The adoption of information and communication technologies by rural general practitioners:

A socio technical analysis

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Doctor of Philosophy Declaration

"I, Patricia Everitt-Deering, declare that the PhD thesis entitled "The adoption of information and communication technologies by Rural General Practitioners: A socio technical analysis", is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

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I would like to acknowledge my family who have encouraged me to continue and "become a doctor".

"From 1970 onwards, a protracted period of enormous change in general practice occurred, with gradual understanding of the huge task that general practice entails, and of the knowledge, skills and technology needed to accomplish it"

(Professor Max Kameir)

University of WA 2000

ABSTRACT

This thesis has been supported by an ARC Industry Linkage grant and sought to explain the process of adoption of information technologies by comparing two main theories that have been developed to explain adoption of innovations, that of innovation diffusion and that of actor network theory. In the process of analysis for this thesis I decided very early on that the better way of explaining the pattern of adoption was by using the framework of actor network theory supported by qualitative methodology. A major contribution of this thesis could be seen as an ANT analysis of IT/IM in general practice.

It appears that the multi partner, multi discipline research approach was a success for it created the opportunity to draw on diverse backgrounds. More importantly this research indicates that the qualitative research methodology of Actor Network Analysis has delivered an insight that is richer in data than the quantitative research that is usually undertaken in this field.

This process assisted with enlightening the barriers and enablers to the adoption of information technology/information management (IT/IM) in general practice in a particular study area and to explain why, in the study area the pattern is fragmented and unclear.

This study found it is important to note the difference between the adoption of IT/IM by general practice and adoption and use by general practitioners. The adoption process has been complex and many stakeholders have grappled with issues such as the cost of computerization, the rapid changes in technology, the lack of agreed standards and the problems of introducing technology information solutions in to the daily work place of general practice.

Through comparison via case studies, extended interviews and implementing several study phases to develop a longitudinal aspect for the research, the teasing out of such issues as decision making in general practice and general practice as small business was undertaken. Through review of models that seek to explain adoption I

will finalise by formalizing which theory of adoption better suits explanation of adoption of innovation within this study area.

This thesis reports that while there are generally pockets of high uptake and use of IT/IM, this is not the complete picture across the study area and this reflects the situation in Australia. There are differences in adoption from one practice to another and even within practices; there are differences in adoption in terms of acceptance of an idea versus doing; in the study area there is only one practice which can reasonably claim to be paperless.

Throughout this thesis a series of vignettes will be developed which set out to provide a whole play. Each vignette presents an aspect in the total picture of computerization. This thesis does not set out to provide the whole picture as that is still a work in progress, as such this thesis has no definite border, and the vignettes will sometimes show only the head and shoulders of the story with the background fading off. Other vignettes are very clear but as with all vignettes there are questions about the shaded areas. It is in these areas that questions arise to demonstrate there is greater depth in the story of the adoption of IT/IM in general practice in the study area, and, that adoption of IT/IM in general practice is complex and a continuing developmental story.

Prologue:
A quick view of history -Some stats, a story and a quote and a hope that these will ask you to be interested in this report.

This was the situation at the beginning of the research:

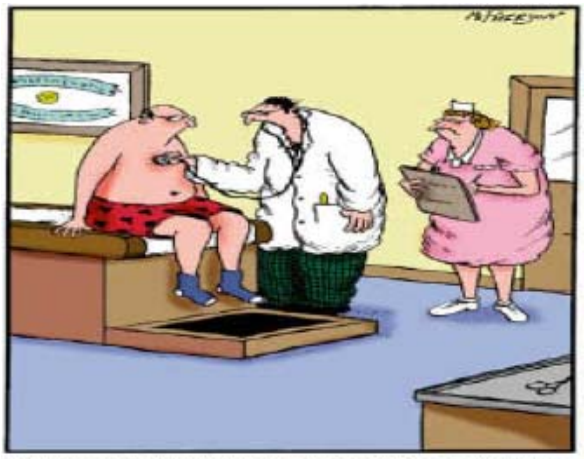
Approximate picture for many practices of computer use in the study area 2003 (adapted from CHDGP records 2003)

Non-Clinical Computer Use
•billing 85%
Issuing accounts/ receipts /bulk-billing
Medicare Online / electronic claims
Managing practice finances and budgets

•administration 47%
Word processing
Recording patient details
Appointments
Payroll
Stock control / Online ordering
Accreditation

•internet and e-mail 53%

Plate 1 Record keeping in the good ol' daze (MJA 2007 reproduced with permission)



Time passed and the situation changed:

Table 1 Self Reported Computer availability at major practice address (HIC 2004)

GP = general practitioner. * 1319 GPs from 1190 individual practices. Some practices had more than one GP participate during the study period.	Number of GPs reporting computer availability for specific functions	Proportion (of GPs in all practices [*n* = 1319])*	Proportion (of GPs in practices with computers [*n* = 1240])
No computer	79	6.0%	—
Computer available for:			
Billing	1050	79.6%	84.7%
Prescribing	1101	83.5%	88.8%
Medical records	934	70.8%	75.3%
Other administrative tasks	974	73.8%	78.5%
Internet/email	888	67.3%	71.6%

Table 2 Computer and software use by individual GPs at work* (Productivity com. 2004)

GP = general practitioner. * 1114 respondents provided data on individual computer use, clinical functions and name of software. † Excludes missing data from 79 GPs who did not provide responses on individual computer use. ‡ Excludes data from 79 GPs with no computer available and from 64 GPs who choose not to use available computers

	Number of GPs using computers and software for specific functions	Proportion (of all GPs with computers and software available [*n* = 1240])†	Proportion (of GPs who use computers and software [*n* = 1097])‡
Computer use			
Computer not used at all	64	5.2%	—
Computer used for:			
Test ordering	902	72.7%	82.2%
Prescribing	1039	83.8%	94.7%
Medical records	872	70.3%	79.5%
Internet	732	59.0%	66.7%
Email	652	52.6%	59.4%
Clinical software:			
Available and used	1040	83.9%	93.4%
Available but not used	74	6.0%	6.6%
Use of clinical functions			
Clinical functions not used at all	143	11.5%	—
All clinical functions	460	37.1%	41.9%
Test ordering + prescribing + medical records	200	16.1%	18.2%
Test ordering + prescribing + medical records + Internet	83	6.7%	7.6%
Test ordering + prescribing	57	4.6%	5.2%
Test ordering + prescribing + Internet + email	45	3.6%	4.1%
Prescribing + medical records + Internet + email	44	3.5%	4.0%
Prescribing only	42	3.4%	3.8%
Internet + email	26	2.1%	2.4%
Prescribing + medical records	20	1.6%	1.8%

WILL THIS BE THE FUTURE? (THE FOLLOWING FABLE HAS BEEN INCLUDED BECAUSE I WANT TO SHOW THE EXPECTATIONS THAT GPS HAD FOR IT/IM. IT HAS BEEN ADAPTED FROM AN ARTICLE BY Edi Albert. **MJA** 2002 177 (2): 119-120)

A FABLE - GETTING TO 2008 – IS THE PAST REALLY PAST, AND BY IMPLICATION WILL THIS BE THE FUTURE – SOME TELL US WE ARE THERE NOW. WHAT A LONG TRIP THIS HAS BEEN.

IT IS FEBRUARY 2005. A bus crawls down the hill into Teppi (a small fictional town on the west coast of Victoria) and grinds to a halt near the harbour. Frank stares out of the window. On one side, all he can see is the great Southern Ocean. On the other is a colourful row of shops, cafes and houses nestling under the steep hillside. As a final-year medical student, Frank is just starting his three-week rural general practice placement, at a rather unusual practice.

The old blue four-wheel-drive is waiting, just as Fiona, his preceptor, had told him it would be. Fiona is sitting on the tailgate tapping away on her laptop and intermittently sipping a cappuccino. After a friendly welcome, Arash is soon bouncing along the gravel road that leads out of town. He has never driven a "cruiser" before.

Meanwhile, Fiona is catching up on a few review consultations, juggling her laptop and mobile phone with admirable dexterity. "Here they are," she says, pointing at the screen, "Mrs Smith's TFT results. She'll need to up her thyroxine a bit, I reckon". Frank looks puzzled. "All our pathology results come direct to the Multipurpose Centre's secure server. I can access new results remotely and then transfer them to her records. They're also web-based." A quick phone call to Mrs Smith, and the plan is made. "See. I can do a script from my laptop that'll go direct to the pharmacy by email, and her medication will be dropped off by the postman first thing tomorrow. And here's the appointments page. I've got her booked in to recheck her TFTs."

Frank slows down as he pulls into a small settlement some 30 minutes' drive south of Teppi. Fiona is just finishing her sixth review over the phone. "It's

made a big difference now that rural doctors can claim through the MBS [Medical Benefits Schedule] for telephone consultations," she says. "Now, this is Spero Bay. Only 400 or so people live here permanently. It's mostly the copper mine and a bit of tourism that keeps this place alive. One of us comes down once a fortnight and we hold a surgery in the community hall."

Half an hour later and Frank is stuck. He has 40-year-old Bill Hodgson to see. Bill is worried about heart disease, because his workmate has just had a heart attack, and he thinks he should have his cholesterol checked and get some treatment. It is all very well knowing risk factors for heart disease, but Arash is struggling to answer some of Bill's questions. He turns to Fiona.

"Don't worry; you can't carry this stuff in your head. Now here's the practice home page," she says, turning the laptop's screen so that Bill can look as well. "Click on 'consultation tools' . . . there it is . . . 'New Zealand Risk Tables'.1" Frank is soon able to help Bill understand things more clearly. "So, your overall risk of having heart trouble in the next five years is between 2.5% and 5%. That's pretty low, isn't it? But if you could stop smoking then you'd halve your chances of getting heart disease." Guided by Fiona, Frank "clicks" a few more times and prints out some information for Bill from the Quit campaign2 and National Heart Foundation3 websites. Fiona suggests that Bill contact Aaron, the nurse practitioner, if he wants to give up smoking.

"Aaron's great", says Fiona as they drive back later that morning. "He does some sessions to relieve Linda, our regular community nurse, and also runs our respiratory and diabetes clinics. He's really good at the educational side of things. It makes a real difference to managing chronic disease. He works from sets of guidelines that we developed. In fact, our income through the Practice Incentive Program has meant we can pay for an endocrinologist and optometrist to visit annually."

Frank looks puzzled again. "But how can Aaron work in the surgery and in the community, and why would you use your own income to pay for visiting services?" Fiona smiles.

"We solved quite a few problems like that when we took the plunge 18 months ago. Our municipality became the first fund-holding demonstration site. Essentially, we set up a service company that takes an annual lump sum from State Health and all our Medicare and PIP [Practice Incentive Program] income. In fact, every dollar we can grab from grants, university teaching appointments or whatever goes into one pot. The service company is overseen by a local board of directors, with both professional and consumer representation. So both Aaron and I are employed locally. We do quite nicely out of this arrangement, so we can just get on with planning and delivering services as best fits our skills without worrying about income or bureaucracy or traditional professional roles.

"It's certainly not an easy way to go. The local community has had a hard time deciding priorities out of the limited bucket of money. But the important thing is that it is their decisions and their priorities, not some bureaucrat's. They really *own* their health service."

Frank is feeling a bit numb as he walks into the Multi-purpose Centre. It seems he is going to need a heap of skills to be a doctor that he is not learning at medical school. Still pensive, he follows Fiona into the videoconferencing room next to the office. "This should be a good session for you to join", she says, as a group of eight students appears on the large screen in front of them. "These students are all in final year and come from Medicine, Nursing and Pharmacy. We have integrated skills teaching with all three schools early on in their courses and then a series of integrated sessions throughout the course. Today, we're doing some problem-based stuff on chronic disease. We'll focus on multidisciplinary team work. We're using the videoconferencing equipment much more for clinical applications

as well, particularly for psychiatry. We've got so few psychiatrists in this State — most of our referrals go to Brisbane now. It works very well."

After lunch, Fiona flicks through her emails. There is one from Oliver, an exploration geologist who spends a good deal of time overseas. His asthma often worsens in hot humid climates and today, in Brazil, it is doing so again. Fiona opens his web-based record and finds the page with his asthma management plan to jog her memory. Oliver has entered a few peak flow readings over the past few days for Fiona to look at and informed her that he has doubled his inhaled steroids. He really wants some reassurance. Fiona enters a few comments in his notes and then emails him back.

She also has an email from Marjory. "Marjory's a poor soul really, but much better than she was a year or so ago. For the last few years, she's had a worsening combination of agoraphobia and panic disorder. She was taking up a lot of our time in house calls as she wouldn't leave home. And, worse, we weren't even helping her. Last summer, her grandchildren visited, got her hooked up to the Internet and bought her a small web cam for her computer - She had a few sessions of CBT [cognitive–behavioural therapy] with a psychologist using videoconferencing and has been using some Internet-based self-guided CBT. She's even had exposure therapy for her agoraphobia using virtual reality. Linda and I started taking turns to see her face-to-face once a month and would hook up with the videoconferencing in between. It was quite amazing — she actually started doing her hair and make-up for these sessions. She came to the surgery to see me last week for the first time in three years."

Fiona points to another email. "I'll sort this one out tonight", she says. "I do some charity work with some doctors in Nepal. I get one or two referrals a week for second opinions. They'll email me the history and any x-rays or things and any questions. If I don't know something, I can more easily find out than they can."

Frank has his thinking cap on by now. "How do you manage to keep up to date with everything?" Fiona smiles, "You can't, so I don't really try. Look, it's a question of redefining education and what it means and how we use it. And that's where all our fancy IT [information technology] really helps. I can't predict who is going to walk through the door tomorrow, so how do I know what to learn about? And what I learnt at the last evening meeting might be old hat by the time I need it anyway. We use 'just in time' education, and it's revolutionised the way I manage my patients. Our practice homepage links to websites like the *BMJ*s "Clinical Evidence" site[4] and the National Electronic Library of Health in the UK.[5] I usually get the answers I want quite quickly. Sometimes, we'll look for things during the consultation. If I can't get what I want in 30 seconds, I'll chase it up later. Sometimes, my patients will find the answers for me. It's sort of healthcare homework, I suppose. The practice provides an up-to-date list of reliable websites, and I just help patients work through it all. This way we get the answers to the questions we've got, as and when we need them."

Fiona clicks again on her laptop. "What's all that about?" asks Arash. "Up the top is the height of the ocean swell, and at the bottom are the local tide tables. This means we've done enough work for one day. It's time to go surfing."

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A quote

“2005 - GPs have embraced software tools that improve the efficiency of their practices internally (appointment systems, billing systems, medical records) and externally (HIC online, Broadband for Health initiative, Australian Childhood Immunisation Register). However, the different components of the ICT solutions need to be brought together. We run the risk of losing the benefits of ICT in the paperwork battle”. (Aloizos MJA 2005; 183 (2): 96)

CHAPTER 1: THESIS ORGANIZATION:

1.1 Introduction:

Many information technology (IT) products have been developed to support general practitioners in all aspects of their work (general practice computing group (GPCG) 2004), and much research and development in this area has already been done. It is apparent, however, that GPs are not making as much use of these systems as they could. The question is: if the IT products have been developed, why are GPs reluctant to use them? A major contribution of this research is that it is a social analysis of the use and adoption of IT/IM in general practice in a given area. It is not a technical analysis of products and their use. Throughout this thesis I have presented views by breaking from the tradition and asking the data to present itself in the manner of discovery – in a more unconventional style (after Latour). In this way I have developed a more narrative approach to the relating of the research.

1.2 What this study did:

This study aimed to identify and examine a model that presented the socio-technical factors that act to enable, and to inhibit the uptake and use of information. “The importance of Knowledge Management (KM) to organizations in today's competitive environment is being recognized as paramount and significant. The ..... Healthcare system is facing numerous challenges in trying to deliver cost effective, high quality treatments and is turning to KM techniques and technologies for solutions in an attempt to achieve this goal.” (Wickramasinghe et al 2007).

Thus this study mainly concentrated on how Actor Network Theory (ANT) can be used to explain enablers and barriers to the uptake of IT/IM but it used Roger’s theory of innovation diffusion as a contrasting point to explain why ANT is a more acceptable theory (in this case) to explain technological innovation by rural general practitioners. This thesis aims to articulate the

barriers and enablers throughout rather than list them after the literature review. By doing this the whole story is woven as the expose takes place.

1.3 How was this research different?

This research was different from other studies because the most common approach to theorizing innovation is by using an innovation diffusion model (Rogers 1995), but most of the reported studies investigated by this approach involve large-scale adoptions. Rural GPs, however, operate very much in the mode of small business (Burgess and Trethowan 2002), and research by Tatnall (2001a; 2002) has suggested that another approach, that of innovation translation (Latour 1986; Latour 1996) may be more amenable to investigating the adoption of information technology by small businesses like GPs. So, while this study concentrated on ANT it also examined both approaches to determine which can be better applied to explaining the adoption and use of IT/IM by rural GPs.

1.4 Rogers' theory of innovation diffusion:

Rogers (1995) asserts that an individual's decision to adopt an innovation is not an instantaneous act, but a process that occurs over time, consisting of a series of actions and decisions. The innovation-decision process is "the process through which an individual passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers 1995:163).

Although Rogers' approach (1995) has increasingly moved towards the inclusion of social factors to explain the diffusion and adoption of technology, I argue that it has not gone far enough. In the field of technology studies there is an increasing body of work that argues that there are many complex social factors involved in the interaction of society and technology (Latour 1988; Mol and Law 1994). I argue that any process of technology adoption in such an

environment must inevitably involve a set of complex negotiations between all those involved. Furthermore, the final outcome will typically involve any devised product being *translated* (Law 1992) from the form initially proposed to a form suitable for actual use. Most GPs operate in a small business environment, and research has suggested (Tatnall 2001a; Tatnall and Lepa 2001; Tatnall 2002) that adoption of technology in small business and by special groups can be better explained using an approach such as *innovation translation* (Callon 1986; Latour 1986; Latour 1996). This argument will be tested in this research and presented throughout this thesis.

1.5 The Innovation Translation approach:

The *innovation translation* approach recognizes that businesses may not adopt an innovation for all of the 'right' reasons. The adoption of an innovation through time and space is in the hands of people, each of whom may react to it in different ways (Latour 1986). Consequently, GPs may be adopting technology for 'other' reasons, thereby erecting barriers to the achievement of the key outcomes in the General Practice Computing Group Strategic Framework.

1.6 The differences between the theories:

The essential tenets of innovation diffusion that 'there is some property in the innovation, the society, or the potential adopter that facilitates diffusion' differ radically from the translation view in which it is 'the potential adopters who hold the key in their actions'. There are occasions when diffusion does not occur despite the excellence of the idea or the technical quality of the innovation, and the diffusion model finds these difficult to explain.

Innovation translation concentrates on issues of network formation and investigates the human and non-human alliances and networks built up by the various actors involved. It concentrates on the negotiations that allow the network to be configured by the enrolment of both human and non-human

allies, and considers the IT system's characteristics only as network effects resulting from association (Wenn 2002). Innovation translation theory suggests that it is not any *innate properties* of these systems that are important, but rather *network associations* such as the extent to which the business has been enrolled in the advantages of the new system. It looks at the process of re-definition in which the small business tries to seek compromises from the IT system, and how the system imposes definitions of how the technology should be used; how it 'interested' the business and then got them to follow its interests, so becoming indispensable to them. What is finally adopted for this task is not the IT system originally examined as such, but a translation of this in which it becomes a tool for their particular business use. Innovation translation is thus more attuned to the human and political issues involved in small business decision-making, and so offers a useful approach to modelling innovation in small business (Tatnall 2002).

1.7 What I thought when I began:

In this study, I thought it most likely that the areas that would be of most relevance would be those relating to the spread of ideas, motivating force, origin of power, function of innovation and incorporation of social factors. As the study developed I found that this was correct and so these became the primary areas in which the two approaches were contrasted.

A business would normally adopt IT because it can provide cost savings or efficiency improvements, IT can assist with decision-making processes or it can help to provide better service for customers (O'Brien, 1999). GPs can potentially use IT to obtain and provide epidemiological information, to carry out preventative screening (with 'reminder' systems), to access up-to-date electronic medical records, to improve the accuracy and safety of prescribing by the elimination or reduction of handwritten data, to facilitate the gathering and analysis of data for GP research, or to manage practice costs more effectively (GPSRG, 1998). This study found that factors more likely to influence GPs in their uptake of IT/IM were personal and social and varied in

influence over time according to shifting balances of power. This study also found that it is not GPs who ended up using IT/IM the most but the practices.

GPs' actual usage of IT reflects the patterns of small business usage of IT. Many doctors have been reluctant to use these technologies, trailing other small businesses in their levels of adoption and use (Burgess and Trethowan, 2002). If GPs do use IT, it is mainly for cost savings and efficiency gains, not 'added value' applications: it is often for basic record keeping purposes only, and in many instances the doctors themselves do not use computers (NHIMAC 1999; GPCG 2001; Burgess and Trethowan 2002). The similarities between GPs and small businesses are evident, with concerns about having the resources (especially time and money) to devote to IT, lack of IT expertise, poor support and technical assistance, and a struggle to see the benefits of IT usage (GPSRG, 1998). GPs, like small businesses, generally have fewer resources available to devote to IT projects and have less formalised planning and control procedures (such as evaluation and review).

Often, the small business owner/ manager (who in this case is likely to be the GP, but this is shifting towards a corporate model of ownership) does not have the time, resources or expertise necessary for such tasks (Burgess, 2002; GPCG 2001). In addition to these problems, GPs face added problems in relation to privacy and confidentiality, and are concerned that having a computer on their desk may interfere with their patient consultations (GPSRG, 1998). This all means that factors affecting the adoption and use of IT by small businesses made a more than useful ancillary point for examining such uses of IT by GPs in this study.

These uses tend to match up well with some of the ways in which information systems can assist GPs in managing practice costs more effectively, facilitating the gathering and analysis of data for GP research, and improving the accuracy and safety of prescribing. However, not all GPs are taking advantage of the benefits available, with some still not using computers at all.

There is certainly scope for many more GPs to adopt IT, and for those that use IT, to use it to far greater advantage. This study examined the usage of IT by GPs and placed them according to a model of usage.

The 2001 US Institute of Medicine report on American Healthcare indicated that the top IT priority over the forthcoming year would be deploying Internet technologies (Health Management Technology, 2001). This was echoed by Kidd (2006), who stated that the challenge ahead for GPs was the integration of their service with others and the wider use of IT/IM for diagnosis. The challenge in future for GPs will be a progression from the position of agreeing to the concept of computers and claiming they are using them fully to general adoption and effective use of computers, to the use of Internet-based services – a progression which this study will map. With patient record management on the Internet (within privacy legislation and guidelines), the potential for clinical data mining and developing health information scenarios lends itself to the effective practice of evidence-based medicine and knowledge dissemination amongst regional medical professionals (Medical Economics, 2000). These results can potentially be translated into improved patient care (General Practice Computing Group (1999). This is a most contentious issue for GPs as it is not the mining by the profession but by the government that is their greatest worry.

Before any existing business can move into an online environment it should be capable of being supported by an existing IT base. This is usually some combination of personal computers, suitable applications software, support, networks and printers. There is strong evidence to suggest that many GPs are being encouraged to adopt the Federal Government's online approach without having the necessary IT infrastructure in place and this continues more so for rural GPs (Richards, 1999, ARWAG 2006, RWAV 2007).

When examining the use of IT by GPs in rural areas, a major consideration relates to resources and geographical distance: the further you are away from resources, the longer it takes and the more it costs to get them. This can

particularly be the case with hardware and software purchases, training and support (Burgess 2002). There is an even greater challenge facing GPs in rural areas when online services become the norm. To be able to achieve some of the benefits that the Internet promises, such as faster service, it is necessary to have an efficient telecommunications infrastructure (Belisle and Czinkota, 1999). A reliable service has not yet been introduced to all rural areas of Australia (NHIMAC 1999, COAG 2006).

GPs in rural areas therefore face special challenges in relation to their use of IT/IM. This study investigated the special needs of GPs in these regions and examined the factors that affect how they progress through the model. Underpinning this research I continuously sought an answer to the question: given that many IT products have been developed to support general practitioners (GP) in all aspects of their work, why are GPs reluctant to use them?

1.8 A multi dimensional model:

A multi-dimensional model based on a synthesis of enablers and inhibitors was examined to ascertain its relevance in this study area. A 3-D model has been developed to chart a GP's position in 3-D space relative to the 'lighthouse' practices. This preliminary model, termed the 'lighthouse model', is shown in Figure 2 chapter 2 of this thesis; it uses the dimensions of *Technical Support, Computer Literacy* and *Motivation*. Results examined the factors influencing adoption by GPs more closely.

Table 3 Categorization of adopters using the lighthouse model

	Tech. Support	Comp. Literacy	Motivation
Lighthouse	High	High	High
Motivation desert	High	High	Low
Literacy desert	High	Low	High
Support desert	Low	High	High
Motivation island	Low	Low	High
Literacy island	Low	High	Low
Support island	High	Low	Low
Wilderness	Low	Low	Low

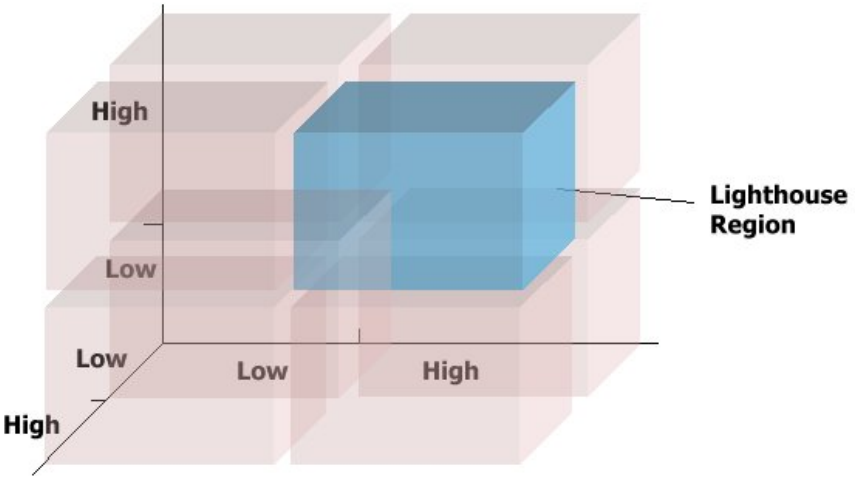


Figure 1: Lighthouse model of technology adoption (ARC funding application document)

This research found that a GP's relative position in the lighthouse model can be determined by measuring their level of realisation along each of the dimensions that plot their location. I expected that GPs not adopting IT for use in various elements of their practice will typically have 'low' scores along one or more of the model's dimensions (axes). This was not always the case. I thought that the lighthouse practices identified by CHDGP would generally be found in the region of the model where the progression along the axes will be relatively high in all dimensions. Initially I identified this as the 'lighthouse region' of the model (see figure 2).

The GPCG report (2001) made recommendations on both training and technical support, which it regards as significant factors in GPs' take-up of IT.

These efforts in training and support continue within the GP's professional organizations, the divisions of general practice and the registered training organization responsible for post graduate development. In the preliminary model I suggested dimensions of computer literacy and computer support. The third dimension of the preliminary model; motivation also draws inspiration from recommendations of the GPCG report. Initially, it will be possible to place GPs into different cells, generated through the model. Table 6 chapter 2 provides an example of how this may occur.

In conjunction with the cells of this model, I thought I would be able to identify the various enabling and inhibiting factors for individual GPs adoption of IT/IM.

1.9 The phases of this research:

This research had several phases as follows:
Initial Survey phase; the purpose of this phase was to provide a snapshot of the current level of uptake and use of IT in general practice. CHDGP played a role in the recruitment of GPs to participate in the survey. Samples of 200 rural

and urban GPs were surveyed, to classify them according to the lighthouse model cells.

Interview phase. This phase commenced immediately after the initial survey. I identified where individual GPs stand in relation to adoption of IT and interviewed with careful questioning to find out whether GPs consider 'characteristics of the technology' as being the most important factor leading to adoption (Rogers 1995), or whether other socio-technical factors have a greater influence (Latour 1996). These were in-depth surveys and the process I used is described in chapter 3 - methodology

Case studies: I chose 20 case study practices from the 43 within the study area for in-depth case studies. These practices were representative of the study area. It was possible to fully examine 10 of these as some practices did not want to continue their involvement as time passed – time was a very important factor in their decision. As a result I have used these 10 practices consistently throughout this thesis and used information from the other practices as supportive evidence.

Comparison of Models phase involved further research about models that might explain or assist in enlightening the pattern of adoption in the study area. While maintaining focus on the two major theories under examination other theories were applied to the case studies, to ensure that I was not being too narrow in my examination.

This study provided an opportunity for me to work in a practical setting with GPs in a small business environment. The Central Highland Division of General Practice actively participated in this project by providing support for the initial survey and access to historical records of projects undertaken to support the adoption of IT/IM. Through their current and ongoing contact with GPs they were be able to provide valuable advice to me in relation to GP usage and attitudes towards the use of IT.

The CHDGP is one of 123 nationally funded divisions in Australia that have been charged with the task of linking General Practitioners with each other and to link GPs with their communities to improve health outcomes. The division has extensive experience in administering additional programs funded through

other sources. (CHDGP also recently partnered with Victoria University and the Royal Australian College of General Practitioners to gain another ARC Linkage grant for 2002, 'Research and Practice in Medical Practitioner Wellbeing: Testing a Conceptual Model'.

The research design was such that it facilitated dissemination of information about the project. There have been several papers published as a result of this research, a chapter within a book, presentations at conferences, and 5 papers planned after presentation of this thesis. This strategy of immediate publication effectively allows the research to be evaluated by peers.

1.10 Snapshot of the study area

Central Highlands Division of General Practice

The Division's Mission Statement

The Central Highlands Division of General Practice seeks to promote and enhance the health of its community and to support General Practice.

Brief Background

The Central Highlands Division of General Practice is one of 123 such Divisions around Australia. It is primarily funded by the Commonwealth Department of Health and Aged Care to link General Practitioners with each other and to link GPs with their communities to improve health outcomes. This Division's operations are managed by a Board of Directors made up of six elected GPs. The Division is a company limited by guarantee and commenced formal operations in November 1993 and established its offices in January 1994.

It has developed formal links with all other Victorian Divisions through General Practice Divisions-Victoria (GPDV) which meets bi-monthly. It also links to all rural divisions in Victoria through the Rural Workforce Agency-Victoria (RWAV). It works closely with the Victorian Department of Human Services and various Health Foundations.

Why Divisions Were Established

Divisions were established to deal with the following nationally identified issues including:

- Erosion of the GP's position in the health care system
- Falling remuneration for GPs
- GP isolation and frustration

In addition to these issues, of concern to Governments is the need to better manage the health care dollar. Divisions thus provide a network to address these issues at local, State and National levels. They also enable GPs to improve primary health care in the community and work with other health providers.

Table 4 Brief Profile of the Central Highlands Division

• Population	173,000
• Geography	Urban areas of Sunbury and Melton, majority of the Division is rural
• Number of GPs:	177 (full and part-time)
• Number of Practices:	50
• Nature:	A mixture of rural, provincial and semi-urban towns
• Hospitals:	Six Public Hospitals and one Private Hospital
• Community Health:	Seven Community Health Centres
• Health Status:	Trends in Mortality above State or National rates include Heart Disease, Diabetes Mellitus, Suicide, Stroke, some Cancers, Chronic Bronchitis/Emphysema, Asthma, Neuroses, and Dementia. Leading to high patient load with complexity of rural management
• Socio-Economic Status:	Generally matches state & national averages but is up to 1% lower in certain areas.
• Other Services:	Strong links to the Royal Melbourne, Western & other major metropolitan hospitals as well as Victoria University of Technology.

The Division stretches from Melton, Bacchus Marsh and Sunbury up to Kyneton and Castlemaine and Daylesford and across to Kilmore, Seymour, and Wallan. It includes the towns of Gisborne and Lancefield, Romsey, Woodend and Riddells Creek. (Also see map appendix I) There are 150 GPs practising in this Division, about thirty of whom are part time.

1.11 What I brought to the research:

Before commencing this research I had not been involved with the healthcare sector in Australia. I had completed several research projects in education. I had to build many networks and sustain these networks throughout the research. This was an important aspect of this research as there was no one key actor in the adoption of information technology in the study area, key actors emerged on a practice by practice basis, and in a reflective manner they referred to their professional organizations as mentors in their process of adoption. Thus in the sense of Latour (1996) following the actors in the case studies, learning about them, how they made decisions, and the factors involved in their decision making became very important.

While at first it may appear that I could claim that I was an objective outside observer in this research, being situated within the networks during the research would discredit this claim. However, I can claim that this initial situation meant I came to the research with a fresh outlook. This was particularly important in the case of reporting on the work and place of the division of general practice in the process of adoption in the study area. This research is significant because it examines the minutiae of the process of adoption of computers in general practice and clarifies the importance of allowing for human interactions in innovation processes. It takes a drilling down approach from the outside organizations and government policy to the individual practices then to the processes that have occurred in individual practices.

When I began this research I thought it would be less complex than other researchers suggested. I found that they were correct, and I was less correct. In the beginning of this research I completed my literature review and classified all my data to that point and went to Kmart and bought twelve of those black file boxes into which I put everything in an orderly manner. It was not long before I spilt out of those black boxes and developed side folders and other sub folders. It is an interesting metaphor that I chose the black filling boxes as I had not considered the special place that black boxes held in Actor Network Theory. This was unintentional and only dawned on me in a discussion with my supervisor when he commented “Black boxes Patricia?” “Yes”, I said “all neat and tidy”, “Oh really”, he said. “ I bet it does not stay that way and I would like you to consider the metaphor that you have just made”. In consideration of that metaphor I took myself to ***Wikipedia*** for some introductory definitions and I introduce you to the basis of one of the aspects of Actor Network Theory that is of importance.

1.12 A most important term - Black Box

The term black box theory is used in philosophy and in science.

> “The term is important in philosophical contexts, because various philosophers have proposed black box theories for various fields.....In science studies, a more abstract notion of a black box refers to the results of the social science process of black boxing, is the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed the more opaque and obscure they become” (Pandora’s Hope 1999)

"A black box contains that which no longer needs to be considered, those things whose contents have become a matter of indifference." (Callon, Latour, 1981 p.285) A black box, therefore, is any setting that, no matter how

complex it is or how contested its history has been, is now so stable and certain that it can be treated as a fact where only the input and output counts - Eg general practice. Our society values general practice and our government funds it to the tune of millions of dollars because our society believes in access to good quality health care, thus general practice is accepted and unquestioned - it is a black box (an accepted unquestioned entity).

Turned into a black box, things such as general practice and high standards of health care for all Australians, the use of computers in general practice tend to be very closed for they are not only accepted through the rigorous process of debate about them. It took, for example, a metaphoric earthquake to open the black box of the first computer use guidelines in general practice to enlighten general practitioners about the errors in basing their original guidelines on manual systems for record keeping. Software that was consequently developed, is on the other hand, constantly reopened and sealed again because of its fluidity and low production costs. This is the process of constantly questioning some elements of the box (finding bugs) and trying to seal it again in a new up-grade.

Another example is that when we research, we file information and undertake to keep records according to ethical guidelines. This is accepted practice – a black box. The black box is the information and the reliability of the records, the research network of people and things. In this case I started by filing all my information in the black file boxes I bought at Kmart, and gave no thought to the metaphor. The following plates show you the process described here. I began by reading (as we all do), and I continued to read and read and give you the starting point for the metaphor.

1.13 An early pictorial progress report:

Plate 2 Articles for reading

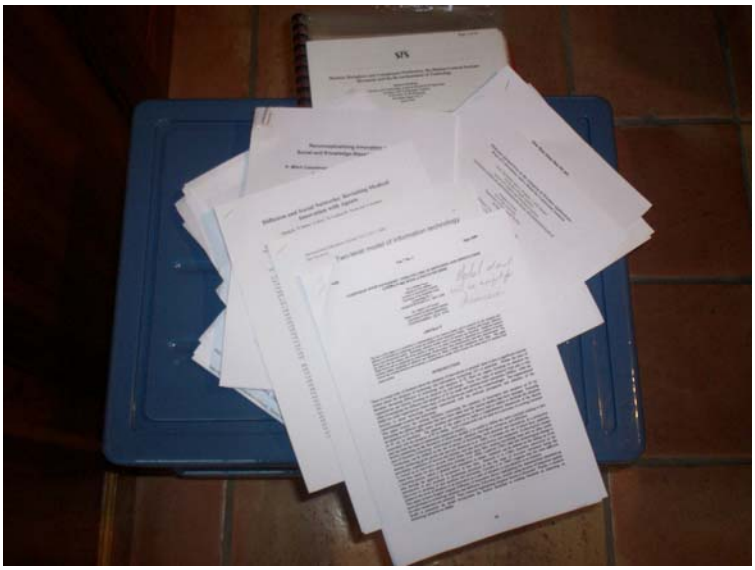


Plate 3: It was not long before I realised I knew very little indeed.

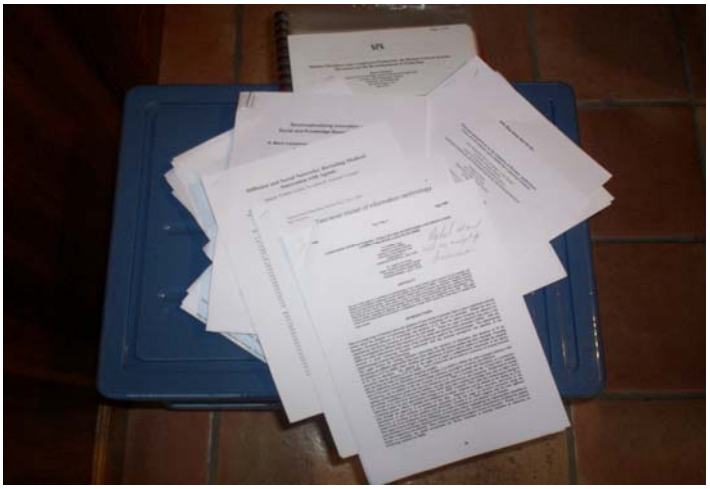


Plate 4: My research begins to expand and expand; the black boxes are not here yet but are present in the form of a black binder. I begin to suspect these binders will need replacing with filing boxes because they will not be enough to keep everything neat and separated - they will not remain contained and once opened act like a Pandora's Box.

Plates 5&6: My research continues to expand and the black boxes continue to will me to open them, but when should I do this? Do I really need to know what is inside yet?

Plate 7: I try to keep all the actors separated so that I can think, but they struggle against my best efforts and try migrating to each other. I ask myself are they really different actors? Will looking inside now tell me something useful?

Plate 8: Finally my black boxes are exposed for what they are, they have sought to come together and so they did, but in doing so have created another identity, and I am now seeing the actors more clearly.

1.14. My approach to the write up of this thesis.

Throughout this thesis I continually compare and contrast between ANT and Diffusion of Innovation Theory. This is intentional as it is one of the main aims of the research. Therefore you will see that on the surface there appears to be some repetition of the theories. That this might be repetition is appearance only, for I have taken aspects of the theories and applied them having regard for the content of the chapters. Then I have compared and contrasted in relation to the aspect being discussed in each chapter.

