer 2006, 15). Here Andersen was advising women to take advantage of any abilities they may have to further their careers.

On occasion women's 'natural abilities' have been rather more calculatedly exploited in the ICT industry; more so by men than women it appears (although women may well have been complicit). Mark, who owned a computer sales company in the 1980s, viewed women as having 'natural advantages' when selling computers to men. He deliberately employed young women for IT sales roles, as did many other organisations at that time, so as to appeal to male customers:

> It was mostly men [in IT], so I employed women to do the selling to them… Because the computer people at the time tended to be a lot more geeky than they are now and were most probably a lot less socially adjusted so therefore a young female was much more likely to get an appointment and get a return visit. That may not be totally acceptable these days but that was how it worked. Not everybody did that but I would say the computer sales

> people from the mid 80s to the mid 90s, a third of them would have been women, even though 98% of the customers would have been men, the IT managers, the technicians and so on.

This practice appears to be less common today, with only 21.5% of ICT sales representatives reported to be women (see Table 3 page 136).

6.7.4 Resisting, Opposition, and Bringing about Change

Some women inhabit an outsider-within location whilst critically reflecting on their position, and using the insights gained to resist and/or bring about change (Collins 2009, 287). This demanding work requires creativity and the support of others who are similarly located (Collins 2009, 287). These comments can be applied to women working in the ICT industry.

Wajcman (1991, 164) advised women who are interested in technology not to resist working in technological fields but to "work from within and without to create another kind of culture". She suggested political resistance: "There are opportunities for disruption in the engine-rooms of technological productions" (Wajcman 1991, 164). Similarly Faulkner (2001, 91) advised women to work "from the inside out" (as well as from the "outside in") to transform the practice of technology to a democratic footing.

My study has identified only very limited forms of resistance and few initiatives to bring about change in New Zealand's ICT industry. Women's support networks are not strong, although some grass roots initiatives are gaining momentum. A small number of women take a personal stance against marginalisation. Mentoring programmes, which have been suggested as a means of encouraging more women into ICT careers (von Hellens, Nielsen, and Beekhuyzen 2004, 113), do not exist in this country in any comprehensive form.

6.7.4.1 Support Networks and Grass Roots Initiatives

One way women can respond to their exclusion from formal organisations dominated by men is to develop their own alternative organisations, for example informal support networks. Support networks have the potential to play an important role in helping women who are located as outsiders-within survive in the ICT industry whilst also challenging the male dominance of the field. They provide an important forum for women who are often excluded from traditional (male) networking groups (Tattersall and Keogh cited in Belgorodskiy et al. 2010, 18; Laird 2006, 287) and give women the opportunity to work collectively to challenge and negotiate the masculine culture of IT work (Margolis and Fisher 2002, 105). Support networks allow women to build social capital (Laird 2006, 285) and so counter to some extent the dominance of men in the industry. For example, as Laird (2006, 294) pointed out, social capital is required for

women seeking to break through the glass ceiling. Support networks often start as small grass roots initiatives and then over time grow in size and adopt a more formal structure (Laird 2006, 313).

One of the most successful support networks in New Zealand, the *Young Women's Programming Contest* (now known as the *Programming Challenge for Girls*), aims to empower girls who may be interested in pursuing computing careers. Established in 1988 by Margot Phillipps, a past programmer and teacher of programming (New Zealand Association for Computing Digital and Information Technology Teachers 2009), the *Programming Contest* began as a grass roots initiative and grew to become a nation-wide event with the winners competing internationally (see www.pc4g.org.nz). The *Programming Challenge* is now an annual competition for female secondary students which aims to show girls in a non-threatening environment that programming can be collaborative and fun (or as one teacher said at the 2009 competition, "show these girls that programming is not an isolated individual pursuit for geeky guys"). Figure 12 shows participants in the 2009 challenge.

Figure 12: Participants in the Programming Challenge for Girls November 18th 2009

Source: http://www.mbas.ac.nz/index.php/general-department/308-programming-challenge-for-girls

In Australia the number of support networks for women working in ICT is reported to be increasing (von Hellens, Nielsen, and Beekhuyzen 2004, 110). In New Zealand a few support networks for women working in the industry currently exist, or did exist, although they generally struggle to survive. Five of these are discussed below.

Women in Technology: *Women in Technology* (WIT) began as an informal support network for women in senior ICT positions in Auckland in 1996, under the encouragement of Carol Lee Anderson. WIT provided an alternative for women who were typically greatly outnumbered by men at regular professional ICT functions. These women were committed to "sending the lift

back down" – they wanted to give other women the guidance and support needed to reach the upper levels of ICT. Interest in WIT functions grew steadily, and as women from less senior positions started attending, the group needed a more formal structure. In 2002 WIT became an incorporated society with a Board and General Manager, funded by membership fees and corporate sponsorship. WIT's mission was 'inspiring, motivating, networking', and to achieve this, the organisation provided women with training opportunities, mentoring support, and guest-speaker functions. The focus was on personal development; building women's confidence and self-esteem, improving women's negotiating skills, and career planning. Women were told that through making the right choices, working hard, and being prepared to give up some things, they could achieve senior positions in ICT. The "Behind the Lipstick" lunches were particularly popular, with as many as 250 people (mainly women) attending. Networking gatherings would normally attract between 40 to 50 people. WIT also worked with secondary schools, Microsoft, Vodafone, HP, Unisys and other industry organisations to promote ICT as a career option for all, with a particular focus on encouraging girls to consider ICT. WIT flourished during 2003 to 2007, but by 2007 the economic decline and sponsorship becoming harder to obtain meant that the organisation struggled to keep charges reasonable. During 2008 companies looked closely at budgets and sponsorship became negligible. Funding for WIT dried up, which meant staff could no longer be supported, and by mid-2009 WIT had disbanded. (Cheryl Horo, email to the author, 4 March 2010)

New Zealand Women in Computing: *New Zealand Women in Computing* (NZWC) is an informal collective of women, mostly academics from computer science departments in New Zealand universities, who meet biannually for the Computing Women Congress. The NZWC website hosted by Waikato University identifies a number of groups, resources, and events which support women in IT (New Zealand Women in Computing 2007).[132]

'Girls' Dinners': A number of girls' dinner events take place throughout the year, allowing women to enjoy each others' company and have fun while also listening to noteworthy speakers. For example *The Tech Girls Dinner* is an annual event which occurs during Microsoft's Tech Ed gathering (South 2009), and *Geek Girl Dinner NZ* organises dinners for women in the main centres, although men may attend if invited by a woman (see www.girlgeekdinners.co.nz). Figure 13 shows the mainly female audience at the 2009 *Tech Girls Dinner*.

[132] The Congress planned for 2010 did not eventuate. This, plus the fact that the website has not been updated since 2007 suggests that the organisation may be struggling.

Figure 13: Women at the Tech Girls Dinner 2009

Source: http://blogs.msdn.com/b/nzdev/archive/2009/09/19/tech-girls-dinner-fun-enterntaining.aspx

Webgrrls Aotearoa: *Webgrrls Aotearoa* began in 1995 as a chapter of Webgrrls International and currently has 171 members, all female (Webgrrls Aotearoa n.d.). The organisation's website states:

> Webgrrls provides a forum for women in or interested in new media and the Internet to network, exchange job and business leads, form strategic alliances, mentor and teach, intern and learn the skills to help women succeed in an increasingly technical workplace and world. (Webgrrls Aotearoa n.d.)

When *Webgrrls USA* began focussing more on women in corporate ICT roles and adopted more formalised structures in the late 1990s, *Webgrrls Aotearoa* chose to remain as a "low-key", very informal support network for women which functions mainly through an email list supported by a website (Helen Varley Jamieson, email to the author, 19 February 2010). Women support each other with emails about IT matters and job opportunities, as well as other non-work matters such as flatmate advertisements. There are also occasional social gatherings (Helen Varley Jamieson and Rachel Hamilton-Williams, emails to the author February 2010).