As this process proceeds the bias toward ANT also emerges. I have left this bias there, as I consider that an implicit decision was being made throughout the thesis as to most applicable theory to use in explaining the pattern of adoption in the study area. This bias is then addressed in the conclusion with the decision as to which theory is preferred.

I have also taken an informal style in the write up of this thesis. As this research was informed Actor Network Theory which involved reflecting as I was writing I thought that it would not be clear where I was offering my own reflections based on the data and readings included in this research and where I was discussing the work of others in relation to this research. To solve this problem I have highlighted my reflections or thoughts with the use of time new roman font and italics. This does not occur in the first four chapters for it was not necessary to direct you to my own thoughts in these chapters. However as I proceeded though the writing I have recognized that I needed to make this undertaking and ensure that it was clear – particularly for chapters 5, 6, 7, 8, 9, 10 and 11

1.15 Structure of the chapters

Chapter 1

This chapter offers some background to this research and a description of the study area. I describe in a pictorial manner the processes I went through in my “journey to enlightenment”.

Chapter 2

This literature review explains the significance of this research, much of the literature on the adoption of computers in general practice points to the success of the process, that computers are now used widely in general practice. This literature avoids the issue that it is not general practitioners that have computerised but it is general practice that has done so. The literature review explores this and directs the following chapters to the explanation of this.

Chapter 3

In this chapter I clarify why actor network is so important to this study and model structures of networks and factors that might be included in an explanatory model for the study area. This chapter also develops the reasons why I have a bias throughout the thesis toward Actor Network Theory.

Chapter 4

In the methodology I deal with the theories of adoption and the ways that I researched and I expand on the detail of gathering the data that I needed. This is important because I came to the research with so little knowledge about the health care field. My strength lay in my previous experience with adoption research and I was able to apply this through the qualitative methodology I used to follow my actors.

Chapter 5

History of IT/IM adoption in general practice is necessarily a small chapter placed here to focus on the long history of the process. The importance of this chapter is that it identifies an actor on the scene. The development of a history gives a persona through this historical account. This is a most important chapter to the thesis as Actor Network Theory accounts for actors in the research - be they human actors or non-human actors. In the development of a history the character is given life and a corollary of this is that this history gives legitimacy to the need for computerization of general practice. This chapter directs you to the beginning of the process where general practice and the adoption of computers became perceived as a person/actor.

Chapter 6

In identifying the important players and the translations that occurred in the process of persuasion undertaken by RACGP I intend to articulate how the RACGP is a very important player/actor in the process of adoption in the Central Highlands Division of General Practice. I will also use this opportunity to develop discussion to support the use of Actor Network Theory as the theory which provides a richer understanding of the factors at play in the adoption of IT/IM in the study area.

Chapter 7

The General Practice Computing Group (GPCG) and the Practice Incentive Scheme (PIP) were very important in the acceleration of the adoption of computing in general practice. Through advocacy, development of position papers, and development of policy they played an important role in clarifying how computers would be adopted and how they would be used in general practice.

The General Practice Computing Group is the peak body for computing in general practice and as such is obviously important and persuasive. Why the

profession established a peak body for this purpose in an interesting question and is addressed throughout the exploration of their role and the influences and networks they established in advocacy for the adoption of computing in general practice. The GPCG played and important role in having items included in the PIP that was crucial to the cost benefit of computerization of general practice

Chapter 8

The Australian Divisions of General Practice (ADGP later known as Australian Division of General Practice Networks ADGPN); Central Highlands Division of General Practice (CHDGP) and the role of the computer assistance officer were another important player. As a result of the review of general practice in 1992 the Divisions of General Practice were founded. The Divisions have played an important role in the adoption of computing in general practice in the study area because it was within the divisions that the IT/IM officers were placed. They were there to support the practices in the process of adoption. Thus I have taken the opportunity of this chapter to examine the role of the Information technology/Information management (IT/IM) officer in depth and explain her role using the two theories of adoption. This further enriches the comparison of the two theories.

Chapter 9

It is through the case studies that light is thrown on the real reasons for the pattern of adoption of computers in general practice in the study area. The case studies illustrate why the process has been so long and they begin the exploratory journey to finding the real reasons for the fragmented adoption pattern in the study area and the factors that are at play. They show that even though there was a lot of pressure to computerise, this did not happen in the manner that was expected, nor did it happen in a pattern that was predictable.

Chapter 10

The minutiae of decision making in general practice are an important aspect of this research for it illustrates the factors that underpin decision making for GPs. This chapter drills deeper into the processes that have taken place in the decision making for the adoption of computers in the study area. This chapter directs us back to consideration of the place and importance of following the actors and the role of actor network in the explanation of the pattern of adoption of computers in the study area.

Chapter 11

In examining the decision making processes in greater depth, the importance of general practice as small business is clarified. The place and importance of looking to the individual and the part that they play in a process such as this research has examined. It directs the reader to the importance of being able to follow the actors. In light of the micro factors that affect GPs in the study area in decision making this chapter will focus on the importance of general practice as small business. The reason for doing this is to illustrate that there exists a dichotomy for GPs in the study area. Where on the one hand they function as small business they are juxtaposed by the way that they were inculcated into the persona of carer. This will be shown by contrasting what GPs say they want and what they are required to do in acting as a small business.

Chapter 12

I will finalize the preceding chapters and discuss why Actor Network Theory is very useful in this study, I finalize the information I have gathered and make some recommendations for further studies.

Chapter 2 Literature Review

The journey for information technology in general practice and some indications of how it became a black box.

"The principle of symmetry hits home: how can people be condemned for failing when those very same people are succeeding elsewhere" (Latore 1996)

2.1 Introduction

In the history of General Practice the 1980 - 90s will stand out as a time when computerisation of practices was accelerated on a large scale, computerisation at this time was complemented by the same occurring in many other spheres of business and is a time when rapid technological change was unsurpassed. In the case of general practice it was, and still is fully supported by Government policy, profession and support services backing. This development has not been restricted to a few rich countries in the world. As part of general advancement, many countries have initiated programs which aim to make all citizens competent and confident computer users. The aims of such programs generally point to economic benefits. In the case of General Practice usage of computers, the aims point to increased health outcomes and then economic benefits. However the capacity of practices to provide, sustain and utilise the necessary IT/IM infrastructure varies greatly, particularly from urban areas to rural areas and then between practices.

2.2 What of the future?

In a world where situations are completely ideal, it is envisioned that GPs will be using systems connected to one another reversibly and securely via the internet, and sharing applications, utilities, information and knowledge resources among themselves and with other members of the health team. They will move easily from one desktop workstation to another without losing patient or practice information.

Patient information will be collected and captured directly, at point of care, by GPs using relevant clinical terminologies, which are consistently mapped to and represented by a reference terminology. This reference terminology may in turn be mapped to appropriate classifications to enable population health and epidemiological research. This will enable electronic health records to "talk" with information and knowledge resources through electronic decision support systems at the point of care.

The collection and management of accurate and comprehensive practice and population data, as a by-product of good clinical care and record keeping, will promote the sustainable collection and use of patient-centred clinical information to improve the health care and health of individuals and populations.

2.3 This is the ideal, but what is the reality?

This research discusses the current level of adoption and use of IT/IM by GPs working in a rural area and by applying two theories of explanation of this process examines the enablers and barriers to adoption of IT/IM. Many information technology products have been developed to support medical practitioners in all aspects of their work (General Practice Strategy Review Group, (GPSRG) 1998). However it is apparent that many GPs are still reluctant to adopt full use of computers and become what is called "a paperless practice" despite the efforts of the late 1990s

2.4 Powerful drivers for change

During the late 1990s three powerful drivers emerged for the computerisation of Australian General Practice

- The promotion of computerisation by the General Practice Strategy Review
- The inclusion of computerisation as a factor in the Practice Incentive Program

- The funding of the General Practice Computing Group.

2.5 The attitude changes but does the behaviour?

According to the annual divisions surveys of GPs (2000, 2002, 2006, 2007) there has apparently been widespread attitudinal acceptance of computers by GPs. By contrast, in a study commissioned by the Commonwealth Department of Health and Aging, (GPSRG 1992) GPs were asked about the extra demand that computerization places on them. It appears that there is good evidence in this study to show that extra demands may be due to the manner in which the innovation has been presented to them - as a necessary tool to achieve improved health outcomes instead of as a peripheral skill which may be understood by those who implement technology and attend the computer labs. Computers in general practice may be little understood particularly by older GPs and sometimes resented by GPs who have had to accept it and the additional skills to be acquired. However anecdotal information would point to another situation for GPs particularly in rural areas. In the General Practice and Primary Care (1999) survey it was stated that: "Although it can be argued that the use of computers has contributed to the more effective management of information at population level, there is little direct evidence that the general use of computers improves efficiency at individual GP level…….nor evidence that clearly shows that rural GPs have benefited"

For over two decades GPs and general practice have been encouraged to use IT, (PHCRIS 2003, 2005, 2006), but very little still is known about the exact way that rural GPs and their practices use IT. The variations of results shown in tables 1 and 2 on pages 15 and 16 are witness to this. It is important to capture why use of IT occurs in the manner that it does. Research on how general practices use IT has concentrated on providing baseline data to inform about future initiatives but very little information exists about the actual process general practices pass through in decision-making about IT or about

the enablers and barriers to use. The question then is: if the IT products have been developed why are some general practices reluctant to use them?

The General Practice Computing Group study (2001) recommended increased training and technical support, and, also recommended in their 2001-2005 strategic framework for IT/IM that the vision for Australian general practice is "The vast majority of Australian general practice will be utilising structured, standards-based information technology and management systems to provide improved patient care" (GPCG 2001) The 2001 US Institute of Medicine report on American Healthcare indicated the top IT priority over the forthcoming year would be deploying internet technologies.(Health Management Technology 2001). But there is a nagging situation for general practice in rural areas which is that they service greater numbers of patients than urban general practices, and geographically these patients are spread over a broader area. This has an impact on the amount of time available for learning new skills.

Another nagging issue is that of quality of infrastructure to support such networking - eg access to effective broadband connections. As long ago as 1999 Richards et al (1999) suggested there is evidence that many GPs are being encouraged to adopt the Federal Government's policy supporting implementation of an online approach without have the necessary IT infrastructure to support it (this includes in house office support). This was reiterated at a PHRIC research conference regarding primary care in June 2003 where the concern regarding reliability of services to support interconnections was voiced by several GPs, this seems to be a fair enough challenge in light of the fact that the government at the time was wanting to continue to sell of Telstra.

The issue here is the ability of a private provider to sustain the infrastructure needed. A good example is the ability to download information in rural areas

in the same manner that can occur in urban areas. Another example comes in the form of a question “How can rural GPs, who are already overburdened with workload, sustain yet more work in terms of data input?” Access to effective broadband continues to be an issue even though rural GPs have now been able to access satellite connection via a scheme started in 2004 by the federal government. In regard to these connections it appears that the provider is of the utmost importance in providing reliable download ability.

These situations are challenging to GPs but there has still been no study of usage in real time. Policy and Frameworks rely on reports, not observations, of what is happening at the coalface. In a review of PHCRIS databases it was found that of the 245 studies reported only 2 studies were of a qualitative nature. In a further review of studies being undertaken and reported by Divisions of General Practice, it was found that while there is a flourishing movement toward qualitative research the actual studies are more about clinical matters with very few having a qualitative nature. Research of a qualitative nature is only just emerging (Flinders University 2003). Only 34 studies of Australian general practice were found to meet the guidelines for credible qualitative research (Russell and Roach 2003). While this was a study that involved a narrative review of Medline referencing qualitative primary care research articles, it is an indication that the full potential of this type of research has yet to be reached (Russell 2003).There is difficulty in finding data on research in the health care fields mainly because it is scattered throughout many databases, there is a call for a national register of research being undertaken. No studies are being undertaken to assess the impact of IT/IM on GPs, nor of how they actually use IT/IM. Currently there is one study being conducted by Melbourne University assessing the way the GPs use computers in the doctor - patient - computer triad.

In rural general practice, information management focuses on the better management of information that can assist in promoting improved clinical

outcomes, and dissemination amongst regional medical professionals (Medical Economics 2001; Strategic Plan CHDGP 2003). This situation has not changed even though the approach to achieving it has – the strategic plan for CHDGP 2007 repeats the goal for support as above. Supposedly, this can be transferred into improved patient care. But in a real sense, is it reasonable to require rural general practice to do even more in light of the burden they carry at this time? Despite this situation rural general practices were reported as stating that computers and use of computers is high on their agenda. (Batterman 2003)

2.6 General Practice as Small Business

There are other aspects of computer use in rural general practice. The use of IT by GPs reflects the patterns of use in small business (Burgess, Darbyshire, Sellitto, Tatnall and Wenn 2003) and it seems that if general practices use IT then in many cases it is for perceived cost savings rather than for adding value (Burgess and Trethowan 2002) "General practice business generated a gross business income (before deduction of practice costs) of $2,836.3 million and had an operating profit before tax of $778 million. This represents a margin of 27.6%. By far the greatest proportion of income came from fee for service medicine. GPs' average medical service income was estimated at $124,992. The average business income per medical practitioner employed (without deduction of expenses) was $136,200. Average wages and salaries paid to medical practitioners employed by general practice medical business was $51,200. (General Practice in Australia 2000:172) in light of these figures it is little wonder that the adoption and use of IT/IM accelerated when support for IT/IM was implemented.

In viewing general practice as a business the Department of Health and Ageing (DoHA) offer a clear recognition that in the past few years the concept of general practice as an industry is very clear. It functions on three levels – that of the individual practitioner, that of the practice, and that of

the profession overall. (Dept. of Health and Aged Care 2000). The Department are not the only ones to be taking this view for Allied Medical Group (2007), (a company that supports general practice by providing business services) provides us with this as a mission statement –

Allied Medical Group is committed to providing premium quality facilities, services and personnel in order to facilitate the optimum standard of care to patients.

Allied Medical Group is also committed to providing a premium working environment for medical practitioners in order to assist them in achieving their professional, personal and financial objectives.
http://www.alliedmgp.com.au/

In Australia, an annual study examining the use of computers and electronic commerce in small and medium businesses (Telstra Corporation and NOIE, 2000) defines a small business as having 1-19 employees and a medium sized business as having 20-200 employees. It is not surprising then that general practice clearly falls into the small business category. A total of 56,780 persons were employed in 11933 general practice medical businesses when account principals, employees and contract workers were taken into account. (ABS 1997)

General Practice as Small Business

In General Practices information management focuses of the better management of information that can assist in promoting improved clinical, patient and practice outcomes. Information management in general practices can provide additional functionality that may be available and not being used such as:

- Electronic data availability and exchange (eg on-line pathology/radiology ordering and reporting).
- Patient information databases such as patient registers including patient age, sex and disease; recall and reminder systems.

- Practice administration and management such as electronic staff rosters/pays, billing and claiming; stock ordering on-line; GST statements.
- Contribution to research activity such as adverse drug reporting; electronic contributions to approved clinical research activities.
- Electronic diagnosis and treatment support such as drug-drug interaction alerts; patient medication and clinical histories.

A situation analysis carried out by the GPCG (2002) suggests that Information Management in General Practice should focus on the better management of information that can assist in promoting improved clinical, patient and practice outcomes. The change management required to promote this agenda can be broken down into the following challenges:

- Insufficient information has been passed to stakeholders (Micro).
- Communications are not yet adequately coordinated (Micro).
- Specific messages are still being targeted for each audience (Micro).
- Little understanding on the impact of Information Management in General Practice on target groups. IM in General Practice seen to be driven by Information Technology rather than GP Business Needs (Macro).
- Modest buy-in and support from stakeholders (Macro).
- Opinion leaders need to communicate the benefits to key stakeholders (Macro).

But all of this assumes that the technology will be used in rural general practices, hence this research project to identify and model IT adoption by rural general practices. It is clear some progress has been made in terms of adoption (as tables 1 and 2 pager 15 and 16 show) however in light of viewing general practice as a small business, many general practitioners and

their practices still do not foresee any benefits for their own practice even while the potential efficiency and quality gains for both patient and government are more obvious. Many general practitioners are more than happy to leave the "hard stuff" to their staff. Further to this, in a review of GP web sites in Australia Burgess and Trethowan (2002) determined that a lower proportion of general practices have web sites than small business, and that the web site was used mainly to display simple information such as the physical location of the practice, contact details, email addresses, information about the practitioners, and latest news. A very small percentage provided automated services, such as automatic recalls or the ability to make online appointments."(Tatnall et al 2003) In re-doing this web search in 2007 I found that web sites had changed very little.

Barriers and Opportunities

The literature around the area of small business and information technology is rife with what is now a fairly accepted list of 'barriers' to the successful implementation of IT in small businesses. These barriers typically include (Management Services, 1997; Igbaria et al, 1997; Pollard and Hayne, 1998; McDonagh and Prothero, 2000):

- The cost of IT
- Lack of time to devote to the implementation and maintenance of IT
- A lack of IT knowledge combined with difficulty in finding useful, impartial advice
- Lack of use of external consultants and vendors
- Short-range management perspectives
- A lack of understanding of the benefits that IT can provide, and how to measure those benefits
- A lack of formal planning or control procedures.

Rural Small Businesses

Some of the problems facing rural small businesses are similar to those facing small businesses in developing countries. Small businesses that are located

away from major cities and towns face access issues similar to those already mentioned.

A study of small businesses in the rural areas of the United Kingdom (Management Services, 2001) indicated a wide and growing use of computers and the internet, but a lack of ISDN or other broadband services had restricted access in some remote areas. It was felt that there was a lack of opportunity to develop familiarity with computers. It was thought that there could be a possibility of using local schools for acquiring these skills, but difficulties related to clashes with working time, distance, travel time and the relevance of the courses offered needed to be addressed.

One of the benefits that the internet may provide is remote access to many desired IT resources, such as training. Access to the internet can also provide small, rural businesses with greater opportunities to trade across borders though the reduction of transactions costs (Gallagher, 1999).

> Skilful use of the Internet can create opportunities by giving farmers, small business people and communities the capacity to present a regional image to the world, create focal points for inquiries about local businesses and their offerings, create global businesses and develop new products and services. *(Gallagher, 1999)*

Interestingly, a year 2000 survey of Australian small businesses revealed that 29% of metropolitan small businesses had a web site, compared to 20% of rural small businesses. The main reason given by rural small businesses for not having a web site was that they did not have access to the skills needed to design, build and maintain a web site (Telstra Corporation and NOIE, 2000).

2.7 The Validity of IT/IM in General Practice

As hospital stays grow shorter, the effective substitution of care in community settings is required. This requires a greater need for coordination of care between providers, resulting in a requirement for more sophisticated clinical and administrative information systems; those that enable information to be eventually available online. Thus the efficient management of information will be integral to a successful practice.

Coordinated care trials have demonstrated the benefits of IT/IM in general practice. As a result GPs are able to clearly see the support that is gained from such information exchange. Thus the coordinated care trials have become a major driver for improvements in health flows between general practitioners. (Dept. of Health and Aged Care (DoHA) 2000; 2007). As clinical computer use in general practice becomes more widespread, evidence of the quality benefit is being accumulated. Systematic reviews of trials of the effects of computer based clinical decision support systems on physician performance have been shown to improve antibiotic prescribing, drug dosing, and preventive care. (Sullivan and Mithcell1995, Balas et al 1996, Baker 1997, Hunt et al 1998, Ellis and Kidd 2000, Kidd 2006).

According to the General Practice Computing Group (GPCG) strategy 2001-2005 information technology is a tool to assist better information management, "Information technology provides potential solutions to many of the practical difficulties of delivering quality evidence-based medical care in general practice. Information technology can provide rapid access to personal health information about individual patients, clinical guidelines, drug information, diagnostic test results, patient education and preventative care recommendations." However there is a caution here for emphasis on ensuring that any data collected are simply a by-product of the information that general practitioners require to effectively manage their patient's health issues. (Royal Australian College of General Practice (RACGP) 2002) Thus on

the surface of it IT/IM in general practice would appear to be the ideal solution to many issues for rural general practices. But it is not always seen in this light, why?

2.8 Health Costs and Uptake of IT/IM

Australia spends a figure equivalent to approximately 8.5% of gross domestic product on health services (De Looper and Bhatia 2001). In 1998-1999 this represented a figure of over $50 billion on health services. Even a small percentage saving in the cost of health services as a proportion of GDP can translate to huge monetary savings. The effective use of IT can potentially help to save lives that may otherwise be lost, improve delivery of medicines, lower the cost of public health and improve business efficiency (Krasner 2001; Moczygembe 2001; The Health Care Manager 2001; DoHA 2007)

2.9 Computer use over time

Continuing increases in health costs, complexity of health delivery and amount of medical information available to medical practitioners has increased the need for finding better ways of managing medical practice. Although hospitals are also experiencing these problems it is onto general practitioners (GP) that much of the information management burden falls. Many GPs are examining ways that information can be better managed, and various types of information management systems are becoming an important focus of their work. While one might expect that, being highly educated professionals, most GPs would be at the forefront of the information management revolution, our research shows that particularly in rural Australia this is not entirely the case.

The table below represents the main uses for computers that were identified by a study of over 1200 GPs from across Australia (General Practice Computing Group 2001)

Table 5: Types and levels of use of computers in general practice (GPCG 2001)

Use of computers	Level of usage
Administrative functions	85%
Clinical functions	76%
Script writing	60%
General referral letters	57%
Receiving results electronically and running recall systems	57%

Another picture is presented by the Australian Divisions of General Practice Stock-take of IT/IM in general practice.

Table 6: Types of use of Computers by GP's in Australia 2001

Use of computers	Level of usage
Administrative functions	
Patients appoints made electronically	52.4%
Practice software used for billing	73%
Use of accounting software	66.9%
Clinical functions	
Drug interaction prompts entered electronically	75.6%
Clinical notes were being entered electronically	52.8%
Scripts were being generated electronically	78%
Ordering and receiving of pathology	63%
Ordering and receiving of radiology	38.8%
General referral letters	49.3%
Patient information databases	
running recall and reminder systems	66%
Patient registers being utilized	67.1%

It appears that slow uptake has continued to some degree in all areas of general practice despite continued support and promotion of computer use. The Commonwealth Department of Health and Aged Care, along with the General Practice Computing Group (GPCG), also reports that general practitioners in Australia are still being encouraged, via their Divisions of General Practice, to adopt electronic information systems to enhance clinical and practice management. However Richards et al. (1999) note that "The

adoption of computers by Australian general practitioners has been slow in comparison with other English speaking countries". In the "Annual Report of Divisions of General Practice – ten years on" all divisions reported being involved in IT/IM activities and more than 95% continued to provide continued IT/IM support and training for GP's and practice staff. (PHICIS 2003)

2.10 Policy development to support implementation of IT/IM by GPs

It is apparent that the consequences of innovation and the processes that are passed through while undertaking it need to be considered. Policies to develop such support for GPs as demonstrated above are not conceived in a vacuum, many actors are involved. In the future these policies will not be implemented in a vacuum, thus it is important to relate this research to this process.

The development of policy to support IT/IM implementation in general practice can be idealised as an impartial process resulting in the optimum action to achieve goals. Within the fabric of the society the in-habit, decision makers affirm and reinforce values from it. The policy making is the consequence of a series of decisions by groups of individuals, each of whom applies beliefs, values and tastes to the process. (Kogan 1975 p55)

Social Background.

General practice is seen as the cornerstone of Australia's health system. Around 90% of Australians see a GP each year and, through those visits, gain access to a range of diagnostic, pharmaceutical and specialist services. (Commonwealth Dept. of Health and Aged Care 2000) Even though general practice is seen as independent with practices run as small business, it receives considerable subsidy from the public purse through Medicare.

Parallel to this is that rural doctors work longer hours and see more patients than their city counterparts. (The Australian Institute of Health and Welfare

June 2003). The situation here is getting worse for figures from Rural Workforce Victoria (2007), show that the long work hours are continuing and supply of GPs to rural areas is getting tighter. In rural areas it is not unusual for doctors to work an average of 49 hours per week. Anecdotal information available to this researcher from division offices points out that this situation is in some way contributed to by the nature of the work that GPs undertake in rural and remote areas. GP's in rural areas undertake more procedural work than they do in urban areas. They also undertake a lot more inpatient and outpatient work than in urban areas. These are only two examples of a very complex situation. Added to which are the following -

Family / lifestyle influences.

- Only about 10% of GPs practicing in rural areas were born in rural areas. (Dept. of Health and Aged Care 2000)
- General practice is attractive to females because it allows for flexibility in regard to family/social matters (ibid)
- Education of children is important and several GPs this researcher knows have left general practice because of this reason.

2.11 Nature of Rural General Practice

Many studies (GPCG 1998, 2000; PHC RED 2003; Annual Survey of Divisions 2000-20001; Ten Years On – Commonwealth Dept. of Health and Aging 2003; DoHA 2007) have identified the complex nature of rural general practice and the many adaptations that have been made to address the changing demands of the Australian health system. These studies have, among other things, covered the emerging issues of implementing IT/IM, and of effective and efficient use of IT/IM systems for desktop and clinical use.

Throughout the 1990s a pattern of support for IT/IM accelerated, Humphreys (1998) argued that some of the value of health services to rural communities may include: employment multipliers, psychological 'security blanket', and social justice. In short, general practitioner services may be

seen by the community as something they must have, although reasons for that need are not strictly health-related. Thus sustainability of general practice must be high on the agenda, and raises issues such as professional development, peer support, recruitment, equity, administration, perceptions of rural versus urban, standards of service community characteristics, demographics, service environment, policy environment..... the list goes on!!!!!!!!!!

The Joint Advisory Group (JAG) was formed in 1999 and in 2001 published a consensus statement on the role of GPs in general practice. JAG claimed that the unavoidable features of practice environment over the following five years will be characterised by:

- Continuing workforce shortages in general practice as a whole;
- Continuing pressure on primary care to help address problems of the acute sector while at the same time there is increasing demand for high tech, high cost care;
- Maintained or increased accountability for services delivered to practice populations, and maintenance of a blended system of payments;
- Increased demonstration of quality improvement required to maintain registration and accreditation;
- Increased awareness of standards of quality in medico-legal considerations;

It is highly probable that this environment will also include:

- Replacement or restructuring of the current systems of items and incentives into a single more integrated system;
- Reluctance of governments to meet full costs of all consultations but willingness to pay a premium for evidence based care in health priority areas;
- Continuing and increasing support for GPs to access nurses and allied health within and outside practices;
- Increasing targeted fund-holding at either the practice or Division level and some ability for GPs or Divisions to access savings from quality improvements

Thus it appears the nature of rural general practice will be in constant change and, by implication the divisions will play an even greater role in how the nature of general practice (particularly in rural and remote areas)

develops. This is also demonstrated by the current strategic planning of the Central Highlands Division of General Practice whose board (2004) identified the following as a key principle

"The Central Highlands Division of General Practice promotes GP-led, evidence based best practice to improve population health"

2.12 The Effect of Government – national approaches to IT/IM for GPs.

Until financial support for computerisation was provided through the Practice Incentives Program the usual reason for GP's to buy a computer was for administration. AC Neilson/McNair1997, found that 28% of GPs used a computer for these purposes and that only 15% used computers for clinical reasons. However by 1999 59% of practices in Australia had enrolled in the PIP program and were undertaking in-servicing to increase skills to be able to use computers more widely.

Accreditation of practices has also played a part in promotion of IT/IM. Two of the five categories that make up the standards clearly relate to the use of IT/IM in general practice. It is not unexpected given the history of the professions' own development in this arena. The first computer policy for Australian GPs was developed in 1978 and related to the use of IT in generating medical record systems. Then in 1985 the Computer Assisted Practice Project was launched. Its principle objective was to study the effects of the introduction of computerised patient record systems.

A National Computer Committee was formed in 1986 as an Advisory Board for this project. A Computer Fellow was appointed to oversee, guide and advise GPs in all matters relating to the use of IT. The Royal Australian College of General Practitioners (RACGP) soon also involved themselves, and in 1988 the second RACGP Standards for Computerised Medical Record Systems was released. In this document GPs expressed their views to the computing industry. In 1992 the Australian Medical Association (AMA), the RACGP and the Commonwealth Government negotiated a strategy for

information management and technology. This strategy flagged this issue as a major one to be addressed.

The National Health Information Advisory Council, established to advise the Minister for Health and Aged Care on the most effective and efficient use of information technologies, published Health online: A health information action plan for Australia in November 1999. This plan recognises that the effective use of information management is one of the central factors for ensuring continuous improvement, increased efficiency and micro-economic reform. It specifically supported the work of the GP Computing Group (NHIMAC1999 in General Practice in Australia 2000)

Measuring Implementation

The general practice evaluation program which had been implemented in 1990 ran for 10 years and was then replaced by the Primary Health Care Research and Information Services, this service was extended by the introduction of PHC RED (primary health care research, evaluation and development). The PHC RED strategy is a $50 million five-year national strategy that the Commonwealth Minister for Health, the then Hon Dr Michael Wooldridge, announced in 2000. The strategy arose from the recommendations made in 1998 by the General Practice Strategy Review Group (Commonwealth of Australia 1998). The key focus of PHC RED is on general practice in the Australian primary health care system. General practices are being encouraged to implement evaluation and review of their practices and consequently use these reviews to continually improve health care delivery. This is one way that measuring of implementation is occurring, However of the 248 projects funded through the general practice evaluation program only 3 examined IT/IM implementation.

Evaluation of implementation is also being encouraged through the General Practice Computing Group. Activities within this group are grouped under six outcomes:

- Patient data bases
- Health professionals to communicate electronically
- Electronic diagnostic treatment information
- Practice administration
- Research and population health data
- Consistency across the health sector

(GPCG Work Program 2001 – 2004)

By throwing themselves open to review the GPCG perceives that the spin off will be greater acceptance of evaluation by rural GPs.(Brommeyer 2003) Case studies are one way that GPCG are encouraging evaluation and information exchange. These take the form of Lead Practice Case Studies and the final reports that the practice publishes are available on the internet. The main aim of the case studies is that is it hoped the information in them can be used by divisions to assist in raising awareness of the many benefits that can be achieved through the uptake of information management practices and continued improvement in this area. (WWW.agdp.com.au 2003) In other words, practices evaluate themselves against the lead practices and endeavour to do the same. The work of the GPCG is supported by Commonwealth funds and the AGDP.

At a Division level evaluating implementation of IT/IM is a continual process with member satisfaction surveys being conducted at least on an annual basis. However most of the data gathered is still reliant on reports, not on observations or on interviews. PHCRIS (2003) has published some insights into the implementation of the extensive programs**.**

Table 7: Number of Divisions involved in IT/IM activities, 1999, 2001, 2002.No. of Divisions (% of 123)

	1999-2000	2000-2001	2001-2002
Computer information and advice	n/a	110 (89)	111 (90)
Computer support and technical assistance	88 (72)	102 (83)	101 (82)
Implementation of elec. comm. between GPs & others	98 (80)	89 (72)	91 (74)
Training in clinical case applications	80 (65)	93 (76)	90 (73)
Training in basic computer literacy	110 (89)	109 (89)	87 (71)
Training in practice management software applications	101 (82)	96 (78)	85 (69)
Maintaining divisional databases of local health services and/or other organisations	93 (76)	85 (69)	79 (64)
Electronic data transfer	n/a	68 (55)	78 (63)
Age sex disease registers and/or recall systems	Na	50 (41)	70 (57)
Fostering software consistency between users	78 (63)	44 (36)	45 (37)
Maintaining divisional patient databases	54 (44)	39 (32)	40 (33)
Training in accessing evidence based health databases	52 (42)	46 (37)	34 (28)
Developing new applications	34 (28)	34 (28)	29 (24)
Bulk purchases of computers of software	27 (22)	17 (14)	14 (11)
Training in web site development	Na	23 (19)	22 (18)
Other *	41 (33)	23 (19)	22 (18)
TOTAL	123 (100)	123 (100)	123 (100)

* In 2001-2002 this included a total of 33 other types of IT/IM activities, including PKI, interdivisional IT/IM meetings, development of IT/IM workshops, development of an interactive resource, disaster recovery, IT/IM support to practices, privacy and data security issues, research in health informatics. Template development, trial of smart id technology, electronic discharge systems, advising GPs of IT related issues, and maintenance of division databases.

According to these tables there has been successful implementation of IT/IM strategies. This is further shown by Henderson, Britt and Miller published in 2006 (MJA 2006). They show that in July 2003 87% of the estimated general practices in Australia had undertaken accreditation against the standards of the Royal Australian College of General Practice (RACGP). In 2003-04 the year of Bettering the Evaluation and Care of Health (BEACH) survey 98% of participants in accredited practices reported having a computer available. The productivity Commission reported in 2004 that practices taking part in the PIP covered around 80% of Australian general practice and of that 93.2% of these were prescribing electronically and 92% were using computers to send and receive data. The extent to which general practitioners use computers is still not fully known.

"The decision by the Department of Health and Aging to cease funding support for General Practice Computing Group in August 2005 suggests an assumption that general practice has achieved a "satisfactory" level of computerization. (Henderson et al 2006) However "The results of our study show a distrust of reliability of computer systems..... Only one in five GPs uses the computer to its full capacity and keeps all patient information in the one record..... The paper-based or hybrid nature of practice records for the remaining 80% would prohibit the extraction of all pertinent information" (Henderson et al 2006)

It is my belief that this still does not show the full picture. It is obvious there is still a long way to go in terms of IT/IM usage by GPs. What has been demonstrated is that the Divisions of General Practice are responsive to the designated needs of the GPs as these needs change over time. The incentives to persuade GPs to computerize have been successful but given that most Divisions continue to use a wide variety of methods to evaluate a programs success in computerization I would suggest there is a tacit recognition of the gaps that are still in existence in the adoption of

computers in general practice. Among the ways that divisions continue to gather data are surveys, medical audits, and patient registers. Evaluation and research support also continues to occur at a national level but two thirds of divisions have been given state based organisation, academic department, private consultants support for this.

It appears that the infrastructure is in place and the aspiration of the GPCG for the next five years is sound but there will continue to be difficulties in the full adoption of computers in general practice with some notable gaps. What the data does not show either is the full picture in relation to rural GPs.

2.13 Current Policy Focus.

A review (GPCG 2001) of the GPCG work program reveals the mission and vision for IT/IM in general practice. The General Practice Computing Group's mission is to contribute to the improvement of health and quality of life of the Australian community through facilitating the systematic introduction and more effective management of information in general practice and between general practice and the health sector. The Federal Government made available a total of up to nine million dollars over three years to progress the GPCG's work program.

"The GPCG's (2001) vision was that:

- There are agreed standards for the collection, coding, classification and transmission of clinical and administrative data.
- Appropriate and sustainable education and training programs are established to enable GPs to make effective use of computer systems in their practices;
- GPs establish and maintain electronic databases which conform with agreed standards and which improve the quality of patient care;
- GPs have access to and use up to date diagnostic and treatment information in electronic format;

- GPs exchange information electronically with other health providers and organisations; and
- GPs contribute to and participate in the aggregation and effective use of data for research and population health."

On the surface it appears there is no special consideration within IT/IM focus for rural GPs despite the recommendation "That priority research, evaluation and development focus on rural and remote populations..... and people who are disadvantaged or hard to reach....." (PHCRIS 2001). It would be unfair to leave this comment without noting that the divisions of general practice are funded on the basis of rurality. Thus rural divisions do receive a higher level of funding than urban divisions. However geographical factors are important because the further you are from resources the longer it takes and more expensive it is to access them.

It is not possible to consider IT in General Practices without considering the role of the General Practice Computing Group (GPCG). The GPCG is the peak body for general practice computing - providing a strategic and co-operative approach to Australian GP informatics. Established by the profession in 1997 and funded by the Commonwealth Department of Health and Aging, the group focuses on the effective use of information management and technology for clinical and administrative purposes. It is sponsored by the Royal College of General Practitioners and is based in Canberra.

2.14 Theories of Innovation - Innovation Diffusion (discussion adapted largely from Rogers 2004/5 – both editions used)

A way in which a particular innovation is adopted can be obtained by looking at theories of innovation. The most common approach to studies of the adoption of IT has been to use a diffusion model based on the work of Everett Rogers (Rogers, Daley and Wu 1980; Rogers and Kincaid 1981; Rogers 1995). This involves what is essentially a stage approach that also relies on the characteristics and attributes of the innovation to affect the rate of its adoption. "In diffusion theory the existence of an innovation is seen to

cause uncertainty in the minds of the potential adopters" (Rogers 1983; 1995; 2004). Rogers argues that potential adopters will seek to alleviate that situation and that this drives adoption (or non-adoption) decisions. This approach is essentially quantitative research and measures social phenomena and obtains numerical values which can be analysed statistically.

Traditionally innovation diffusion has been seen as the guiding light in explaining adoption of IT and has had a lot of success in describing how innovations travel through large populations and in the process are either adopted or rejected. According to Rogers (1995; 2004) this explanation proposes that how people perceive change is important. If the idea seems new to the potential adopter then it is considered to be an innovation. The prime concern using this approach to explanation is to identify the factors that affect the speed of the adoption.

Another tenet of this theory is that anything new causes uncertainty and so there is a lack of predicability. Therefore people will seek information to change that situation. Diffusion could be considered to be a process of information exchange aimed at reducing uncertainty. "The new ideas upon which an innovation is based are communicated over time, through various types of communication channels, among members of a social system. There are thus four main elements of any theory of innovation diffusion: characteristic of the innovation itself, the nature of the communication channels, the passage of time, and the social system through which the innovation diffuses" of a communicating social network particularly concerned with the characteristics of the innovation. Rogers (1995) outlines five important characteristics which affect diffusion.

These characteristics are:

Relative advantage – the innovation appears to be better than what was previously available. Research in the health arena has provided evidence of cost effectiveness and potential benefit to patients of implementing a new

clinical activity. However the "objective" data may be less important than the clinician's perception of whether the innovation will be advantageous. Decisions about implementing an innovation are driven by patient welfare and the interplay between the patient, the GP and the healthcare system. Sanson Fisher (2004) gives an example of this –if a proposed change alters the balance of power between or within professional groups in a negative way, the innovation may not be implemented. Conversely, if the recommended behaviour increases the status of adopting clinicians and brings more revenue for individuals or the organization, the innovation may be readily adopted. Thus, in relative advantage we also see a gap in the explanation of how and why an innovation is adopted.

Compatibility – It matches what people already know. To increase the probability of adoption the innovation must address an issue that clinicians or others perceive to be a problem. For example a new procedure that enables early detection of a life threatening illness is likely to be adopted. The gap here is that some such "evidence" is debatable. For example the adoption of mammography screening has been widespread despite the debate about its effectiveness. Thus there is a problem in using this characteristic of innovation and adoption theory.

Complexity – People can understand it. A clinical procedure is more likely to be adopted if it is simple and well defined. For example it is relatively easy to change a patient's medication or drug therapy, but in contrast preventative activities such as recall and reminder systems have been very slow to be adopted. Attempts to intervene in a preventative manner may be hampered by a network of resistance - for example, the patients accuracy in reporting risk behaviours and the skills of GPs in consulting to achieve necessary change.

Trialability – Something people can try in a limited way. Rogers argues that the facility to undertake a limited cost-benefit trial of an intervention promotes faith that the evidence is correct and that its implementation is logistically possible. This aspect that one can learn by doing is debatable in

the arena of general practice and the adoption of computers because of a network of factors, such as cost, time, and skill.