LinuxChix NZ: *LinuxChix NZ* (2007, para 1) is a chapter of the international Linux community and describes itself as "a community for women who like Linux,[133] and for women and men who want to support women in computing". Activities include mentoring, training, social gatherings, support forums. The group is run informally "by women and for women" and membership is free (LinuxChix 2007).

As expected, there were differing views about the various women's support groups amongst the women I interviewed. For example, Sharon had enjoyed WIT functions some years ago:

> I also belonged to the WIT group… I went to the WIT functions, it was good.

[133] Linux = an open source operating system used by some ICT users as an alternative to MS Windows.

However Julia dismissed WIT as replicating a corporate IT culture:

> WIT is a waste of time; the people running it are mainly interested in power dressing.

Emma belonged to *Webgrrls Aotearoa* in the mid-1990s, and found it a useful forum for women to learn about computers and the Internet without the scrutiny and possible interference or ridicule of men:

> I came across a group of women called Webgrrls who were women using the Internet, or were women who wanted to use the Internet but didn't know an enormous amount about the Internet or about computers. Webgrrls used to meet once a month and it was nice to be in an environment where you could potentially ask in inverted commas dumb questions and not have some guy laugh at you for asking them.

Marion belongs to *LinuxChix* and values the supportiveness of other women members of the group. She regards *LinuxChix* as a paradigm of 'sisterhood':

> LinuxChix is really just a group of ladies who stick together in the IT industry. So we give each other confidence, for a lot of things women don't know how to negotiate, say for their wages, if this is the right thing, and if they should be putting up with male crap in the workplace, and all that… We just all talk among ourselves, because everybody's been there… It's all done on respect for each other. Everybody respects and everybody can have their say, no matter what it is… When women band together they do tend to be stronger as a group than they are singly. Which is good because, you know, women help themselves out. They always have done. There's always a sisterhood of some sort somewhere.

It is clear that some women in ICT value their involvement with support networks and grass roots initiatives. However there are problems associated with these groups.

Keeping support networks going is not easy, and the responsibility for maintaining the membership lists and website, sourcing funds, and organising the gatherings usually rests with one or two women. If the organisation becomes too ambitious and there is insufficient membership support and/or sponsorship support, there is a risk it may fold, as in the case of WIT. *Webgrrls Aotearoa* is one of the longer lasting support networks, possibly due to its low-key format. As one member commented:

> A 'loose network of peers' might be one way to describe it. But it has existed for a long time which suggests that it is fulfilling some needs(s), and apart from the web site it is a really low-maintenance 'organisation' that at times has been quite invaluable for me. (Helen Varley Jamieson, email to author, 19 February 2010)

Women's support networks have the potential to challenge the male hegemony (Collins 2009, 8; Margolis and Fisher 2002, 105), but it does not appear that any of these groups have (or had) resistance or even change to the status quo as a primary objective, including WIT. Although resistance is discussed within academic fora, there is currently no industry group actively

working to challenge the male dominance of ICT work. Instead the support groups provide a space for women to discuss issues and share ideas away from the presence of men. Each group does this with a different emphasis. *New Zealand Women in Computing* and the *Computing Women Congress* give (mainly) female academics the opportunity to examine issues and share research findings relating to women in ICT. *Women in Technology* existed to help women succeed in the male dominated industry, and to encourage more women to take up ICT careers in industry. It sought to increase the number of female participants without challenging the male dominance. *Webgrrls Aotearoa* and *LinuxChix* provide a friendly space for women seeking help with issues not necessarily IT-related. Thus the groups can be loosely classified as 'academic', 'corporate', and 'informal'. This in itself is not a problem, but relations between the women's groups have not always been cordial.

WIT was seen by some women as endorsing and replicating a masculine corporate culture (see Julia above). This view is not surprising since Cheryl Horo, General Manager of WIT during the organisation's heyday, was previously National Office Manager of the NZCS. WIT adopted many of NZCS's organisational structures, including a corporate membership option. Functions were often held in expensive upmarket venues; e.g. lunch at the Langham Hotel could cost up to $130 per person or $1050 for a table of 10 (Women in Technology 2006). Some women objected to the exclusive nature of WIT. For example, Frankie, a blogger on the *coffee.geek.nz* website, posted the following thoughts:

> Today I had coffee with a staff member from New Zealand's Women in Technology. My goals were to talk on girl geek dinners, see if she could help me find contacts and perhaps share some advice on the movement. Early on she blindsided me, when I asked if she would mention Girl Geek Dinners to her members, the answer was a flat "No", because we are competing against their "Behind the Lipstick" events so they cannot tell their members. This both surprised and dismayed me. I had interpreted their goals as helping women working in technology. 'Our goals are the same' was my rebuttal. But as the conversation progressed I came to the conclusion that they're not the same at all. WIT's vision statement is To be the premiere organisation empowering technology workers to achieve unimagined possibilities. This leaves me to perhaps conclude they wish to be the ONLY group helping women into technology. Highlander syndrome. THERE CAN BE ONLY ONE!
>
> As for goals, we don't have the same goals at all. They have an upcoming programme for teenage girls in high school to spend a day learning about how a career in technology needn't be about building technology - or rather that it's not about geeks or coding, and you can have a great career in marketing or sales. All of this is true, but I can't help wonder why pump money into encouraging young women to get into marketing and sales? There was never any doubt that women could do this, nor is there any under-representation of women in these fields. Most of all I wonder why hide marketing + sales career promotion under the banner of

> "Women in Technology". Names are important – shouldn't they be called "Women in sales and marketing"?
>
> My own goal is to get more women into *building* technology, not just supporting those that do. That can be coding, or documentation, designing interfaces, architecture and dozens of other disciplines. I want to get past the stigma of the geek label, or that girls can't or shouldn't be geeks, or ideas that women should leave the "hard" stuff to the boys. I'm very disappointed that WIT see this as "competition". (Frankie 2008)

Frankie's blog prompted several replies, also critical of WIT, sometimes fiercely so:

> I share Frankie's distaste for "Behind the Lipstick". Just damn – it's not about the wearing or not of lipstick (most women don't), it's about the idea that maybe just maybe you don't have to be an avatar of traditional femininity to do your job, whether you're an ovaries-to the-wall type of riot nerd or a saleswoman. A syphilitic pox on the lipstick and the façade they're using to symbolise. (Kerrigan)
>
> So, women can be geeks, and non-geeks can be technologists. There's hundreds of us women in NZ actually building this stuff, and we want thousands more. (Shiny)

Frankie's conclusion was:

> My impression is that it looks like someone's "get rich quick" scheme… It's a corporation not an NGO or a grassroots organisation, so basically I would never give it any credibility unless it demonstrated its usefulness in some way. It seems only to be providing a place where big names can demonstrate their "commitment to women", by sponsoring the group without actually doing anything useful. (Frankie 2008)

These women bloggers are claiming the right for women to feel secure in their identity and to engage with technology on their own terms, without conforming to expectations of others. They challenge the gender dualisms commonly associated with ICT work. They are proud of their technical skills and object to a view that women are deficient and therefore women must change. They feel that WIT offered limited and stereotyped options for women's participation in ICT.

These views have synergy with observations by many scholars that liberal feminist programmes designed to increase the participation of women in technology and science often focus on changing women so that they become more like men (Gilbert 2001, 1). Underpinning these programmes is an inference that women are deficient (Gilbert 2001, 6; Adam 1997, 18). Not only must women change to be more like men, the notion of femaleness is itself defined in relation to the (heterosexual) male (Wilson 2003, 138). Women collude with men's power (Wilson 2003, 138), and fail to question what makes ICT work unappealing to women (Adam 1997, 18).

The tension between the women's groups is also indicative of neo-Weberian occupational closure strategies of exclusion, inclusion, and dual closure (Parkin 1979; Witz 1990). As a group claiming to represent women who are marginalised in the dominant male ICT profession, WIT undertook a dual closure strategy of (1) inclusionary usurpation (Witz 1990, 680) - by adopting similar structures to the dominant group WIT sought to gain similar status to men and to be seen 'as good as' men, and (2) exclusion (Parkin 1979; Witz 1990) - by seeking to exclude other women's groups and women who could not afford to participate in WIT sponsored activities. These actions constitute a "female professional project" (Witz 1990, 685) on the part of WIT, although we would have to consider it a failed female professional project.

While there is research within academia which draws attention to the marginalised conditions for women working in ICT in New Zealand, this work does not connect effectively with any industry group or individual women working in the ICT industry. Besides, no women's support network currently has change as a priority. Cheryl Horo would like to see WIT (or something similar) reconstituted:

> There is still need for an organisation like WIT as Cheryl is often contacted to see what is happening and if she could offer support and guidance. Several options are currently being considered. (Cheryl Horo, email to the author, 4 March 2010)

At this stage it is not clear whether a new form of WIT will emerge. Real change aimed to resist the current exclusion of women from ICT would require engagement with other women's support networks and implementation of unified usurpationary closure strategies.

6.7.4.2 Taking a Personal Stance

Some of the women I interviewed took a personal stance against behaviours and expectations which threatened to locate them as outsiders-within. They resisted efforts by men to assert power over them and refused to conform to stereotypical expectations.

A few women effectively waived aside men who tried to use their superior technical expertise (either imagined or real) as a means of putting-down their female colleague. Older and/or more confident women in particular were comfortable asserting themselves when dealing with male counterparts.

Lyn, who we saw earlier (page 39) has no qualms admitting her lack of understanding about technical matters to male colleagues: "So I'm not backward in coming forward and saying, please don't talk like that because I can't understand it." She does not feel compelled to represent herself as 'equal' to the men.

Andrea has a ‘look’ she uses when men try to score points over her regarding technical matters. She shuts down any enquiry into her technical expertise:

> I would give them my ‘look’ and they don’t do it. I have to say; as I’ve got older they don’t take you on like that anyway.

As a programmer, Phyllis worked alongside many men. Her tactic was to appear self-confident, even when she wasn’t. Being older helped too:

> I was often a little bit older, and it might be to do with confidence coming with age, perhaps… I think I probably gave off quite positive vibes that I was confident and in control, even though I wasn’t always.

Lyn, Phyllis, and Andrea are women who refuse to kowtow to men, each in their own manner. As Margolis and Fisher (2002, 102-103) noted, refusing to conform to the stereotype of a meek and technically-helpless woman is another survival strategy for female persisters in IT.

Keri also does not conform to stereotypical expectations, although she attributes this more to ‘who she is’ rather than a conscious stance. Keri has found that her practice of giving a forthright message is regarded as atypical for a female. Overall she has not found being a woman in IT difficult, but this aspect of her character has created problems which men would not have experienced:

> I worked for a long time in a team with two guys, and then three guys, and me, and I got on very well them and I didn't feel like it [being female] was a barrier... This is a very convoluted way of saying it, because it is, and it isn't. Somebody called me the other day a truth-teller and I think that is what I am. And I think that that is acceptable in a male and it’s not in a female.

> [AH: So there have been issues around that?] Yes, definitely. I think I'm very blunt, and I often don't soften the message and that's because I don't think you need to. [AH: The stereotype of a woman is not that, it's that the messages are soft, non-confrontational?] Yes, and if you don't play that role particularly well… And it wasn't that I chose to adopt an alternative role, it's just who I am.

Over a long career Keri has never considered taking on a different persona at work, even though she has at times suffered from being ‘different’.

Emma has never felt under pressure to prove she is equal to men, and thinks this might be a result of her pronounced self-belief. Her ‘high opinion of herself’, her confidence in her own ability and her obliviousness to criticism are characteristics she thinks are most often associated with men:

> Maybe I've just got a high opinion of myself and I don't notice. I don't know. I know I have a very good education… I've got a lot of information in my head and I've always considered

> myself to be above average intelligence. And maybe I'm really just up myself and have a really high opinion of myself and I never notice, or perhaps I just ride through any questions that anybody might have about me because they might think that I'm not so good because I'm a woman, because I think I'm so great. Because I think in those ways I act like a guy.

Women who avoid or refuse to conform to stereotypical expectations often develop an individualised view of computing and how they will carry out computing (Margolis and Fisher 2002, 102). These women have all developed a personalised mode of participating in the ICT industry.

6.7.5 Avoidance

Some women react to their outsider-within status in IT by avoiding working in a male-dominated organisation, and set up their own female-only organisation instead. In New Zealand there have been a number of female-only IT businesses. For example, Duo NZ Ltd, was founded by two women committed to balancing work and family commitments (Meyer 2007, 11).

For one period in her career Andrea worked for a female-only IT company:

> One of the companies I worked with, [XYZ Company], which is no longer functioning, they were all women. They did the managing of the product, the training of it, all the documentation for the product, and a lot of the testing and requirements stuff.

Patricia explained the appeal of working in a less male-dominated workplace:

> I know a lot of women choose [ABC Company] because there's a lot of women there, so for example, I might be reluctant to go into a work environment where there wasn't another professional woman.

Avoidance can also mean changing status from employee to contractor. Kelly worked mainly with men in her programming role, but experienced an aggressively harsh environment. She left and now works from home as a contractor:

> It wasn't, it sounds awful, but it wasn't a very nurturing sort of an atmosphere. At [XYZ Company] it was one of the worst places I've ever worked at. The programming team was very competitive and very cliquey and I never really got into their clique. They were gloating because they were the elite, you know, we're in IT and we're elite, we're special… I didn't like that gloating… And if you needed help, I never felt you could go to anybody and ask for help or advice. It was never encouraged. It was always too competitive and too fast-paced.

6.8 Chapter Summary

As the professionalisation project in New Zealand's ICT industry gains momentum, indications are that women participants in the industry will become even more cemented in their position as outsiders-within.

Even though women's participation in the professions has increased in the last few decades, professions continue to be gendered institutions. Women working in the emerging ICT profession in New Zealand face many challenges, including having to be twice as good as men to be considered good at their work, and being resented by men for having superior technical knowledge or being ridiculed for having too little. By being judged as women rather than colleagues, women are often treated dismissively and disrespectfully.

Women are under-represented amongst the membership and leadership of the professional body for ICT in New Zealand, the NZCS, as they have been since its inception. Few women appear to be interested in joining the society or participating in its certification programme. NZCS events aimed to attract new young members give unwelcoming messages to women. Most women prefer to join professional organisations directly related to their occupation and/or more informal women's support networks rather than the NZCS. Few women have contributed to the development of the NZCS Code of Professional Conduct. By failing to encourage more women into ICT work and by continuing to discourage women from joining its organisation, the NZCS is undermining its own stated aim of trying to increase participation in New Zealand's computing industry and is also contravening its own *Code of Professional Conduct*.

Women working in the ICT industry in New Zealand have developed a range of strategies to cope with their outsider-within location. Some actively deny their subordination thereby supporting the male hegemony, others opt to wholeheartedly join the club, and some more passively accept the subordination. Most women join the club as 'persisters' and implement a range of strategies of survival and/or adaptation in order to cope with their marginalised situation. A much smaller number of women show some resistance and opposition to their outsider-within position.

Men and women both use gender dualisms to represent their work. Although some women do not fit the feminine dualistic norm, they explain this in terms of being different to other women, and in so doing fail to challenge the dualisms. Women who differ from the socially accepted notion of femininity are regarded negatively by their male colleagues.