Observability – Potential adopters are able to see the results. Visibility of an innovation stimulates discussion as other GPs would ask for information about it. If the clinician is respected and influential in arguing for the application of say the use of computers in general practice, then it is likely to have a positive impact upon adoption rates. Further to this Rogers states the more charismatic the person providing the role model the more likely that a greater number of professionals will adopt the advocated change. Consumer innovation such as computers and the software are less observable and so are less likely to be adopted easily or quickly. "An example is computer systems. Usually the software component is not so apparent, so innovations in which any component is not observable usually have slower rates of adoption" (Rogers 1983; 1995; 2004) Not only do they have slower rates of adoption but they are affected by other forces over time.

2.15 Innovation Translation (from actor-network theory)

An alternative view has been suggested as more appropriate for the field of IT research because it has been suggested (Tatnall and Gilding 1999) that many complex social factors are involved in the interaction of society and technology and that any process of technological adoption in such an environment must inevitably involve a set of complex negotiations between all those involved. Unlike diffusion theory this is essentially a qualitative research method and seeks to understand social phenomena. This method generally produces findings not arrived at by means of statistical procedures or other means of quantification, and includes in-depth interviews, observations and participant observation used in an effort to tease out the day to day minutiae that may contribute to the barriers impeding progress of IT/IM adoption**.**

Innovation translation concentrates on the decisions that were made, who made them and on what basis they were made ……..it investigates the

detail of how the changes occurred as it is the interactions between people and other people, and between people and machines that a key understanding of why IT/IM was adopted and of how it is used, will be gained. (Tatnall 2004)

It was further argued that any adoption of IT would involve the product to be adopted being *translated* from the originally proposed form to a form suitable for actual use. Latour (1986; 1996) has suggested the core of this approach is translation "the means by which one entity gives a role to another" (Singleton and Michael 1993).

This suggests that innovation thought has become more process-oriented and is now viewed as incremental (evolutionary) depending far more on the accumulation of understanding about the system within which the technology itself is only a part. Thus innovation is seen as a result of the growth in our technological learning, organisational learning and social understanding. We argue that traditional theories, such as innovation diffusion, that seek to explain uptake of new ideas (in this case IT) are more applicable to large scale adoptions.

It has also been suggested that these traditional theories do not go far enough in their explanation. Tatnall (2002) has also suggested that not all innovations are adopted for the 'right' reasons: the reasons that might be suggested by the innovation diffusion theory, or are changed in some way in the process of uptake. This explanation posits a process of translation and suggests it is not the properties of the innovation that propel it along in the adoption process but the networks that are formed to support its uptake.

Latour (1986) suggest that a useful method of examining activity such as uptake of an innovation is for researchers not to view players in the scene as separate from the subject but to view them as part of a network. Uptake of innovation takes place within a network and Law (1994) writes that "actor-network theory (ANT) ... tends to tell stories, stories that have to do with the

processes of ordering that generate effects such as technologies, stories about how actor-networks elaborate themselves, and stories which erode the analytical status of the distinction between the macro and micro-social".

Actors in networks can be human or non-human. Latour (1986) describes actors as any entity able to associate texts, humans, non-humans and money. In associating these entities there has to be some sort of ordering or drawing together; this is a political process and is continuous. It may result in many networks that overlap, but in explanation all actors are treated with the same equality. The success of adoption, according to this explanation, is in getting the actors to pull together in being able to stabilise the network by talk or by Machiavellian tactics. This will create a resilient network that should be self sustaining. "This means that ANT does not distinguish between social or technological and sees properties as network effects rather than innate characteristics of an entity." (Tatnall and Gilding 1999). Latour (1992) claims several advantages of this approach.

- respect to the actors and their individual differences,
- it allows for all entities,
- it pays respect to the outcomes,
- failures have the same explanations as successes so no hierarchy of dominance is produced,
- all links in the network are accounted for,
- when information is translated from one form to another it can still be credited to its origins.

ANT has been applied to information systems research because it is claimed that it allows a finer-grained analysis of information systems than some other interpretive approaches which can treat all information systems as essentially similar (Monteiro and Hanseth 1996). It is thought that a theory of innovation in information technology should give an account of what is actually going on both politically and technically. This may be because a large percentage of computer-based information systems are generally

acknowledged to provide less than satisfactory service to end-users and to fall short of their original objectives. ANT would seek to understand this situation at a very personal level and to examine the capacity of actors to negotiate and trade off within the network.

ANT has been criticised for going too far down the line of feasibility, that is, that one could go on and on exploring networks. The solution to this might be in restricting the frameworks by exploring, for example, political networks or economic networks (Underwood 1998) However Bijker, Hughes et al (1987) offer the notion of heterogeneous entities which raise the question of associations and of how strong or weak they are. By doing this networks can be used to describe shifting alliances of actors, so the network is not a fixed thing.

Innovation diffusion and innovation translation are based on very different philosophies as the comparative table below shows. It may be that they both have a part to play in explanation.

2.16 The two models

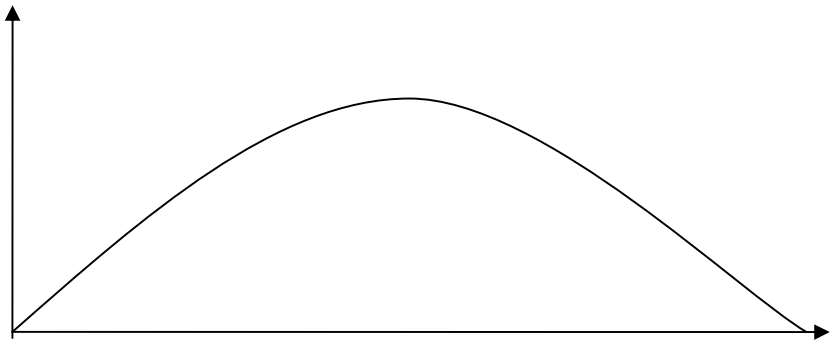
Table 8: Innovation diffusion versus innovation translation - adapted from McMaster et al. (1997)

	Innovation Diffusion	**Innovation Translation**
Innovation	A technology perceived to be **new** by the potential adopter.	A technology that has yet to be 'black boxed'.
Communication	Communication channels can be categorized as cosmopolite or localized, and mass media or interpersonal. Innovations are transferred through these channels.	Translations are made by actors in enrolling the innovation.
Time	Speed of decision to innovate, earliness of adoption and rate of adoption are important.	Network dynamics in enrolment. Control and dissemination are what matter.
The social system	Homophily vs. Hetrophily. Sharing of interests of human actors.	Interessement between actants (human and non-human) and goals. Black boxes form when interests move in the same direction.
The technology	Changes are made to the form and content of the technology as a result of experiences during implementation (re-invention).	The technology is translated through being enrolled, regardless of whether its form or content is modified.
Socio-technical stance	The social system and the technology are separate. Diffusion is the adoption of technology by a social system. Technology transfer requires the bringing together of social and technical elements.	The social system and the technology are inseparable. Successful innovation and technology transfer gives the appearance of separation, but this is merely evidence that the actor-network had stabilized.

The most used model of adoption has been Rogers' diffusion theory. Rogers (1995; 2004) found that individuals in a social system do not all adopt an innovation at the same time. Rogers proposed that adopters can be classified into categories according to their degree of innovativeness over time. See figure 2 below.

Figure 2 Categories of Adopters

No. of Adopters



Time innovators early adopters early majority late majority laggards

With use of an allocation matrix Central Highlands Division of General Practice has identified several lighthouse practices and this research will compare them with others from within the division. Burgess (2002), claims that a model that simply locates GPs and their ability to use IT/IM along a continuum is too simple and fails to capture the nature of technology adoption and use. Thus a matrix model has been proposed and (please refer to page 31 of this thesis). A general practice's relative position in the lighthouse model can be determined by measuring their level of realisation along each of the dimensions that plot their

Early in this research it was suggested by staff at CHDGP that the process of decision making in the adoption process would be interesting to investigate. They thought that doctors in the study area made decisions in ways that they thought prioritised issues other than IT/IM. They were not able to say

what process they thought they went through but simply that they thought it would be important to examine the way that the doctors made decisions because it would have some bearing on the explanation for the adoption pattern across the study area.

Rogers (2005) suggests the "Innovation-decision process is the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new ides, and to confirmation of that decision". The innovation-decision process takes time, that is something that rural GPs have very little of, thus it may be that in not undertaking this process in a thorough manner the use of computers at the desk top is incomplete.

A corollary of this situation is that GPs may have little time to allocate to the element of reinvention (Rogers 2005) is limited time for decision making. Thus little time is spent in the adaption of the innovation for the suitability of the practice needs. This aspect of adoption will be explored in chapter nine.

2.17 Conclusion

It appears that many rural general practices have not adopted IT/IM rapidly or fully and this concerns the Commonwealth Government and medical bodies. It is of particular concern to the General Practice Computing Group and the Divisions of General Practice. In reviewing the literature relevant to this study and covering the applicable theories several issues have emerged that will be covered by this research. It also appears that the approach taken in this research, that is, using two theories to explain adoption of IT/IM may enrich the understanding of the patterns of use by rural general practices.

CHAPTER 3: THE MODELS EXPLAINED AND DISCUSSED

3.1 Introduction:

Aim for this chapter

The approach for this chapter is to revisit the two explanations that will be compared throughout this thesis, and then to build the evaluation theme that will be threaded throughout the chapters. This will result in confirmation or adjustment in later chapters of the lighthouse model developed by CHDGP.

Throughout the literature review I have quoted others who show there is a high acceptance of computer use in general practice (eg Kidd 2006), at this same time in the literature review I have pointed out that it is not the general practitioners but the practice that has adopted computers. (Of course use by general practitioners has increased – there can be little doubt of that). Thus developing a model to explain the adoption of computers in general practice for this particular study area has been complex.

As will be clear from the case studies in chapter 8, the process of adoption of computers in general practice relies on the acceptance of them, and their importance to general practice. It will also be clear from other chapters that there has been research conducted to prove that computerization of general practice has occurred to a high level.

The two theories used for comparison within this research are on the one hand a traditional approach found in Rogers' adoption of innovation work and then on the other had the work of Bruno Latour (1996) a more contemporary approach. Both approaches have their strengths; however, I believe it has been clear that this researcher has a leaning towards Latour and Actor Network Theory. The aim here is to decide which theory I think is most appropriate in assisting explanation for this research area and to provide support for the development of the model provided by CHDGP.

3.2 Revisiting the theories:

Rogers' approaches to explaining how computerization will occur leans towards assuming that technology develops according to its own internal necessity and out of dynamics beyond human control – even his later work in 2005 has this leaning. It is also focussed on the impact of technology which is seen as the distinguishing element between the past and the future (most prominently, Toffler, 1980; Glider, 1989; for a general discussion see Smith, Marx, 1994). At the extreme end of the spectrum is "technological determinism". My main difficulty in accepting this as a way of explaining adoption of computers in the study area lies in the question, which is leading which? Is technology constructed of society or society made up of technology?

Actor-Network Theory enables the social and the technical to be analysed at the same time. The theory's aim is to describe a society of humans and non-humans as equal actors tied together into networks built and maintained in order to achieve a particular goal, for example the adoption of computers in general practices.

To achieve his contemporary explanation Latour (1993) developed a language specifically for his research. The key term actor, for example, is not used as in conventional sociology where actors are usually defined as "discrete individual, corporate, or collective social units." (Wasserman, Faust, 1994, p.17)

So, in order to develop this explanation further it is necessary to discuss the particular meanings of the central concepts in the Actor-Network Theory. For Bruno Latour (1993) the Actor-Network Theory attempts to overcome what he sees as the major shortfall of other explanatory theories, in that other theories tend to dissect the focus of the research away from reality. For example traditional approaches such as Rogers', are seen as dividing nature and society into two polarized views. From this perspective nature was only observed,

never man-made; whereas society was only made by humans. The two poles were indirectly connected by humans which enables us to make references to either one of them. It is Latour's goal to show that the separation introduced by traditional approaches is artificial. Because (technological) reality is "simultaneously real, like nature, narrated, like discourse, and collective, like society" (Latour 1993 p.6) he does not follow the clean divisions of tradition.

In order to combine the three areas of nature, society and humans, Actor Network Theory highlights how humans and non-human can both be actors which work into networks, sometimes sealed in black boxes. These networks can be observed through the actions of the actors or intermediaries, who are involved within those networks. The intended product of these networks varies: it can be nature in form of scientific facts (Latour, Woolgar, 1986; Latour, 1987) it can be technology (Bijker, 1994; Law, Callon, 1992; Latour, 1991), and it can also be society (Woolgar, 1991). The way that things happen and the actual results of these enterprises are always "hybrids" comprising all three domains simultaneously. I found this somewhat confusing to begin with because unfortunately, the terminologies used in different studies are inconsistent. Different terms are used to describe the same concept while, on the other hand, the same expression appears to have different meanings

3.3 Clarifying the concepts – further to chapter one:

I will further develop some main concepts from the literature review before leading into a discussion of the role of intermediaries, which is of importance to this chapter. The concepts actor, black box, network, inscription, and intermediary, need some clarification before I can proceed to the stage of examining the model developed by CHDGP to explaining adoption in the study area. The following are put together from different sources to capture those aspects of their meaning which I find most important to this research.

Actor

Actors are "entities that do things" (Latour, 1992a, p. 241) This appears to differ from my sociological studies formed when I undertook my first degree in social science - the main difference from the more conventional sociological definition of actors as "social entities" is stressed: what actors are, whether social or technological entities, is less important, whereas the aspect of action, doing things, is emphasized. "The distinction between humans and non-humans, embodied or disembodied skills, impersonation or 'machination', are less interesting than the complete chain along which competences and actions are distributed." (Latour, 1992a, p.243)

Latour (1987, p.84) extends one definition of actor to "whoever and whatever is represented [is an] actant." So to me this was confusing for it appeared almost contradictory until I reread Aramis and realised that Latour (1993) aims at retying the separated categories of humans, nature and society. While analysing reality as being constructed sounds like Marx, the concept of actors marks the difference from those theories and others like them. Actor indicates that the elements represented in a certain context act, that they do particular things. Outside that context, the elements are actants, entities that have an independent reality. Inside the context, they become actors, they do things. They act because they are involved in the context.

A context can be understood as a network aligning heterogeneous elements (people – the general practitioners, their staff, their knowledge; other contexts – hospitals, other practices, the RACGP; the GPCG and the CHDGP; equipment – medical tools, computers; procedures – decision making both clinical and business; institutions – the RACGP, universities) to achieve a particular goal such as adoption of computers in general practice. Each of these aligned elements has a reality outside the context. This reality outside allows enforcement of the meaning and of the strength of the context. For example, it took a Louis Pasteur to align his research about bacteria with

other elements and turn them into the acknowledged source of infections, thus making them (social) actors (Latour, 1986).

The more like aspects that can be is implicitly or explicitly aligned into a network, the more the network gains identity. A computer, for example, is able to mobilize communication say through email to simplify communication between pathologists and general practice. If the email, via the computer, cannot mobilize communication because of the way that it is written, the computer and the email loses some or all its power. A computer is an actor because it can mobilize a network of like allies to do things, to store and exchange information. A computer is in this sense a "black box".

Black Box

"A black box contains that which no longer needs to be considered, those things whose contents have become a matter of indifference." (Callon, Latour, 1981 p.285) A black box, therefore, is any setting that, no matter how complex it is or how contested its history has been, is now so stable and certain that it can be treated as a fact where only the input and output counts - Eg general practice. Our society values general practice and our government funds it to the tune of millions of $'s because our society believes in access to good quality health care, thus general practice is accepted and unquestioned - it is a black box.

A further example is the guidelines for use of computers in general practice, these are a collection of black boxes. In its formation stage the guidelines went through a process of review, construction, reconstruction, debate. During the formation stage in the developmental process they were fluid and open. Once they have been published, say by the general practice computing group, they turn into a black box, sealing all the elements, however arbitrary they might be, in a fixed and stable relationship that cannot be questioned easily. A black box is a network of people and things.

Network

Besides actor, network is the second central concept. The term network is defined as a "group of unspecified relationships among entities of which the nature itself is undetermined." (Callon, 1993, p.263) A network ties together two systems of alliances: People: everyone who is involved in the invention, construction, distribution, and usage of an artefact. Things: all the pieces that were already on stage or had to be brought into place in order to connect the people.

As in any natural system a change on one area will change the other. Each modification in one system of alliances is visible in the other. (Latour 1987). For example the network of people who were associated with computer adoption in general practice in the study area, is changed by adding more people or dropping people out – as we observed in the case studies. In order to understand the dynamics in one level of a network, I had to examine the dynamics in the other part, and that is why it has been necessary to examine the RACGP, the GPCG, the division of general practice, and finally the case studies of the practices.

Actor and network support each other. An actor can not do action in regard to goals without a network and a network consists of actors. This relationship is highlighted by defining an actor as "any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own." (Callon, Latour, 1981, p.286) Actor and network constantly redefine each other; one is dependent on the other.

We were able to observe this in the way that the computer project officer went about implementing her position description; in the way that the actors within the case studies went about supporting, translating and adopting computers in the various general practices and in the way that the GPCG

went about the work of professional development for the adoption of computers in general practice

There is no structural difference between large and small actors, between a major institution or a single individual (Latour, 1992). This does not say that they are all equal. This simply means that the main differences between micro and macro actors is the size of the network they can bring into place for a particular goal, that is the number of actors they can arrange according to their objectives – often acting through intermediaries.

Intermediary

This is the last of the central concepts that needs to be defined. Intermediaries provide the still missing link which connects actors into a network and defines the network itself. Actors form networks by circulating intermediaries among themselves, thus defining the respective position of the actors within the networks and in doing so constituting the actors and the networks themselves. An intermediary is anything that "passes between actors in the course of relatively stable transactions." (Bijker and Law 1992:25)

Intermediaries can be the language of the network, the organization within it; the committees or the practices that communicate with one another and that is the way actors translate their intentions into other actors. Considering the definition of actors as any element "which makes other elements dependent upon itself and translates their will into a language of its own" (Callon, Latour, 1981, p.286), the ability to have power and influence others is central to the action, which is translating an actor's own goals into other actors goals.

With the concept of translation I have arrived at the point where things begin to get dynamic. I would now like to use these descriptions to highlight some central aspects of the dynamics within actor-networks in this research.

3.4 The Dynamics of Actor-Networks (or the forces and changes at play)

Networks are established by actors. However, since there is no actor without a network, new networks emerge out of already existing ones, an example of this is the number of committees formed by the GPCG. Sometimes this happens through subtle changes, sometime as the results of revolutionary developments which might push into the background the element of continuity that is part of every dynamic. Subtle changes might be similar to those exposed to the process of computerization of one practice – see case study one. Revolutionary changes might be those bought about by the funding of computers through the PIP.

Defining a beginning for change is necessary - for example the forming of the GPCG. John Law and Michel Callon (1992) trace the beginning of a failed project for a British military aircraft back to a policy decision for rationalization of the aircraft industry. This decision, however, in itself contested, functioned only as an intermediary, (re)connecting existing networks of industry, labour and government to begin aligning themselves for the development and production a new aircraft. Just as in this research the beginning of the GPCG was a turning point in the adoption of computers.

At the beginning, therefore, stands the intermediary of the GPCG which is a network to align more/different actors for the network's own interest is an example in this research for a starting point. In other words, the attempt of an existing actor to grow and include new domains can be a good starting point to observe the emergence of a network.

It is clear networks allow actors to translate their objectives and to gain power and to add the other actors' power to their own. "By translation we understand all the negotiations, intrigues, calculations, acts of persuasion and violence thanks to which an actor or force takes, or causes to be conferred to itself, authority to speak or act on behalf of another actor or

force." (Callon, Latour, 1981, p.279) This can be seen in the examples from the case studies in chapter eight.

Networks emerge and are shaped by aligning more and more actors. In this way an actor can grow. The importance of an actor depends therefore on the number of actors which can be employed to a particular purpose. As you read in chapter five the network that is the RACGP was able to negotiate, advocate and develop sub networks to ensure the adoption of computers in general practice. Actors correspond to their network in some way but the size and shape is not set but the result of a long development and dynamics. By contrasting the large network that is the RACGP to the small network that is a practice we can see there is no fundamental difference between a large structure and a small actor, the only difference is in the number of actors that can be employed. It is a mistake to take differences in size of a network for differences in level, because networks always connect at the same time what conventional sociology differentiates into micro and macro levels. This is one of the strengths of using Actor Network Theory to inform research.

This interconnection renders such a distinction less significant, because "that which is large is that which has successfully translated others and has therefore grown. Since size is nothing more than the end-product of translation, the need for two analytical vocabularies is thus avoided." (Callon, Law, Rip, 1986, p.228)

Networks are made up of what the network-actors which are always localized-yet these networks can extend around the globe. Networks can be so large and stable that they appear to be independent from the actors. This, however, is a misconception. While they can (and do) seriously constrain the range of action for certain actors, they always need actors. Any given actor might be replaceable, but only by another actor. This research has shown that there is no gap between the individual and the structure which is made up of individuals which are made up of structure which is made up of individuals and so on, endlessly. For Bruno Latour "the two

extremes, local and global, are much less interesting than the intermediary arrangements that we are calling networks." (1993, p.122)

To observe the emergence, formation and growth of a network, one has to look at the intermediaries that are put into circulation, who sends them, where they suddenly appear, what they do there, as well as how they are translated and put into further circulation.

This research has found there is a process of mutual shaping – translation - between a new actor and an existing network. In the end neither the network nor the actor remains the same. The changes can be so subtle that they are negligible or they might be massive for either one or for both of them.

Translation is a process that is performed by one actor (A) on another actor (B). For the networks exemplified in this research to have operated successfully, the circulation of intermediaries was coordinated. This meant the included actors did not (or maybe only to a limited extent), contest their own translation. Such an example is the IT/IM project officer. This actor moved toward an internal agreement which allowed for an optimal circulation within the networks she created. In networks where the actors have successfully converged, (i.e. are strongly coordinated - in this case by the division of general practice) the network as a whole stands behind any one of the actors who make it up, as clearly occurred with the IT/IM officer.

The way agreement was to be reached, the scope of the translations possible, shaped the form of the network she created. In other words, "the network is constructed according to the translation's own logic." (Callon, 1992:84) The stronger the coordination of the circulation is, the more the different elements are aligned, the more stable and predictable it becomes. We saw this with the networks of the RACGP, the GPCG and the project officer. Thus the more stable a network the better it defines its components. The possibilities decrease for other networks to untie the connections in

order to redefine an actor for his/her/its own purposes. The setting turns into a black box.

Looking ahead, chapter ten points to another import finding from this research - actors do not necessarily need to be successful. The translation process can be denied - for example some of the practices put off adopting IT/IM and did not want to become users. We can see this occurring in many areas - people might not want to become users and not buy a product, or they might stop being wilful citizens and overthrow their government. A machine can fall apart because of a construction error; a new invention may render old solutions obsolete and channel money and other resources into new directions. The circulation of intermediaries within a network, then, becomes more and more difficult and the alignment of actors becomes weaker and weaker, the actors begin to diverge and the setting to disintegrate. The black box loses its integrity, the edges become fuzzy.

Convergence and divergence point at the directions into which a network can move, either towards stabilizing itself, or towards disintegration in which it becomes easier and easier to reverse its connections. Convergence in a network does not mean that every element acts or becomes the same. It "simply means that any one actor's activity fits easily with those of the other actors, despite their heterogeneity." (Callon, 1992:87) Thus it is clear how important it is to have a stable network.

This research found that this aspect of Actor Network Theory is very important as no network will be fruitful if it is not stable. In other words, networks that are not able to stabilize themselves to a certain degree disappear from the scene, while those which were able to achieve a certain convergence proliferate and may become the starting point for a new network.

This research shows that networks aimed for stabilization because none of the entities which make it up would exist in the form they do within the

network without that network in that form. The promotion of a network is a way to ensure the actor's existence and development, as we saw in the case studies – particularly in case study one. As we saw in that case study it was important that the practice manager persuade others that they had common goals (see table 8) this case study points to how it was in the interest of all actors within a particular network to stabilize the network which guaranteed their own survival perhaps in terms of retaining their positions within the practice either as employees or for the work they were undertaking.

The stability of a network depends on ensuring that it is impossible to return to the patterns or situation that was the past. (Callon 1992:89). In other words, stabilization, or closure “means that the interpretive flexibility diminishes”, (Bijker 1994:86) and agreement among the different relevant actors (members of the group) about the dominant reason for the agreement to move toward certain goals merges and the diversity of the goals decreases, simplifying the network through agreed goals.

Once forged into a network that all are participating in, embedded social relations remain stable as long as the network is used. Bruno Latour details in his programmatic essay, Technology Is Society Made Durable, how the social relations embedded in networks are a stabilizing factor of society: "Society and technology are not two ontologically distinct entities but more like phases of the same essential action. By replacing those two arbitrary divisions with syntagm and paradigm, we may draw a few more methodological conclusions. The description of socio-technical networks is often opposed to their explanation, which is supposed to come afterwards. ... If we display a socio-technical network - defining trajectories by actants' association and substitution, defining actants by all the trajectories in which they enter, by following translations and, finally, by varying the observer's point of view - we have no need to look for any additional causes. The explanation emerges once the description is saturated. ... There is no need to go searching for mysterious or global causes outside networks. If

something is missing, it is because something is missing. Period." (1991:129-130).

Heterogeneity is another, central aspect of a stable network. The more the diverse elements are interrelated, the more complex and stable a network becomes. In a heterogeneous network each element is kept in place through a set of heterogeneous ties to other actors and in order to untie such multiple determined actors, multiple connections have to be untied. Again I refer you to table 8 where I have dissected the negotiations between actors.

The size and the heterogeneity of a network are related as the RACGP network shows. The larger it became the more heterogeneous it became because it develops additional elements just to keep all other elements in place. In the language of systems theory this development is called "differentiation" (Parsons, 1968). The network starts to develop its own trajectory, supported by its elements which themselves depend on the network as environment. A network therefore starts to "become heavy with norms of all sorts" (Callon1992:91) in the course of stabilization. This means, of course, nothing else than that more actors are integrated or created. All case studies in this research demonstrate this.

3.5 The cutting edge:

I have now reached some of the cutting edge of the Actor-Network-Theory. The following section further develops the scope of the actor network as an analytical tool.

An important question I faced was, where does one network end and the next one begin? For Bruno Latour, the description of a network is simply finished when it is "saturated" and an explanation emerges. In other words, the question of how to limit the analysis can only be addressed on an empirical level. So it was more helpful to define a network from the inside, thus the network is defined by its own components. What belongs to a

system (or a network) can only be decided based on the definition of the system itself. This definition of the system can be a decision made by the observer (the researcher) who chooses to account for a defined section of a continuous reality; for example the ongoing development of the process to adopt computers in the study area as illustrated by the case studies, and as a separate but connected network, the influences of the RACGP.

What marks the difference between the internal and the external interdependencies of a system is its boundary. The boundary is at the same time separating the system from its environment and connecting it to it by serving as a filter to translate stimuli into input that can be dealt with by the system's internal structure. "The boundary, therefore, separates and unites and, as such, illustrates the dynamic characteristic of every distinction." (van Dongen, 1992:50) Establishing and maintaining such a boundary is always an active process. This process of establishing a boundary, of defining who is included in and who is excluded from a network, can be used as one of the indicators of how to limit the extension of a network.

The boundary separates and joins two sets of relationships: those of the system (internal) and those to the environment (external). The focus is on which of the criteria developed here might help expand the Actor-Network Theory in defining the limits of an actor-network and how actors might maintain the network. This research shows that influence in a network can only go so far insofar as it is translated into the network by one or more components of the network. The communication, therefore, between the network and anything outside the network may always be indirect and determined by the characteristics of the network itself. We saw this when it was inferred in the case study involving the father in the general practice. His

position as a person of influence was inferred rather than articulated, but it affected the network development in that it was put on hold until other factors came into play some years later.

The place where translations such as these take place is the border. The border in a social system is evidently not physical, as in a cell, but logical or functional (Zeleny, 1996). For example, the members of a family are determined by the relationship to one another, a company is an entity even if it is dispersed around the globe or entirely virtual, and, a doctor does not leave the system of the hospital system as long as he/she is connected with a beeper.

The notion of the border developed so far can be used to clarify that any element which is directly needed to achieve a certain goal is inside the network. Any element that is able to influence an actor but is not inside the network belongs to the environment. The separation and connection between the two which occurs at the border is maintained by the network itself.

So why does an actor act and why are networks dynamic? While actors in networks thrive towards convergence and stability, one of the central aims of Actor Network Theory is to account for dynamic, change and innovation (Law, Callon, 1992). Perhaps this can be seen through the concept of structural coupling which in the actor-network is the conception that all actors are participating in several (sometimes conflicting) networks (Callon 1986:24). In this sense, even networks which are extremely closed and stable-black boxes are connected to an ever changing environment. A clear demonstration of this is the RACGP. Take for example the network that is figure 5 of this thesis

"General Practice and its Links to Government". This is a complex set of networks but a change in one of the networks in which an actor is involved might alter him/her/it in such a radical way that he/she/it is, as an effect, ripped out of another, previously sealed network. The establishment of the divisions of general practice, for example, not only changed general practice but also had considerable influence on it which up to that point had maintained its network of meaning (theology) with the general practitioner as the actor at the centre of healthcare.

Networks, while maintaining themselves, are therefore interrelated with one another across their boundaries. While networks constitute themselves in the circulation of intermediaries among actors which are themselves defined by the same circulation of intermediaries, no actor is exclusively defined by one such network. The case can be made even stronger: the reason why a particular actor is included in a given or emerging network is precisely because he/she/it brings along all the actors of the other networks to which he/she/it belongs. In Latour's analysis this is one of the reasons why scientists refer to the classic authors of their field. By including those cherished pillars of the discipline into their text authors try not only to include a specific piece of information but also its reputation, i.e. all the other actors which also positively refer to this source (Latour, 1987).

Networks develop because they are in inseparable dynamic interaction with other networks and self-reproduction requires adaptation to an ever changing environment. Network development in the study area is no different and thus the pattern of adoption can be seen more clearly through the development of networks rather that in other way such as presented by Rogers.

For me the concept of the self-organized, critical state of a network joins two major ideas together. First, order in such systems emerges only out of the interrelations of the elements of the systems. Second, this order is critical in the sense that it is unstable between two stable states; the state of "frozen" stability where nothing moves and the state of random change which exhibits no stable pattern. In both stable states, development of the network is not possible.

To explain what I mean I will use the concept of a network's ability to reproduce itself based on the fitness of the network. In this way its ability to reproduce itself can be modelled as a landscape where the peaks indicate high reproductive ability and the valleys low reproductive ability. The position of a unit on this landscape indicates its adaptation to the reproductive constraints imposed by the environment. A unit within such a landscape can move from whatever site it is located at a given point in time to any of the neighbouring sites, one step at a time. Moving upwards means that the next network inherits better reproductive ability, moving downwards means that the next network inherits a less well adapted set of abilities. Each translation in the development of a network takes one step until it reaches either the top of the peak or becomes non-functioning.

So the networks order themselves and at the same time order their patterns, they self-organize. The state of this self-organized system is critical because it is between the two poles of absolute stability and total randomness which allow no translations toward development and further stabilization of the network.

On a very general level, this means that a network can only develop at a certain pace and in a certain direction which must be related. By using actor network theory as an explanatory vehicle we can examine the rate of change to a network, analyse how the network has to adapt so that it remains relevant to overall dynamics. By doing this we can "see" the way that computerization was adopted in the study area. We can also see that introducing too radical change would mean that the networks needed to confirm the changes and adoption of computers would become very disturbed, which in turn might rip the network apart. Not adopting change at the right moment might mean that the actors become involved in an increasing number of conflicts between the different networks to which they belong as they go "out of tune". In this sense, and as my father (who was a piano tuner of the old school) would say they are involved in constant processes of tuning themselves to one another. Without the use of actor network theory we would not tune ourselves into this process and miss the deeper explanations in the adoption of computers in the study area.

So where does this leave us in developing a model to explain the adoption of information technologies in the study area?

3.6 A model to locate individual GPs' use of IT/IM

It is obvious at this early stage that I favour actor network theory as a way of explaining adoption of computers in the study area. So, in an effort to decide if I agree with the model proposed by CHDGP as informed by actor network theory and to expand on the explanation as addressed at the beginning of this chapter I find it necessary to examine Rogers' Diffusion theory (as I will do throughout the report).

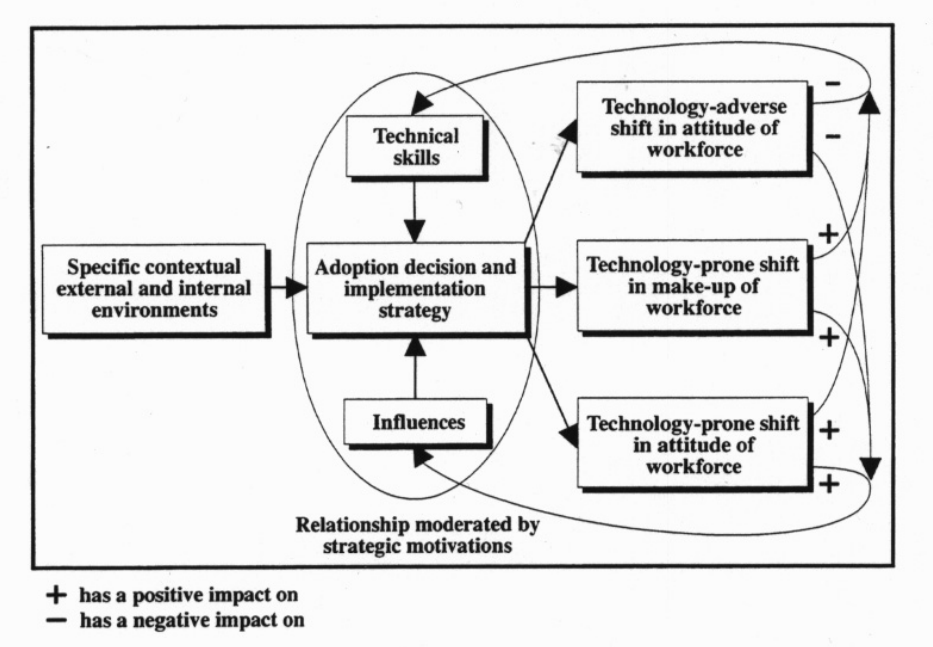
The most used model of adoption has been Rogers' diffusion theory. Rogers (1995) found that individuals in a social system do not all adopt an innovation at the same time. Rogers proposed that adopters can be classified into categories according to their degree of innovativeness over time. See figure 2 page 77.

Central Highlands Division of General Practice has identified several lighthouse practices and this research will compare them with others from within the division. Burgess (2002) claims that a model that simply locates GPs and their ability to use IT/IM along a continuum is too simple. It fails to capture the nature of technology adoption and use. Thus a multi dimensional model has been proposed and is shown in figure 1 page 31.

A general practice's relative position in the lighthouse model can be determined by measuring their level of realisation along each of the dimensions that plot their location. Is this enough to explain the adoption of computers in general practice in the study area? Perhaps a short examination of the concept of relative advantage will develop the explanation further.

Rogers' concept of relative advantage is appropriate but like many aspects of this work does not go far enough for this research. Rogers concludes that "We need a standard classification scheme so that the perceived attributes of innovation can be described in universal terms" Rogers 2005:223) However he does acknowledge that perceptions of an innovation count and that relative advantage is the degree to which an innovation is perceived as being better than the idea it superceded.

3.7 Figure 3 Effect of perceived ease of use on computer use.



I diverge –

Dillon and Morris, 1996 and Davis 1986 offer some further clarification (albeit from another perspective). The Technology Acceptance Model postulates that the use of an information system is determined by the behavioural intention, but on the other hand, that the behavioural intention is determined by the person's attitude towards the use of the system and also by his perception of its utility. According to Davis, the attitude of an individual is not the only factor that determines his use of a system, but is also based on the impact which it may have on his performance. Therefore, even if an employee does not welcome an information system, the probability that he will use it is high if he perceives that the system will improve his performance at work. Besides, the Technology Acceptance Model hypothesizes a direct link between perceived usefulness and perceived ease of use. With two systems offering the same features, a user will find more useful the one that he finds easier to use.

According to Davis (1986) perceived ease of use also influences in a significant way the attitude of an individual through two main mechanisms: self-efficacy and instrumentality. Moreover, a tool that is easy to use will make the user feel that he has a control over what he is doing (Lepper 1985). Efficacy is one of the main factors underlying intrinsic motivation (Bandura 1982; Lepper 1985) and it is what illustrates here the direct link between perceived ease of use and attitude. Perceived ease of use can also contribute in an instrumental way in improving a person's performance. Due to the fact that the user will have to deploy fewer efforts with a tool that is easy to use, he will be able to spare efforts to accomplish other tasks. (Davis, 1986).

According to this research, we can therefore expect that the factor which influences the most is the perceived usefulness of a tool - the relative advantage of the thing. But as can be seen from the case studies this only partly explains the adoption of computers and is not fully applicable to the study area.

So, for general practices attractiveness relating to IT/IM may revolve around the benefits to their practice and clinical needs; following on from that the benefits to patients and communities in terms of improved health outcomes.

Feasibility is a measure of the ability of the practice to undertake IT/IM and consideration of the difficulties involved.

The development, introduction and use of an information infrastructure is an involved socio-technical process of negotiation. The open-ended character of this process - the stumbling, the compromises, the way non-technical interests get dressed up in technical disguise - calls for an analytic vehicle that helps tease out interesting and relevant issues related to the "management" of such processes.

So how does the model developed by CHDGP assist the explanation of barriers and enablers to the adoption of IT/IM in general practice in the study area?

This concluding section of this chapter further outlines and illustrates Actor Network Theory in application and I will briefly position ANT within the broader landscape of conceptualisations of technology and society. This exercise is neither intended to be comprehensive nor systematic. It is aimed at spelling out which underlying aspects of an information infrastructure ANT makes us sensitive towards and why the model developed will be a good starting point for development of such models.

3.8 Musings about the Advantages of ANT:

First and foremost, ANT offers a way to zoom in and out of situations as suits the need. ANT offers an illuminating vocabulary to describe information infrastructure. It provides a language to describe how, where and to which extent technology influences human behaviour. This is valuable when identifying the influence of seemingly grey and unanimous technical present purpose. The model above aligns comfortably with ANT and visualises it in context.

This implies that the analysis as provided by the model is flexible. It needs to be for sometimes when using ANT a comprehensive set of interconnected modules and systems is collapsed into one node, sometimes you want to focus on the relative contribution of each of the modules and sometimes you want to dig into the design and details of one, specific module. This kind of flexibility is indispensable in any analysis of information infrastructure. An ANT influenced perspective on information infrastructure provides a fruitful supplement to the body of critical management literature. In particular, it provides a

different handle on how information systems and business strategies get "aligned"

ANT offers a different account. With ANT there is an open-ended array of "things" that need to be aligned including work-routines, incentive structures, training, information systems modules and organisational roles. It follows immediately that there can be no strict top-down control over such a collection of "things". Hence, ANT leans heavily towards a bottom-up concept emphasising strongly the performative or process aspect of the adoption process which according to ANT is not the result of any top down plan - it is the achievement of a process of bottom-up mobilisation "things" as Latour (1996, p.86) underscores in his phrase that "every day is a working day".