Within the ranks of women in ICT there are divergent views about the purpose of support networks. Some women value female-only support networks because they provide a safe haven for women to share ideas, ask questions in a non-threatening environment, and provide opportunities for sisterhood. These groups are affirming of women as women, and support women away from the gaze of men. In comparison, WIT was focussed on supporting women to

enable them to better compete with men by becoming more like men, and in doing so actively excluded some women. Support networks have the potential to be an important factor in helping women deal with working in a male dominated industry, but currently no support networks are actively challenging the male domination of the industry.

Chapter 7 – Conclusions

"Many occupations engage in heroic struggles for professional identification; few make the grade"
(Wilensky 1964, 137)

7.1 Introduction

This research had two main purposes:

1. To enquire into the ICT professionalisation project in New Zealand, and
2. To determine where and how women are positioned in the ICT professionalisation project

My conclusions are based on primary data mainly collected from 44 individuals, most of whom work or have worked in the New Zealand computing industry, and a range of secondary sources such as *New Zealand Computer Society* newsletters and reports, oral history recordings from the Alexander Turnbull Library, and computing magazines. My findings were presented in Chapters 2 to 6, and a short summary was included at the end of each chapter. This chapter presents my overall conclusions.

7.2 The ICT Professionalisation Project

Soon after its inception in 1960, the *New Zealand Computer Society* (NZCS) embarked upon a project to professionalise New Zealand's ICT industry. The conclusion of this research is that, despite the best efforts of the society, a formalised ICT profession remains a distant prospect.

In this thesis I have charted the progress of the professionalisation project since 1960. Using the engineering profession as a model, the NZCS has taken a number of key steps toward establishing the structures of professionalism, the first being the introduction of a code of ethics in 1978. During the 1980s and 1990s little progress was made, but since the 2000s an increasingly refined vision of professionalism has been articulated by the NZCS leadership, and further key steps have been taken. These include the introduction of professional certification and the (imminent) implementation of accreditation of computing degrees. Throughout these endeavours, the NZCS has successfully maintained links with strategically important international organisations such as the *International Federation for Information Processing* (IFIP), and more established professional bodies in larger countries, for example the *British Computer Society* (BCS).

The professionalisation project has been justified by various claims founded on two arguments.

The first argument, ostensibly altruistic, is that an ICT profession will provide trustworthiness, which by implication is essential for society. The second argument, more overtly self-interested, is that an ICT profession will enhance the prestige of computing work, thereby reducing the current skills shortage affecting the industry. These arguments provide the basis for a range of dual closure activities.

I accepted the argument that trustworthiness in ICT work is essential, and demonstrated that trustworthiness in terms of competence and ethicality amongst ICT practitioners is sometimes lacking. This appears to support the claim for an ICT profession, however I argued that externally imposed professional structures will not ensure ethical behaviour or competent practice. Codes of ethics have long been recognised as ineffective in ensuring ethical behaviour, and are now regarded by many sociologists as a means of justifying professional privilege rather than expressions of genuine moral commitment. Several of my findings point to the NZCS *Code of Professional Conduct* being similarly ineffective. Very few practitioners, even those who are members of NZCS, were aware of the code. Further, the code's sanctions have never been implemented. The circumstances of ICT work often work diminish ethical responsibility and individual accountability, most noticeably specialisation, bureaucratic norms, and project team work. In addition, some ICT workers, particularly those who regard computer technologies as ends in themselves, lack ethical awareness. Examples from New Zealand's health and building sectors illustrate the ineffectiveness of regulation in ensuring competence. Regulation will similarly fail in the ICT industry, and challenges associated with the complexity of computer systems, inadequate project management methodologies, and a lack of accountability within large project teams mean that computer system failures and breakdowns will continue to occur.

I also accepted the argument that there is currently a skills shortage impacting negatively on the industry, and that a lack of public understanding of computing work is likely linked to this shortage.[134] Although public understanding and perception of ICT work have not been formally studied, careers in computing do appear to suffer from a lack of profile and consequently status. This is a curious situation. Computing workers constitute a privileged class - the high level of skills, qualifications, and incomes of the workers indicate this - but privileged class has not led to privileged status as might be expected. In fact it appears that because computers are now

[134] Interestingly, if in the future there is no longer a skills shortage, this argument in support of a profession would be invalidated, and would perhaps be replaced by a further reverse argument that given a skills excess, an ICT profession is necessary in order for individuals to demonstrate their credentials in a competitive market.

commonplace, ICT work may currently benefit from less status than previously. Despite these observations, I do not accept the claim that increased prestige will boost the number of people joining the industry. The dual closure programme currently being undertaken by the NZCS to boost prestige is likely to lead to a reduction in the number of ICT practitioners, rather than an increase as claimed. At the very least it will lead to a fewer number of practitioners having access to lucrative contracts. Interestingly, as Larson (1977, 236) has commented, the drive for greater status could work against the unity professionalisation requires.

The success of the professionalisation project ultimately depends upon professional claims being widely accepted as legitimate. This presents a further set of barriers for the NZCS. Firstly, the society's leadership, although zealously dedicated to professionalisation (Bourdieu's habitus comes to mind), appears to lack the necessary charismatic authority to establish legitimacy amongst parties who might otherwise support the concept. Secondly, despite computing work seeming to invoke considerable cultural authority, successful legitimation will not easily be established in any of the stakeholder arenas. There is a lack of solidarity within the NZCS, whose members most often join the organisation for networking purposes rather than for professionalisation ambitions. In addition, there are at least 90 other ICT associations in New Zealand, many of which have highly engaged memberships. The majority of ICT workers I interviewed preferred to belong to one of these other associations, and many were unaware of the NZCS and the professionalisation project. While the state has been supportive of professional certification, successive Ministers of Communications and Information Technology were unwilling to support the notion of a legally mandated ICT profession. Key government officials were also guarded in their support for the NZCS and professionalisation, as were a number of senior industry representatives. Ultimately the professional claims can only succeed if they are considered legitimate in the public arena. The indications of poor public understanding of ICT work, my preliminary finding of conflicting perceptions of ICT work as either overly complex or overly simple, and the fact that the public is unlikely to feel personally affected by ICT work, all suggest that public legitimation of an ICT profession will not be easily secured.

Professionalisation typically involves a professional body seeking to seize control of the work. Controlling computing work will not be easy. A body of knowledge is proving difficult to identify due to rapid changes in technology and the large number of computing disciplines. Commodification of computing knowledge and a loss of mystery surrounding computing work also impact on efforts to control a body of knowledge. Education for computing work is even

more difficult to control. Many computing workers have qualifications, but these are often not computing qualifications, and at least 25% have no tertiary qualifications at all. Amateurism has been an enduring feature of the ICT industry, and continues to prosper in niche areas of the industry in a manner which is not easily quantified or controlled. Computing education, when it does occur, takes place in many different types of institutions, and curricula are not controlled by any professional body. The accreditation of computing degrees currently being introduced is optional and therefore does not constitute control. The highly specialised nature of computing work also undermines the possibility of control. Distinctly different cultures amongst specialist groups and a preference for practitioners to mix with like-minded individuals mean that control by way of a federated profession is unlikely. The majority of computing practitioners work as employees, often under bureaucratic conditions, and this further reduces the opportunity for professional control of computing work. Increasing globalisation of ICT work presents a final barrier to control given that professional norms, even if established in this country, could not be enforced elsewhere.

Arguably the greatest barrier to an ICT profession is simply the extreme heterogeneity of the industry. In Chapter 2 I described an industry involving differently oriented groups of individuals working in a vast range of different computing occupations in a variety of work settings, and an apparently significant but as yet unmeasured number of non-standard ICT entities. Assembling these diverse groups into a formal professional structure is the logistical equivalent of herding cats. For some individuals within the medley of ICT occupations, the very notion of a regulated profession is an affront to their vision of computing as a creative activity which has no bounds. For these individuals, an ICT profession makes no sense at all.