ANT belongs to the strand of thinking that questions given categories. It is accordingly more geared towards performing order through the establishment of facts, effects, beliefs or technological solutions. Order is the effect of an achievement – it is not given a priori - and the challenge is to develop an understanding of what this achievement is made up of. In others words, to unpack the dynamic, socio-technical process unfolding over time that as a net result constructs reality and order. This is an operationalisation of the essence of social construction: it is waging war against essentialism and is devoted to "understand how it is that durability is achieved" (Law 1999, p.4).

The relationship between technology and society may be conceptualised in many ways and the diagram above has sought to do this – to contextualize the situation in the study area. It embraces the fairly widespread belief that IT is a, perhaps the, crucial factor as it

simultaneously enables and amplifies the currently dominating trends for restructuring of organisations (Applegate 1994; Orlikowski 1991).

I found that while researching I had to supplement it with a grasp of the interplay between IT and organisations in more detail. The model assisted me in doing this. I set out to find out more about how IT shapes, enables and constrains organisational changes in the general practice in the study area.

A more satisfactory account of the interwoven relationship between IT and organisational transformations was lacking but by applying the model to assist in the visualization of the process in action I quickly gained insight into the different case studies from the RACGP through to the GPCG and the practices. More specifically I learned more about how the interplay works, not only that it exists. This implies that it is vital to be more concrete with respect to the specifics of the technology. As an information system consists of a large number of modules and inter-connections the majority of accounts I first contacted with ended up with the very important, but all too crude, insight that "information technology has both restricting and enabling implications" (Orlikowski and Robey 1991, p.154). This insight — that IT enables and constrains — is reached using a rich variety of theoretical frameworks.

ANT represents one framework within this restricting/ enabling regime outlined above. Given the interdisciplinary character of information systems research, there has never been a lack of candidates for theoretical frameworks. There has always been a steady import as

indicated the discussion above. ANT has neither been employed for a long time nor extensively within information systems research.

In what follows, I argue that ANT is particularly relevant in relation to developing models that will assist in the explanation of barriers and enablers to the adoption of IT/IM in the study area. This is due to the way ANT lends itself to empirically underpinned studies (Jones, 1998; Monteiro and Hanseth, 1995).

ANT has not, of course, developed out of nowhere. To trace its roots in any detail would quickly take us beyond the scope of this chapter. Still, to (even in this concluding chapter) to map out at least crudely the background is helpful in getting under the skin of ANT in relation to models.

ANT is born out of the interdisciplinary field of science and technology studies. This field, which is only a couple of decades old, is grounded in a fairly simple observation. The way science is actually done – not how it is normatively supposed to be – and the way technological artefacts are actually designed – not how textbooks in engineering instruct us – have largely been ignored by the social sciences and the humanities. The essence, then, is to ask the following question: if we bracket all espoused theories about this realm and instead bring along the critical and empirically underpinned apparatus from sociology, history and anthropology, what does the process of producing science and technology look like?

The term "actor-network", the A and N in ANT, is not very illuminating. It is hardly obvious what the term implies. The idea, however, is fairly simple. When going about doing your business —

driving your car or writing a document using a word-processor — there are a lot of things that influence how you do it. For instance, when driving a car, you are influenced by traffic regulations, prior driving experience and the car's manoeuvring abilities; the use of a word-processor is influenced by earlier experience using it, the functionality of the word-processor and so forth. All of these factors are related or connected to how you act. You do not go about doing your business in a total vacuum but rather under the influence of a wide range of surrounding factors. The act you are carrying out and all of these influencing factors should be considered together. This is exactly what the term actor-network accomplishes. An actor-network, then, is the act linked together with all of its influencing factors (which again are linked), producing a network.

An actor-network consists of and links together both technical and non-technical elements. Not only the car's motor capacity, but also your driving training, influences your driving. Hence, ANT talks about the heterogeneous nature of actor-networks. In line with its semiotic origin, actor-network theory is granting all entities of such a heterogeneous network the same explanatory status as "semiotics is the study of order building (...) and may be applied to settings, machines, bodies, and programming languages as well as text (...) [because] semiotics is not limited to signs" (Akrich and Latour 1992, p.259). It is "a ruthless application of semiotics" (Law 1999, p.3).

It might perhaps seem a radical move to grant artefacts the same explanatory status as human actors: does not this reduce human actors to mere objects and social science to natural science? We intend to bracket this rather dogmatic issue and fully embrace Law

(1992, p.383) that this "is an analytical stance, not an ethical position". Interested readers should consult (Callon and Latour 1992; Collins and Yearley 1992).

For the present purposes, what is important is that this move has the potential for increasing the level of detail and precision in developing models. More specifically, allowing oneself not to distinguish between social and technical elements of a socio-technical web encourages a detailed description of the concrete mechanisms at work which glue the network together — without being distracted by the means, technical or non-technical, of actually achieving this. If really interested in discovering influential factors regarding the way you drive, we should focus on what turns out to be actually influential, be it technical (the motor capacity) or non-technical (the driver's training).

In relation to the development of a working information infrastructure, how should we think about actor-networks, where are they and how should they be identified? Equating an actor-network with the specifics, some technical others not, of the context says something about what an actor-network is. But it does not say what it is not or, more precisely, how to delineate one actor-network from the next. The notion of an actor-network, quite literally, instructs us to map out the set of elements ("the network") which influence, shape or determine action. But each of these elements is in turn part of another actor-network and so forth. Hence, if you take this in a too literal sense, unpacking any actor-network will cause an explosion in terms of complexity. You end up with the whole world in your lap every time.

In terms of methodology, this apparently makes the analytic tool of an actor-network utterly unmanageable. This, however, is a distortion of ANT. It is rather the case, I argue, that it is overly ambitious (or naive) to expect ANT (or any other theoretical framework for that matter) to instruct you how to separate foreground from background (Bijker 1993). Employing ANT still requires a researcher to make critical judgements about how to delineate the context of study from the backdrop. By placing ANT at the basis of the model and setting enables the models to develop in a flexible manner towards supplementing explanation and supplying a vehicle to wheel actor network explanations into clarity for the non believers.

Two concepts from actor network theory are of particular relevance in using it to underpin a model: they are inscription (Akrich 1992; Akrich and Latour 1992) and translation (Callon 1991, 1994; Latour 1987). The notion of inscription refers to the way technical artefacts embody patterns of use: "Technical objects thus simultaneously embody and measure a set of relations between heterogeneous elements" (Akrich 1992, p.205). The term inscription might sound somewhat deterministic by suggesting that action is inscribed, grafted or hard-wired into an artefact. This, however, is a misinterpretation. Balancing the tight-rope between, on the one hand, an objectivistic stance where artefacts determine the use and, on the other hand, a subjectivistic stance holding that an artefact is always interpreted and appropriated flexibly, the notion of an inscription may be used to describe how concrete anticipations and restrictions of future patterns of use are involved in the development and use of a technology. Akrich (1992, p.208, emphasis added) explains the notion of inscription in the following way:

> Designers thus define actors with specific tastes, competencies, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. (...) The technical realization of the innovator's beliefs about the relationship between an object and its surrounding actors is thus an attempt to predetermine the settings that users are asked to imagine (...).

Stability and social order, according to actor-network theory, are continually negotiated as a social process of aligning interests. This takes place in "the process that is called translation which generates ordering effects such as devices, agents, institutions, or organizations" (Law 1992, p.366). As actors from the outset have a diverse set of interests, stability rests crucially on the ability to translate, that is, re-interpret, re-present or appropriate, others' interests to one's own. In other words, with a translation one and the same interest or anticipation may be presented in different ways thereby mobilising broader support. A translation presupposes a medium or a "material into which it is inscribed", that is, translations are "embodied in texts, machines, bodily skills [which] become their support, their more or less faithful executive" (Callon 1991, p.143).

In ANT terms, design is translation: "users'" and others' interests may, according to typical ideal models, be translated into specific "needs," the specific needs are further translated into more general and unified needs so that these needs might be translated into one and

the same solution. When the solution (system) is running, it will be adopted by the users by translating the system into the context of their specific work tasks and situations.

In such a translation, or design, process, the designer works out a scenario for how the system will be used. This scenario is inscribed into the system. The inscription includes programs of action for the users, and it defines roles to be played by users and the system. In doing this she is also making implicit or explicit assumptions about what competencies are required by the users as well as the system. In ANT terminology, she delegates roles and competencies to the components of the socio-technical network, including users as well as the components of the system (Latour 1991). By inscribing programs of actions into a piece of technology, the technology becomes an actor imposing its inscribed program of action on its users.

The inscribed patterns of use may not succeed because the actual use deviates from it. Rather than following its assigned program of action, a user may use the system in an unanticipated way; she may follow an anti-program (Latour 1991). When studying the use of technical artefacts one necessarily shifts back and forth "between the designer's projected user and the real user" in order to describe this dynamic negotiation process of design (Akrich 1992, p.209).

Some technologies inscribe weak/flexible programs of action while others inscribe strong/inflexible programs. Examples of the former are tools, the hammer being a classic example and the assembly line of Chaplin's "Modern times" a standard illustration of the latter.

Inscriptions are given a concrete content because they represent interests inscribed into a material. As Law (1992, p.387) points out:

> "Thus a good ordering strategy is to embody a set of relations in durable materials. Consequently, a relatively stable network is one embodied in and performed by a range of durable materials".

The flexibility of inscriptions vary, some structure the pattern of use strongly, others weakly. The strength of inscriptions, whether they must be followed or can be avoided, depends on the irreversibility of the actor-network they are inscribed into. It is never possible to know before hand, but by studying the sequence of attempted inscriptions we learn more about exactly how and which inscriptions were needed to achieve a given aim. To exemplify, consider what it takes to establish a specific work routine. One could, for instance, try to inscribe the routine into required skills through training. Or, if this inscription was too weak, one could inscribe the routine into a textual description in the form of manuals. Or, if this still is too weak, one could inscribe the work routines by supporting them by an information system. Hence, through a process of translation, one and the same work routine may be attempted to be inscribed into components of different materials, components being linked together into a socio-technical network. By adding and superimposing these inscriptions they accumulate strength.

Latour (1991) provides an illuminating illustration of this aspect of actor-network theory. It is an example intended for pedagogic purposes. Hotels, from the point of view of management, want to ensure that the guests leave their keys at the front desk when leaving.

The way this objective may be accomplished, according to actor-network theory, is to inscribe the desired pattern of behaviour into an actor-network. The question then becomes how to inscribe it and into what. This is impossible to know for sure before hand, so management had to make a sequence of trials to test the strength of different inscriptions. In Latour's story, management first tried to inscribe it into an artefact in the form of a sign behind the counter requesting all guests to return the key when leaving. This inscription, however, was not strong enough. Then they tried having a manual doorkeeper — with the same result. Management then inscribed it into a key with a metal knob of some weight. By stepwise increasing the weight of the knob, the desired behaviour was finally achieved. Hence, through a succession of translations, the hotels' interest was finally inscribed into a network strong enough to impose the desired behaviour on the guests.

Inscriptions invite us to talk about how the various kinds of materials — artefacts, work routines, legal documents, prevailing norms and habits, written manuals, institutional and organisational arrangements and procedures — attempt to inscribe patterns of use (which may or may not succeed). Inscribing patterns of use is a way to confine the flexibility of use of an information infrastructure.

Inscriptions have many forms, quite a few of which are not easily spotted. We are accordingly particularly concerned with uncovering the different materials for inscriptions, that is, how and where patterns of use are inscribed. But first it is necessary to study how interests get translated, that is, how they are inscribed into one material before getting re-presented by inscribing it in a different material.

There are four aspects of the notions of inscription and translation which are particularly: (i) the identification of explicit anticipations (or scenarios) of use held by the various actors during design (that is, standardisation), (ii) how these anticipations are translated and inscribed into the standards (that is, the materials of the inscriptions), (iii) who inscribes them and (iv) the strength of these inscriptions, that is, the effort it takes to oppose or work around them.

Using and extending the core ANT vocabulary developed above, this vital aspect may be lifted forward to occupy centre stage. An information infrastructure is an aligned actor-network. The constitutive elements of an information infrastructure — the collection of standards and protocols, user expectations and experience, bureaucratic procedures for passing standards — inscribe patterns of use. But is it not possible to express this more precisely, to somehow "measure" the net effects (a dangerous expression, but let it pass) to which these superimposed inscriptions actually succeed in shaping the pattern of use, to "measure" the strength of an inscription?

Callon's concept of the (possible) irreversibility of an aligned network captures the accumulated resistance against change quite nicely (Callon 1991, 1994). It describes how translations between actor-networks are made durable, how they can resist assaults from competing translations. Callon (1991, p.159) states that the degree of irreversibility depends on (i) the extent to which it is subsequently impossible to go back to a point where that translation was only one amongst others and (ii) the extent to which it shapes and determines subsequent translations.

The alternative to distinct frameworks that ANT represents is to make the notion of an actor-network scalable. This implies that one actant of an actor-network may be expanded into a new, complete actor-network. Or the other way around, a whole actor-network may be collapsed into a single actant. As Callon and Latour (1986, p.286) phrase it: "To summarize, macro-actors are micro-actors seated on top of many (leaky) black boxes."

The basic message of ANT is as a strategy for unpacking the complexity of our everyday life. Abbreviations, short-circuits and simplifications are always produced. They are the result of a mobilisation process with black-boxing effects. The ordering these simplifications produce is neither neutral nor "obvious". They are made obvious or "neutral" in order to achieve an effect, namely to curb opposition or alternatives. Hence, the utterly "obvious" the model produced by the CHDGP to explain adoption of IT/IM in their division is a sound starting point for the further development of this model.

CHAPTER 4: THEORIES, METHODOLOGIES AND GUIDES

4.1 The approach to my research:

This section provides the parameters for my research which both directed and structured the research. Here I have described how the research was implemented from the literature review to the conclusions and recommendations. A qualitative approach using case study methodology informed by Actor Network Theory and supported by a comparison of this with Rogers' theory of adoption has been adopted for this research. This enables the views of the subjects to be fully documented and explained, it has enabled the assessment and comparison of two theories of adoption.

I found this approach was very useful because of the entities involved. This study was complex and the difficulty of dealing with a very diverse range of situations and contexts involving people, computers, the peripherals, procedures, software, data, and the health system and the issues that arose from the politics generated by the involvement of such diverse groups and organizations. Add to this the rapid change in information systems over the research period coupled with the changing emphasis on research method in the health related fields.

This research was provoked by four concerns:

- To explain the enablers and barriers to computerization of general practice in a given study area.
- To articulate and lay open the networks involved in the process of adoption.
- To articulate the significance of decisions, working lives, general practitioners, computerization and the contexts in which this happens.
- To compare two theories that explain the adoption of innovation.

By choosing a case study approach informed by ANT for this research I have enabled access to all the tools of qualitative research that I might choose to use. This may have produced a bias toward ANT throughout the thesis, however I have felt justified in this by the richness of the explanation that I have achieved and I have facilitated the flexibility of use of these tools. By not constraining myself to the use of only one tool for research within qualitative method I have been able to help myself to assistance as I have needed mechanisms to assist in gathering data. I have been able to apply methods from anthropology, sociology, and the social sciences. I have been in the position to open the Pandora's black box of this project and apply methods not usually used in the application of clinical research.

4.2 An approach that enables access to other research tools used as a framework:

This research is carried out in the precarious situation of a setting imbued with the scientific ethic. Even though the shift in emphasis from quantitative data gathering to qualitative data has accelerated dramatically over the last 5 years within the research arena of this project, this does not mean that my methodology will be easily received. The field of study is very dependant on a technology that is rapidly changing. The difficulty here is that there is still an overhang from the days when qualitative data was seen as unreliable, thus I thought I had to be very careful about the hows and whys of my methodology. There are a number of key concepts and terms which move ANT from a theory/experience to a method.

I offer this explanation of how this works. This research is carried out in a number of places (sites) in ANT terms - centres of calculation. Latour defines centres of calculation as "Any site where inscriptions are combined and make possible a type of calculation." (Latour 2000) Calling all sites where I carried out my research centres of calculation produces a genre of sites temporarily separated from the distraction of their local aims and practices. In terms of

this thesis, centres of calculation are sites which represent general practice and the adoption of computerization in any way. These can be institutions, organizations, events, policy, computers in general practice, software for the computers, and so on. For a centre of calculation to function as an ANT site the hierarchical ranking of actors there must be dissolved. Instead, the mix of humans and non human actors in the sites are ascribed with equal status and power and renamed actants.

For all actants to infer the nature of a site they must enter into relationships called networks. (Brown, Capevila 1999) Networks are the entities that bring together all the socio/technical actions which transform ideas into objects. The potential for all actants in centres of calculation to create networks is modified by two roles that the actants play. Latour calls these intermediary and mediator roles. He saw the first to be links that are not always permanent – they are dispensable, may be open to manipulation and often very flexible. Mediator roles on the other hand are strong entities which add to and remain in networks. He described mediators as "actors endowed with the capacity to translate what they transport, to redefine it, redeploy it, and also betray it" (Latour 1993). By applying this approach we can now separate the roles. Intermediaries make connection and hand things on while mediators translate connection into a form which builds the network into an object. By viewing the actant in this way we can now separate them into their role at the site and give ourselves an analytical tool.

Implied here is that there is a lot of behind the scenes work being done. "Chains of translation refer to the work through which actors modify, displace and translate their various and contradictory interests. Chains of translation problematize (identify a problem) so that interessment can occur (getting everyone interested) followed by enrolment forming a team and mobilization As a result of these activities a mediator can translate the activities into terms understood and supported by others in the network resulting in strengthening of the network. When the results of translation available for a centre of

calculation are no longer subject to further mediation they are “Black Boxed” and the actants in the black box taken for granted.

In going through the above acceptance of ANT and combining it with my usual qualitative research method not only made me understand what I was about to undertake but also facilitated the comparison of the two theories and the decision that one of the theories was more appropriate in these complex circumstances. By using ANT I was able to open up the black boxes of the taken for granted facts, truths and ways of being in general practice

By using ANT to inform the method I have been able to analyse by not making distinction between subjects and objects, the subjective and the objective. I have been able to view the vignette including all actants and accept that both human and non humans can be actors (actants). I have been able to open up the process of how one actant may enrol another into the network so that allies are created and the network is strengthened. (Latour and Callon 1999)

Further to the above, by using ANT I have been able to test the assertion of Latour that laboratory science is more that the implementation of a rational science. For example Latour asserts that the results of laboratory research are not always what they seem. The scientist has an idea about something - an hypothesis. An experiment is set up to test that hypothesis. But in doing so the result is distorted because the method of research is chosen to prove the hypothesis. Therefore not all research is what it seems. Latour takes that approach that a researcher has to follow the actants (the entire human and non humans in a network). Discover what they do, what they think and how they network together. This will give the information that will expose what occurs and show the pattern in say a process of adoption of computers in general practice.

4.3 The tools I used to implement my approach:

Use of qualitative tools for this methodology, coupled with the use of several phases during this research – Case study; Initial survey; Interviews; Follow up survey; Second interview; has assisted in the comparison of the two theories that might explain adoption. I feel more than justified, because of this thorough sorting process, in concluding that one theory (in this case) was superior to the other. By using this approach I have been able to discover what the players really "did" in the adoption of computers in general practice. I have been able to "see" more than the results of their action. I have been able to "see" what those actions were and how they were linked in a network within contexts that were ever changing.

In the first phase of the research a literature search was conducted to assist with background information, at this point case study evidence came from documents, archival records, interviews, direct observation**.** In relation to the literature review the process began with the original submission for funding. Research used in this preparation (Tatnall et al 2002) appears to have confirmed the view that the study area and general practices within it may be an example of diffusion process in action or of innovation translation.

The literature review involved a narrative review of several data bases, qualitative primary care research articles, case studies published through the General Practice Computing Group, reported research in Social Science Journals and journals from health informatics associations. The narrative I developed was based on selecting articles/research that meet the criteria of a coding instrument that used the study details, trustworthiness of data, data collection method and data analysis method as criteria for selection. Each of these four aspects was given a rating out of seven. If all four criteria were given a rating of five or over on these four characteristics then that article/research was used in the literature review.

Using the case study approach – another tool for this research

In undertaking the literature review for methodology I have discovered that there is strong tradition maintained by regular case study reports in the *British Medical Journal* and other leading medical journals. It is my belief that this research, being as it was, about wider health service changes, would benefit from the inclusion of these in the third phase. Therefore I will briefly outline the circumstances where case studies were used.

4.4 Case study research

When is it appropriate to use case studies? Case studies are valuable where policy change is occurring in messy real world settings, and it is important to understand why such interventions succeed or fail. (Yin 1994) The key problem for this research is that the ways in which policies/decisions are formulated and promulgated means that I have no control over events. As a result, experimental designs are typically not feasible, and even the opportunities for rigorous comparison using observational designs can be limited so cannot easily be distinguished from the general environment. An example of this point is the networking and other elements of the General Practice Computing Group in the forming of the information technology strategy 2004-2006. These strategies are well defined and might be expected to exert their effects over different timescales, in many different places and on different groups of people. Thus case studies will be an effective way to draw out the minutiae of situations in general practices that have arisen as a result of this political group.

Another reason I used case studies in the third phase of this research is that questions about policy and practice touch on local and national health politics. Adoption of IT/IM can be linked to the implementation of the Practice Incentives Program, and so, may depend for its success on the involvement of several different interested parties, so it was often necessary to be sensitive to issues of collaboration and conflict. Each party may have a

legitimate, but different, interpretation of events. I thought that for political and other reasons, it may not be clear at the outset of this research whether adopting IT/IM will be fully implemented by the end of a study period, or for that matter ever fully implemented. Such an example is the National Health System in Britain where accounts of the problems faced in implementing computer systems in health care are well documented - yet study of these failures may provide valuable clues that help to shape future policies. In short, the strength of good case study design is that they can cope with, and provide insights into, complex real world developments, with the "case" providing a source of explanations for wider developments. Thus I feel very justified in using case studies within an Actor Network Approach.

Design of case studies

Case studies have a number of common features (Yin 1994). Each one involves identifying research questions that stem from concerns about the implications of new policies, or from concerns about implementation "on the ground", or from claims about new management theories such as re-engineering.

Once a broad research question has been identified, there are two approaches to the design of case study research, either of which may be appropriate depending on the circumstances. In the first, precise questions are posed at the outset of the research and data collection and analysis are directed towards answering them. I chose the second approach because it was more open, and in effect started by asking very broad questions: "What is happening here, what are the important features and relationships in this practice?" I thought this approach was more in line with gathering richer data and with Actor Network Theory.

The early fieldwork for this research used interviews and observation of meetings as I hoped to generate data that could be used to identify and refine specific research questions inductively. This type of design, in which

detailed research questions emerge during the course of the study, has been advocated for general use in the study of the impact of government policies in the health system. Silverman (1993) claims that in some ways it is similar to the way in which clinical consultations are conducted. These involve initial exploration followed by progress over time towards a diagnosis inferred from the available data. From the point of view of Actor Network the patient is enrolled in the process of diagnosis, the doctor guides the process and then may enrol the use of the internet via the computer on the desk to assist in the diagnosis. Thus a diagnosis is arrived at and the short term network is dissolved when the patient leaves the consultation room. In the case of the adoption of computers in the practice the network established is much longer term but in the scheme of time still short term, so will endear itself to the case study approach of Actor Network.

The process of selecting sites for study was central to my case study approach. I used a number of selection strategies. Because resources for case study work are usually limited, it was necessary to design a "purposive" sample that was typical of the phenomenon being investigated, where a specific theory can be tested, or where cases will confirm or refute a hypothesis. I was able to benefit from expert advice from the industry partner and many of the staff at Central Highlands Division of General Practice in developing this sample. I was also able to benefit from the good advice of the coordinator of the practice managers group, herself a practice manager. Staff at CHDGP had also identified a list of practices identified as “lighthouse practices” (see glossary). Thus I was able to replicate results across sites ensuring that findings are not due to idiosyncratic features of particular sites.

The next step was to ensure that any data gathered in the case studies was valid. Here I noted that case studies often use "triangulation" to maximise validity of findings. In triangulation, all data items are corroborated from at least one other source and normally also via another method of data collection. I had my earlier interviews and also the results of my surveys.

This said, I found that triangulation had some weaknesses for not all results completely made sense. I then remembered that the tool used can influence the data gathered, so triangulation had some difficulties for me. Some studies have, by contrast, used comparison of case study data with that from a larger sample to explore how far findings might be strengthened and generalised.

Based on the work of Yin (1994) I implemented the concept of comparison of the case studies, and took it a step further. Some practices self reported using IT/IM in several ways and on observation I found that was not the case. So in drawing up a comparative spreadsheet of the case studies I was able to "see" the number of uses that practices reported. This provided me with a sound comparative tool. The less items/uses they talked about the less they were using computers in a very broad way in the practice. The key point here is that I was able to combine data from all methods of data gathering in order to validate findings.

Another example of the central concern of case studies with establishing validity is provided in a study of purchaser-provider contracting for community health services. The purpose of the study was to gather information about the processes involved in contracting in the National Health Scheme (NHS) internal market. A small number of sites were chosen, the selection of sites being based in part on different organisational structures and approaches to purchasing to allow for broad comparison of experiences. Observations of meetings were recorded, verbatim notes were made of discussions in situ, and documents were obtained about all stages of the contracting process. Interviews were held with patients and users of health services, and an interview survey of GPs was conducted. The data obtained using each method were analysed separately and then compared with one another across different methods and study sites.

Whatever the details, the collection of data should be directed towards the development of an analytical framework that will facilitate interpretation of

findings. Again, there are several ways in which this might be done. Sometimes data are collected in order to test specific hypotheses. In the evaluation of resource management, in contrast, there was no obvious pre-existing theory that could be applied: the development of a framework during the study was crucial to help organise data and evaluate findings. The framework was not imposed on the data, but derived from it in an iterative process over the course of the evaluation; each was used to refine the other over time. Possibilities for testing emerging findings can be built into case study design - for example, by feedback in report or workshop form to participants or knowledgeable informants, or by using further small-scale case studies.

The investigator is finally left with the difficult task of making a judgement about the findings of a study and determining its wider implications. The purpose of the steps followed in designing and building the case study is to maximise confidence in the findings, but interpretation inevitably involves value judgements and the danger of bias. In some circumstances widely differing opinions of participants are themselves very important, and should be reflected in any report. The case study approach enables the researcher to gauge confidence in both the internal and external validity of the findings, and make comments with the appropriate assurance or with reservations.

4.5 Other qualitative methodology used to support my case study approach:

Qualitative research methods have long been used in the social sciences. I believe qualitative methods have much to offer those studying health and health care settings, and they are increasingly being used in health services research. However it is still a new type of research method for many of the people involved in the health sciences as they are so established in the traditions of scientific methodology. Thus, these methods may be unfamiliar to health care professionals and researchers with biomedical or natural science backgrounds or in the IT/IM fields. I found that there were some misunderstandings about the nature of qualitative methods and it was often

labelled "unscientific". A frequent criticism of my data gathering was that qualitative data are necessarily subjective (and, therefore, biased) and that my research would be difficult to replicate and may amount to little more than anecdote, personal impression or conjecture. The following remark of one of the general practitioners in the research is representative of this line of thinking – 'Well we know you social scientists make more out of things than there really is in it" (Interview May 2004)

Moreover, the connection between research and theoretical perspective may not always be clear: sometimes the link is implicit or simply not acknowledged. This was originally a good reason for using the two theories of adoption. I believed that this would make clear the implicit and sometime unacknowledged links. I also thought that the use of qualitative methodology would facilitate my aim to unpack some of the accepted (and now taken as given) "facts" about computer use in general practice.

I believe that I would not have been able to do this using traditional methodology alone. As Bruno Latour might claim, I was able to unpack the black boxes. As it has turned out the use of Actor Network Theory was by far the superior method in unpacking the story about computer use in rural general practice.

However, the unfortunate corollary of this way of defining qualitative research is the inference that because qualitative research does not seek to quantify or enumerate, it does not "measure". Whilst it is true that qualitative research generally deals with talk or words rather than numbers, this did not mean that my research was devoid of measurement, or that it cannot be used to explain social phenomena, for example I found in the early stages of the research that a certain number of general practices were using computers in a specific way – this was obviously quantified data. However the reasons for this can only be explained in a qualitative manner. The use of computers in the earlier parts of the study was then compared

with the later parts of the study and again provided quantitative data, but again this could only be explained by the use of qualitative method.

Another feature of my research, and one of its key strengths, is that I studied people in their natural settings rather than in artificial or experimental ones. Watching people in their own territory entailed observing, joining in (*participant observation*), talking with people (interviews, focus and informal chatting) and reading what they have written. I thought it was important to discuss the responses that the members of a general practice gave in interviews, or to extrapolate the reasons that they gave for using computers in a specific way. Here I had to overcome the difficulty of being perceived as someone who was eavesdropping or being secretive. I found that the more I was open and the more that people understood what I was doing then the better the situation became. I believe I would not have been able to gain trust if I had used quantitative methods. I also found that asking people to sign my privacy form helped in establishing trust. In the world of medical application this was more important to the participants than in other research that I have conducted.

I also came to appreciate the role that qualitative research played in "validating" the quantitative aspects of this research by providing a different perspective on the same social phenomena. It emerged from discussions with my supervisor that a major reinterpretation of quantitative data I gathered could only be gained through actor network analysis, for the details of the “whys and wherefores” emerged.

In the past the staff members at CHDPG had kept data on the levels of computers use in general practices but there was no evidence that would explain why the levels of use were the way that they were. The explanations I gained from this research enriched the original data greatly. As well as complementing the data that CHDGP had in their systems, my data was able

to uncover social processes and factors explaining the process of adoption that would not have emerged if I had used a different approach.

In exploring peoples' subjective understandings of their everyday lives by applying Actor Network Analysis I was able to focus on talk and action rather than numbers. On one level, these "qualitative methods" are used every day by human beings to make sense of the world - we watch what is going on, ask questions of each other and try to comprehend the social world we live in. The key difference between this and the qualitative methods I employed is that I was systematic (taking the advice of Bruno Latour 1996). As Latour suggested in applying Actor Network Analysis I was able to follow the actors in the research in a logical, planned and thorough collection of data and I was able to give a careful, thoughtful analysis .

In the second phase of the research I originally planned to undertake intensive case studies of 32 practices, based on the case study methodology of Yin 1994. This was not possible, for I was not able to have access to that many, so I undertook intensive case studies of 4 of the practices. While I originally thought that this would limit my chances of results being generalized, I decided in the light of the emerging data that it was far more important to have intensive case studies rather than 32 sketchy case studies. For the purposes of comparing the two theories of adoption 4 practices would be more than enough. The precedent for a limited number of case studies has been created by the productivity commission in 2004. Their justification was that it is very difficult to have practices become involved in research because of time and cost restraints. The story is no different for this research.

In the second phase interviewing and participant observation were important. The attraction of interview-based studies for my research in this area was proximity of the doctors and practice managers to the task of data gathering. The strength of this approach in this case is that practices routinely interview patients every day, all staff do this either on the telephone accepting appointments, talking to patients as they arrive for appointments, or as

doctors interviewing patients, and so were used to this as an information gathering process. So it was only one step further to formalize it. However they still wondered whether simply talking to people constituted a legitimate form of research. For this research I used all three types of interviewing techniques - structured, semi-structured and depth interviews.

My structured interviews consisted of administering structured questionnaires. In this research for example, one of the questions asked of the GPs was: "Is your use of computers excellent, good, fair or poor?" If there were no structure, I felt there would be no guarantee that the data gathered would be appropriate to the research question.

Semi-structured interviews were conducted on the basis of a looser structure consisting of open-ended questions that define the area to be explored, at least initially, and from which the interviewer or interviewee may diverge in order to pursue an idea or response in more detail. Continuing with the same example, GPs and practice managers were asked a series of questions such as: "What do you think good use of computers involves?", "How do you consider your own use of computers?" “How do you think that the practice went about integrating computers?”

Depth interviews were less structured than this, and covered only one or two issues, but in much greater detail. Such an interview began with the interviewer saying, "This research study is about how GPs use computers. Can you tell me about your own use and experiences with computers?" Further questions from me would be based on what the interviewee said, and consisted mostly of clarification and probing for details. It was in these interviews that transcription was of the utmost importance.

I was comfortable in using these three interviewing techniques because my literature review showed that interviews have been used extensively in studies of both patients and doctors. For example, Britten (1994; 44:465-8.) interviewed 30 attendees and non-attendees at two general practices to

explore patients' ideas about medicines. A semi-structured interview schedule of 16 questions was used, but respondents were also encouraged to talk freely. The data revealed that on the one hand much medicine taking was taken for granted and, on the other hand, that patients had many fears and powerful negative images of medicines. This last, would not have emerged if quantitative methodology was used. I found that this was much the same for my research. For example it would not have emerged that some GPs resent being covertly told how to run their practices by the Health Insurance Commission. I would not have been in a position to tease this out and discover the way in which codes are applied to payments thus affecting the way that doctors are paid for services, thus covertly controlling the practices. It is obvious the research needed to remain open to the possibility that the concepts and variables that emerge may be very different from those that might have been predicted at the outset.

Conducting the interview

It was the aim of this research to try to be interactive and sensitive to the language and concepts used by general practice, and to try to keep the agenda flexible. The aim was to go below the surface of the way general practices report they use computers and to explore what they say in as much detail as possible, and uncover new areas or ideas that were not anticipated at the outset of the research. I thought it important that during the interviews checks were made to show I understood the meanings instead of relying on my own assumptions. This was particularly important if there is obvious potential for misunderstanding - for example, I am not overly familiar with medical terminology so I needed to be careful that I was aware that the person being interviewed in the general practice used medical terminology in the same way that I do and that this use does not sidetrack away from the topic of computer usage.

Patton(1987:108-43. 1987:108-43.) has written that good questions in qualitative interviews should be open-ended, neutral, sensitive and clear to

the interviewee. In constructing my interview questions I took note of the six types of questions that Paton suggested could be asked:

- those based on behaviour or experience,
- on opinion or value,
- on feeling,
- on knowledge,
- on sensory experience,
- and those asking about demographic or background details.

Patton (1987) suggested it is best to start with questions that the interviewee can answer easily and then proceed to more difficult or sensitive topics. It appeared that most doctors and practice managers would be willing to provide the kind of information that I wanted because they had given their support for this project to the board for CHDGP but I felt I needed to give clear guidance about the amount of detail required.

I also suspected that the less structured the interview, the less the questions were determined and standardised before the interview occurred, the greater the quality of the data I would collect. I had a list of core questions that defined the areas to be covered, however, based on the objectives of this study, the order in which questions were asked varied.

I also thought it was not possible to standardise wordings because I was trying to use the member of general practice's own vocabulary and experiences when framing supplementary questions. I also introduced further questions as I became more familiar with the topic being discussed. This was very beneficial to gathering data as these questions allowed me to tease out the case studies and to individualise the case studies.

Another aspect I was concerned about was the effects of my personal characteristics on the interviews I conducted. In the first place I might appear as a non expert eg; I was not a drug company rep, I was not a

receptionist, I was not a nurse, nor a doctor. At this outset of the research I did not think this was very important. However, as I became more familiar with GPs and practice managers I recognized a culture of needing to get "things". I suspect this was mainly because general practice has had extensive funding and support from the Federal Government for implementing IT/IM. Thus it became important to give the GPs permission to say what they really thought if the research I reported was to contribute to clarifying the position of general practice in rural areas.

Researcher as Instrument

Throughout this research I was careful to monitor my own interviewing technique, critically appraising tape recordings of interviews and referring back to the general practices if necessary to clarify meaning. I was careful of being too directive, eg not to ask leading questions, to pick up on cues, and ensure that the interviewees in the general practices are given enough time to explain what they mean. Whyte (1982:111-22) devised a six point directiveness scale to help researchers analyse their own interviewing technique. The point I am making is not that non-directiveness is always best, but that the amount of directiveness should be appropriate to my research. I found some interviewees were more verbose than others, and it was important to not waste any one's time in allowing the interview to be sidetracked. Patton (1987) provided three strategies for maintaining control: knowing the purpose of the interview, asking the right questions to get the information needed, and giving appropriate verbal and non-verbal feedback. In taking care with my interviewing I coupled Whyte's (op cit) directiveness scale for analysing interviewing technique and Paton's (1987) suggestions.

1. Making encouraging noises
2. Reflecting on remarks made by the informant
3. Probing on the last remark by the informant
4. Probing an idea preceding the last remark by the informant
5. Probing an idea expressed earlier in the interview

6. Introducing a new topic

(1=least directive, 6=most directive)

Holstein and Gubrium (1995:56) have written about the "active" interview to emphasise the point that all interviews are collaborative enterprises. They argue that both interviewer and interviewee are engaged in the business of constructing meaning, whether this is acknowledged or not. They criticise the traditional view in which a passive respondent is accessing a "vessel of answers" that exists independently of the interview process. In their view the interview is an active process in which the respondent activates different aspects of her or his stock of knowledge, with the interviewer's help. They conclude that an active interview study has two aims: "to gather information about what the research project is about and to explicate how knowledge concerning that topic is narratively constructed".

I could not have used this participant mode of interviewing if I used an approach that was even slightly quantitative. I would not have obtained the data that would explain if I used surveys and interviews that concentrated on gathering information to apply Rogers' theory of adoption. This was only possible when I applied Actor Network Theory to my thinking about interview structure. I found that I lost contact with the interviewees if I spent too much time with them. Spending too much time occurred when I tried to use interview techniques from both perspectives. Thus, as the research progressed, I found that I was leaning more and more towards and Actor Network approach for it facilitated in obtaining the rich field of data that would assist in exploring the inhibitors to adoption of IT/IM in general practice.

Some common pitfalls for interviewers identified by Field and Morse (1989) include outside interruptions, competing distractions, stage fright, awkward questions, jumping from one subject to another, and the temptation to counsel interviewees. Having an awareness of these pitfalls assisted me to

develop ways of overcoming them, ranging from simple tasks such as asking a practice manager to give me uninterrupted time in private or if this was not possible to allow me to spend a day shadowing them in their work, thus giving us both the opportunity to exchange information in a progressive manner during the day. This also allowed them to get to know me a little and broke down barriers, so that it was not a difficulty in asking practice managers, (who are very busy), to give me more time –they realised they could continue with their work

Recording the interviews

In recording interviews I could chose any one of three ways of recording qualitative interviews: notes written at the time, notes written afterwards, and audio taping. Writing notes at the time can interfere with the process of interviewing, and notes written afterwards are likely to miss out some details. In the past I have found that in certain situations, written notes are preferable to audio taping, but most people will agree to have an interview tape recorded, although it may take them a little while to speak freely in front of a machine. My machine was a Sony digital recorder and it was very unobtrusive - a slim little thing that was soon forgotten. It could record up to sixteen hours; I could download it to the internet to a transcription agency which ensured that the minimum amount of time was used in transcribing.

Identifying interviewees

Statistical representativeness is not thought of as utmost important to this research because the study area decrees the interviewees. However a sample size of 143 GPs and 32 in depth interviews, followed by 60 topic specific interviews, was already determined in the original submission of this research. This changed because such factors as the depth and duration required for each interview and the distance to travel in the study area made it impossible to achieve that number of interviews. Large qualitative studies do not often interview more than 50 or 60 people.

Even though the Practices (via the board at CHDGP) had given their support to this research, negotiating access had to be carried out. This was not as easy as it may have seemed to some. In the first place federal funding was withdrawn for full blown support for IT/IM, thus relegating it to the back benches in importance to practices. The focus of practices was on other new initiatives that were funded in a more substantial manner. Thus again the number of practices willing to participate was reduced.

Britten (1994) contends that qualitative interviewing is a flexible and powerful tool but it is worth remembering that answers to interview questions about the whys and hows of behaviour will not necessarily correspond with observational studies: what people say they do is not always the same as what they can be observed doing. According to anecdotal information this may well be the case for rural general practice. That said, qualitative interviews are of immediate relevance to this research because it enables everyday work of general practice to be researched, this would otherwise be difficult to investigate.

Observational methods in health care settings

While interviews may reveal the beliefs and attitudes of general practices in the study area, and members of general practices may talk about their actions and behaviour, we cannot be sure that what people say they do is what they really do (Atkinson P.1995.). This became evident to me from remarks of staff at CHDGP. “Oh they say they are fully computerised and almost paperless, but why do they still hand write their notes on patients and, why do they still keep a handwritten appointment book?” Thus the importance of being in the position of observing on the days that I spent at practices while talking with managers was very important and became a source of very rich data.

It can be argued that observation is the basis of all scientific inquiry. It is the building block of the natural sciences: the biologist observes development of

cell structures and the chemist observes the changes that occur in chemical reactions. Observational studies of populations or communities are used in epidemiology to look for patterns in the incidence of disease, thereby suggesting possible causes. At the individual level, research in clinical and experimental psychology also relies on observation, as does the monitoring of a patient in a hospital bed. (Dingwell 1980). So I determined that observational method would be acceptable in the general practices.

Qualitative observational methods used for this research differed from these types of observation. One of the crucial differences between my research and that conducted in a clinical setting is that in the social world we use language to describe, reflect on, and argue about what we are doing. This shared language and understanding of the practices further enriched the data I gathered.

That does not imply that this research used ethnography as a research tool. The premise underlying ethnography is that in order to understand a group of people, the researcher needs to observe their daily lives, ideally living with, and living like them. I could not do this (obviously) but as an outsider I considered some aspects of the practices noteworthy, eg the diversity of the position of Practice Manager from practice to practice. It is unlikely that I would have noticed this if I had not had the opportunity to observe at the practices. This was important in this research given that the Practice Managers have emerged as an integral part of the study.

Pope (1991) found (based on extended periods spent observing the admissions office in a district hospital), that surgical and administrative preferences dictated how and when patients were selected from surgical waiting lists. This study demonstrated that waiting lists did not operate as a queue, following the rule of "first come, first served"; rather different admission decisions were informed by such things as the sorts of cases needed for teaching medical students, or the ease with which patients could be contacted. In carrying out this research I found that some decisions in a

practice can be made in an unplanned manner, informed by current (todays) information. Thus some IT/IM is changed through these informal decision making processes. I would not have seen this if I was not in a position to observe.

During the observations I found myself adopting different roles according to the type of practice and their relationships with CHDGP. Some practices are more open than others and it was possible to adhere to the role of detached observer, unobtrusively watching what goes on. However, the presence of an observer, particularly in more private settings, may stimulate modifications in behaviour or action - the so-called Hawthorne effect, although this effect seemed to reduce over time. The Practice Managers also began to reflect on their activities and question me about how they were using IT/IM.

Dingwall (1983) has suggested that the research I was able to undertake often entails continual, informal negotiation of access and consent, although he concedes that this may not be feasible or practical in all settings. Thus I was aware of the need to constantly reassure that consent has not been withdrawn either by the practice managers or the practices.

Recording observational data

Observational research relies on the researcher acting as the research instrument and documenting the world she or he observes. This requires not only good observational skills, but good memory and clear, detailed and systematic recording. Silverman (1993) has posited that whatever the research role adopted, whether covert or overt, participant or non-participant can influence the process of recording. Sometimes it is possible to take notes or record information in the setting, at others times this may be impractical or off-putting. The method I chose to record my data and my observations was a tick sheet of all possible acts that a practice manager undertook. This tick sheet was based on the job description provided to me by the practice

managers. After recording these actions I then recorded any variation to these. (See appendix 3) I was not able to fill these out on site at all times, so I would sit in the car before I drove away and go through the day to record what I had seen.

On many occasions I had to rely on my jotted notes made where possible during observation, one way of making such notes was to find excuses to leave the setting for a few minutes to write up - I would simply ask the people being observed if they minded if I took some time off to write up my notes. This was a good way of gaining trust as my notes were open and anyone could read what I was recording. As I have been in this situation in mentoring trainee teachers I knew that it worked. The notes I took will recorded key events, timings, quotes or actions.

I was aware that the recording of observational material could be structured around a list of items to observe and describe, for example, the layout of the practice. Silverman (1993) used such an approach in his study of paediatric cardiology clinics. Having observed ten clinics, he developed a coding form for recording "disposal" decisions, which covered the factors that appeared, on the basis of these initial observations, to be involved in those decisions - things such as clinical and social factors, and how and when decisions were communicated to patients. It was not difficult to develop a short hand for observations –I have had to do this in teaching.

It was important to write my notes up as soon as I could for my experiences as a teacher had shown me that you soon forget what may have occurred. In addition to this I documented my personal impressions, feelings and reactions to these observations through the use of a diary. I was also able to ensure that I gave a true account of the practice being observed as I was able to refer back to these notes and reflect about them in tandem with the member of a practice if it was necessary.

Generalizing from my research

I have carried out a content analysis, and an iterative process of developing categories from the field notes making an Excel spread sheet on which to compare and contrast the practices. This occurred during the third phase of the data collection when the general practice were revisited and also during the time spent with the practice managers. By including the comparative element of different types of practices i.e. semi-urban compared to distinctly rural, which has occurred simply because the study area is comprised of these characteristics, I was in a better position to undertake generalizations with a better element of reliability.

4.6 Conclusion

The complexity of the issues that health professionals have to address, and increasing recognition by policy makers, academics and practitioners of the value of qualitative research in evaluating health service interventions, suggest that the use of such studies is likely to increase in the future. Without the use of Actor Network Theory to underpin and inform the qualitative tools used in this research I would not have been able to describe and explain the complexities nor would I have been able to discover the influence of organizations and articulate the networks of human and non human stakeholders.

CHAPTER 5: **TIMELINE FOR THE ADOPTION OF COMPUTERS IN GENERAL PRACTICE** - *a step further from the literature review in the background history and a little more about how the black box of computerization in general practice in Australia came about.*

Australian general practice is at the heart of Australian health care, and has been the focus of Federal Government policy for almost two decades. (General Practice Review 2004). The formation of the Royal Australian College of General Practice in 1954 was a key milestone in the identification of general practice as a distinct specialisation. It was the recognition of vocational registration in 1987 that enabled general practice to access better payment for service. Until then it was seen as a poor cousin to specialities in any area and not well served by health care policy. (Dr Morton Rawlin 2006)

It was during the late 1980s that the General Practice Forum took place attempting to bring together all stakeholders from the representative groups into one lobbying force. This forum drew together the Australian Medical Association (AMA), Royal Australian College of General Practice (RACGP) and the Rural Doctors Association of Australia (RDAA). This was instigated by the RACGP, and cemented the role of the college as the peak lobbying body with the Commonwealth. Without this approach the reforms of the 1990s, including the implementation of computers in general practice, would not have been possible. The forum was gradually replaced by many committees until the replacement of these by the General Practice Partnership Advisory Council (GPPAC) in 1998. These days the GPPAC has been replaced by the General Practice Reference Group under the auspices of the RACGP. It is the only key body negotiating with the Commonwealth at a high level even though there remain a large number of groups and committees associated with projects and programs. (RACGP archives)

The early 1990s saw a very important policy commitment from all stakeholders to more clearly defining the role of general practice, to develop strategies that would ensure quality, and to contribute to the most effective

way to deliver health services. Thus the agreements from the early 1990s saw the beginning of substantial intervention by the Commonwealth into general practice. This has accelerated over the last decade as the drawing together of a private market model of health provision and a public provision model has occurred. The focus is on continuous improvement of care and the provision of that care. Thus general practice has become the primary point of contact for the public in the provision of health care. Imperatives to emerge from these changes of the 1990s have been very important, not the least of all information technology and information management in general practice. (Dr Morton Rawlin 2006)

The following (taken from archive records at RACGP) are the defining moments in the use of computers in general practice beginning even before the rapid change of the 1990s:

- 1976 The Royal Australian College of General Practice hold their first national computing Conference

- 1979 The first RACGP Computer policy was Promulgated
- 1981 The Computerises Medical Records Systems – Proposed Minimum Standards document was developed by RACGP.
- 1985 Medrecord Computer Systems jointly launch the Computer Assisted Practice Project
- 1986 The national computer committee of RACGP was formed as an advisory body to the Practice Management Committee of Council
- 1988 RACGP released its RACGP Standards for computerised Medical Record Systems
- 1992 The Australian Medical Association, RACGP and the Commonwealth negotiated a strategy to address problems affecting general practice
- 1992 The divisions of general practice are funded as part of the above GP strategy

- 1993 – 1996 95 grants awarded to the divisions of general practice to accelerate the development of information management and information technology
- 1996 Divisions set up electronic communication with hospitals and other health service providers, developed software to promote the use of computers in general practice consultations. They trained GPs about using aspects of software and hardware in their practices.
- 1997 Policy change governing the Divisions of General Practice commenced a move away from short term project funding towards longer term outcomes-based program activity funded by block grants
- IM/IT support for general practice can be available in some divisions of general practice under block grant funding arrangements through the Divisions of General Practice Programs
- Some divisions invest in development of IT/IM infrastructure with information services, education and access to ongoing support from divisional staff with technological expertise.
- 1997 the commonwealth minister for health and family services commissioned a review of the GP strategy (Commonwealth review of general practice 1997) that had been agreed on in 1992 and recommended that:

  "- General practitioners, national GP organizations and governments recognise that increased uptake of information technology is vital to the future of general practice

  - The Commonwealth take initiatives to encourage the rapid development of software that meets appropriate standards for general practice

  - Standards are developed for general practice information systems to cover security and privacy, data dictionaries and data sets, terminology and coding systems, quality information

management systems and tools, communication standards, and prescribing software

- Functional specifications for core modular applications be developed

- Funding be provided to trial integrated health records

- Standardised paper and electronic forms be developed

- General Practitioners are funded to provide de-identified data to monitor health outcomes in local communities

- The development of secure data communication networks be facilitated for interchange of confidential clinical data

- Divisions of General Practice receive funding to promote the use of information management systems, assist GPs to select and install systems which meet appropriate standards, train GPs in the use of applications, and provide IT support services

- The HIC provide practices with an electronic data set on patients"

- 1997 RACGP and AMA produced a strategic framework for improved information management through the use of information management in general practice. The aims of this framework were to promote the uptake of IT/IM in general practice
- 1998 The Commonwealth agree to provide funding for the General Practice Computing Group to implement and oversee aspects of this plan endorsed by the GP Strategy Review. 15 million dollars was allocated over three years in the 1998 commonwealth budget.
- 1998 -1999 shows a 16 fold increase in expenditure on divisional programs with an IT/IM focus under block funding

- 1999 many activities in policy, standards and electronic health records architecture that contributed significantly to the 1999 Health Information Action Plan for Australia. This was the national strategy for information management and the use of online technologies within the health sector
- 2000 A summary text General Practice in Australia is release by the Department of Health and Aging in which the history of general practice in Australia is explicitly and clearly described. Here we find the key findings of the GP Strategy Review (2004) in which the confirmation of the black box that is IT/IM in general practice is definitely described. “That GPs, national GP organizations and governments recognize that increased uptake of IT/IM is vital for the future of general practice.”
- 2001 a second edition of health online is released
- 2001 to present:

  Establishing an infrastructure to provide support, training, education and services to general practitioners as they make the transition to electronic management of clinical and other information in their practices

  Developing a computing environment that is standards based and allows seamless communication between general practice and other parts of the health system

  Developing an environment in which relevant information can be made available to general practice at the point of clinical care

  Facilitate decision making on the basis of the best evidence available

  Facilitate greater integration across the primary health care sector, general practices, hospitals and specialists services through improved communication of relevant information

Improving the effective transfer of care and information between various parts of the health system

Enable the use of information to provide better targeting of resources within general practice, within regions and systems, and across the health sector

2005 More recently than the PIP, the National e-Health Transition Authority was established in 2005 to accelerate the adoption of electronic health information. This is another step in the process of integrating general practice/general practitioners into the health care system and ensuring that computerization is a black box.

CHAPTER 6: THE ROYAL AUSTRALIAN COLLEGE OF GENERAL PRACTITIONERS PLAYS A PART IN THE ADOPTION OF INFORMATION TECHNOLOGY IN THE CENTRAL HIGHLANDS DIVISION OF GENERAL PRACTICE

"A technological project is neither realistic nor unrealistic; it takes on reality, or loses it, by degrees" (Latore p84:1996)

6.1 Aims of this chapter:

In this chapter I will argue that, in the process of computerization of general practice the RACGP (as an actor) played and important role. I will also endeavour to clarify that rather than computers having no identity, being neutral, they reflect or embody origins and as such this may affect the process of computerization of general practice.

So, this chapter is the first in a series of vignettes that seek to articulate the roles of actors in the adoption of computers in general practice represented by the case studies in later chapters. As the black box that is the Royal Australian College of General Practitioners (RACGP) is unpacked its championing of the adoption of computers in general practice will become clear.

6.2 Why the RACGP is such an important actor?

RACGP has played an important part in the adoption of computers in general practice in Australia and in the study area (this research survey result 2004) 82% of GPs belong to the College and actively participate in the College activities. Several GPs from the study area were involved in the GPCG (General Practice Computing Group) from the time it was started by the College and others were intermittently involved. Throughout this chapter I will discuss the applicability of Actor Network to further clarify that this explains the adoption of computers in the Central Highlands Division much better than innovation diffusion theory.

To finally understand that computerisation in the Central Highlands Division of General Practice could not have happened without the influence of the RACGP, it is important to examine firstly the role that the RACGP played in the national adoption process and then how that spun off into the research area. In doing this I will articulate networks that were created by this organisation in its constant pursing of support for the computerisation of general practice. The College influences the GPs, advocates for them with government and other professional bodies and serves many of the professional development needs of fellows of the college, of which there are about 16000.

The influence of the College can be initially seen through its actions in the creation of standards for general practice. In unpacking the layers of the black box of the College it is important to acknowledge the role of setting standards (which set effective and clear pathways for GPs to follow). Standards are generally agreed by the membership and set the college up as a black box.

It is an interesting aside that even though the College had been actively involved in advocating both up and down for the computerization of general practice since the eighties and possibly the seventies, the standards for 1995 did not mention IT/IM even though the College had already been very active – this will be elaborated upon later in this chapter. The standards for 1998 did mention computerization and so have consequent standards. To develop this throughout this chapter I intend to follow the actors and not the factors, because the pattern can't be located in the last few years. I also believe the explanation for the adoption pattern can't be found in earlier years since those phases did not commit the adoption of computers to go in one direction or the other – it was not until 1998 that the direction was set.

Putting the above away for the moment - the questions to answer here may be - 'what were the translations going on in the background in the shady area of the vignette that plays out in a partly political organization that

advocates for its members for a good deal from government funding?"
Secondly – 'what is the effect in the study area?'

The Royal Australian College of General Practitioners (RACGP) has a dignified and accepted role in general practice in Australia. Since its inception in 1958 it has become an accepted umbrella for general practice – a black box, (read RACGP). Opening such a black box to see what it contains is a tricky operation. In this case my aim is not to question or challenge but to examine activities in the promotion of computerization of general practice.

Fuchs (1992) suggests that what is accepted as a black box is defined largely through collegiate control and that membership of such a collegiate involves the assessment and attainment of appropriate qualifications. It follows from this that a professional group such as the RACGP can be put down to successful networks that have created black boxes.

Latour (1986) has described this process of a network (read RACGP) becoming an actor that can be applied to the computerization of general practice. From its position of being an accepted black box in general practice it has had influence in the process. Latour describes an actor as "any entity able to associate texts, humans, non-humans and money" (Latour p140:1986). He goes on to state that "when an actor simply exerts power nothing happens and s/he is powerless: when, on the other hand, an actor exerts power it is others who perform the action" (Latour 1986:p264).

In this research this means that actors influence or enrol other actors in their network, and are influenced in turn. It also means that people and things pick up an idea, techniques or process as they see it, which is not necessarily the same as that originally intended. Of course, the idea, techniques or process may be rejected; actors do not have to be successful.

Enrolling others actors can simply be seen as an act of negotiation through which one actor becomes indispensable to another as part of an alliance. Completely successful network enrolment then, involves interessment, an entanglement of sorts whereby all in the network will speak as if of one voice. A successful enrolment or translation therefore does not depend on any initial impetus, but rather on what each person involved in the network does with the idea or artefact, for they have a choice as to what they will do. Interessement means that their chosen uses have become close to identical.

O'Connell, (1993:p134) asserts that "to have collective-producing value, research must collect data at various locations using standardized procedures and instruments that are of known calibration – that is to say, that which circulates among them must be immutable". O'Connell (op.cit) writes further that immutable mobiles and inscription devices are the means by which actors enrol other allies. They are objects that are transportable while remaining the same. This means they can be used in a number of localities with the same result. Such things as medical instruments, books, televisions, organizational guidelines are all examples of this.

6.3 The RACGP network and its translations:

It is through the network and translations that the above can be addressed. The following figure and discussion will address this. This discussion identifies the College as a political player that has been most influential in the adoption of computers in general practice (as should be expected). This also shows how the College was a player and the processes that were used in the processes undertaken. It is through the application of ANT that this can be articulated and so again there is a leaning toward ANT.

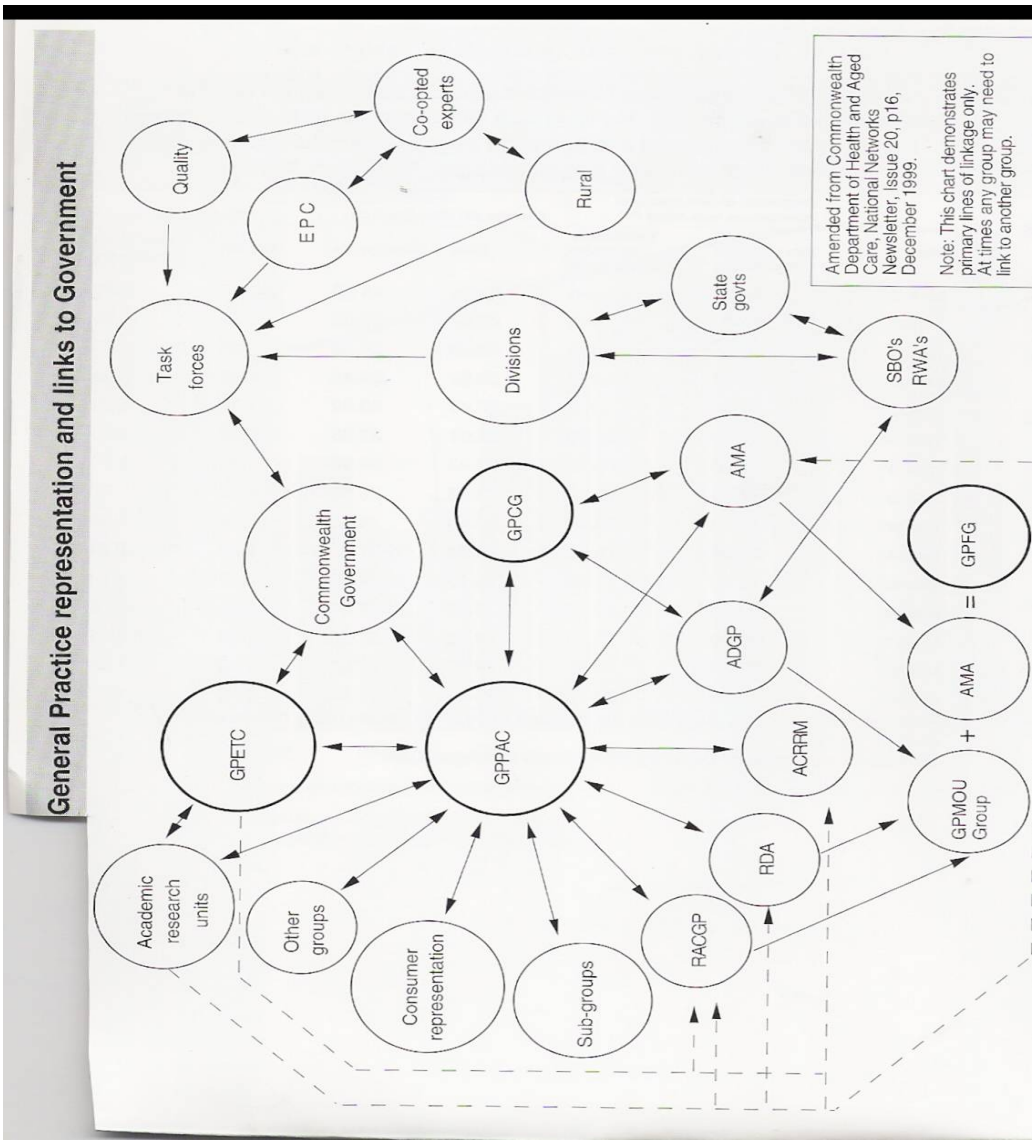


Figure 4 General practice representation and links to government (Australian General Practice 2004)

The establishment of the College was a defining moment for general practice in Australia. It is the oldest professional body specifically for Australian general practice in Australia. It almost goes without saying (except that it is important to do so) that this member based organisation is very well respected throughout healthcare. It wields a lot of influence and has complex relationships with other extremely influential organizations - see figure 4 above. The RACGP is clearly supported by the Department of Health and Aging as the peak body for general practice in Australia. As in the study of Aramis (Latore 1996) by following some of the actors involved in such a complex network a clearer picture can be created of the translations that became the process of adoption or partial adoption.

In identifying the important players and the translations that occurred in the process of persuasion undertaken by RACGP I intend to articulate how the RACGP is a very important player in the process of adoption in the Central Highlands Division of General Practice.

As shown in the above diagram the RACGP is characterised by multidimensional functional complexity and has interactions with numerous stakeholders as well as having the potential to change working practices of GPs. The influence of the RACGP in the adoption of computer technologies can be uncovered and articulated through an examination of its activities and the way that it has canvassed support for those activities over the past twenty years. It has been prepared to go to plan B or C when its first attempts to accelerate the adoption of computers in general practice were unsuccessful. It has been prepared to change as an organisation to accommodate the computerisation of general practice. “So anything can become more real or less real, depending of the continuous chains of translation. It’s essential to continue to generate interest, to seduce, to translate interests. You can’t ever stop becoming more real” Latour p85:1996)

This becoming real could be compared with what Marilyn Ferguson describes as an Aquarian conspiracy where conspirators (read health informaticians) collude to change social institutions (Ferguson 1980) Conspirators (those in the network) are characterised by their habit of rethinking everything, examining old assumptions, by looking differently at their work relationships. They lead the way towards new ways of doing things despite the drawbacks and the stumbling blocks. As Gabriele Tarde (1903) claimed – "New ways of doing things are nearly always received with coolness, even mockery and hostility. Their discoveries are attacked for heresy. The idea may appear bizarre even fuzzy at first because the discoverer made an intuitive leap and does not have all the data in place yet". This was partly the difficulty in the early days of computerization as you will see.

Latour would explain stumbling blocks or faltering in the process as part of the overdevelopment - "the translation must be continued. What has to be done now is to recruit a "local engine" (Latour p85:1996) In this case the College needed to recruit local champions for the introduction of computers, and had to persuade its membership that computerising was beneficial. Again this action could be explained by diffusion theory and the activities of influentials, but this is not the full picture as you will see through the unpacking of the black box that is the RACGP.

Before the 1990s the adoption of computers in general practice was a stop and go movement. (See chapter 4). As discussed in this chapter the development of a code of practice for computer use in general practice in the late 1990s was an important step in arresting this stop start progress. Besides confirming IT/IM as an actor, this importantly confirmed that there is an obligation on behalf of the GP to be familiar with the features of computerization and the electronic package that may be used in their practice, thus according to Latour, this would be the first time that the

profession would be enrolled by a non-human player – a code of practice at that.(again confirming the IT/IM as a non-human is an actor of importance).

Beside this stands an important driver in the increasing use of electronic and online methods of storing data potentially allows large numbers of individuals to have access to personal information about patients. At first the data for these quantum leaps was not readily available for the Australian setting but the potential impact of the process of computerisation certainly made doctors aware that the data was there.

The College may not have wanted to impose its will on its membership but the time had come for formalizing the process for crucial data had been lost in some practices. In developing the code of practice in regard to such an ethically important issue the RACGP confirmed to its members that computerization of general practice was here to stay. The actor had an established role.

An important part in the role of RACGP was played by Professor Michael Kidd who stated in 2000 that general practice has seen significant computerization of medical records and prescribing. Such computerization may well facilitate movement of patients between practitioners, although lack of standardization of software and coding is a barrier. In short Professor Kidd is articulating the thrust of the code of practice - that while greater flexibility in the provision of service may be facilitated, technology must grow.

6.4 All that has happened and there are barriers – how to explain them?

While the RACGP has been the main supporter of IT/IM in general practice they are also one of the barriers in that the organization is by its nature and responsibility a conservative one. It seems a role where a constant balancing of the need for change and the need to be cautious will continually occur and as a result RACGP may be seen to be not responding. However it is important to note is was RACGP who

held the first health focused computer conference here in Australia back in 1974. This cannot be explained by diffusion theory but is enlightened by ANT. So an examination of how the organization went about procuring funding to increase the adoption of IT/IM in general practice will be very interesting.

In the context of ANT it is interesting to note that RACGP has made a number of important changes to its governance – changes that have actually facilitated the acceleration of computerization of general practice. By putting in place strategically placed individuals including changes such as the Chairs of each Faculty having a position on the governing council. It is an interesting point for this research because it indicates an organization that is prepared to quietly change to achieve it own goals and continue judicious stakeholder management. In this case some of the people appointed to council are the people who are working very hard to have computerization of general practice elevated in importance. In this case it is the networks that have to be created and maintained that are important.

Diffusion theory explains this only partly. It is ANT that shows us that, "the feedback loops between utilization constructs and technological constraints were relatively slow for the first ten years"..... "The time frame for innovations depends on the geometry of the actors, not on the calendar" (Latour p88:1996)

It was recognized in 1994 (AC Neilson 1994) that the level of adoption of IT/IM was far below that of other developed countries and a study into this was commissioned by the then Department of Health and Family service (now DoHA). This study showed that there was a clear lag and that this varied across Australia. The RACGP were aware of this lag as early as 1981 when they produced the "Computerised Medical Records Systems – Proposed

Minimum Standards" documents (see chapter 4). This document was meant "for guidance of the computer industry in designing computerised medical record systems that addressed Australian circumstances". This showed an emerging concern that the computer industry needed to develop systems specifically for Australia.

It has emerged from research interviews (2006) that the difficulty was that this was based on the RACGP Manual Health Record System developed in 1974. (There was little input from "computer savvy" GPs, nor was there guidance from the computer industry).

The partnership did not work because there was little recognition that the general practitioner was central to the coordination of care and consequently able to be pivotal in the collection and dissemination of patient data through the use of electronic records. The college made a mistake in this document because it took a top down approach and acted as an influential dictator rather than taking on board the GPs who were interested. This development was rejected by GPs. So while the RACGP was agitating at a political level by producing the guidelines and making it clear that they would be seeking assistance in making computer adoption happen it retarded itself through its own conservatism. Poor communication between the stakeholders further retarded the process of acceptance for neither partner was letting the other partner know exactly what was needed. At this stage the adoption never had an engine. "That was a congenital defect" all those years ago, and may have set the stage for the partial adoption of computers in general practice that we see today. However if progress is to be made it is necessary to get past the fact that all GPs can get along quite well without IT/IM at this time. "In order to oblige them, seduce them (GPs), compel them Aramis will have to go exactly where they

are headed; it will have to help them get there faster and more comfortably. Each one of us, by taking Aramis to reach our regular destinations, will contribute a bit of reality to this ..... system" (Latour 86:1996)

6.5 The RACGP enrols others:

In 1985 the RACGP joined forces with Medrecord Computers Systems and jointly launched the Computer Assistance Practice Project. (RACGP archive records). The principle objective of CAPP was to study the effects of the introduction of computerised patient record systems into general practice. The National Computer Committee of the RACGP was formed in 1986 as an advisory body the Practice Management Committee of the RACGP council on all matters relating to medical computing. This organizational structure was far more successful mainly because it attracted a younger group of GPs. These were the first computer literate graduates to enter the profession and become fellows of the College. "So is there ever any respite? Can't the work of creating interest ever be suspended? Can't things be allowed to go along on their own? Isn't there a day of rest, after all, for innovators? No, for technologies, everyday is a working day. You can forget the work of others, but you can't manage if there's no one left working to maintain the technologies that are up and running. (Latour 86:1996)

RACGP archive records show that the RACGP instituted the Computer Fellow under the guidance of the National Computer Committee (NCC). The role of the Computer Fellow was to oversee, guide and advise the college members in all matters related to the implementation of medical computing systems in their practices. The computer fellow was to also carry out research and educational activities under the guidance of the NCC

This resulted in the release in 1988 of updated "RACGP Standards for Computerised Medical Record Systems". This new document reflected the changes in technology since the production of the first document and was written by computer oriented general practitioners for the medical computing

industry and was of far more value to them in terms of guiding them in what the GPs wanted/needed. “The history of Aramis spreads out over eighteen years. Is that a long time, or a short one? Is it too long, to not long enough? That depends. On what? On the work of alliance and translation……..eighteen years is awfully short for a radical innovation that has to modify behaviour….Eighteen years is awfully long if the project is dropped every three of four years…..Time really drags. What happens is that actors get involved and back out, blend together or set themselves apart, take or lose interest” (Latore p88:1996).

As the archival records at RACGP show this was indeed the case for at this point the RACGP joined forces with the Australian Medical Association (AMA) and produced a joint position statement in which it stated “a strategic approach to implementation is based on the belief that Australian General Practitioners will purchase and use computers …when the technology generates direct benefits for the care they give their patients at a price that is worthwhile as a business investment. GPs will not consider the investment sufficient if it merely gives benefits to governments, other funding agents, researchers, planners and other sectors of the health care system” (RACGP 1996)

At this time the RACGP and AMA declared that the main reasons for the slow uptake of computers in general practices were:

- Lack of financial and professional incentives
- Lack of knowledge among general practitioners
- And fragmentation of government and industry activities leading to lack of coordinated effort in establishing national standards.

By 1992 the AMA and the RACGP and Commonwealth negotiated a strategy to address problems affecting general practice. It was at this time that the issues involved in IT/IM were flagged. In meetings with the Commonwealth they suggested that the issues of IT/IM should be addressed within a

consultative framework. (GPCG records) Coupled with the changes already mentioned in this paragraph the acceleration of IT/IM appears to occur more or less as a side issue within the implementation of the divisions of general practice. Yet it was to be one of the main platforms for the work of the divisions over the next few years until 2002

By 1992 through the GP strategy and with the enlisted help of the AMA the RACGP had managed very subtly to have a major area of concern addressed by the Commonwealth. Not only was it to be addressed through the division of general practice but it was to be funded as well. The adoption rate was set to soar…….. but it did not. The adoption of IT/IM continued to be piecemeal. Most practices claimed they had a computer and were using it. But what were they using it for? There was also a difference across the geographical regions of Australia and within the study area for this research. So it seems that the thorough background work of the RACGP had again stalled. "Projects drift; that's why they are called projects. To follow them it is impossible to trace a target, a starting point, a trajectory.....It is the idea that got them all excited" (Latore p92:1996) In the case of IT/IM in general practice it was the promise of communication (which is implied from the inclusion of the fable at the beginning of this research) at a very sophisticated level, a level that the GPs saw was consistent with their level of training.

This is very important because it is a very important shift in thinking for general practitioners. Meeting minutes show that they started out with the idea of being fully connected to the health care system (as seen in the fable in the prologue for this research). *The possibility of having a complex network that supported them in their work was very seducing, but they end up with problems and barriers to the uptake of computers. The complete idea is less problematic in itself but the implementation of it*

is very problematic (as exemplified by the list of barriers above). The adoption of computerization is feasible but at a cost that is not just measured in dollar terms.

The only way to increase a project's reality is to compromise; to accept socio-technological compromises. It was a wrenching moment in the persuasion process that the college had entered into. Either they could decide that the use of computers would in part exist only in name or they could decide that the project of adoption had to have a better clearer reality. "The compromise is all the more difficult to bring about in that it really should blend social and technological elements, human and non human agents. Behind the actors, others appear; behind one set of intentions there are others; between the goals and the desires, intermediate goals and implications proliferate, and they all demand to be taken into account" (Latour p100:1996)

Further inspection of archival records at RACGP, shows that in 1997 the RACGP again partnered with the AMA and produced another strategic framework. This time the framework specifically spelled out how general practice could improve health care through the use of information technology. The aims of the framework were largely those of RACGP with interests of sustaining its profession at the core of this aim – Some comments from notes claim that "we would drag them kicking and screaming if we had to, but drag them into the 21st century we will"

This new framework resulted in the Commonwealth agreeing to provide funding to the GPCG to implement and oversee aspects of this plan. $15 million was allocated over 3 years from the 1998 federal budget to assist the GPCG to do their job.

"But wait a minute, some will object, we're dealing with technologies, not passions; with drawings, not plots; with logic, not sociology; with economic

calculus, not Machiavellian calculations. Ah, but they're wrong! The two sets have come together in research rooms and administrative council rooms. The pertinent question is not whether it's a matter of technology to society, but only what is the best socio-technological compromise" (Latour p101:1996)

6.6 A respected influential takes part:

At this point an examination of the role of Professor Kidd in the computerization of general practice is important. Professor Kidd was a key player within the RACGP in the promotion of computerization of general practice. I have examined annual reports from both the general practice computing group and from the College, and lastly I have included an interview of Professor Kidd in appendix C.

I will elaborate on the role of Professor Kidd in the general practice computing group in later chapters, but for now I want to simply examine his role in relation to the college, computerization and general practice.

The interests of Professor Kidd (see appendix D) reveal the complexities Latour (1993) explained in writing that in the first place a project isn't one project. "It's taken as a whole or as a set of disconnected parts, depending on whether circumstances are favourable.....it becomes concrete only gradually". *As the account of the interests of Professor Kidd indicate, in the first place it is only abstract, pursuing its own goals, and if circumstances are against it, then the project decomposes, and each element disinterested goes away. That is why the sum of the elements that constitute it can never be fixed for they vary according to the state of the alliances that are formed. In the above case we are seeing Professor Kidd in the process of re-raising the interest of the community in the potential of the use of computers in general practice. A renegotiation if you like, of the motivation for their use. A keeping alive of the original intentions of computerization in general practice.*

In a study released by McInnes, Saltman and Kidd (2006) it was concluded – "Australian general practice has achieved near-universal clinical computerization. Electronic prescribing alone has probably improved efficiency and quality of care, and reduced medication errors. Increasing the use of other functions, such as accessing online decision support and maintaining registries of patients, is likely to lead to further health gains, especially in managing chronic conditions"

6.7 Back to the College

The RACGP has a long history of independence born of the independent nature of general practice before the 1980s. The members of the college have tended to see their accountability to their patients and then to the College and then the profession. They have not until very recently seen their accountability as being to the community. GPs have not seen their role as providing data on patient or population health outcomes to a third party. Computerization is a very big change both physically and ethically. (interview Dr Rawlin at RACGP 2005)

However with the implementing of IT/IM in general practice the medical profession has had to make many changes. These have been promoted because of the College and its political activities in both supporting and instigating the changes.

The scale and ambitious outcomes promoted by the college has been complex. The interplay of human stakeholders such as GPs, coupled with the stakeholders who have an organisational role rather than a human one (such as representatives of DoHA); and again the stakeholders who have a role because they are policy rather human; and then the stakeholder who has a role because they are a computer program makes for complex and interesting considerations.

To the date of writing this report, was computerization of general practice ever adopted to the level that was first envisaged? The simple answer is No, the idea has been adopted by general practitioners, the technology by general practices and admin staff, but it is very important to note that IT/IM has not been fully adopted by general practitioners, despite many claims that declare it has. (See table 8)

Many translations were made to the original concept, there were many players who were in turn influenced by those from within (as I described in terms of the influence of Professor Kidd). There are many who would like government to accept that general practitioners have adopted IT/IM and use it all the time, but that is simply not the case. As will be explained in later chapters there are reasons for this, suffice to comment at this point, expectations of what IT/IM could deliver for general practitioners (as differentiated from general practice) have been high, perhaps too high.

Many would claim that it does not matter how the computerization of general practice took place; all that matters is that it did. However the point here is that to this date computerization of general practice has not occurred to the extent that was at first envisaged and that there have been many shifts in changing that expectation. It is as Latour claims the keeping alive of interest in the innovation that will keep it alive and will keep the innovation translating and developing. "What counts, in a technological project, is deciding what has to be negotiated, and deciding on an official doctrine that will make it possible to proceed with any negotiation at all". (Latour p113:1996)

6.8 Analysis of the process

Actor network theory provides us with a way of explaining the huge influence that RACGP has had in the adoption of computers and at first when I started to examine this process it appeared as though ANT offered little guidance to the analysis and that I should fall back on diffusion theory. These entities alone show the complexity of computerization in the study area. I now believe that ANT can also provide insights on an organization that will be very different from the usual way that organizations are researched and articulated.

In the above account of how the RACGP went about accelerating computerisation of general practice I have tried to set the scene for examination of social arrangements, and in addition outline the historical progress, and the human and non-human arrangements.

My perceptions as I followed the historical pathway, and interviewed the players have been very important in identifying who the actors in this vignette are and in identifying the networks the RACGP created. In addressing this issue here (that of my perceptions), I feel that I am exposing the lacuna of ANT but at the same time I know that I am confirming its strength. In Latour's (1996) writing he recommends that you follow the actors and observe the work they do. In doing this the researcher can trace the network the actor creates.

The actor-world of the RACGP is both varied and diverse in terms of its constituent actor-networks, and so I feel the best approach to analysing it is to start from 'the beginning', looking at some of the actor-networks that were both involved, and have subsequently evolved in the accelerating of the adoption of computers in general

practice. It is obvious that I am not going to explore the total history of this process but pick it up at its most important point – the decision to become actively (but not overtly involved in the eye of the general public) interested in computerization of general practice and actively promote this occurring

In 1981 the RACGP produced its first formal document advising standards for computerized medical records systems, ideas for this had been developing within RACGP since the conference of 1978. The scene was set, the spotlight on, and the focus (?) on members of the College some of whom had very little idea of what was about to take place. It's likely that the exact rate of adoption was unknown by the RACGP but they did know that their membership lay unaware in its torpor. One thing could be relatively certain, though: if computerization could be shown to be financially beneficial then the likelihood of adoption was very much increased.