Thus the long-held vision of an ICT profession, tenaciously fostered over many decades, remains unfinished business. Adopting Roth's (1974, 16) idea of a "scorecard" of professional traits, we would have to conclude that the NZCS has so far accumulated a fairly low score. But this is not surprising; Abbott (1998, 431) pointed out that contrary to the common assumption, professionalisation is not "as inevitable as an escalator". In all likelihood, the NZCS is not surprised by the slow progress. In his oral history interview, early NZCS member William Williams (1985) observed that society was always mindful of the fact that professional status would be difficult to achieve: "We were very aware that engineers took something like 90 years before they were accepted as a professional group". Noting that after 25 years a profession had still not been achieved, he further commented: "NZCS has achieved almost everything except perhaps complete recognition as a professional society, but then it was always a very long-term

aim" (Williams 1985).

7.3 The Position of Women in the Professionalisation Project

If the NZCS really is committed to addressing the shortage of ICT workers in New Zealand and to upholding its *Code of Professional Conduct*, then we would see proactive efforts to attract more women into the industry. Instead, little is being done to address the low numbers of women participating in ICT work or to address the marginalisation these women experience. Consistent with these observations, women are largely absent from the professionalisation project.

Women working in computing in New Zealand experience significant discrimination, comparable to that of other Western countries. Many women chose not to enter the industry at all, while those that do experience their work as outsiders-within (Collins 2009) in a predominantly male domain. Women's location as outsiders-within dates back to the earliest period of computing, when their contributions went unrecognised and often 'disappeared' (Light 1999). In New Zealand, the fledgling computer industry was very small in the 1960s and few women were involved. Data documenting women's experiences during this period is consequently sparse, but oral history recordings provide some evidence of women's subordination as participants in the industry and as wives supporting male participants.

In contemporary ICT work in New Zealand, women's outsider-within location is demonstrated by gendered employment patterns which place women in lower paid and lower status occupations within the industry. A horizontal segregation results in women working predominantly in 'softer' computing roles which are accorded less status than the more technical roles, while a vertical segregation results in women experiencing pay discrimination and a career-restricting glass ceiling. A gender-typing of roles perpetuates this marginalisation. Women's outsider-within location is further demonstrated by their infrequent recognition at industry awards ceremonies. Women who try to break through the discriminatory barriers must accept being measured according to men's expectations, or more frequently being overlooked altogether. They need to out-perform men in order to be recognised as merely adequate, and must be prepared to manage long working hours.

Women's position in the ICT professionalisation project matches their outsiders-within location in the industry. The gendered nature of professions generally has been established by scholars such as Davies (1996) and Witz (1992), and findings from this research indicate that the

emerging ICT profession follows a similar pattern. Women reported a no-win situation in which they are either resented by men for being too knowledgeable or dismissed by men for being too technically inept. A similar situation, in which women are regarded as either technically competent but boring, or suitably feminine but emotional, requires women to suppress their femininity and reveal their competence cautiously.

Without having policies which explicitly treat men and women differently, the professional body, the NZCS, is also significantly gendered. Since its inception in 1960 the NZCS has not attracted representative numbers of women members, nor has it actively sought to increase female membership. Currently women constitute 13% of the NZCS membership, a considerably lower figure than the actual proportion of women in professional roles in the industry (28%). Women who do join the society participate as outsiders-within. They are unlikely to be selected for a leadership role - only one of 28 NZCS presidents has been female, and none of the present branch chairpersons are women. This means women have little opportunity to influence the policy decisions of the society or to contribute to strategically significant documents such as the code of professional conduct. Women are unlikely to join the ranks of the 'Honorary Fellows', and they are less likely than their male counterparts to apply for professional certification. The insignificant role women have within the NZCS, and the larger number of women who do not belong to the NZCS, all point to women being essentially excluded from the professionalisation project. The exclusion of women, whether consciously or unconsciously instigated, would appear to be a propitious move on the part of NZCS, since, occupational groups dominated by women are unlikely to achieve professional status (Davies 1996; Witz 1992; Etzioni 1969).

7.3.1 Coping with Outsider-Within Location

I have identified a number of coping mechanisms employed by women to cope with their outsider-within location in New Zealand's ICT industry.

Some women actively deny the gender inequities by arguing that New Zealand's ICT industry is more equitable than elsewhere, despite expressing a number of contrary observations. Some other women passively deny their marginalisation by noticing different treatment for women but not attributing this to gender. The assertiveness of the former group serves to perpetuate discrimination, while the naivety of the latter group, likely explained by the women's experience of discrimination as 'normal', fails to address the issue. Both groups of women require considerable personal resources in order to survive and adapt to the male dominated workplace.

For some women, 'toughing it out' works best; simply accepting any unpleasantness from men. Others react by suppressing their femininity in order to disassociate themselves from any gender-related disadvantages. In contrast, some women choose to become more assertive in order to complete with men more successfully. An alternative approach taken by some women is to exploit their minority status by eliciting as much leverage as possible from being female.

A disappointingly small number of women in New Zealand actually resist their outsider-within location or seek to bring about change. A few women take a personal stance against male subordination and refuse to conform to stereotypical expectations. A small number of dedicated women work hard to maintain various grass roots initiatives and support networks established to support women in the industry or to encourage girls to pursue computing careers. One organisation, the now defunct *Women in Technology* (WIT), gained considerable momentum and profile with some female ICT workers during the 2000s. This organisation endeavoured to mentor and support women working in the computing industry by adopting many of the practices of the NZCS. This constituted a female professional project (Witz 1990), and resulted in claims from other female sections of the industry that the organisation was endorsing the male hegemony and effectively expecting women to become more like men.

As expected, gender dualisms featured prominently in the discourse as women (and men) discussed their work. The dualisms may provide some women with a satisfactory explanation of their outsider-within position (von Hellens, Nielsen, and Beekhuyzen 2004). A few women claimed to not conform to the gender dualisms because they are 'different' from other women. By distancing themselves from other women, these women were both confirming the dualisms and demonstrating a lack of empathy for their female colleagues. This conclusion differs from von Hellens, Nielsen, and Beekhuyzen's (2004) conclusion that such women are challenging the dualisms.

Finally, some women reported choosing to avoid male domination as much as possible by working for a female-only organisation. This remains an area for future research.

7.4 Further Research Opportunities

This research has identified a number of areas for further research in New Zealand. Public understandings and perceptions of ICT work are poorly understood at present and greater understanding of this would allow industry groups and educational institutions to plan more effectively for a more successful sector. In addition, the ICT industry itself needs to be

quantified more effectively that it is at the moment. A study into the areas of activity I have referred to as 'non-standard' would be a useful start.

The experiences of other minority groups in the industry, for example Māori and Pasifika people, who appear to be even more marginalised than women, have not been documented. Research is required to identify and overcome barriers which may be preventing people from these groups from taking up ICT careers.

There is also scope for further research into gender issues. Examples include research into the experiences of women who have worked in female-only organisations in the ICT industry, which may help clarify work conditions conducive to women's success in ICT, and my own previously signalled interest in exploring any gender differences in ethical reasoning in relation to ICT work. Matters of pay discrimination also need more comprehensive scrutiny.

7.5 Why the Lack of Women in ICT is Important

Throughout this thesis I have implied that the under-representation and marginalisation of women in computing is a significant matter, without justifying this claim. I do so here.

Firstly, consigning women to lower status, lower paid roles can only be regarded as unethical, as has been pointed out by Panteli et al. (1999). This issue relates to equity of opportunity for women to participate in careers which are both intrinsically and extrinsically rewarding.