Drawn into the actor-world, and possibly the base actor (along with the software as a black box entity, encapsulating aspirations, content, staff, programs, policies) in the world so far, was the computer that would bring so much change. Whilst this original computer policy recommended by RACGP was nothing spectacular, it appeared that it was adequate, and accommodated a certain degree of future growth. It did not seem to matter that it was based on something from 1974. Design of the policy was done in-house making use of available staff within the RACGP and they were required to be no more than functional, and it managed to do its job in the short-term in guiding the members towards change. Let's examine this further –

There were some assumptions that the RACGP had made in their production of the policy and this was about knowledge of the organization and how the council at the time thought change should occur. Kuhn (1996) suggests that knowledge of what a change will do is an unknown in that we have no access to what it is we know, and that the knowledge of how something will effect an organization becomes embedded in the tacit routes or networks that are created in the adoption of the innovation. Kuhn further indicates that instigators of change – technicians, scientists (in this case read computers, and RACGP goals) are socialised into paradigms and much of the cultural knowledge cannot be transmitted in a codified form by explicit statements. Kuhn acknowledges that this idea is not new.

In a study (Collins (1974) in which a questionnaire was used to identify knowledge clusters, Collins concluded that knowledge is an activity and thus creates the capacity to do something. Furthermore one can only identify groups that had successfully shared tacit knowledge by their activities, in this case building networks and infrastructure to facilitate the adoption of computers in general practice.

As time progressed, and the policy was implemented it became clear the first policy was not going to work; it was simply an obligatory passage point – more and more computer savvy GPs were demanding a less conservative policy and a policy that offered a real sense of purpose. The process was stalled because of the political nature of the RACGP and the conservative nature of the RACGP. It was almost as though the RACGP had shot itself in the foot. What went wrong? Why didn't the policy work?

Firstly there had been little consultation with the members of the college. Secondly the "new" policy in 1981 was based on a policy that addressed the needs of a manual system, and thirdly there had been no

real effort to diffuse the policy beyond the immediate members involved in its development. In terms of ANT this policy was doomed from the start – it would never have assisted in accelerating the process of adoption. The process that had been started was underpinned by cultural factors and contextual aspects that had not been accounted for. There had been very little consultation with members whose characteristics were age 40 to 60, predominantly male and graduating from a time when general practice was "seen" as the poor cousin in medicine. In this case the GPs knowledge about them was indeed a social construct (a contextual entity)

The lack of consultation with members led to the way that the policy was viewed – it was not owned by the members and so they did not have to do anything about it. Their assistance in supporting it had not been sought – in ANT terms they were not enlisted in the mutual achievement of goals. Most of these GPs would have claimed to have a computer in their business at this time but the things that it was used for were most likely not within the business. The acquisition of the computer at this time was simply a tax write off for most of them. The idea of computer use by general practitioners had been accepted but not the use of them.

This points out another fault in the first policy – it had not addressed the knowledge that the GPs had, it was simply imposed from the top and resulted in being a black box that was destined never to be opened. The translation of the policy to working guidelines never happened. No heterogeneous element was apparent; there was no real network of like minded doctors, no acceptance of the statements in the policy, and very little understanding of the potential for the use of

computers. Thus the knowledge in the policy was a technical construction not a socio-technical construction.

The political nature of the RACGP cannot be underestimated in the adoption of computers in general practice. Unlike virtually any other member based organization at the time, in response to the rejection of the first attempt the proponents of computerization became a tight-knit community between those who were starting to use computers and devising their own software and those that were showing success in developing the technology. The computer buffs would regularly participate in discussions, and even help out with technical problems some users had with their computers. By interacting regularly with (at least part of) their member base, they were able to shape the direction of their new community, subtly (yet surely) and much later, translating a very diverse group of actors into the supporters of computerization in general practice.

This is what happened next: In 1985 the RACGP joined up with Medrecord. The relative success of the alliance between Medrecord demonstrated by the launching of the Computer Assistance Practice Project and their community can be characterized by the following quote: "He who is able to translate others' interests into his own language carries the day... But interests, like everything else, can be constructed." (Latour, 1996) It wasn't simply enough for the College to be interested in computerizing it had to be shown to work.

By creating a community of supporters for computerization, the RACGP was creating interest in further upgrading the technology and providing access to it though the Computer Assistance Practice Project. It was slowly but surely getting everyone on board –enlisting

them in the common cause. More importantly for the future success of the goal, they had set the scene for the most important proof that computers were worthwhile – they had shown that there were financial rewards in adopting computers by instigating the computer assistance practice program.

Further to this by using a delivery style of helping/assistance they were creating a predisposition to adopting the technology for there is nothing a GP likes to more than to help. Such a style could be seen to be both professional, part of the Hippocratic Oath – "pass on thy trade", and innovative. Thus actors both human and non-human were simultaneously translated into networks that would begin to work toward the common goal of computerization of general practice.

Like any successful actor-network (or world, even), the RACGP is a stabilized investment of form, one that has well and truly formed its social, physical, and professional forms. Taking a step inward and exploring the subsistent actor-networks, it can be seen that "...there was no essential distinction between trying computers in your practice under the assistance program and the consumption of the idea that this would be a good thing. The two took shape and adjusted to one another in the same movement." (Callon and Law 1994). As both a generator and organizer of information, the RACGP were creating and constructing various ways of communicating ideas, opinions, and beliefs.

The actual policies in regard to computerization are essentially formalism; "This is because, like all formalisms, it connects and defines the relations between a set of terms" (Law and Mol, (2002) or in this case a network.

Along with the assistance program the RACGP instigated the position of computer fellow and with this the college began the process of standardizing

the connections and definitions of the formalism for virtually every member. The RACGP spelt out the way that computers were to be used. The membership group had been engineered into a heterogeneous identity and the smaller networks can now be enlarged upon. *As an aside at this time it is important to comment that while this is a political process it is done with the risk of litigation high in the mind of the college.*

Now we move further into the account of the RACGP role in the computerization of general practice. The next step the College took was in 1988 when it released its updated "RACGP Standards for Computerised Medical Record Systems". This new document reflected the changes in technology since the production of the first document - in other words the translations that had occurred in the development of computerization of general practice. It was written by computer oriented general practitioners for the medical computing industry and was of far more value to them in terms of guiding them in what the GPs wanted/needed. In other words there was respect for the needs of the profession and this led to further enlistments in the cause from the membership, as they could now see that the use of a computer in their practice just might work beyond having it as a tax deduction. In doing this the RACGP had assured that the new policy would be viewed more positively. They had learned their lesson well.

While various ways of understanding the role of the RACGP in facilitating computerization might exist, the RACGP'S actions and policies remain essentially the same and it still remains essentially the same. This is now a stabilized world and even though various ways of perceiving the actions of the RACGP will be put forward and try to destabilize the "world" in an effort to derail the stabilized actor-world, the RACGP have done their homework and translated

carefully, and their homogeneous nature has been articulated to all members. It is not the aim of this research to explore this further but simply an aside that will be picked up on in recommendations for further study.

However the RACGP is actually viewed, the clear and relatively simple design of their policies (at least to the members view) remains virtually the same for all of them (except the people involved in trying to get practices to computerize faster. The next step the college takes is to reward those who are taking on the computer technology by getting them to write up their experiences on the college web site as case studies. Thus the innovators become heroes. As a result more doctors are enlisted in the "team" and more local networks develop as each area seeks to support each other in dealing with the innovation "thrust" upon them by society and college demands.

Of course, being a diverse collection of people (even though in this activity they are heterogeneously engineered), not everyone tends to agree on the selection of practices that are rewarded. When new appointees to 'Hero' are nominated and have their case studies published on the RACGP web site, there are factional groups that show their support, or disappointment. The RACGP and members of the Practice Assistance Group generally contain this 'hubris', and placate disgruntled members. Sometimes a doctor may feel strongly enough to opt out of the process, but more than likely, they stay and try harder to achieve 'Hero-hood' themselves. It's rather easier to translate people who share common interests, and who look up to and respect you.

The RACGP community made up of members and can be viewed as a black box, with the varying factions and cliques that form amongst friends, creating localized actor-networks made up of these black boxes. The localization refers both to the closeness that organizations which are member communities can engender for a small population spread across Australia, as well as the physical proximity some members share with one another. Sometimes, the black box that is a particular member may be opened; certain college members are quite open, and willing to share aspects of their practice development. Through this close-knit sharing within the community, General Practitioners started to meet up with other members in the same locality, forming solid bonds with similar interests. Thus began a really positive breaking down of the usual situation of isolation that GPs tend to operate within.

6.9 The college expands its horizons

During 1990 -1991 the college joined further with the AMA and undertook a review of general practice in Australia. From this was developed a new strategy underpinned by three identified weaknesses of the health care system as it was then:

- Lack of financial and professional incentives
- Lack of knowledge among general practitioners
- Fragmentation of government resources

By 1992 the AMA and the RACGP and Commonwealth negotiated a strategy to address problems affecting general practice. Through the GP strategy and with the enlisted help of the AMA the RACGP had managed very subtly to have a major area of concern addressed by the Commonwealth – that of the cost of computerization of general practice. Not only was it to be addressed

in terms of funding to practices, it was to also be addressed by the creation of the Divisions of General Practice and the General Practice Computing Group. (Both these organizations will be examined in subsequent chapters). So rather than go directly to the Commonwealth with their difficulties in 1988 the RACGP took four years to work in partnership with the AMA developing a far broader approach with a built in system of accreditation of general practices, increased support for rural and remote practitioners, changes to vocation training, and exploration of new roles for general practitioners.

An extension of the RACGP can be seen in how it has enabled the building of smaller communities. The RACGP and its subsidiary committees involved in computerization of general practice have engineered homogeneous groups of entities – like minded GPs, software companies, DoHA, and all associated entities involved with the College. In addition to this, it's lent its auspices to the General Practice Computing Group.

Thus further non-human actors are brought into the picture; even though these new identities are represented by humans they have to act in the interests of their organizations and as such are classified as non-human. So the RACGP has established more networks.

The RACGP interface provides standardization and acts as a boundary object. As a boundary object, it is "both adaptable to different viewpoints and robust enough to maintain identity across them" (Star and Griesemer 2001) The RACGP have, up until now, been remarkably successful at this.

6.10 Conclusion, news bulletin – more questions!

The RACGP is a much larger world of which policy, practice assistance programs, general practice computer groups and the instigation of divisions of general practice, are but a small pinprick in the black box. In the case of

computerization of general practice it is based on both the supporting structures (hardware), and the information that flows across said hardware/network. "Information.... is the direct result of the construction and extension of networks which are, at one and the same time, networks of production, distribution, and exchange" (Callon and Law 1994) This larger 'actor-universe', the policies and support of the RACGP actor-world is a microcosm: it has been drawn together from a largely heterogeneous 'actor-universe', and for almost twenty years now, has drawn into itself a host of "juxtaposed components", harnessing the "diverse trajectories of various entities", that is a "stabilised, self-sustaining [and growing]" network which has resisted dissociation of the actor-world. Even though losing some substituent actor-networks, it has ably replaced them with new ones. RACGP is a stabilised, homogeneously engineered, actor-world.

According to Law (1997) actors in this network would be both actors and network at the same time. This can be seen by examining the RACGP. It is made up of its members, its directing council, its departments, and infrastructure and on and on. What I tried to identify here is that it acts like the director of a company (who in turn is a network but that is not relevant here - I digress). To be a director the college has to walk a very neat tight rope between the interests of risk management and the interests of promoting the profession. It has to be entrepreneurial but protect its members. It has to be active, commanding, and energetic and it has to be a strategist. So in the language of College as director we can view what is actually a heterogeneous network: The council, the building of college house, the members, the departments of the College, the infrastructure of the College, the computers and so on. For all this to be effective it has to be in a stable form.

Actor network theory suggests that organizations are not simply inert entities through which economic and political forces flow. But instead these forces emerge from the organization through interactions with heterogeneous actors. Through an examination the efforts of RACGP in computerizing

general practice actor network has opened up all organizational and economic factors for empirical investigation. Callon (1998) has applied this to an examination of markets in order to show how the nature of markets is a result of actors and technologies is a stabilised network. Callon's investigation of markets suggests a research agenda that can investigate the emergence of strategic choice and the limitations of firms (read RACGP) as centres of calculation. This opens some very exciting doors for applying actor network theory to the analysis of organizations. Because ANT was originally devised to examine scientific knowledge from a socio-technical perspective it is equally amenable to the study of power, agency and control. This is very interesting in light of investigation procedures such as triple bottom line in which the area of "soft" capital is included. So what should a study of actor network and say triple bottom line look like? The answer to that is probably another research project. The point here is that despite the impression that the RACGP wields all the power the individuals that make it up still choose that path they wish to walk. This is clearly demonstrated by the inconsistent uptake of IT/IM in general across Australia but less so in the study area.

Why does it appear that it been so successful in the study area? What are the links?

Put simply:

- 82% of GPs in the study area are active members of RACGP.
- Three GPs in the study area have been actively involved in the General Practice Computer Group
- The Division of General Practice has been an outstanding proponent of computerization in the study area
- The board of the Division has or has had the three GPs on it who were involved in the GPCG.
- The division actively collaborated with the GPCG through the information technology officer and a good proportion of their budget

was set aside for the promotion of computerization (instigated by the board that of course were networked with the GPCG)

All of the above will be explored in the next chapters.

News Bulletin March 2006-07-26 - The Royal Australian College of General Practice has recently signed a memorandum of understanding with the Australian College of Rural and Remote Medicine increasing its influence to a wider audience.

CHAPTER 7: THE GENERAL PRACTICE COMPUTING GROUP AND THE PRACTICE INCENTIVES SCHEME – two further actors contribute further defining moments in the adoption of computers in general practice.

There can be little argument with the suggestion that "As GPs we should not expect that all the solutions will come from government. Certainly government has a legitimate interest and role in working with the profession to find solutions. However, we should expect that our own representative organizations remain united in their conviction and not lose sight of the urgent need for solutions for a balance between productivity, efficiency, professional satisfaction for GPs and quality care for our patients and our communities".(General Practice Computing Group 2006).

Aim of this chapter - To illustrate that as actors in the network the GPCG and the PIP were very influential in ensuring the adoption of computers in general practice. In the first instance the GPCG was actively advocating and taking a political role in ensuring the GPs were supported in the adoption of computing. In the second instance they were able to have great success in having payments for the use of computers included in the PIP. This added to the funding that was already available for practices and ensured an ongoing source of income for the new role that GPs undertook in supplying information to the government

7.1 Background and defining moments

The General Practice Strategy Review (1998) stated that good information management and communication are believed to be central to enhancing the quality of care delivered by general practitioners. While sophisticated information technology is seen as having enormous potential to assist GPs in this regard, finding ways to promote the rapid adoption of information technology to improve information management is seen as the single most important step that could be taken to enhance quality of General Practice.

The review group consider that the time is right to support greater use of computers for clinical application in general practice. Its recommendations are designed to overcome the many barriers that discourage GPs from investing in computers to resolve some of the wider health system problems inhibiting effective information flows.

The formation of the General Practice Computing Group (GPCG) and the initiation of the Practice Incentives Program (PIP) occurred almost at the same time arising out of these recommendations. They were very important in the fast tracking of uptake of computing in general practice. The clear goal of the GPCG was the support and acceleration of computerization and use of computers in general practice. It was never the goal of this group to have general practitioners use computers. *This of course would happen in the future with the use of clinical decision making tools, use of broadband and secure internet. However at this point this is not publicly acknowledged.*

When acceleration of computing began in 1998, these latter were not of great concern to either government or general practitioners. Of greater concern was getting practices on line, getting infrastructure into practices and getting practices to use it, and getting data from the practices. These were the driving forces behind funding form the PIP and the funding of a promotional body such as the GPCG.

7.2 The General Practice Computing Group (GPCG)

The General Practice Computing Group (GPCG) has been accepted by the profession as the peak national body for GP informatics in Australian general practice. It was formed in 1997 because there was a need for coordination of, and a much sharper focus in, general practice information technology. (Mott 2000). At this time it was generally accepted that uptake of computers was not occurring quickly enough and the profession needed to address this (interview no.89 Tomlinson 2006).

The GPCG was formed as a result of recommendations from the General Practice Strategy Review Group made in 1996. This group was evaluating (amongst other things) the Better Practice Program, and during this time of review intense lobbying by computer savvy GPs took place (Tomlinson 2006).

The role of the CPCG as an actor is confirmed when it was officially auspiced by the Royal Australian College of General Practitioners and a multi partnership between the Australian College of Rural and Remote Medicine, Australian Divisions of General Practice, Australian Medical Association, Consumers Health Forum, Medical Software Industry Association, the Rural Doctors Association of Australia, the consumer health forum, and government agencies such as HIC and DoHA. The national prescribing service was an observer to the GPCG. *With such a network there can be little doubt that it has been one of the main public instigators for the adoption of computers in general practice in Australia.*

At the same time that lobbying for the formation of the GPCG was occurring the RACGP was lobbying for the redefinition of the Better Practice Program, so an important recommendation was the redefinition of the Better Practice Program to become a broader based program that not only supported clinical development but also supported the profession financially by balancing the difference between sectors in fee for service payments. This in turn would support better service to patients.

The context of the GPCP has emphasised the importance of adequate information systems in general practice operating environment (Power and Aloizos 2000) to promote quality and outcomes of care (Mott et al 2000) as well as integration across health care and integrated care for patients in communities (Harris and Powell-Davis 2000). Issues of quality and security of data in general practice were also recognised (MacIsaacet al 2000) With the acceptance by government of a revised Better Practice Program to be known as the Practice Incentives Program (PIP), and the General Practice

Computer Group (GPCG), work began in earnest by the profession to computerise, and the achievement of these goals.

When the GPCG and the PIP began, little did everyone involved guess that the achievement of all the GPCG goals was to take a much longer timeline than they imagined. However, it is clear that great steps have been taken in the uptake of computers (the first goal of the GPCG). It is the second and other goals of the GPCG - that of full use of computers by GPs - that has yet to occur. (I will explore this later in this chapter).

However Divisions of General Practice annual returns (2006) show that as at 2005 the achievements for computerisation in Australian general practice have grown, with 90% of GPs now using a computerised clinical package. While prescribing is the most commonly used electronic function (98% of those who use a clinical package), medication safety functions, such as checking drug–drug interactions, are also frequently used. GPs (Kidd et al 2006), also reported widespread use of electronic health record functions, including ordering laboratory tests (85%), updating allergy information (84%), and generating health summaries (84%). These results reflect significant progress since 2001, when, among GPs in computerised practices, 71% used electronic prescribing and 42% generated health summaries electronically. (McInnes, Saltman and Kidd 2006)

This study (Kidd et al 2006) has several limitations. The 39.5% response rate may mean that the respondents were not representative of the population of Australian GPs. Another limitation is that survey responses were self-reported, and we do not have independent verification of the computer uses reported by GPs.

For this research further work was necessary to examine whether GP reports of information technology use match their actual use and whether it is the

practice that is using the computers or the GPs. At a micro level, has the GCPG been as successful in persuading general practitioners to use computers as it claims, or is it again a case that they may have been very successful in persuading general practice to use computers? The difference is important and can be expressed in calls by the GPCG (2004) for a "need for a realistic expectation for, and sensible use of, information and communications technologies, in concert with complementary and organizational processes and strategies, to promote the sustainable use of information and communication technologies and evidence based information to improve the health care and health outcomes of individuals and populations". At a time when research would show nearly full use of information technologies why such a call for conservatism? Or is this really a call for maintenance of the integrity of decision making as a doctor – as a professional, and the need to ensure that this is valued and not undermined?

My case study interviews throw some light on this -

In discussion I put the following propositions to the general practice staffs for all the case study practices -1) that General Practitioners (GPs) are centrally motivated by a vocational orientation to their patients; 2) that GPs are participating in the information revolution, accessing the net, 3) and using their computers to conduct research on their own practice characteristics; 4) how GPs are remunerated does not affect their performance; 5) the issue is not one of ownership but of behaviour; 6) it is possible to provide high quality medicine in any well managed setting.

There is virtually no evidence in my research to say that any of these propositions were so. I started this research with very few impressions about the barriers and enablers to computerization in general practice and found that there were many complex aspects of this process with many players in action. The GPCG would have us believe they have had a big impact on computer use in general practice while on the other hand they would claim that things have

changed but are not different, and much of their discussion goes on as if the world is not different, with general practice still existing in a sphere of its own.

7.3 Explaining the PIP and its success in accelerating the use of computers in general practice

HIC data (2002; 2005; 2006) show that the PIP is part of a blended payment approach for general practice. Payments made through the program are in addition to other income earned by the general practitioners and the practice, such as patient payments and Medicare rebates.

The PIP aims to compensate for the limitations of fee-for-service arrangements. Under fee for service arrangements, practices that provide numerous quick consultations receive higher rewards than those that take the time to look after the ongoing health care needs of their patients. High throughput of patients is also associated with unnecessary prescribing, tests and referrals – this is not encouraged by DoHA (RACGP2006)

The establishment of the PIP and the inclusion of IT/IM as an area for payment was a defining moment in the adoption of IT/IM in general practice, simply because the PIP aims to recognise general practices that provide comprehensive, quality care, and which are either accredited or working towards accreditation against the Royal Australian College of General Practitioners' standards. (RACGP *Standards for General Practices* 2005)

It is important to note at this point that the first goal of government has changed dramatically. It has changed from computer use by GPs to an emphasis on the general practice operating environment, with the next step being general practice. This is emphasised by the way the payment structure for the PIP was organized.

The Productivity Commission report (2004) states that PIP practices in 2004 covered about 80% of Australian general practice patients. The

Commission reported that 93% of PIP practices were prescribing electronically — a figure similar to the proportion of GPs in our study using electronic prescribing (95%). However, while the Commission found that 92% of PIP practices "had the capacity to send and/or receive clinical information via use of computer technology", only 67% of the GPs in our study were using the Internet and 59% using email — even though 81% reported having these computer services available at their major practice. Having the capacity for these services satisfies PIP requirements but does not guarantee their use by individual GPs. Having the PIP payments certainly increased, rather dramatically, the adoption of computers in general practice in the study area. But there is still a rather mixed story about how they are used.

Of great importance is the link between RACGP and GPCG. As can be seen in chapter 3 the first RACGP computer policy was promulgated in 1979 and the RACGP has continued to update and develop policy in this area ever since. The RACGP is the main organization for support of the GPCG.

The size of this group would suggest a problem for governance but the GPCG would argue that it is essential to ensure engagement of stakeholders and to optimise intersectional coordination and collaboration. (Tomlinson 2006) The GPCG's overt aim is to contribute to national policy, standard development and implementation, and provide practical support for GPs to meet the challenges posed now by Health Online – a clear move on from their original goal.

It is clear that the GPCG has developed influential networks and represents GP informatics on a number of advisory and health informatics organizations. Examples of this representative role include

various standards Australia health informatics committees, the HealthConnect and MediConnect Development group, the former Medicines Coding Council of Australia, (ACIR), the Red Tape Review and the National Electronic Decision Support Task Force. The overt activities and networks that the GPCG has established have clearly been positive. However it has been the covert lobbying by the GPCG that has been the real quiet achiever. In making alliances with key stakeholders and lobbying for inclusion in the PIP of certain items, the cost benefit of computerization has been very much improved. Payments as listed in table 7 (p70) are on top of fee for service and on top of any initial funding for computerization.

As many of these organizations do not support the costs of involvement (assuming that those participating are supported by their workplaces), a key enabler of the GPCG has been its ability to reimburse representatives for their costs. The GPCG was able to successfully have this included in budgets for funding. The GPCG, in partnership with member organisations and on the basis of broad consultation has developed a Strategic Plan for IM & IT in General Practice beyond June 2001 (when funding for these initiatives ended), and then on to 2002 - 2008. The AMA submission endorses this plan and the proposal for funding in the order of $75 million over four years until 2005, to advance the cause of computerization of general practice.

An evaluation and infrastructure analysis of the GPCP (June 2001) found that the group had addressed all its key activity areas for 1999 – 2001, without being dominated or unduly influenced by any one of its members or related organizations. I found it interesting that it was necessary to examine governance of an interest group from this

aspect, and this engendered in me a curiosity as to the machinations of the group, particularly in light of the amount of funding that it received and in light of the achievement that it made in earning funding for general practice through the PIP.

7.4 How payments are calculated –the importance of PIP:

Payments through the PIP recognize specific aspects of general practice that contribute to quality care. The payment formula was developed in consultation with the GPFG (General Practice Financing Group), which also consulted many GPs and Divisions. The GPFG consists of GP representative organizations as well as the Australian Government.

Practice Size

Most components of the PIP payments are proportional to practice size. Practice size is calculated using a measure of patient load at the practice that is independent of the number of services provided to patients. This measure is called the SWPE. The SWPE value for a practice is the sum of the fractions of care it provides to each of its patients, weighted for the age and sex of each patient. This value is calculated in three steps.

Firstly, the SWPE value of each individual patient attending the practice is calculated. This is the fraction of the care provided by the practice for each patient.

This fraction is based on the schedule fee value of non-referred consultations received by the patient at the practice within the twelve-month reference period used to calculate the payment. The value of these consultations is then divided by the total schedule fee value of all non-referred consultations received by the patient within the reference period. Using the schedule fee value in the calculation, rather than just the number of consultations, allows greater weight to be given to longer consultations, out of surgery visits, and the like.

Secondly, this fraction is multiplied by a weighting factor that varies according to the patient's age and sex. This adjustment recognizes that, on average, people require different amounts of general practice care at different stages in their life, and that this amount of care also differs between males and females.

The following table gives the current values used in weighting SWPEs for age and sex.

Table 9 Weighting factors for age and sex of patients

Sex	< 1 years	1-4 years	5-14 years	15-24 years	25-44 years	45-64 years	65-74 years	75+ years
Female	0.611	0.985	0.575	0.863	0.972	1.157	1.602	2.291
Male	0.656	1.058	0.570	0.585	0.704	0.937	1.454	2.160

The values in the table above are calculated from consultations received by age and gender group, using Medicare and DVA data and may be updated from time to time.

Thirdly, these weighted fractions of patient care are then added together, giving the SWPE value for the practice. The calculation relates to a twelve month reference period that ends four months prior to the start of the payment quarter. For example, payments received in the May quarter of 2000 were calculated using practice size data from the year ending 31 December 1999. The four-month gap between the end of the reference period and the payment calculation allows time for consultations conducted within the reference period to be registered in the Medicare and DVA systems. The practice size calculation only uses general practitioner and other non-referred consultation items (including antenatal and Enhanced Primary Care (EPC) items). It does not include other MBS items, such as procedures.

Table 10 How payments are applied *Most components of the PIP payments are proportional to practice size. Practice size is calculated using a measure of patient load at the practice that is independent of the number of services provided to patients. This measure is called the SWPE.

	Aspect or Activity	Annual Payments per SWPE*
1. IM/IT	Tier 1 – Providing data to the Australian Government	$3.00
	Tier 2 – Use of bona fide electronic prescribing software to generate the majority of scripts in the practice	$2.00
	Tier 3 – The practice has on site and uses a computer/s connected to a modem to send and/or receive clinical information	$2.00
2.After hours care**	Tier 1 – Ensuring patients have access to 24-hour care as specified in the application form	$2.00
	Tier 2 – On average, the practice covers at least 15 hours per week of its after hours care from within the practice	$2.00
	Tier 3 – The practice provides 24-hour care from within the practice	$2.00
3. Teaching	Teaching of medical students	$50 per session Max 2 sessions per day)
4.Quality Prescribing Initiative	Practice participation in quality use of medicines programs, endorsed by the National Prescribing Service	$1.00
5. Diabetes	*Register Payment*: Once-off payment for notifying the Australian Government that the practice uses a diabetes register and recall/reminder system. *Service Incentive Payment*: Payment for each annual cycle of care for a patient with diabetes, payable once per year per patient. *Outcomes Payment*: Payment to practices that complete an annual program of care for a target proportion of their patients with diabetes.	$1.00 $40 per diabetic $20 per eligible SWPE
6. Asthma	*Sign-on Payment*: Payment to practices that agree to provide data to the Australian Government. *Service Incentive Payment*: Payment to practitioners who complete an Asthma 3+ Visit Plan for patients with moderate to severe asthma, payable once per year per patient.	$0.25 $100 per patient
7.Cervical Screening	*Sign-on Payment*: Payment to practices that agree to provide data to the Australian Government.	$0.25 $35 per patient

	Services Incentive Payment: Payment to practitioners for screening women between 20 and 69 years who have not had a cervical smear within the last four years. *Outcomes Payment*: Payment to practices where a specified proportion of women ages between 20 and 69 years has been screened in the last 24 months.	$2.00 per female WPE aged between 20 and 69
8.Practice Nurses	Payment to PIP practices that employ or retain the services of a practice nurse and are located in the target area (see page 33 for details).	RRMAs 1-2: $8 per SWPE RRMAs 3-7: $7 per SWPE
9.Mental Health	*Sign-on Payment*: Once-off payment to individual general practitioners who register for the incentive. *Service Incentive Payment*: Payment to practitioners on completion of the 3 step mental health process.	$150 $150 per patient
10. Rurality	The practice's main location is outside metropolitan areas (increases with extent of remoteness)	15% to 50% loading of total payment.

7.5 Case study descriptions of how the PIP and the formulas work

Case Study 1

Table 11: Outcomes and breakdown for Futurama (pseudonym) clinic of the calculations based on the relevant rates; total combined annual PIP payment including loading = $50,600. per doctor per practice (Medicare 2007)

Element	Required Activity	Prescribed Annual Rate per SWPE	Calculated Annual Payment for Sample Practice
1. IM/IT	Tier 1 - Provide data to the Australian Government	$3.00	$12,000
	Tier 2 - Use of bona fide electronic prescribing software to generate the majority of scripts	$2.00	$8,000

	Tier 3 - the practice has on site and uses a computer/s connected to a modem to send and/or receive clinical information	$2.00	$8,000
2. After hours care	Tier 1 - Ensuring patients have access to 24-hour care as outlined in the application form	$2.00	$8,000 (as the MDS the practice uses covers out of hours visits)*
	Tier 2 - On average, the Practice covers at least 15 hours per week of its total after hours arrangements from within the practice	$2.00	Nil. Provides only 13 hours on average per week from within the practice.
	Tier 3 - The practice provides 24-hour coverage seven days a week from within the practice	$2.00	Nil. The Practice engages the services of an accredited deputising service.
3. Care Planning	The practice provides appropriate care planning for the target coverage level	$10.00 per 65+ WPE	$4,000
4. Teaching	Teaching of medical students	$50.00 per session	Nil. No teaching undertaken
5.Quality Prescribing Initiative	Average of three activities per FTE GP, one of which must be a clinical audit.	$1.00	$4,000
6. Rurality Loading	Practice's main location is outside metropolitan area	Practice is graded as a RRMA 3 location attracting a 15% loading	$6,600

The Futurama Medical Clinic is located in one of the areas of the study as a RRMA 6 practice, hence attracting a **15% Rurality** loading. The practice is operated by five doctors (three of whom are full time). Between them, they perform 26,000 consultations (an amount equating to four full time equivalent GPs), and have a stable patient load of **4,000 SWPEs** (practice size).

The Practice is open from 9 am to 8pm each weekday and for a morning session (9am to 12pm) on Saturdays and Sundays. At other times, an accredited deputizing service has been engaged to cover these periods.

Comparing this operating profile against the definition of "after hours" for the purposes of PIP **After hours care**, (*being hours outside 8 am to 6pm weekdays and 8am to 12noon on Saturday*) we calculate a total of **13 hours** (i.e. 10 hours for Monday to Friday plus three hours for Sunday). Hence of after hours care, 13 hours is provided from within the practice.

Two of the associates are interested in clinical computing. There is a computer in each consulting room, and these are networked so that clinical records can be accessed from any room. All GPs use the standard approved prescribing software. The practice has an Internet connection with the majority of pathology reports being received electronically and communication with other GPs via email. In this regard all three elements of the **Information Management / Information Technology** have been met. The practice has not hosted a medical student placement and therefore does not qualify for the **Teaching** component.

Four of the GPs have undertaken quality use of medicine activities recognised by the PIP, however the fifth GP has decided not to undertake these activities. The GPs have done four clinical audits and nine case studies for a total of 13 activities.

The practice patient profile includes 400 65+ WPEs and 60 patients within the practice have care plans. The practice therefore meets the minimum coverage rate for the **Care Planning** component (which is 10% in the first year). Against this background the Practice's payment level for the financial year would be **$50,600**. Actual payments each quarter would be $14,950 for the February and May quarters

The Practice Incentives Scheme (PIP) and this practice the following is adapted from interviews conducted in this practice 2004-05):

This practice principal does not have any difficulties when complying with the PIP and all its sub programs. This is because he is able to rely on systems

and procedures developed by the practice manager and the practice nurses. The partners decide which programs of the PIP to participate in and develop systems and procedures for use in those programs.

His opinion about the programs is they are a good idea, but are often difficult to implement, as GPs are very busy. This creates tension between obligations to paper work or to the patients. My perception of this is that the tension really exists between acute care and preventive medicine.

The initial accreditation for the practice to participate in the PIP was reported by the principal to be very demanding in administrative time. It is administrative time that curtails fuller involvement with the PIP for the costs of compliance are seen to be high by this practice (Summary of practice documents supplied to me by the practice but developed for submission to the productivity commission 2003.)

Case Study 2

*The Practice Incentives Scheme (PIP) and this practice (*adapted for interviews conducted from 2004-05):

This practice describes the practice incentive scheme as bureaucracy gone mad. Although some requirements are perceived positively and allow the practice to maintain high standards, other requirements are said to be excessive. The procedure manual for instance, requires considerable time for a very limited utilization once the accreditation is complete. "I don't think that I have looked at the manual since the accreditation, I suppose I will look at it again when our next accreditation comes up" (Practice principal 2005) It seemed to me that the accreditation process was hardest on these small practices because there is not economy of scale for them. Furthermore, the lack of administrative staff in small practices that can be allocated only to this job when it arises makes the amount of paperwork difficult to tackle.

The practice was first accredited in 1999 after the first implementation of the PIP and then again in October 2002 and again in 2005. In the first place the PIP involved a lot of time but by the time they had done it the third time the principal did not have to spend much time as all the records were there because they had been generating them as they went along.

Everyone in this practice tries to use the computers as much as they can "To get the full value out of them"

Case study 3

The Practice Incentives Scheme (PIP) and this practice (adapted from interviews conducted from 2004-05):

The practice reports that there is a strong base of support for computerization of this practice and the continual upgrade of the systems.

"Computers have had a big impact on our practice particularly the PIP. But I would like to say that some aspects of the PIP are not worth our while" (interview 34 2005) this remark was made in regard to the accreditation process. The process is again seen by staff as negative to the mission of the practice. However the practice principal has a very different view -

> *I think that the first accreditation process for the PIP IT/IM was a very involved process and they could have had more practices being involved if they had not made it so detailed in terms of paperwork. We got involved early because of me you know. I have always believed in IT/IM and took the opportunity offered by PIP. I have been chair of the local division and helped establish it. I have also been very involved in the RTO in the provincial city not far from here. What I do there is get involved in professional development for the registrars and this involves getting them up to speed about the use of computers in general practice so that they*

will be in better position to use them if and when the hospitals expand their use of IT/IM for patient discharge and after care – that's if they ever start to directly collaborate with us GPs.(interview 35 2005)

It is interesting to speculate about the process of adoption within this case study in regard to how one actor within the practice influences all the activities of the practice. Fletcher 1999 suggests that perceived power has a lot to do with influence. In the case of this practice the principal is perceived as very powerful in terms of traditional structures of society –i.e. traditional respect for the doctor. In this practice adoption has occurred mainly because of this one individual and the influence he holds which can be represented by statements of employees such as - "He is the doctor you know and so we do as he wants us to do" (interview 36 2005)

In returning to the interview with the practice principal a further insight to the process of adoption within this practice is gained by the following information*;*

"When we first started out with the IT/IM we had some difficulties installing it because of the heat here in this town, and we found that we had to build a new building that would be good for the computer system server. The practice manager works in that building now and so does the coding clerk. Going over to the fully computerised practice eventually meant that we had to move location because of the requirements of continued registration through the PIP. So the effect of computerizing can bee seen in that way as well" (interview 35 2005)

In terms of Actor Network Theory this would point out how it is very difficult to separate the actors human and non human. In a view informed by ANT,

this ability of inanimate objects to have as much influence as humans in the adoption/translation process is clearly presented by the needs of this practice to adjust to the needs of the computers and change location. Further examples of this can be found as the practice translated through other developments

> *"This practice uses the Genie medical software. We do not use Medical Director as it causes problems with the way that we have our system networked here at the practice. One thing that I still find amazing is just how rapidly computers were integrated into our practice and how soon we came to treat them more or less as part of the practice. They assumed some sort of personality. I'll explain this. Take the fact that in this practice not all of us use the computers for the same things. Some of us use them only to comply with the PIP requirements; some of the others of us use them for as many things as they can. Now those that use them as little as possible are the ones who are always reminding us about the fact that the system might crash, that we have too much information "in there". These GPs also back up their data with paper print outs of anything they do. They also worry about the security of the data. You can tell them and explain to them again and again but it makes no difference. I think that this represents a lot of the GPs attitudes in this division.*
>
> *This practice does not use them right across the board – you can see that by the fact that some of us still only use them to PIP requirements. Then there is another picture at this practice –that some of us use them as much as we can. I think that our practice represents the picture right across Australia and of course across this division. (op.cit.)*

Again it is clear that the level of adoption varies according to the way that computers are perceived by the practice doctors. The interplay of computers, perceptions, ability to use the computers, the requirements from the PIP and the aspirations of the doctors are all linked in a complex network of relationships that all play a part in the process and level of adoption. So despite the incentives supplied by the PIP and the support provided by this individual practice the adoption of computers within it is incomplete.

7.6 Conclusion

The three case studies point to a variety of influences in the way that computers were adopted, not the least of which is the influence of support and financial reward. In the case of Actor Network it can be clearly seen that the PIP was an actor in an equal way that the computer group were. While one is a financial reward the other is a political actor. The reward would not have been achieved without the other.

CHAPTER 8: THE DIVISION OF GENERAL PRACTICE AND THE ROLE OF THE IT/IM OFFICER

Aim of this Chapter: To articulate the character of the division and discuss the role of the IT/IM officer as an actor in the network of adoption. In the second part of this chapter the articulation of the role of the IT/IM officer there will be a focus on the micro-sociological aspects of power in actor networks,

8.1 Introduction

The division – establishing why it was an important player and why the placement of the IT/IM officer within it was an important move:
During the time that this research was taking place there was heated debate (Mooney, G. 2003) about the place and funding of Divisions of General Practice, going so far as to ask the question – Do divisions have a future? There was active restructure of the divisions from project based funding to longer term outcomes based funding. (2004 -05 CEO report). It was during the phase of project based funding in the life of CHDGP that achievements were made in relation to IT/IM. After this time funding ceased for the IT/IM program and it focused more on integrated projects to improve health outcomes, such as the introduction of active recall and reminder systems to support diabetes health programs. Thus the IT/IM initiatives were integrated into the wider picture. Before this the CHDGP had an IT officer who was available to general practices to assist with the implementation of IT/IM. This officer was supported by two other staff on a part time basis (they undertook other responsibilities as well). This indicates the importance that CHDGP gave to the development of IT/IM infrastructure.

The IT officer role was pivotal in the establishment of computerization in this division. However the achievements did not come without difficulties which in themselves created barriers to adoption of IT/IM in the division. To get to the point above it is important to take a look

at the history and debate that was taking place in divisions at the beginning of this research.

8.2 Some History (adapted from archives records at CHDGP; interviews with the CEO at CHDGP and staff at CHDGP):

One way that the Commonwealth Government has sought to organise general practitioners into groups, both to improve delivery and to control costs, is the creation of Divisions of General Practice. The first local Divisions were established in 1992 and about 94% of GPs are now members of a local Division of General Practice. The objectives of divisions were to deal with nationally identified issues including:

- erosion of the GPs position in the health care system,
- falling remuneration for GPs,
- GP isolation and frustration.

The initial divisions were locally based, responding to local issues. They were funded on a project basis and not on a national focus. In 1998, after a Commonwealth Government General Practice Strategy Review a recommendation was accepted that divisions be funded as the national organisation of Divisions and became known as Australian Divisions of General Practice. ADGP became one of Australia's largest representative voices for General Practitioners.

As part of ADGP's representation program, grass roots GPs sit on approximately 60 key decision-making bodies in the health sector, having direct input into general practice financing, GP workforce and training, clinical practice and practice management and other key issues influencing the future of General Practice. This ensures that there is communication with Divisions of General Practice, directly or through State Based Organisations.

In 2005 the ADGP changed its name to Australian General Practice Network (AGPN) representing 119 divisions of general practice and their state-based organizations across Australia. They are now the largest voice for general practice in Australia with over 95 per cent of Australia's GPs members of their local division. Australian General Practice Network Ltd. (AGPN) is the peak national body representing 121 Divisions of General Practice across Australia. The establishment of divisions of general practice was a response to the need for local focus on training for GPs. The aim of the AGPN is:

- be the voice of Divisions of General Practice to the Commonwealth of Australia;
- support Divisions of General Practice across Australia;
- advocate for Divisions of General Practice;
- inform the public about issues affecting General Practice;
- promote the exchange of skills, information and ideas between Divisions of General Practice.

AGPN also coordinates a number of national programs through Divisions of General Practice to improve the health of all Australians. AGPN's programs cover a broad range of primary care issues including immunisation, youth health and practice nursing. These programs aim to strengthen primary health care to better meet the needs of the Australian community. Where appropriate AGPN works collaboratively with other organisations such as the Pharmacy Guild, to develop and coordinate a program. Many of the programs are overseen by committees made up of GPs from Divisions and other stakeholders such as academics, allied health professionals and consumers. AGPN also works closely with the State Based Organisations and Divisions in implementing national programs to ensure they meet the local needs of their communities.

8.3 Other issues

In addition to these issues of concern to Governments is the need to better manage the health care dollar. Divisions thus provide a network to address these issues at local, State and National levels. They also enable GPs to improve primary health care in the community and work with other health providers.

AGPN receives funding from the Australian Government under the Divisions of General Practice Program. The Network has changed emphasis since acquiring its new name and delivers local heath solutions through general practice. Divisions of General Practice are the key infrastructure for integrated, quality primary health care services delivered through general practice.

The objects for which the *Company* is established are to promote the health and well-being of Australians through Divisions of General Practice, including by:

a. strengthening the effectiveness and vitality of the general practice sector through support to member divisions and member SBOs (State Based Organizations) and advocacy and representation of member divisions and member SBOs to the Federal Government, to other national organisations and to the Australian public

b. contributing to the development of national health policy in collaboration with member divisions and member SBOs (State Based Organizations)

c. promoting cooperation and communication with other national organisations in Australia with objects similar to these objects of the company

d. providing national leadership in health system development.

In 2005, a national performance framework linked to Division funding was introduced. The Divisions network, including the AGPN and the state-based organisations, received $157.3 million in financial year 2004–05. (Annual Report on Divisions 2006) Divisions received $140.6 million, of which $66.5 million was "core" funding from the Australian Government Department of Health and Ageing, with the remainder from state health departments, specific government programs, and other sources. This is equivalent to $8 per Australian, compared with $4319 in total health spending per Australian and $1098 per Australian on public hospitals. Division spending was equivalent to $7342 per GP, or $1.75 per GP service provided. There can be no doubt that the government sees division as very important in the health care system.

However, I think it can be difficult to distinguish the effect of Divisions as it depends on effective interaction with other parts of the system. Outputs such as computerization of general practice are now measured through PIP payments and I think it is important to note this because these outputs are used by general practices to help reduce the cost to the practices of providing services. The practices can then provide higher levels of service and develop infrastructure that is related to improving quality of care and the practice gaining accreditation with the Government.

Scott and Coote (2007) sought to isolate the effect of Divisions on measurable areas of primary care performance, while controlling for other factors influencing performance, such as remoteness, population, and GP and general practice characteristics. They found that overall, Divisions had more effect on aspects of performance related to practice infrastructure than on performance related to clinical activities conducted by GPs.

Again, this points to the adoption of computers by general practitioners in terms of the idea of them rather than the use of them, the real use of them happens in the practice by the practice administration staff. For example, Divisions had a relatively large role in explaining the variation in the proportion of PIP practices in a Division, the proportion of PIP practices claiming sign-on payments, and in after-hours care. They had a relatively smaller role in explaining the variation in GP clinical behaviour such as SIP benefits or health assessments. (Scott and Coote MJA 2007; 187 (2): 95-99) It is important to remember that the PIP is reliant on the implementation of IT/IM in the practice.

"The implementation of IT/IM in general practice is still an important issue. Despite the demise of the GPCG, the role of IT/IM officers in divisions continues to be the important basis on which all other initiatives are now built. Any practice without effective computerization is paid less, seen as less and has a more difficult time servicing patients" (Kidd 2006). The extent to which IT is still important is seen in the Figure 6 (GPCG web site 2006), and the role of divisions is still crucial in the development and further implementation of IT/IM.

Figure 5 GPCG Guides (GPCG web page 2007)

IT support

Contact your local Division of General Practice for information on training activities and hands-on support. The nature and extent of assistance will vary between divisions. Use this section to:

- view case studies on how others have approached computerisation, issues they faced and what actually worked
- find out what to consider when purchasing hardware or software
- link to software vendors and IT support staff from Divisions of General Practice
- talk with other GPs in a discussion forum.

Buying guide - software	Software.pdf (101.01 KB)
Buying computer systems for General Practice	Guide.pdf (148.24 KB)
Buying computer systems for General Practice: an introduction for General Practitioners and their staff	Intro13.pdf (97.94 KB)
Internet - a brief introduction	Internet.pdf (36.47 KB)
World Wide Web - a brief introduction	Www.pdf (32.50 KB)
WWW search strategies - a brief introduction	Search.pdf (37.17 KB)

General Practice in Australia 2004 states:

> "In the face of budgetary limitations, within a health industry that has consistently underinvested in health informatics, a major critical success factor is the skill and capacity of people to promote and support sound management and appropriate deployment of appropriate health information systems in the health care sector. The benefits of IT have not been realised in health care because of the shortage of well trained health informatics professionals; inadequate informatics skills to ensure safe and cost effective e-health; a lack of competent health informatics project managers, innovative and useful health informatics R&D and clinicians with informatics skills to

> enhance evidence based practice; and a lack of tertiary institutions to provide health informatics training. Resources need to be allocated to support general practice computing at a local level so that as general practitioners begin to utilise computers in their practices to support their daily work of delivering health care and coordinating health services they will receive relevant and accessible assistance and support"

At the beginning of this research most of the informatics issues in general practice had only been partly addressed. The greatest challenge remains the lack of explicit processes and systems in place to promote and reward quality and safety and to manage risk at the clinical and population health levels. There has been little policy development on implementation, and despite the introduction of the PIP, RACGP still claims that there are only limited incentives for GPs to extend their use of computers-based clinical information systems beyond prescribing and data collection. This was the result, despite the fruitful work of IT officers within divisions – particularly in the CHDGP, and government support. I will extend these remarks in chapter 8 "decision making in general practice", where I will explore an explanation for this situation. Suffice to comment for now that IT/IM up-take still faces many challenges. It is important to comment that the position of adoption for general practice is at 90%, but I remark yet again that this is below the expectation of IT/IM for use is in regard to general practice not general practitioners.

8.4 The initial role of the IT/IM officer:

At the outset of this section I stressed that the focus here is on the micro-sociological aspects of power in actor networks, on the coupling of the IT/IM officer and the practices she persuaded to adopt IT/IM. This discussion here is not on the structural implications of the social distribution of power. This approach relates to the tactical exercise of having power through social interaction.

According to the IT officer (interview 2005) at CHDGP the challenges that she faced were as follows:

- Unrealistic expectations of the professions, government and industry
- Change management, including social and organizational informatics issues
- Lack of information system standards and benchmarks
- Fragmented political and legislative approaches and support
- Fragmented financial approaches and support, including an unfilled need for clear business models with which to engage the clinical software industry.

This was the situation that she faced, so the question is how did she face it and why was she so successful in gaining support if not full adoption of IT/IM? To address this I will examine her role and how she implemented it. I will pay close attention to her actions in relation to the negotiations and give examples of these drawing on actor network and actor strategies. What are the mechanisms through which she exercised power in negotiations in subtle application, so that this view of power is far less massive than is often imagined?

8.5 The role of the IT/IM officer 2001 – 2004 CHDGP:

Figure 7 below describes the position that the IT officer was to fulfil during the period 2001 to 2004. This role was important to the success rate of adoption for the division.

The position was very important and in reality it developed into more than what is stated in the position description, and, I would also like to again make the point, that even at this stage it is clear that the emphasis is on general practice not on the GPs. This last point is developed further in the following chapters of this thesis.

It is through the role of the IT/IM officer that I was able to develop my thoughts further still in regard to which theory I feel better explains the pattern of adoption in the study area for complex mechanisms through which actors generate social and material networks of support can be highlighted with Actor Network Theory than can be with Rogers' theory of adoption.

It is the translations, both social and business in the practice outcomes that can be examined by using ANT rather than Rogers. With ANT outcomes arise through a series of displacements and transformations (of interests, goals, actions, objects, people etc). (Callon 1986) through the actions of the IT/IM officers we see power is composed by enrolling other actors in the scheme of adoption of computers in general practice. Latour (1986) writes that the ability to generate such associations hinges on both material and non-material resources. Thus the main aim of this section is to explore the subtlety of power relations in terms of processes such as legitimation and negotiation

that the officer used. It becomes clear that power is dispersed throughout the general practitioners, their practices and practice managers and many others. It is not concentrated in any one area and as such each has their own leader and influential that the IT/IM officer had to tap into.

Ideally, the appointee should possess the following qualifications, skills, abilities and experience:

- A degree in a relevant discipline and 2-3 years experience in a library or information management role or equivalent.
- Demonstrated knowledge of current information management practices, and an appreciation of knowledge management principles.
- Knowledge of copyright legislation and the ability to research and monitor legislative changes.
- High level communication skills including experience in consulting and negotiating with stakeholders at all levels and the ability to establish and maintain useful networks.
- Excellent organisational and time management skills.
- Ability to work independently and as an effective team member.
- Well developed research and writing skills including the ability to prepare reports on information management issues, develop policies and prepare documentation in collaboration with practices.
- Ability to resolve problems and contribute to the achievement of positive outcomes for the Division about information management access issues.

This position leads the implementation of the information management and technology (IM&T) so as to deliver high quality, timely, cost effective ICT solutions to CHDGP member practices. The Officer works in partnership with key stakeholder to maximise the contribution of information management and technology to high quality health care and an efficient health system. The Officer has primary responsibility for leading, guiding, coaching and supporting staff across a diverse range of practice in the division.

Figure 6 Requirements of the IT/IM officer (CHDGP Position description 2001)

By using the following table to constantly compare the two theories during the examination of the role of the IT/IM officer I was able to clarify the factors at play and the nuances of these factors in regard to this role.

Table 12: Social and power origins and comparison of innovation diffusion and innovation translation (adapted from Kelman 1961)

	Innovation Diffusion	**Innovation Translation**
Discipline of origin	Social Science and Communication Theory	Semiotics, Sociology of Scientific Knowledge
Spread of ideas	Diffusion of an initial impulse from one source that spreads throughout a system.	Occurs through social/network relations between actors
Motivating force	Early adopters provide the example for the non-adopting individuals to follow.	Resides in the network of actors (habits, routines, institutional behaviours inhibit movement)
Origin of power	Usually vested in a single powerful entity or a change agent	Power is a result of the interactions between entities in the network. It is a result of the alliances formed by actors.
Treatment of entities	Categorize individuals in five groups (innovators, early adopters, early and late majority, and the laggards)	All entities (human and non human) are treated as equals
Source of motive force	Extrinsic	Intrinsic
Function of innovation	Generally decided at design stage	Shaped by the network of actors as it passes through the network
Incorporation of social factors	Social network interaction facilitates the communication of the new innovation.	Contained within the network of actors
Spread of effects	Larger populations (macro view)	Local variations exist and are important (micro view)
View of the difference between social and technical factors	Innovators and early adopters are more likely to gain benefits than the laggards	The technical is not privileged over the social

The project officer (interview 2005) for information technology and information management in the study area took the following point of view about her job: "*Before I came to this job Information Technology (IT) was beginning to be adopted in the study area. There had been a lot of work undertaken by government, some practices and the GPCG. Now it was the division's turn to underpin the developments so far with direct assistance."(inteview2004)*

These comments would seem to fit very nicely with the explanations offered by (Rogers 2003:391). Rogers would claim that agenda setting occurs in organizations because the system has to know what it is working towards. "Agenda setting is the way the needs, problems and issues bubble up through a system and are prioritized in a hierarchy for attention". This can take many years. Thus far in this research it is clear that this has occurred. The problem for the study area is that these agendas are not necessarily the agenda of the practices. To understand this I used ANT as the explanatory framework and the case studies demonstrate that the agendas in the practices are often very different from those of outside organizations. I perceived that the way an organization would go about implementing an innovation was very different to way that the practices or the individual GPs would go about implementing a change.

In returning to the IT/IM officer for further information she offered this,

> *"My first thoughts about the job were that I was there to assist in bringing about some behavioural change. I thought this was a bit amazing as when I first started I came to this job thinking that the GPs would be gung ho to change because of the benefits that the technology would bring to them. I was mostly wrong about this, many of the GPs did not want to have to do the IT but they did see that it would help the practice deliver a better service*" (interview 2004)

The IT/IM officer in this case was not what Rogers would have described as having homophily (Rogers 2003:346). All generalizations offered by Rogers suggest that a change agent will have more effective communication with clients when they are homophilous. Such effective communication will be rewarding and encourage the client and the agent to continue towards success. But in this case the change agent

was heterophilous – not sharing common beliefs with clients. This would indicate that she was not going to be successful.

The IT/IM officer explains further –

> "*What I thought was that properly designed and successfully implemented information technology could promote collaboration among the patients, their doctors, the practices, the hospitals and whatever other health care provider got involved with patients. In this I had a bit too much expectation, so I was not very successful at first, what I was trying to do was use the seven stages recommended by Rogers for the sequence of change agent activities. I found that this did not work*" (interview 2004).

On asking the question of what made her successful she immediately explained that success was due to finding our more about her clients and being able to understand what was making the practice tick and what made each of the GPs tick. This would not be possible if she used the approach that Rogers recommends (Rogers 2004:336). Bringing about greater use of computers by the GPs was her task but this was not going to happen the way that she thought. (In fact even as this research finalizes she still claims that she was not successful in her role). To achieve her task she set about getting to know the details of each practice and the GPs. This was not the work of a day, but many of the GPs and practice managers applaud her efforts and state that if it had not been for her help they would not have achieved as much as they had.

In getting to know the practice and its GPs she shows that her activities were more informed by Actor Network Theory than by

Rogers and I have illustrated this in tables 12 and 13 below. In aligning ANT with the comments of the IT/IM officer I can identify that she entered into a far more collaborative mode of operating and would explain it in the following manner: (adapted from interviews and diary records kept by the IT/IM officer)

Table 13. Process (interpreted through ANT) used by the IT/IM officer to get a practice on board

ANT Process	Persuasive Influence	Example
Problematisation	I want what you want	Said to the practice manager by the IT/IM officer I understand the problems that you are having, and I am trained to help you use the computers a lot more than you do now. That way the practice will be making more money and your salary will be paid for. Let me show you the figures from Medicare that will prove this for you.
Interessement	I want it why don't you	Said by practice manager to the practice principal "What do you think of this idea about using the computers a lot more than we have been? I think it's probably good but I'm worried about how much work that will mean for you." In reply to the practice manager "Don't worry about me. I will probably just get you girls to do all the work and do as little as I can myself so that I can look after the patients.
Interessement and Translation	If you just make a short detour	Practice manager to the IT/IM officer "I'm worried about a few things and one of them is the training for the staff and then who takes responsibility for the use of the computers in this way, for example the coding that will have to happen for the claims to Medicare" Will you have a talk to the practice principle and see if you can sort out time with him for our training?
Enrolment	Reshuffling interests and goals a. Displacing goals: maybe	Said by the practice manager to the practice principal a. Have you had a chance to talk with

	you don't know you have a problem	the IT/IM officer at the division? Yes What was the outcome? Well I think that we can have the training. The girl from the division said she would organize it all and that it would not cost us
	b. Inventing new goals –but you have… c. Inventing new groups – you need help	b. Maybe we can also get some of the staff to be involved in the training organization so that it means more to them – you know get each one of them to assist the girl from the division with part of a session. c. We could get some of the staff from the division to also assist – you know the ones that are supposed to be helping the officer.
	d. Rendering the detour invisible	d. Said by the practice manager to the IT/IM officer. I wonder if you could help me with the in-service at this practice. I feel like it is going to be on my head if it does not work or they don't learn quick enough, especially now that I have pointed out to Dr Wonder that we will make more money, so I hope that you can help me organize our in-service and help the girls to do their bit at it. Said by the practice manager to the staff members
	e Dissolving responsibility	e. We have decided to run an in-service to teach us all how to use the computers much more than we are now. So Dr Wonder and the girl from the division will organize it with your help Practice manager in staff meeting
Mobilization	f Becoming indispensable	f. I am sure that the wider use of the computers will cause a lot of us to become a bit frazzled and so I am happy to help out wherever I can – just let me know if you need me.

Table 14: Processes of persuasion (interpreted through ANT) used by the IT/IM officer at CHDGP 2002 -2004

Translation 1	I want to help you	Said to the practice principal by the IT/IM office "I want to help you build up your computer usage so that you get the most out of the systems that you have
		Yes said the practice manager that would be a good idea to get better use of the computers in this practice as soon as we can.
Translation 2	I want it why don't you	Said by practice manager to a staff member
		Now come on you lot we need to get our act together because we now have to report figures to HIC and we have to make sure that we are using computers so that we can get our registration for PIP payments
Translation 3	If you just make a short detour	As above
		We would not have to do all the things in one month – we can have some training and then get on with the use of these things, we have the girl from the division who will help us now.
Translation 4	Reshuffling interests and goals	Said by the practice manager to the practice principal
	a. Displacing goals: maybe you don't know you have a problem	a. Now Doctor 1 we have had a look at the plan to use computers in a better way in this practice and I think that we have a problem – We need to have some staff training
	b. Inventing new goals –but you have...	
		b. So what I propose it that we get the staff trained by the girl from the division, which will not cost us except for the time.
	c. Inventing new groups – you need help	c. This will add to the day we spent at the division office getting to know the computers - we could not have that happen here in this practice. It would mean that we need to be here out of hours but that should be ok as we will be able to go at it without interruption.
	d. Rendering the detour	d. If we learn to code properly for the PIP and use the system for recalls and reminders we will make the practice more income

	invisible	Said by the practice manager to the staff member
	e Dissolving responsibility	e. You know after all the stuff that we have learnt I think that we can easily say that our wages are paid for by the things that we do with the PIP, and we couldn't have done that if we did not learn to use the computers more effectively
Translation 6	Becoming indispensable	Practice manager to everyone who will hear 6. Now that we have made the decision to get the computers and we have the division office helping us, I think that I should be the person in this office to be in charge of the coding system – it is a specialised job.

Latour explains this by considering a far more didactic interpersonal relationship as the building of the ability to persuade or enlist others in the cause is done through the development of social relationships. In the process of enlisting others into the network it is the actions of those involved that are important. The ability to persuade or enlist is not something you possess or hoard – it is something you do or do not have (Latour 1986). The IT/IM officer assumed a revised and expanded role in the initiatives described above and in this way she practiced power or the ability to persuade, enlisting others into the successful network of adoption. In these practices, IT focused on personal needs, professional/organizational roles and the social contexts (cultures) in which her clients functioned. This focus involved a shift from the IT role as a "builder of things" to a net-worker and further to a person who had to sustain these networks. She expressed it this way "It used to be that I asked what they wanted. I got people to build it. I installed it. And then I showed them how to use it. What more could they want?

The relationships of power in this case require an active subject upon which to act, and moreover, involve acts on actions. Thus, following Latour (1986), successfully enrolling subjects in the exercise of power means that power must

have already been incorporated in the concerns of those involved. So, by inference power is already contaminated by resistance or the putting up of barriers to the adoption of IT/IM in the practice. There is clearly a shift from the principle of power to the practice of power, or from power as a possession to power as a relationship. So the implication is that rather than power spreading out from the IT/IM officer it is highly contingent and the subject of constant renegotiation. All this brings a great deal to bear on winning hearts as well as the minds of stakeholders.

Although some of the problems and solutions discussed in this example apply specifically to the research, the lessons learned from them seem relevant to information technology applications in other fields. Successful development and implementation requires of the IT/IM officer frequent and ongoing communication with clients, serious investigation of the context (culture) of end users and investing significant time and other resources in non-technical issues. This can only be explained by using ANT to framework the enquiry.

It was not always possible to predict which practices would change based on understanding initial practice conditions. "Malleable moments" such as described in the table above can be identified during which practices and people become open to change. It was important for the IT/IM officer to tie change strategies with existing motivations, or to develop new motivation.

The development, implementation and ongoing evolution of Practice One information technology illustrate factors that influence the successful adoption of innovative information technology. "Practice one has evolved, and as it has done so the strategies for ensuring its successful adoption of IT and IM have evolved" (interview 2004). What was recognized by the IT officer was that the technology was an organizational intervention and that working with users' social context and culture was critical for success. The IT officer had to build a collaborative relationship with users.

When the IT/IM officer came on board Practice One had an interactive database system that stored records, received data from external sources, and kept the practice stats up to date for HIC – it was science-based, norm-referenced information regarding health status and treatment outcomes. (As I explained in case study one, this was not always the situation). Such systems support management of individual cases and caseloads as well as site, regional and national practice patterns for clinicians and health-care-provider companies, managed care companies and insurers. This data also informs employers and government agencies of the health care services.

In support of this the IT/IM officer commented in the following manner:

> "*Efforts by the divisions have often been reduced by the GPs themselves. In some divisions it is reported that identification of practices that were centres of excellence in IT/IM was actually a barrier to other GPs adoption of IT/IM. Some general practices thought that the centres of excellence were getting all the resources in terms of support, skills and expertise for the division office. Thus they resolved to have little to do with IT/IM, and remain outside the system today; they only adopted that which was necessary to remain compliant in terms of practice registration. Increased income via the PIP was not an incentive to them. I had to work very hard to over come this*". (interview 2005)

8.6 The role of the IT/IM officer translates to another role:

Time stands still for no man and the division is now working with e-health specifically - The Broadband for Health incentive program. The current incentive payments are:

Table 15: payments for the broadband for health project (*RRMA rural and remote metropolitan areas)

RRMA Location	Terrestrial	Satellite
RRMA 1	$774.50	$2,371.50
RRMA 2	$813.00	$2,490.00
RRMA 3	$853.50	$2,614.50
RRMA 4	$896.50	$2,745.50
RRMA 5	$941.50	$2,882.50
RRMA 6	$988.50	$3,026.50
RRMA 7	$1,004.50	$3,178.00

CHDGP will assist those Practices which are making a decision about their broadband connection, and they are using the National e-Health Support Program which is producing a document called “Broadband Internet Connectivity for General Practice: Recommended Minimum Requirements”. This document is being developed to assist General Practitioners and Practice Managers choose the most suitable broadband Internet service for their Practice.

The CHDGP is also assisting with the development of an information management capacity check tool. The objectives if the IM Capacity Check initiatives are to assist practices to:

- Assess their current information management (IM) practices against recognized international best practices and principles and identify current level of capacity. Capacity includes people, skills, processes, technology, policy, management framework and resources. The

Capacity Check is based on generally accepted best practices, and therefore provides an opportunity for practices to assess where they stand relative to these best practices.

- Bring together all the elements of information management practices. The Capacity Check integrates the full range of capabilities necessary to implement sound IM.
- Assist practices to identify and prioritise improvements in IM capability and high priority opportunity areas to pursue.

Table 16 The 6 IM capacity domains and their foci are as follows (ADGP 2006):

No	IM Domain	Key Focus of Domain
1	Organisational context	Capacity to strategically support, sustain, and strengthen quality IM, including the Division's capacity to address requirements of the NQPS
2	Organisational capability	Capacity to develop the people, processes & technology resources required for sound IM
3	Management of information management	Capacity to identify and manage key organisation and key performance measures
4	Compliance and quality	Capacity to ensure the organisation's information holdings are not compromised and support required compliance and quality management outcomes
5	Records and information life cycle management	Capacity to support each phase of the information life cycle
6	User perspective	Capacity to meet the IM needs of all users

8.7 Conclusion:

The role of the CHDGP and the IT/IM officer have been important in the acceleration of the adoption process but to understand this it was important to delve further into the minutiae and the comings and goings of negotiations that occurred. I have included a sample of these negotiations in this chapter and have demonstrated that while Rogers' adoption theory offers some explanation for the process in the study area it is not a full or rich explanation. It does not cover the personal reasons that motivate people to form the events the way that they have in the study area.

I have introduced Actor Network in the form of telling a story for this vignette. This has not been a heroic episode, rather it tells of the unfolding of an innovation process, in its fits and starts, with the success and failures experienced by the IT/IM officer over time as a backdrop to the reforms that the division was charged to support. The story of information technology adoption being supported within small business by government and of the heterogeneous entities involved through the development of networks was a contested process - which brings me to the concept of power and its shifting alliances

The dictionary definition of "power" concentrates almost entirely on authority and its various permutations: the ability to exercise "power over." In such a diffusion model of power, a successful command moves under an impetus given to it by a central source. Latour (1986) contends that social scientists must necessarily shift away from this model to understand power as a consequence and not as a cause of collective action

For Latour (1986), the problem of power is encapsulated in the following paradox: when you simply have power (potential) nothing happens and you are powerless; when you exert power (act) others are performing the action and not you. Power over something is a composition that is made by many and attributed to one. The notion of "power" is a convenient way to summarize the consequence of a collective action, but it cannot explain what holds the collective action in place: "this pliable and empty term" can be used as an effect, but never as a cause.

The translation model of power (Callon 1986) presents a successful command as resulting from the actions of a chain of agents, each of whom translates or shapes it according to their own objectives. Those who are powerful are not those who hold power in principle but those who practically define or redefine what holds everyone together. This shift from principle to practice allows the vague notion of power to be treated not as a cause of people's behaviour but as a consequence of an intense activity of enrolling, convincing and enlisting.

The analysis of stories in ANT leads to a better understanding of the establishment and the evolution of power relationships, because all the fluctuations that occur are preserved in these histories. In ANT, translation is the mechanism by which the networks progressively take form, resulting in a situation where certain entities control others.

Against a multidimensional background with power relationships as a framework power illustrates a way of understanding and examining the translations in the adoption process as they occur and are demonstrated in tables 12 and 13. Power in this case was the information and knowledge that the IT officer had of how the IT/IM systems were to work. In this demonstration it is clear how the discourse that took place has provided one way of understanding how subject positions and power relations are located and inscribed within the actor network and that they are not always formal

structures. By using the discourse the hidden and multiple differences within a network are illuminated, and the overt and less overt ways that translations occur become more obvious

The repertoire of translation is not designed to give only a symmetrical description of a complex process that constantly mixes together a variety of human and nonhuman entities. It also permits an explanation of how a few obtain the right to express and to represent the many silent actors they have mobilized. To translate is to displace, but it is also to express in one's own language what others say and want: it is to establish oneself as a spokesperson.

Callon's (1986) paper on the history of the scallop fishermen of Saint Brieuc Bay in France presents, in a concise form, an important approach to social analysis and the study of power that emphasizes the processes of displacement, transformation and translation. In Callon's story, a scientific and economic controversy is described about the causes of the decline of scallops *(pecten maximus)* in Saint Brieuc Bay and the efforts of three marine biologists to develop a conservation strategy. The researchers sought to become indispensable by defining the problem and instituting a research program of investigation. They successfully locked the other actors into their strategy, enrolled them and became their spokesperson. This is exactly the process that was undertaken by the actors in the case study presented in this chapter.

CHAPTER 9: CASE STUDY AND THE MINUTIAE OF GENERAL PRACTIC

Aim for this chapter:

By using one of the case studies and through a discussion of the micro political process within the practice and the factors that affect this process I will focus on why and how decisions are made in relation to the adoption of IT/IM in this practice. This will lead into the following chapter where decision making will be explored in greater detail.

9.1 Introduction:

From the case studies it becomes clearer that computers in general practice were mainly used for administrative purposes in the initial stages of adoption. It is also clear that there is a defined difference between general practice use of computers and the use of computers by general practitioners.

There is little doubt that since the Practice Incentive Program (PIP) (see chapter 6) there has been notable acceleration in the rate of adoption. If a practice prescribes electronically, has the capacity to transfer clinical information electronically, and use approved electronic prescribing software that includes patient medical records then that practice will attract a payment from the federal government.

As part of this research I conducted a series of in depth interviews with up to 4 members of each participating practice in this research. The members included the principal (or the principals designate) and the practice manager. It was not always possible to have these 2 people together. Other members interviewed were designated by the principal and included the practice nurse, the registrar, administration staff, and the IT systems manager. In total the interview time at each practice ranged from 4 to 6 hours. The interviews took place from June to December 2004 with some follow up interviews during April to August 2005, (details in appendix D and G).

During these interviews the activities within the practice of the persons being interviewed and their perceptions in regard to the adoption of information technology were discussed. The discussions involved the following main components

- The context of the practice i.e. the location (rural vs. urban fringe),
- The history of IT/IM in the practice.
- The GPs and the practice managers were asked to discuss their opinions of the use of IT/IM in general practice
- The Practice Incentives Program - The level of participation in the Practice incentives program and the level of time and other resources in being involved in this program

The interviews were preceded by completion of a survey during January to April of 2004. It was from these surveys that the practices were chosen. As a result of the survey 4 practices were chosen to be interviewed. These practices were chosen on the following criteria.

- They had to be prepared to give the time that it would take for the interview.
- The practice had to represent a sector of the normal cross-section of the division The final selection of case studies included in this research report were chosen because they gave a representation of the division in terms of RRMA ratings and ownership types.
- Not more than one practice from each area of the division was included.

The case studies also considered size and type, gender make-up, and personal characteristics of the GPs (shown in the survey). The recruitment of the case study practices was a lengthy process and was undertaken through the umbrella of the division office and the practice managers' coordinator.

The most common reasons for not participating in the in-depth interview process were:

- Too much to do in the practice
- Too much work in being involved
- Privacy
- What is the use “this won’t help in any way”
- Not enough reimbursement for time involved.

After completing the interviews practices were categorized according to the lighthouse model developed by the division in the study area. Examples from each category are included here and then discussion about them is presented. The practice chosen for the case studies are representative of the division of general practice in which the research was conducted

9.2 Case study 1

Category – This practice would have been initially categorised as Wilderness. In 1996 it was using a manual system for recording all patient contact. It was using a manual system for all administrative purposes. However by the time I began this research it had moved from this category to a Lighthouse Practice. In this case study I intend to examine how this occurred; what were the drivers to facilitating the change and when the change did occur; why and how did it occur? By applying two contrasting theories -- actor-network theory and Rogers’ theory of diffusion to this case study, the strengths and weaknesses of each approach are highlighted and I will make a decision to proceed with the research on the basis of using the theory that provides the best fit explanation for this research in the local Division of General Practice.

The actor-network approach is useful for understanding local processes but may lack tools for easily illuminating patterns across countries; by contrast, the concepts involved in Rogers Diffusion Theory are useful for explaining the general lack of implementation of computer technology across Australia but I suspect not for explaining variations between adoption within the country nor, more importantly for this research, for explaining the variation of adoption at a local division level. This

case study highlights the importance of attempting to compare theories on the same research.

Practice Profile:

Based on the edge of a capital city

RRMA rating 1

All GPs are members RACGP

Ages of permanent full timers and permanent part timers varies from 35 years to 58 years of age

One of the practice principals was very involved with the General Practice Computing Group (GPCG) from 1999 to 2003.

Socio-economic patient characteristic – middle-to lower class with an average wage of $25,000.00 to $30,000.00

The practice does not bulk bill (see glossary)

The practice was accredited in 2001 and was re-accreditation in 2004. It receives PIP payment for all or the most of the PIP programs.

Seven fulltime GPs and several part time GPs – the number of part time GPs varies depending on the situation of the part time GP. They may be undertaking part of a training program and this practice provides them with one aspect of that as they are a registered training post. Other part time GPs are females and are permanent.

2 job sharing practice nurses and seven part time receptionists.

One full time practice manager

Nine computers, with one on each doctor's desk

3 laptop computers for use of GPs in training

Patient load per week is about 1100 visits

Has access to email and the internet via broadband

Uses clinical practice management software

Computer system presently used for:

Scripts

Referrals

Receiving pathology and radiology results

Completing health assessments and care plans

Medication records

Patient's recalls and reminders

Clinical audits and Practice management

History and perceptions:

Even though this practice was a member of the RACAGP and of other professional organizations with ties to computer groups that were originally established within the profession, it had not attempted to adopt computers even for administrative purposes.

The practice had recognized the need to use computers –"look it was years ago, about 1990 that we talked about the use of computers in this practice, I think after some of us had been to a conference in Melbourne at the RACGP, but we decided the cost was too great for the benefits we thought we would get out of it. We also

thought that we were too busy to take the time to learn about how to use them." (Research Interview 1.32 2005)

For this researcher this was a most interesting situation. This practice had come from being a wilderness (laggard) practice to being a lighthouse practice in a very short space of time. So how did this happen?

Explaining with use of the two theories

The diffusion model postulates five steps in the decision making process: Knowledge – where information is gathered about the innovation; Persuasion where in individual forms a favourable or unfavourable attitude toward an innovation;

Decision when an individual engages in activities that lead to a choice to adopt or reject an innovation;

Implementation when an individual puts an innovation into use;

Confirmation when an individual seeks reinforcement of an innovation-decision already made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation

The GPs in this case acquire knowledge about computers either through journals, conferences or significant others; they are exposed in some way to the innovations existence and supposedly gain some understanding of it. In the case of this practice they may have had knowledge of it and a little understanding through contact with the conference run by RACGP, but they did not have a real understanding of how it functioned. They very quickly passed through the other stages in making a decision about the adoption of computers. In the words of the practice principal "There was no reason for

us to search out further understanding, we were well organised with the system we had, all the reception staff were happy, why would we want to change it when it meant more work to do so, and we are short of time even then." (Interview 1.33 2005)

According to Rogers (1983) the social system and motivation were what stopped computers being adopted. They were in a position where they could adopt or reject the use of computers. The decision here was influenced by the work place social system being content with the situation and not being motivated to change. Therefore at the very beginning of the decision process this practice had rejected the use of computers that it had knowledge of, and understood that there would be an improvement at least to administration. According to the staff they would have very quickly learned the new systems. So why was the innovation really rejected?

The principal of the practice perceives that all is well in the administration of the practice and the staff did not articulate their desire to try the new system. In an interview with the practice manager (interview 2.11 2005) I found out that the reason that computers were not adopted was because the present principal's father was still practicing at the time and no one wanted to show him up. He was well loved and a strong part of the practice. She said there was no lobbying, no influential person putting their thoughts together, there was just this feeling from the staff and the other GPs in the practice that they would not like to show him up and make the last few years of his working life uncomfortable. The practice manager said this was never articulated openly but we all knew it was so and "I bet if you asked his son now he would tell you that this was the case." (interview 2.11 2005) Rogers' theory of adoption does not fully account for this type of barrier to adoption. For if one were to apply the decision making process at this stage and not

seek out further information by following the discussion through I would never have been aware that this was the reason that this practice held off adopting computers. It is the approach offered by ANT that enables this sort of information to come to the fore.

Even if I had attempted to explain this set of negotiations using that aspect of Rogers' theory (Rogers 1983; 1995) which refers to the effect of opinion leadership on the uptake of innovations I would still not have the full picture. Rogers' characteristics of opinion leaders might at first seem to link in with the process of negotiation that is explicit in ANT but on further examination it does not. Opinion leaders have five characteristics. They have access to external communications and have greater exposure to mass communication than their followers – this idea would seem to be somewhat out of date in the hyper-communicative society we presently live in. Rogers also claims that opinion leaders have greater access to change agent contact, but in reality general practice restricts contact with change agents through professional guidelines and limited time.

Further Rogers' theory (ibid) would state that opinion leaders have greater access to social participation than their followers. In general practice this is not so – time is always listed as a constraint in access to professional development. (PHICRIS 2005; Divisions of General Practice 2005) In this particular case study all members of the practice were members of the RACGP – their professional body, and according to Rogers would have been able to seek out opinions from the college but time is the big constraint.

Socioeconomic status is important claims Rogers (ibid). We expect that followers will seek the opinion of someone that is regarded as a higher status (for one reason or another). In the case of general practice it is not

socioeconomic status but professional status. And further, in the case of general practice it is not professional practice in terms of innovativeness but in terms of reliability or application of the scientific method in diagnosis that is well regarded. Preece (1994) writes that the general practitioner motivated by the duty and attendant intellectual asceticism, finds that the process of computerising a practice is unattractive because of these motivations, and that computerising was not influenced by what others thought. This was more a result of general practitioners seeing their practice with a unique identity and therefore having a unique set of criteria to be addressed in the decision process.

Thus while the model put forward by Rogers might explain adoption of innovations on a large scale such as the diffusion of a new drug into the general practices across a country (Rogers 1994) it does not explain the smaller scale decision making that is applicable to individual general practices. Nor does it explain the nuances of the processes across individual practices.

In interviewing other members of the practice more light was thrown on the situation as it was then, and I have presented this interesting set of negotiations in the table below for I believe they illustrate the political nature and inner workings of negotiating when and how a practice will become computerised. This table is based on that aspect of ANT which emphasises the translation of ideas and how they are negotiated into a stable network. In gathering the data about the conversations recounted below I was in the fortunate position of getting to know the practice pretty well by this stage. They told me about the way that the computerization was held up and I asked them to act it out – surprisingly they did!!!!!