Secondly, another matter of equity is that since women constitute half the population, women should be proportionately involved in the development of technologies in order to ensure women's interests are considered when new technologies are designed. Increased involvement of women would likely result in different types of technologies, as Adam (2005, 175) has surmised, and the male dominance of computing denies women the opportunity to influence technology decisions (Wilson 2003, 136). Justice requires that women are involved in 'shaping the world' (Margolis and Fisher 2002, 3; Wajcman 2007, 295).

Thirdly, in a world where computer technologies are increasingly important, the involvement of women in the ICT industry makes pragmatic sense. More women taking up computing careers would help reduce the skills shortage and help boost the productivity of the sector, thus benefiting New Zealand's economy; a point similarly noted by Crump (2008, 14).

Fourthly, I have noted in this thesis that ICT teamwork is often inefficient, with poor

communication within teams contributing to unsatisfactory outcomes. Teamwork would be enhanced by greater diversity amongst project teams, and the involvement of more women would assist with this by introducing a range of different perspectives and skills. As Scott Page (2007, 319-323) has shown, better outcomes are produced by diverse groups than by homogeneous groups for tasks which involve problem solving, creativity, and innovation – all features which are characteristic of computing project work.

Finally, it is unacceptable for an organisation claiming to be the professional body for ICT workers to remain unconcerned about gender inequalities and gender stereotypes – failure to take a stand against these issues equates to endorsing them.

7.5.1 Whose Responsibility is it to Address Gender Issues?

If more women are to join the industry and become legitimate 'insiders' in both the workplace and the ICT professional project, then all stakeholders will need to be involved in bringing about this change, as previously argued by Trauth (2002, 115) and Panteli et al. (1999, 180).

Men, who I found to typically attribute women's underrepresentation to a deficiency in women, will need to consider their own role in perpetuating disparity. This requires effort and being prepared to give up power, admittedly an unappealing prospect: "Silence is perfect for the dominant culture and its members" (Bjorkman et al. cited in Wilson 2003, 138).

Women cannot remain passive victims; they need to be more cognisant of their 'outsider-within' location and demand change. While this can and should happen at an individual level, supportive group action would be more effective. Strong female leadership and a new women's organisation inclusive of all women in ICT is needed.

The NZCS needs to take responsibility for its own contribution in gendering ICT, and take positive steps towards promoting change. Other institutions, for example tertiary educational institutes, schools, government bodies, and other computing groups, can also make positive contributions.

Finally, the ICT industry has a responsibility to draw attention to unacceptable practices and to encourage women into computing careers – and to ensure women advance in those careers equitably. Employers and industry groups need to lead this change.

More women are needed across all roles and particularly in higher level roles. My hope is that this would lead to more satisfying careers for both genders as well as increased productivity,

rather than, as Oppenheimer (1973, 216) has proposed, more problems for men. Von Hellens, Nielsen, and Beekhuyzen (2004, 113) proposed that simply doing research can help bring about change. This is an optimistic view, but I hope a correct one.

Appendix A – Reflections on the Research Process

"The interpretive bricoleur produces a bricolage – that is, a pieced-together set of representations that is fitted to the specifics of a complex situation" (Denzin and Lincoln 2005, 4)

A.1 Introduction

Reflexivity is a necessary component of any qualitative research project (Liamputtong and Ezzy 2005, 43), and particularly so for research involving unstructured interviews (Fontana and Frey 2005, 713). Reflexivity prompts the researcher to reflect on their involvement in the research process and how this influences their interpretations of the phenomena studied. In feminist research terminology this 'gazing back' is vital when the researcher is an active participant in the research (Olesen 2005, 251). Reflexivity not only helps legitimate research findings, it also promotes better understanding of oneself (Fontana and Frey 2005, 697).

A.2 Research Methods

When I began this research I regarded the ICT industry as a jigsaw puzzle; one which would reveal a coherent picture once all the pieces were assembled. And so, without then understanding the term, I became a "bricoleur" (Denzin and Lincoln 2005, 4). As for most bricoleurs, completing my jigsaw involved several methods (Denzin and Lincoln 2005, 25). My primary research method was a multi-sited ethnography (Marcus 1995) which allowed me to investigate the working-worlds of a range of ICT practitioners across the broad and varied landscape of computing enterprise in New Zealand. By "following the people" (Marcus 1995, 106), I was able to map the work-related aspirations, experiences, practices, and beliefs of these individuals. I was then able to juxtapose these findings with the current ICT professionalisation project, my actual object of study. Multi-sited ethnography also allowed me to locate myself in the research, since this is an accepted feature of the method (Marcus 1995, 112). It is a feature which typically introduces political and ethical complexities into the research and can lead to the researcher being placed in an activist role (Marcus 1995, 113). These factors are consistent with feminist notions which also underpinned my research. My other methods included autobiographical storytelling and analysis of archival materials such as oral history recordings, minutes of meetings, Internet blogs, newsletters, and reports. I felt an affinity for qualitative methods, for their potential to enable me to make "visible" (Denzin and Lincoln 2005, 3) the world of ICT work in New Zealand. I was aware that qualitative research allows for insider viewpoints and the meanings they generate in the course of social action, and so I also

welcomed being permitted to include myself in the jigsaw; indeed not to do so would have been dishonest. After all, as many scholars have noted, any researcher's gaze is filtered by many lenses (Denzin and Lincoln 2005, 21).

A.2.1 Autobiography

I decided to begin this thesis with a short autobiographical preface. Stacy Holman Jones (2005, 765) has noted the potential of personal narratives to set the scene, tell a story, and "demand attention". They also provide the narrator with the opportunity to explore and ask questions about issues she feels strongly about (Holman Jones 2005, 784). My autobiographical preface was a vehicle for acknowledging my historical and current association with the ICT industry, and my active role in the research. The narrative provided a justification for my research and inextricably linked me to the process:

> There is something curious about autobiography. It is an account given by a narrator in the here and now about a protagonist bearing his [sic] name who existed in the there and then, the story terminating in the present when the protagonist fuses with the narrator. (Bruner 1990, 121)

Prior to starting the research I had read Adam's (2005, 2) recollection of entering the data processing industry as a young graduate in the 1970s, an experience she believes triggered her political awareness. Although I began my computing career in the same decade, my political consciousness was much slower to emerge, and it was not until recently that I began to critically examine the nature of ICT work, what it means to be a woman doing that work, and whether an ICT profession was desirable. I wanted to be "purposeful, bold, contentious" as Sidonie Smith (1993, 157) recommended autobiographical narratives should be. Certainly the autobiography and subsequent research have allowed me to strengthen my awareness of myself and my understanding of significant issues in the ICT industry.

My autobiographical narrative was one of several stories included in this thesis; further comments on storytelling are included below.

A.2.2 Multi-sited Ethnographic Interviews

At the start of the research it was difficult to assess how many interviews I would need to conduct, given the ambiguity of the term 'ICT industry'. Pranee Liamputtong and Douglas Ezzy (2005, 44-45) note that sampling in qualitative research is purposive, and aims to "identify the cases that will provide a full and sophisticated understanding of all aspects of the phenomenon". For my research this meant trying to identify a range of participants who would represent the vastly heterogeneous ICT industry and who are potential stakeholders in the

professionalisation project. This was a daunting prospect given the constraints of my research project, and although I cannot claim to have captured every representative voice from the computing industry, I have attempted a wide coverage of roles, ages, genders, qualifications, levels of responsibility, and work settings. Altogether I conducted 39 face-to-face interviews (29 practitioners, 7 industry leaders, 1 prominent academic, 2 past Ministers of ICT), and a further 5 interviews by telephone (4 senior government employees, 1 IT recruitment specialist) – in total 17 women and 27 men.[135] In addition I emailed questions to 22 other people (2 extra practitioners, the present Minister of ICT, and 19 representatives of professional bodies). My sampling methods ranged from convenience sampling of personal contacts at the start, to snowball sampling as participants suggested other possible participants, to opportunistic sampling as I met people of interest during the course of my work (Liamputtong and Ezzy 2005, 48). Throughout I was mindful of achieving a purposeful sample, and so in the latter stages I targeted particular individuals to fill the gaps in my participant pool by 'cold-calling'. Only one person declined to be interviewed (without giving a reason). After 39 interviews, supplemented by further email and telephone interchanges, I felt that my data was sufficiently "rich enough" and gave sufficient coverage of my research topic to allow me to stop (Liamputtong and Ezzy 2005, 49).

Without exception my participants were accommodating, generous with their time and very willing to share their stories. Interviews lasted between 60 and 90 minutes, and took place in a variety of settings according to each participant's choice: a quiet office at their place of work, their home, a coffee bar, a small office at the university, my own workplace office, and on one noisy occasion a hotel foyer. I was usually offered a cup of tea or coffee on arrival and sometimes partners or children were dispatched to produce these. Without violating the principle of informed consent (Snook 1999, 74), I gave each of my interviewees a small gift before we parted in appreciation of their contribution, and they were typically delighted with this gesture. Most participants spontaneously offered to be contacted again if necessary.

My interviews were initially semi-structured, and mindful of Anne Opie's (1999, 223) caution that "guides create their own imperatives", I had prepared an interview guide or set of

[135] This meant there were 44 individuals, most of whom I had promised confidentiality. However, I was mindful of the possibility that in a small country like New Zealand some participants might be recognisable to others in the industry – an issue of "internal confidentiality" highlighted by Martin Tolich (2004, 105). I therefore used an additional 6 pseudonyms so as to provide further confidentiality to my participants (50 names for 44 actual people). A similar approach was used by Trlin and Tolich (1995) (Martin Tolich, personal communication December 13, 2010).

"prompts" (Bruner 1990, 125) consisting of a list of topics and only five set questions.[136] As my confidence grew, the interviews became increasingly unstructured until they more resembled my desired "open ended, in-depth (ethnographic) interview" (Fontana and Frey 2005, 705). In some cases, and I could never predict when this would happen, interviews developed into a form of storytelling (Bruner 1990, 115; Chase 2005, 661). My interviews thus resembled very closely Andrea Fontana and James Frey's (2005, 696) notion of a "collaborative effort" in which both parties interacted actively and, I felt, equally. While trying to be careful not to lead my participants in any particular direction, I was also aware that interviewers can never be "neutral" (Bruner 1990, 124; Fontana and Frey 2005, 695). To present myself as having no views, no past, and no experience of the issues my interviewees raised, and to react impassively to the discourse, would have been a disrespectful façade and unethical.

"Empathetic" interviewing is often undertaken in order to benefit the group being studied (Fontana and Frey 2005, 697), but my research had this aim only in respect of the gender issues raised. As I have argued in this thesis, women are marginalised in the ICT industry and are excluded from the professionalisation project. In response I have applied a (mainly) empathetic lens to the gathering and reporting of data pertaining to women's involvement in the emerging ICT profession. Men did not require, nor did they seek, such empathy.

Although interviewers can sometimes experience difficulties understanding the language and/or culture of their interviewees (Fontana and Frey 2005, 707), being an insider to the world of ICT I did not face this problem and was able to establish rapport with my participants easily and quickly. My "presentational self" (Fontana and Frey 2005, 707), comprising firstly a middle-class middle-aged woman, and secondly a mix of successful academic and collaborator in ICT work, presented no barriers to successful dialogue, except with Marion. Marion was my only interviewee in a clerical rather than a 'professional' role; she had little formal education and had experienced many challenges in her working and personal life. Marion indicated she enjoyed little financial security, and was also my only Māori participant. I had detected none of these factors before meeting Marion in her modest home, and quickly needed to adapt my presentational self to emphasise our commonalities as women and mothers. My interest in her stories of things Māori, her artworks for example, and her children, helped us develop rapport but nevertheless I was not confident I fully understood Marion's narrative.

[136] These were: *Please tell me how you came to be working in ICT? What is the most enjoyable aspect of your work? What is the most challenging aspect of your work? Does computing ever put society at risk? Is it easier being a man or a woman in ICT?*

All my interviews were audio-taped and following Ann Oakley's (1981, 47) advice, I reassured my participants that no-one else would listen to the tapes. I also wrote additional field notes during the interviews and immediately afterwards. My decision to interview and then transcribe before conducting the next interview, and to complete these tasks myself, gave me the advantages of early engagement with the data and the time to reflect on each interview and so better plan for the next one (Opie 1999, 225).

A.2.2.1 Coding and Analysis of Interview Data

Qualitative researchers risk "drowning" in their data and consequently proper data management is essential for reliable data analysis (Opie 1999, 225). Computer software assists greatly with data management (Liamputtong and Ezzy 2005, 274), but I chose not to use any specialised qualitative research software package (or pre-determined formal coding process) for data analysis as I felt these would be too mechanical and potentially limiting (Opie 1999, 228; Alice 1999, 62). Rather I entered my interview transcriptions into a Microsoft Excel workbook (one worksheet for each participant, with each coherent portion of interviewer and participant dialogue entered into separate and adjacent cells).[137] This gave me the ability to search for particular phrases in the data and also provided a convenient space for my own field notes and comments to be entered directly alongside the relevant data – without any restrictions imposed by a software package.

I immersed myself in reading the transcripts, recalling the conversations and the faces, searching for nuances and contradictions (Opie 1999, 228), making notes and eventually identifying themes. This was a challenging task as I sought to find a balance between "calculation" and "chaos" (Liamputtong and Ezzy 2005, 258). Themes were worked and then re-worked many times as I learned to "see" which data were valuable (Opie 1999, 228) and strived to avoid duplication (for example "reward", "satisfaction", "payback"). From a starting point of two broad themes, "profession" and "gender", I developed other themes relevant to my research questions as they appeared in the data, and each theme had several sub-themes.[138] I was also careful to select themes which aligned with literature on professions, professionalisation, and gender. Themes were added to the Excel workbook, alongside the relevant data items, to allow for easy searching.

[137] By the end of my research the Excel workbook was 1.56MB in size and contained 39 worksheets, with most worksheets containing between 70 and 140 rows and 8-10 columns of data.

[138] For example, I found that the theme "profession" required the following sub-themes: accountability, public good, hierarchy, regulation, reputation, trust, standards, status, public understanding, networking, qualifications, personal experience, history, definition, corporate. Another theme, "ethics", involved the following sub-themes: ethical commitment, cowboys, customer expectations, failures, risk, methodology, prevention.

Data collection and analysis occurred over a lengthy timeframe (2007 to 2010) and throughout this period I wrote copiously around the themes emerging in the data and in the literature. Gradually the shape of the thesis became clear; the two purposes of my research would require two chapters each, and a preliminary chapter would be required to describe the ICT industry and ICT work in New Zealand to readers unfamiliar with the field. Determining which interview extracts to include and which to exclude was difficult (in Section A.3.2 I point out that this is actually an ethical matter). Whilst acknowledging the personal lens overarching my research, I tried to report data honestly by selecting extracts which would be most interesting for the reader as well as most demonstrative of the point. For example, I decided to report Linda's narrative regarding unsupportive work environments at length in Section 5.5.2.2 because her distress was so apparent, but I also acknowledged the accounts of women who did experience supportive work environments.

A.2.3 Storytelling

My thesis includes a number of stories (and could itself be considered a story). Storytelling is often used by post-structuralist feminist researchers to explore individual identity (Alice 1999, 66) and to contest the "ancien régime"[139] (Smith 1993, 157), and these were purposes of the autobiographical preface explained above. Stories are usually constructed around a plot or a theme which has some moral or other relevance (Bertaux and Kohli cited in Liamputtong and Ezzy 2005, 129). My stories focus on gendered practices in the ICT industry and events relating to the professionalisation project. Adopting a tradition of feminist research, I also wrote myself into the stories. This seems apt as I am part of them.

Telling a story always has moral, ethical, and political implications (Liamputtong and Ezzy 2005, 132; Bruner 1990, 51). Many decisions are made when crafting the story, none of them neutral, and this raises concerns about a lack of objectivity and generalisability (Chase 2005, 657). However these epistemological attributes are not a goal of storytelling (Chase 2005, 661); rather the aim is to achieve 'truthfulness' through plausibility, or "lifelikeness" (Bruner 1990, 61).

One of my moral obligations in storytelling, particularly since I included myself in the stories, is to reflect on my insider status. I describe myself as an insider with reservations. Although I have been associated with the ICT industry for over 30 years, for much of that time I have felt myself to be on the periphery of events. This is partly due to my minority status as a female in a

[139] Smith uses this term to refer to entrenched and continuing male hegemony, rather than to identify any particular political revolution.

male dominated industry, but there are other reasons for my quasi-insider status. It is a long time since I was actually working in ICT, and my present role teaching computing students about the professional and ethical issues they may face as practitioners distances me even further from the 'nuts and bolts' of practice. I am also a marginal insider in my relationship with the NZCS. I first attended NZCS meetings in the 1980s, and for some years I have been a 'corporate staff member' through the institutional membership of my employer. I have never independently joined the organisation; nor have I attended meetings regularly. For these reasons I do not consider myself a complete insider of the ICT industry or the NZCS, but neither could I be considered an outsider. This rather elusive insider position gave me dual advantages of adequate domain knowledge and sufficient understanding of the nature of ICT work to interpret the events I observed and related in my stories, and sufficient distance to avoid insider bias.

A.2.4 Oral History Recordings

Fontana and Frey (2005, 709) describe oral history records as being "like silent memoirs waiting for someone to rummage through them and bring their testimony to life". This delightful image portrays precisely my feelings as I arrived at the Alexander Turnbull Library, eager to listen to the New Zealand Computer Society Silver Jubilee Oral History collection of oral history tapes. This collection, commissioned to commemorate the 25th anniversary of the NZCS, consists of over 40 tapes which record the recollections of 12 people involved with the founding of computing in New Zealand (Else 1985, 163). I was eager to delve into these tapes and learn about these people and their work in the 1960s. I wanted to know how and where women were positioned in early computer work and whether the genesis of an ICT profession could be detected this long ago.

I listened to 10 of these recordings over a two day period, and took note of matters pertaining to my research questions. An 11th tape recorded a Special Meeting of the NZCS in 1978. I felt privileged listening to these tapes; although focussed on computing work some of the narratives contained personal matters that I was surprised had been revealed.[140] I also felt transported back to an era now gone but still present in the remote edges of my childhood memories - the formality of the Queen's English, and women as homebodies, wives, mothers, and unquestioning supporters of husbands, for example. These oral histories provided a rich portrait of early computing work in New Zealand and generated far more data than I was able to incorporate into this thesis. The book *Looking back to tomorrow: Reflections on twenty-five years of computers in New Zealand*, published by the NZCS to commemorate the organisation's

[140] The Alexander Turnbull Library has strict procedures protecting the rights of interviewees and owners of the oral history collection.

Silver Jubilee in 1985, supplemented the data obtained from the Oral History tapes. Identification details of the tapes are listed in Table 7.

Table 7: NZOHA NZ Computer Society Silver Jubilee Oral History Project OHColl-0093

Record	Interviewee
OHInt-0093/01	Lorin Peko
OHInt-0093/02	William Williams
OHInt-0093/03	Norma Moffett
OHInt-0093/04	Professor Gordon Oed
OHInt-0093/05	Graeme Barnard
OHInt-0093/06	Dr George Battersby
OHInt-0093/07	Percy Harpham
OHInt-0093/09	Arthur Henley
OHInt-0093/11	John Robinson
OHInt-0093/12	Tolmie Scoular
OHInt-0093/15	NZ Computer Society Special Meeting, 18 August 1978

A.2.5 Other Archival Sources

My research also involved textual analysis of a wide range of other NZCS archival documents, including conference papers, reports, discussion documents, CEO blogs, NZCS 'news' (posted online), professional documents such as the *Code of Professional Conduct*, a membership survey, and President's presentations.

I also supplemented my qualitative data with statistical records from organisations such as Statistics New Zealand, Department of Labour, Ministry of Economic Development, Ministry of Education, New Zealand Qualifications Authority, Australian Bureau of Statistics, the OECD, the Department of Computer Science at the University of Auckland (Annual Reports), and the NZ Vocational Training Council.

A.3 Other Reflections

A.3.1 Feminist Research

While most feminist research involves qualitative methods, it is values rather than any particular method(s) which differentiates feminist research (Alice 1999, 63). A pivotal value is that research should be 'by women, for women' (Olesen 2005, 236). Further, research should provide women with a 'voice' to express their stories as they see fit and in the absence of hierarchical separation between the researcher and the subject (Alice 1999, 64-65). Masculine

models privileging values such as objectivity, detachment, and hierarchy in research are specifically and emphatically rejected in favour of values such as personal involvement, intimacy, reciprocity, mutual trust and sharing (Oakley 1981, 38-49). Feminist research draws attention to gendered institutions and the power relations inherent in these (Olesen 2005, 236). Often feminist research seeks to highlight the powerlessness of women in oppressed circumstances, but it also acknowledges that not all women are marginalised to the same extent or in the same way (Alice 1999, 67).

My research incorporated some of these elements. Although all of the women I interviewed (apart from Marion) are prosperous and have enjoyed rewarding careers in ICT, I have argued that they are all marginalised to some extent in their work and in the professionalisation project. More importantly, there are thousands of women *not* working in the industry who potentially could be, and it was these women I was particularly concerned with. My motivations are best reflected in the words of Lynne Alice (1999, 62):

> Feminist research is often defined as a self-consciously political practice aiming to changes women's lives by producing knowledge about social circumstances that will make a difference to how individuals and groups are organised.

A.3.2 Ethical Considerations

My research was undertaken with due consideration of standard ethical principles of individual rights, informed consent, privacy, confidentiality, and avoiding harm (Fontana and Frey 2005, 715; Snook 1999, 73-78). However as I discovered, not all ethical issues can be anticipated and incorporated into an ethics consent form, and as the research proceeded I sometimes needed to rely on my "integrity and positioning" (Opie 1999, 224). Three specific ethical difficulties prompted this uncertainty. Firstly, I was partly involved with the NZCS through my employer's corporate membership of that organisation, and secondly, I was at times writing critically of the organisation and its motivations and leadership. Thirdly, my job involved teaching students about professionalism and encouraging them to join the NZCS.

I dealt with the first issue by deciding not to personally join the organisation and by declining an opportunity to join the Auckland Branch committee, thus keeping as great a distance as possible between myself and the organisation I was critiquing. The second issue was troublesome until I came to accept that my conclusions were based on empirical findings, notwithstanding the lens through which my interpretations of the data were filtered. I minimised (or perhaps more truthfully avoided) the third difficulty by taking a positive stance with students concerning professionalism and professionalisation, and by promoting with them the NZCS and its

activities.

Another important ethical matter concerns the veracity of the qualitative researcher's story; its "truth likeness" (Bruner 1990, 61). Perceptions of researcher bias may damage veracity, but may also be alleviated by honest reflection of one's position and by thorough exploration of the data (Olesen 2005, 251). Throughout the research and the writing of this thesis I have tried to do this. I believe I have achieved "credibility and believability" (Chase 2005, 657).

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