9.3 Table 17 Factors affecting decision making - processes, influences and examples in translation

ANT Process	Persuasive Influence	Example
Problematisation	I want what you want	Said to the practice principal by practice manager The conference was very interesting and it would be good to get us on computers as soon as we can. It would probably save us a lot of work. I suppose that is the way that this practice has to go.
Interessement	I want it why don't you	Said by practice manager to the practice principals father What do you think of this idea about computers? I think they are probably good but I'm worried about you. In reply to the practice manager Don't worry about me. I will probably retire when we have to go to computers. I don't want to just yet, but there you go I don't think I could cope with computers at my age.
Interessement and Translation	If you just make a short detour	Practice manager to the principal of the practice I'm worried about a few things; one of them is the reaction of this practice when we computerize. You know they all think the world of your father and if we computerize we will lose him from the practice as I think he will retire. Most of the patients would not want that to happen. We would not want to lose the skills he has before he has finished passing them on

		Will you have a talk to him about it and see if we can work this out. He is too good a doctor to lose; we all love him very much.
Enrolment	Reshuffling interests and goals	Maybe we can think of a way around this? Said by the practice manager to the practice principal
	a. Displacing goals: maybe you don't know you have a problem	a. Have you had a chance to talk to your father?
		Yes
		What was the outcome
		He will retire if we computerize right now – maybe we should wait for a while
		Well that's probably good thinking because I have been talking to the other staff members and I think that we will lose other staff if he goes. That would be a problem that we did not know we had.
	b. Inventing new goals –but you have...	b. Maybe we could set your father the task of finding out about computers for the practice, and get the other staff to find out information too.
	c. Inventing new groups – you need help	c. We could get them to form a development group for us and report at meeting about the progress that they are making
	d. Rendering the detour invisible	d. Dad, I wonder if you could help me with this computerization thing. We will have to computerize at some time, but I can see that this is not the right time for any of us.

	e Dissolving responsibility	So I wonder if you would be able to help us to make the time right. We need a wise head in this because it will be a big commitment and needs to happen the way we all want Said by the practice manager to the staff members e. We have decided to put off the process of computerising the practice. We have decided that we want a team approach to this thing and that we would like to have a few people involved. We have got Father on board to head up the investigation for us but we need other wise heads to make sure we get all the information together. So I am calling for volunteers. Practice manager in staff meeting
Mobilization	Becoming indispensable	6. I am sure that the computerization of this practice will cause a lot of changes. They will have to be managed; I am prepared to take a lot of responsibility for that.

The practice has dual roles: it is expected to simultaneously fulfil the traditional role of carer for the patients at a high level, and provide work for the staff. It is expected that the practice will conduct itself in a manner that is ethical and upholds the aspirations of the Department of Health and Aging (DoHA); it is expected that the practice will represent the professional body the RACGP in a positive manner.

9.4 Some issues of conflict in providing high level service:

Thus the questions: how do relations between the unavoidable nature of the practice and its operations, the aspirations of the staff, the aspirations of DoHA; the actions of the members of the practice draw together to provide the traditional service that a practice has to provide, and provide at a high level? (Remember that providing service at a high level inevitably involves computerization in the delivery of modern general practice within a system that is starved for practitioners – or an aside - is this just a black box?). Can traditional and contemporary health service demands all be upheld by the practice? What would have constituted modern general practice at this time? How does the involvement of the father affect the practice and how does this impinge on the delivery of the health service as required? How is computerization of the practice changed because of the involvement of the father in the practice and vice versa?

My argument is that the practice reforms the way that it delivers its service to uphold the traditions of the profession and satisfy the demands of all actants in the practice.

In a practice where all services are delivered by humans it would seem their significance is beyond question - that humans in general practice are the only important thing. The human is ever present, fully visible in delivering the medical service, the centre of attention. This would assume that the practice is an autonomous site unencumbered by any goals but its own. This may not be the case, the service and the delivery of that service may be struggling for autonomy and the right to deliver that service in a unique form. The idea that humans in general practice are the most important actant seems to be a black box. But is it?

The practice is answerable to others outside. In a modern practice they are required to generate and disseminate knowledge they are not accustomed to supplying – reports to DoHA, patient education programs, recall and reminder of chronic diseases.

A modern practice is expected to have computerized; computers in general practice are now taken as a given. They have been black boxed – or have they? - Maybe by some but not by others - remember that the figures for adoption of computers are now supposedly at 100% however they do not show that there is complete adoption of all aspects of computing. I will delve further into this later in this case study and within this research.

9.5 Dispensability and significance:

An example of the pattern of adoption and the reasons for it can be found in the question of significance and dispensability within the context of the case study presented here, particularly the significance of the father and his particular talents, the significance of the regard for the father by the practice, the perception that he is indispensable to the practice. If the particular talents of the father were not tacitly acknowledged then the process of computerization would have been accelerated. So how did the tacit acknowledgement of the father's talents come about, how were they black boxed so that adoption of computers was delayed? How did this black box become vulnerable? How did the position of the father change? What was the effect on the practice?

The father was a black box and as such he was immutable (fixed) but he is mobile because his skills and experience could be passed on to others. By recognizing his skills the practice was obligated to ensure that they were passed on, therefore he was no longer a fixed actant and in this form he was

vulnerable because he was no longer a GP only, he was now the father of the practice and his wisdom was needed. His form has changed within the practice, he is translated and the black box that was "The Father" is opened to exploration.

The father offers us some information for the vignette (Interview21:2006):

When I started in general practice there was very little support for us. As general practitioners we were looked down on by the "specialists" in the profession. We were general practitioners because we could not get into a speciality.

I went about doing what I had chosen to do. I wanted to work at the front line of health care. I think that it is very important because it is the first place that people have to go to when they have a health problem. So I set out to do my very best. I went over to the UK and spent a while studying there and working in their system, then I went to France and Germany to work in their systems. That was really good for me as I had to learn their language. You couldn't do that as easily these days. I picked up a lot of skill in surgery particularly from the French and Germans as they had a more structured approach to surgery. I like the way that they took the risk out of the job by having a team of people on the go.

When I came back to Australia I bought this practice, and joined the RACGP. I settled down and had a family. I worked hard and was sometimes on the go for long hours. I have brought most of the adults into the world in this place you know. The thing that I am very proud about is that all the patients still ask to see me because I will give them the time you see. I don't think it (general practice) is really like that these days. You know I have never had anyone die because of what I have done as a GP; no one even came close. That's a record you know.

It is obvious why the father is such a valued member of this practice – he holds up for all to see the values and ethics of his profession. However the way that the father provides the service to the patients is a very vulnerable thing. By acknowledging his skills the need to have them passed on arose. Therefore the

change in the status of the father has to be achieved very carefully and with love from those involved in the practice. He is due respect, but there is an underlying need for the practice to move on. Then DoHA bring to the practice an agenda of their own, the RACGP also bring an agenda of their own, the patients of the practice bring another agenda – all these agenda are based on the concepts and attitudes of those organizations and patients and are introducing conflicting needs. In sorting out the need of the practice to retain the father and show value and respect for his work the decision to not computerize is put off until it can be put off no longer. Practices as sites that deliver health care require compromises from all involved who will benefit from their shared residency, these compromises make themselves known through the process of translation.

The computerization of a practice brings expectations for spaces, expectations for learning new skills, expectations for specialized equipment and capital outlay, the fulfilment of stringent occupational health and safety requirements. Additionally space for computers in general practice requires area not characteristic of general practice rooms thus creating problems of integration and adaptation.

The computerization of this general practice was seen as an annoying intruder on the everyday delivery of health care - more so in light of the value of the father of the practice. If I was to only use the theory of adoption that is presented by Rogers this situation and thus barrier to adoption of computers would never have emerged. It would have appeared that the reason for non adoption was mainly the cost and support that the practice was simply a very materially oriented place. In this case the cost of losing the skills and experience of the father were too great, the practice is not a materially oriented place but is full of feeling and consideration and love for the father and the achievements that he has made.

Becoming a GP requires the mastering of a range of difficult human relations skills. It takes years to perfect the delivery of a good patient/doctor relationship. To develop the ability to read all the language that the patient is talking in (verbal and non verbal whatever language) and the skills required to be a good GP – those of putting together all the information from the patient, the interpretation of that

information and the ability to feed back to the patient in a manner that is acceptable do not appear over night. To even consider that these skills could be lost if computerization was to occur when it was first put forward in the practice was unthinkable to all involved in the practice.

This practice may or may not be typical of general practice but it is a pertinent research subject because it has always offered a high level of service (Patient satisfaction surveys provided to this researcher on request) It is arguable that even though all general practice is individual (they may differ in detail) they are related in a fundamental way, they are all servants to the demands of the stakeholders, the application of specific skills and knowledge and the dramatic changes that have occurred in society as a result of computerization. This practice is ideal to explore for it highlights the significance of general practice skills and introduces the conflicting demands of the stakeholders. This practice represents general practice and the adoption process well, in its stripped down form it opens to view the basis of general practice in these current times – it is a network of socio-technical relations that have become indispensable to the delivery of health care.

9.6 The next stage in adoption – or more grey areas within the vignette

The story continues:

Obviously this practice developed its information management system over a period of time. After many years of avoiding the adoption of computers into the practice it had to compromise. It started out using information management with the introduction of IT/IM as part of the Practice Incentive Program (PIP) in 1998. There is irony here encapsulated by the words of the practice manager "there are many factors at play here". It is the word play that I would like to explore. For me it paints a picture of myself as a child playing with boxes of dress-ups. The more I delved into the box of dress up "stuff" the more I became engrossed in the play. The more I discovered about the things in the box and the way that they could be used in my play.

This is for me, a powerful example of the attention to detail of the task at hand. When the practice manager spoke to me I immediately went off in my imagination to that box. Now I can see why I did.

The adoption of computers in general practice is taken as a given – a black box. We are not meant to go inside that box and change it nor make it into something other than it should be. So the image of my dress box corrupts the serious task at hand – but does it really? If I had not thought of that image at that time I would not have pursued this comment any further. I might have remained focused on the end product of the interview and not paid any attention to the actual research experience. By taking on a little bit of "play" I was able to nudge the conventions of accepted research method and make room for possibilities with the vivid image of delving into the box. But I digress more about boxes later on - back to the serious task at hand.

At the time of the practice decision to adopt computers the Health Department introduced the PIP and so they purchased the amount of hardware and a software program that would enable them to meet the criteria for receiving the PIP payments. The practice was offered the opportunity to spend several days at the division office looking over computer systems and talking to other GPs who were already using them.

In Rogers' terms this would have meant that the practice now had knowledge, another aspect is that the decision was made by an influential person,,the practice principle. "Generally, the fastest rate of adoption of innovations results from authority decision, but often in their implementation (innovation adopted this way) are circumvented and even stopped by the social system" Rogers 1982)

So while the practice is motivated to now adopt, in the adoption process there was circumvention. Earlier comments for this case study show that there was a positive feeling toward computerization from the staff but that adoption was curtailed because no one wanted to hurt the principal's father's feelings. The fact that this practice only adopted as much of the innovation that allowed them to gain access to the payments from the PIP shows that the decision from the top was circumvented in the implementation process. Not for any reasons that Rogers would cite but because the administration staff decided that this was how adoption would occur. It was not to occur in a rush as the principal wanted.

According to ANT theory this is an example of networks (the admin staff) affecting the adoption process. But it is more than that; it is an example of how within an organization a sector of that organization can capitalize on a vulnerability (a decision from the top) to instigate the process another way – the way that they would like to see it happen.

Further to this, even though this practice was now motivated to turn around the decision from the earlier 1990s (even though the father was still working part time by now) Rogers' theory of diffusion does not offer any mechanism for explanation of such circumstances or of the social milieu that is the context of such situations.

Secondly a decision was made by the practice principal to adopt computers. But at a practice level the computers are only adopted partially. Nothing about the computers or the computer systems is changed –there is no adaption of the innovation. So thirdly it has been translated into the way that it could be used in the practice. Rogers' theory does not address this aspect of adoption, but by using ANT there is a greater depth of information

available and more chance that the partial adoption of an innovation will come to light and be explained. In this case the reason for partial adoption was that it was as much as could be coped with at the time.

How did this occur? By using Latour's translating interests again to analyse parts of the interview with the practice manager in which the process was recounted we can see how the change in approach took place over time. I believe the following is as true an account as one would be able to achieve (again I was able to have the members of the practice act out the events). I would not have been able to have this information if I had not spent time in the practice and earned the trust of the members of the practice. I would not have this information if I had not used Actor Network to inform my research.

9.7 Political Activities:

Table 18 More in the process of translation

Translation 1	I want what you want	Said to the practice principal by practice manager Yes doctor 1 that would be a good idea to computerize this practice as soon as we can. I guess we have held off long enough
Translation 2	I want it why don't you	Said by practice manager to a staff member Now come on "Jane" we have worked here for a long time together. You know that it is getting harder and harder to keep up with the demands of DoHA – just for our own peace of mind, to make sure we are doing the right thing and to make our job easier – Why wouldn't you want to go with computers?
Translation 3	If you just make a short detour	As above Now come on "Jane" we would not have to use

		all of the stuff at first and we could tell the boss that it is impossible to start to use all the stuff until we have the records changed over and have learned to use it ourselves. That way when it comes their time to use it we will be able to help them
Translation 4	Reshuffling interests and goals	Said by the practice manager to the practice principal
	a. Displacing goals: maybe you don't know you have a problem	a. Now Doctor 1 we have had a look at the plan to get computers into this practice and I think that we have a problem – We won't be able to go at this as fast as we would like.
	b. Inventing new goals –but you have…	b. What we do have is a good team of people out the in admin land. We have a good computer set up about to arrive and now we have the space to put it all, but none of us have the experience.
	c. Inventing new groups – you need help	c. Because we do not have enough experience and this is all new to most of us we need to have some help. So I have an idea, when I was at the last practice managers meeting we were told that the Division office is going to offer a day when we can all go in there and see the things working and also get help from the computer officer in the division office.
	d. Rendering the detour invisible	d. If I haven't convinced you that we need to take some time to work on this and build up our support I have read that the advantages of taking your time to do this thing thoroughly will mean we get better payments for the PIP because we can show that we have networked the change with the division office and they will pay us a bonus of $10,000.0 for doing that. The division office will also spend any amount of time we need to set the system up so we will save money

		on that too.
	e Dissolving responsibility	Said by the practice manager to the staff member e. You know Jane, after all the things that we have had to go through to get this computer system in place Doctor 1 will not care when and how the computer system goes in, he will only care that it works and that it pays for itself.
Translation 6	Becoming indispensable	Practice manager to everyone who will hear 6. Now that we have made the decision to get the computers and we have the division office helping us, I think that we should have a designated person in this office to be in charge of the system. It will be more secure that way.

We can clearly see that the computers have already affected both the practice and the staff. So, in ANT terms there is an inseparable link between the inanimate object and the human members of the network of staff. Rogers' diffusion theory does not allow for the inclusion and the affects of inanimate objects in the process of adoption. Nor does it allow for the interactions of the actants.

Another step in the process

With partial computerization of the practice came the employment of an administrative officer to implement a coding system, enter the coded consultations and apply for the reimbursements from Medicare. Again we can observe the interplay of how computers can affect the practice and of how the practice can affect the computers. In ANT terms all actants are affecting one another in a consolidating network.

From 1998 to 2001 the practice continued with this system where the main use of the computer system was administrative and those clinical uses that would earn PIP payments. In 2001 there was a need to upgrade the system and address shortfalls in the system as it stood. Again we can see the affect of the computers, the

software, the processes, and the practice context being part of a network that has cause and effect relationships throughout. Rogers' theory of adoption does not allow for this interplay nor does it offer any mechanism to explore the minutiae behind such networks.

This second stage of development took place over a year. It was a big step from the original system to the new system. Capacity to download information was a very important consideration as was the speed of operation of the computers on the GPs desks – so the server had to be very reliable and secure.

All of these aspects of the process are addressed by Rogers' theory, but there are gaps. Firstly the GPs and the staff now had fuller knowledge of the innovation, they not only knew about its existence but they had had the chance to get to know it and learn about it. They had seen the affects of it on their practice and were in a position to better understand how the whole thing worked and what the advantages of the system were. In Rogers' terms they had passed through several stages in the adoption process – The practice had made the decision to computerize; they had implemented; they had had the decision confirmed; and now they were at the end of implementation and about to pass into reinvention and the whole process would start again.

However the second stage of development began with a $40,000.00 upgrade of hardware and software. This was perceived as very reasonable as the practice had already seen savings on in-house pre-printed letterheads and files, the use of continuous paper and associated printers. There was another cost saving in terms of data storage. Patient data was stored electronically and thus reduced the costs of file storage and staff were freed up from paper-based manual work and redeployed into other areas of patient service. Added to this was the access to payments from Medicare which this practice had decided to split among the partners with an agreement that half of that earned from these payments by the partners was to be reinvested in the practice.

With the move to upgrade, not only patient records could be stored electronically but all practice records could be stored in this way. The advantages of clear records observed from the product of computer based patient's files and their readability, that they were available to all GPs in the practice and the administrative staff if a patient wanted information was a very strong impetus to further change. Within the patent records were the GPs notes from visits, referrals, scripts and test results, such as pathology and radiology. This allowed for easy referencing, monitoring and access for the patient (under the guidance of the GP)

In interviews (2005) the practice principle commented that electronic records have the advantage of allowing quick manipulation of data to identify candidates for clinical trials and audits and monitoring of such issues as chronic disease management and cervical screening. This has resulted in the stored information being much more accurate.

With the new system the GPs will be able to use electronic clinical decision making support software. This will aid in giving the patients more information and assist with knowledge about the latest treatments. In this practice the GPs have a very clearly collaborative style with patient consultations. They believe that this style of consultation has actually assisted them in implementing the upgrade. Their patient base is very used to finding information on the internet and so do not think it is unusual for the GP to do the same thing – in fact one principal commented that the patients almost expect it these days. The problem with this was the time that the GPs have to search for information and they felt that more effective systems needed to be developed for this purpose.

This introduces another level in the black box of computerization. It emerged from interviews (2005) that some of the general practitioners in the study area do not like using the time they have with patients to search in front of them for information about the presenting symptoms. This will be discussed further in later chapters.

With the upgrade the practice has a more reliable recall and reminder system and so more control over items like Pap smear recalls. As well as routine recalls the practice feels that they can respond to local disease outbreaks such as flu, measles and bronchitis by being in a position to notify local schools and parents by using the data base to identify those at risk.

In regard to the administration of the practice, practice software is used for private billing and maintaining business accounts. With the upgrade a more integrated approach will be taken and the interface between this and the patient records will be electronic, no longer relying on manually pulling the data out for such things as reporting to the Commonwealth. This will enable better data transfer to the Commonwealth and less time consumed with a basically boring task. All administrative tasks will now be electronic.

With the tight time frame for upgrading the system it was important to communicate with the staff and ensure that all staff development took place – that there was no learning on the job. Education and training was provided to suit the different levels of ability amongst staff and a practice manual documenting the information management within the practice was drawn up and is maintained and updated to this day.

Another aspect of implementation that this practice undertook was to employ for a three month period an administrative person to be responsible for the running of the changeover. This also helped reduce resistance to staff fears and to change.

While the maintenance of the upgraded system required ongoing attention the practice believes that the longer term benefits (which began emerging as soon as the upgrade took place) will be increasingly realized as the information management continues to improve efficiency.

9.8 Actor Network – and this case study

An actor-network account is one which traces "socio-technical networks that are put in place by actors whether these pertain to content or to context" (Callon and Law

1989, p58). The focus is on actors -- whether humans or artefacts -- and how they *create* networks (rather than simply dealing with objects assumed to exist a priori). The investigator uses the same conceptual tools for dealing with human and non-human actors, and is enjoined from taking sides in the controversy being studied. The application of this approach can best be illustrated through analysis of specific cases, such as the preceding case study.

One problem recognized by the practice as early as 1990 was the need to contend with the way that communication, record keeping/storing and data gathering would begin to happen, with greater need predicted. The government had acted by undertaking an important and landmark review of general practice. In addition, and especially relevant to this analysis, the general practice computing group, divisions of general practice and the practice incentives program all came into being in the early 1990's (These will be explored in greater detail later) Thus, the key external actors in the early stages were these three organization. But more importantly for this case study the real key actants were the practice and the networks and interactions that took place there.

In the first two years of the PIP, the divisions of General Practice and the GPCG mobilizing of the technology to assist their cause occurred. This approach worked with some reliability, but was not sufficient; for General Practice to computerize at the level that was required, the government to had to enrol the practice. They had to have the support of the key interest groups in the territory. The government's failure to achieve this meant that computers in general practice could not be extended to all of the study area (let alone Australia). Only by consulting with general practice and talking to government planners, the three interested groups, and various other interest groups is it possible to understand this failure -a failure that centred on the lack of understanding of the local issues and the factors at play in each general practice. To have computerization of general practice occur the government would have to "do" a lot better.

For this practice the position of the father within the practice played a crucial role

in the opposition to computerizing. The practice members including the practice manager were able to mobilize support through the other members of the practice to defeat the proposal by the practice principal. The practice questioned whether the technology would work, would be cost effective, and raised security issues and the importance of the father to the practice. After the effective lobbying by the practice manager, the practice overwhelmingly opposed or failed to endorse the computerization scheme, as well as the arguments about privacy and reliability.

The experiences in this practice show that it is possible for system builders to enrol the technical components of computerization. Yet at the outset (in the early 1990s) computerization had been installed only in 45% of practices in Australia, so this practice was not out of step with the rest of the division, nor in fact with Australia. On the whole, socio-technical or heterogeneous engineers had so far been unsuccessful in gaining strong support from general practice. Technical writers on computerization in general practice naively seem to expect that because the technology works and there are obvious pressing applications for it, it should be going ahead. By closely examining actions of all actants and their attempts to create networks, we are shown that promoters have failed to enrol the full complement of allies, human as well as technical, to make computerization operational. This was to change later, so that a higher but not complete level of computerization would occur.

9.9 Assessment of the Theoretical Approaches

This case study shows how actor-network approach can be used to gain insight. It is quite difficult to gain certain types of insight into the development of computerizing a practice by following the actors. Basic researchers in optical scanning, microwaves, microchips, and so forth form one set of actors to follow. This researcher, for the most part, was not directly involved in the adoption of computers in this practice and I thought at the outset that my observations such as I perceived would provide little insight. A second set of actors in this case study were those that were external to the practice, those involved in the formation of

government policy, in the division of general practice, in the PIP and in the GPCG. None of these are involved in the practice until later in the research and so are not prominent in advocating the computerization of this practice. This is because the research area is dividend by geography, different organization and different technologies.

Finally, there are various consultants, who are involved in mobilizing support, building alliances, and undertaking various networking and enrolment activities. But again this is not obvious from the beginning of the research process and again the research area is divided by geography, and there is no particular individual or group to follow whose behaviour can provide much generalizable insight. This is a very individual case study.

Unlike Latour's example of Pasteur, there is no *one* person, *one* group, or even *one* technology to follow. What seems to be occurring is a simultaneous development of various possibilities, with only sporadic interaction. Following the actors appears to at first leave out the possibility of using the concepts of social structure, including ideology, which favour or foster the independent introduction of similar types of technologies in different places. Later I discovered that if I had not followed the actors I would not have found these actants. They are below the surface of the everyday. So in this individual case, following the actors provided valuable insights, as in the case of the overt opposition of the staff in computerizing and losing the father from the practice.

The actor-network approach in this case explains why Computerization was *not* taken up in the first place by saying, presumably, either that the socio-technical engineering by the proponents was faulty or that the socio-technical engineering by the opponents was superior.

More generally, why are some people better able to engineer their socio-technical worlds more effectively? One explanation in this case is that the practice manager had access to greater resources, such as a prior cohesive organization or prevailing belief system.

Actor-network research has important contributions, especially in questioning the conventional dichotomy made between the social and the technical. Whereas the problem with Rogers' approach is that it does not provide any way of examining the exceptions to accepted generalizations or accepted black boxes. An actor-oriented analysis seems much more useful for probing and examining.
As indicated at the beginning of this research, actor network analysis and Rogers' theory set out to achieve different things, and is problematic because as the author, I am aware of the insights to be gained from each approach. I have decided to continue with ANT because I believe it is better suited to drawing out the minutiae involved in the study area. Each general practice is an individual that is pressured by many other outside forces. To try to examine general practice any other way would be too narrow.

As table 19 illustrates, there is no clear support for Rogers' theory. The table shows that each element of the generalizations will provide us with a hierarchy and that is the initial difficulty, for each element within the generalizations is constrained by but not determined by other elements. In using Rogers' theory it appears that each element must arise out of others but has to be analysed in its own right. For an analysis of the case studies to be meaningful the use of ANT is crucial and far more appropriate. Thus as I have done previously I will explore how ANT offers explanation.

Table 19: A summary of the number of times evidence in case this study did or did not clearly support the generalizations from Rogers' theory of rate of adoption of innovations

Generalization	Clear Support for the generalization	Contradictory support for the generalization	Summary description of the gaps identified
The relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption	5	8	No cost advantage; No time advantage; Lack of skills; When financial support is given then the innovation becomes feasible; Personal reasons for not adopting that affect the whole practice; The innovation is not fully adopted; The innovation changes the practice; The advantage does not meet the reason for the existence of the practice - that is care of patients, it is only a cost advantage to the business
The compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption	4	7	The innovation was not compatible for personal reasons; The principal of the practice wanted the process to occur too quickly; Patients observed they would prefer to see the doctor not the computer; The features of the system in 2005 were still not able to do the things that the practice wanted; The features of the system in 2005 were not able to do what the accrediting body wanted; The features of the system would not be compatible with outside health care providers such as hospitals; There was nothing that could be done about the above three reasons for the software was not developed in 2005 to undertake these services; The GP was not the main person to use the computers in the practice, it was the practice manager and the administration staff.
The compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption	4	7	The innovation was not compatible for personal reasons; The principal of the practice wanted the process to occur too quickly; Patients observed they would prefer to see the doctor not the computer; The features of the system in 2005 were still not able to do the things that the practice wanted; The features of the system in 2005 were not able to do what the accrediting body wanted; The features of the system would not be compatible with outside health care providers such as hospitals; There was nothing that could

			be done about the above three reasons for the software was not developed in 2005 to undertake these services; The GP was not the main person to use the computers in the practice, it was the practice manager and the administration staff.
The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption	6	7	The time taken for adoption was 10 years Once support was offered time taken was very little The innovation involved computers. policy, software, people, changing social circumstances, the perceptions of the staff, the collective identity of the practice,
The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption	5	8	The computer system was too expensive to trial it. We put off computerizing until we had funding from the government to do it These comments were repeated 5 times very clearly but several more times in amongst other comments However 8 times various members of the practice commented that the real reason for not computerizing was the father of the senior principal of the practice
The observability of an innovation, as perceived by members of a social system is positively related to its rate of adoption	2	9	Could not observe the innovation easily in the early stages When support is given observability increases and so does adoption However the system that is finally adopted is nothing like that which is observed –why?
The degree of interconnectedness in a social system is positively related to the rate of adoption	4	10	This practice principal had many contacts that would enrich knowledge from outside the practice, but the computerization of the practice did not take place until funding arrived; or was it that the father went part time at that time?

9.10 ANT provides a more appropriate explanation:

As can be seen from the vignettes that are the case studies, ANT examines how abilities are distributed within heterogeneous networks composed of human and non-human actors. Actors and networks construct the process in the sense that a network shapes and defines the actors who align themselves into a network. Intermediaries in the form of software, computers, membership organizations, people and networks, are among the actors and assure a certain degree of convergence among them. Convergence in this sense is about seemingly unrelated organisms, human and non-human, having the tendency to become similar because they are coming together towards the same goal even though they may come from different or direct or opposing points of view.

For Bruno Latour (1993) the Actor-Network Theory attempts to overcome what he sees as the major shortfall of Modernism and Postmodernism: the slicing of a continuous, "hybrid" reality into analytical domains. The epistemology of Modernism divided nature and society into two incommensurable poles. Nature was only observed, never man-made; whereas society was only made by humans. The two poles were indirectly connected by language which allowed us to make stable references to either one of them. Postmodernism separated the middle ground, language, from both poles by declaring it autonomous. This autonomous domain has been described as free-floating. It is Latour's goal to show that the separation introduced by Modernism and extended by Postmodernism is artificial. Because (technological) reality is "simultaneously real, like nature, narrated, like discourse, and collective, like society" (Latour 1993) he does not follow the clean divisions envisioned by Modernism and recently claimed that Modernity never happened, that We Have Never Been Modern (1993).

In order to integrate the three separated domains of nature and society the key terms in the Actor-Network Theory take on somewhat unusual meanings. This serves to highlight how humans and non-human can both be actors which are

integrated into networks, sometimes sealed in black boxes. These networks can be read through the inscription in the intermediaries, which circulate within those networks. The intended product of these networks varies: it can be nature in form of scientific facts (Latour, Woolgar, 1986; Latour, 1987) it can be technology (Bijker, 1994; Law, Callon, 1992; Latour, 1991), and it can also be society (Woolgar, 1991). The means and actual products of these enterprises are never purely one or the other, they are always "hybrids" comprising all three domains simultaneously. This is somewhat confusing to begin with.

In this way the network of actors that come together to form the whole can be dynamic – as we see from the case studies. In this sense the convergence will have a clear limit. This convergence allows the heterogeneous network to act in a coherent way, which is to translate one actor's objectives through a number of different actors to achieve a goal. The prominence and the potential of an actor is defined by he/her/its position within the network and by the size and degree and stability of convergence of the network. The case studies enlighten the concept that the higher the degree of convergence within a network, the better, easier and more reliable the translation process works, the more powerful it becomes. It is over the process of convergence that the political process of adoption of IT and IM in general practice can be seen for during the process of convergence there is always contesting.

In cases of very high convergence the network itself becomes so stable that it can be treated as a black box, such is the case with the RACGP, the practices and the health care system. The complexity of these can be almost factored out of the equation because the input-output relation is stable regardless of the heterogeneity of the network it incorporates. I would suggest this because they allow the reduction of the complexity of socio-technological reality, as shown in the case studies. We do not need to know the intimate details of the workings of the RACGP to see that is has a complex network built up over a

long period of time. All we need to know is that the RACGP was a very influential body in gaining financial support for the adoption of IT and IM in general practice. We do not have to take into account everything down to every component of an organization such as this: what I have done in the chapter on the RACGP is enlighten the influences and the ways that computerization has been supported. But despite all this support greater light is gained by the examination of the minutiae of general practice. Whole sets of black boxes can be integrated purely on the level of their in- and out-put because they remain stable.

By following the actors in the general practice the dynamics arising out of the communication networks, their complexity and interrelatedness, their evolutionary character, all indicate that there are different dynamics at play than in other sectors of technology. Latour (1996) demonstrates how different elements shape the development and the plans for a transit system, however, the systems failed finally because it was not possible to adopt one general plan. That in itself may explain why the adoption of IT and IM in general practice has been fragmented to begin with but then more stable as time passed.

Besides actor, network is the second central concept - hence the name Actor-Network Theory. The term network is defined as a "group of unspecified relationships among entities of which the nature itself is undetermined." (Callon, 1993, p.263) The inclusive character of this definition becomes more evident when contrasted with one of the conventional sociological definitions of network where "a social network consists of a finite set or sets of actors and the relation or relations defined on them" (Wasserman, Faust, 1994, p.20). An actor-network is not restricted to 'social actors', not even to actors in the theory's broader sense.

A network ties together two systems of alliances:
People: everyone who is involved in the invention, construction, distribution, and usage of an artefact: describing this system leads to a "socio-gram". Sociological analysis, such as social network analysis, focuses on this set of alliances

(Wasserman, Faust, 1994; Wellmann, 1983). Things: all the pieces that were already on stage or had to be brought into place in order to connect the people. Describing this system leads to a "techno-gram".

However, while it is useful for clarification purposes to separate the two levels analytically, it is not appropriate to study these systems separately because they are highly interconnected. A change on one level will simultaneously change the other. Each modification in one system of alliances is visible in the other. Each alteration in the techno-gram is made to overcome a limitation in the socio-gram and vice versa (Latour, 1987, p.138-139).

Interrelations between the socio-gram and the techno-gram become evident, for example, when a product is not accepted by its envisioned users. One way to react to this mismatch might be to change the product, to bring a different technological network into place in order to give rise to acceptance by the users, change the socio-gram. However, market failure does not lead necessarily to a change in the product. It is possible that the socio-gram, the network of people who are associated with a product, is changed by adding more people to a company's marketing department. In order to understand the dynamics in one level of a network, one has to examine the dynamics in the other part.

Actor and network are mutually constitutive. An actor can not act without a network and a network consists of actors. This relationship is highlighted in yet another definition of actor as "any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own." (Callon, Latour, 1981, p.286) Actor and network constantly redefine each other; one is dependent on the other. Michel Callon (1987, p.93) details the interrelation between the two: "the actor network is reducible neither to an actor alone nor to a network. Like a network it is composed of a series of heterogeneous elements, animate and inanimate, that have been linked to one another for certain period of time. ... An actor network is simultaneously an actor whose activity is networking

heterogeneous elements and a network that is able to redefine and transform what it is made of."

The size or importance of an actor is dependent on the size of the networks he/she/it can command and the size of the networks depends on the number of actors it can align. Since networks consist of a (large) number of actors which have different possibilities to influence other members of the same network, the specific power of an actor depends on the position within his/her/its network. There is no structural difference between large and small actors, between a major institution or a single individual or even a thing as mundane as a door opener (Latour, 1992). This does not say that they are all equal.

Bijker (1994, 1992) analysed how an artefact changed significantly in its distribution phase, but still, at all times, it had a centrally planned design. In the case of computers in general practice that is not perceived by the users. The extraordinary pace of the development of computers adds further dimensions to the process. Not only the fixed artefacts or procedures are important, but their evolutionary character moves into the foreground as one of their integral, regular patterns. McLuhan (1968) pointed this out decades ago when he claimed that change is the only constant in the electronic environment. The use of ANT can sharpen the intuition to see the structure of change which becomes central in the electronic environment.

Amidst all those changes, the elements show a great ability in maintaining their identity, in differentiating themselves from their environment by constantly interacting with it. The concept of the border in the theory of actor network systems is one example of how to think about organizational change and the adoption of innovations such as in general practice. The case studies show that Rogers' innovation diffusion provides an explanation of the adoption process but does not fully account for the way that it occurred nor

does it fully account for the non-adoption of computers in general practice nor does it account for the manner of adoption in rural general practice.

The primary purpose of the table 14 has been to illuminate how detailed analysis can be employed to trace the mechanisms of translation and its social aspects in interactions between actors. By analysing the motives, resources and tactics of different actors in the negotiating arena in this way I hope I have provided a better understanding of the effects of these in the processes of adoption and translations. The accumulation of negotiations suggests that an overall process shapes the interactions between actors. The actions of the actors were focused on facilitating participation but not necessarily on achieving pre-planned pre-conceived goals. As a result each actor in their own way achieved something of the adoption – there was no one actor responsible for this – it was the accumulation of influences. These case studies have shown that actor oriented approach can enhance understanding of how adoption of IT/IM occurred in the study area.

CHAPTER 10: THE MINUTIAE OF DECISION MAKING IN GENERAL PRACTICE

Aims of this chapter: In this chapter I intend to examine the micro political and social-economic influences and processes that have taken place while decisions are being made about the adoption of computers

I will examine what decisions GPs think are important to make so the thesis considerations are articulated as an influence or a barrier to the full adoption of computers in general practice

I hope to direct readers to consideration of the place and importance of following the actors and the role of actor network in the explanation of the pattern of adoption of computers in the study area.

10.1 Introduction:

GPs in this case study initially claim they have made a reasoned decision about adopting computers but in the course of interviews they have discussed many barriers that have prevented them taking up full use of them. In the evolution of discussion about making the decision, they begin talking to me by quoting other failures and reasons why they discard options, they discuss the blind alleys that failed to achieve a stable fit with the other components of their system. It emerged that it is not the perception of use alone that has persuaded GPs in the study area to flick the main use of computers through to their administrative staff, but the perception of themselves as care givers and gate keepers of health for their patients. They "see" that useful technologies are assemblages of multiple components that have co-evolved into a useful configuration. If they are not perceived as useful then it is very likely that they will not be adopted. It is important to re-note that one of the findings for this research is that is it not particularly the GPs who have adopted computers but the practice that has done so.

The other components of the system that were much more important in this study include the social roles and mutual understandings that make the use of computers beneficial. These roles and understandings can include skills, procedures, and regulations such as reporting to DoHA. They also include the shared understandings of how the system is used, the social expectations, for example, that have shaped the role of the computer in Australian society.

From a computational point of view these roles and components are arranged in the networks in the study area. These are exchanging energy and information with adjacent nodes. The co-evolution of roles and components and mutual understandings is called technological progress in terms of Actor Network Theory but in terms of Rogers' theory of Adoption it is more to do with stages in a process. In other words Rogers' theory does not allow for technologies changing, in other words, not simply as a consequence of mechanical developments, but of social developments as well: the invention, widespread acceptance, and present configuration of the computer, for example, were possible only with changing consumer expectations and cultural understandings.

10.2 Revelations from the case studies:

The case study interviews reveal several dichotomies in general practice. Firstly there is the way that GPs perceive themselves - older GPs would not view themselves as business people, nor employees. Younger GPs or GPs who trained in other countries are more likely to see themselves this way, particularly if they are women. Secondly the ways that GPs perceive themselves in terms of ownership or small business people is important in the decision making process to adopt innovation. Thirdly the way that GPs say they make decision and the way that they do in reality are often different.

Many researchers (Pollard and Hayne 1998); McDonagh and Porthero (2000); Burgess (2000) have suggested a list of fairly well accepted barriers to adoption. Among these is a lack of formal planning in regard to the adoption of computers. These researchers propose that this relates to a lack of knowledge on how to plan

effectively and lack of time to apply it, even if they have the knowledge. Lack of time to make effective decisions to use IT/IM would certainly be the case for GPs in the study area. This research suggests further development of these factors in that decision making is not perceived as important unless it is making decisions about patients. This is one of the main reasons that GPs is the study area have only gone "so far" in adopting use of IT/IM.

Based on my research I have no doubt that individual practitioners are highly motivated to help their patients. However, the network of contacts that is demonstrated in figure 4 "General Practice Representation and Links to Government" reinforces the dichotomy I have observed in the study area, a dichotomy that involves "push and pull" factors that have both social and economic basis - on the one hand is the picture of the traditional GP and on the other the picture of the business person striving to survive in an ever changing world. Underpinning this is the perception of the occupation as a whole, through its representative organizations such as the Royal Australian College of General Practitioners and the Australian Medical Association, that it often appears to put self-interest ahead of patient welfare. (See chapter 4)

10.3 Factors affecting decision making:

However I think that there is an opposing view, probably of more importance to the decision making process that general practitioners have gone through in the study area. This is the high value for perceived professional autonomy. Professional autonomy is a much used concept which has been valued by GPs. This emerged from every interview I conducted. How General Practitioners (GPs) understand their professional autonomy and what they perceive to be the main threats to it does affect the decisions that they make. Professional autonomy in this way is about patient's not about reporting to

government or about running a business – that can be left to office managers and practice managers. The decisions that GPs have to make are considered by them to be of far greater importance than making decisions about technology. In respect to the making of decisions about technology, they may even take the easiest decision. My interviews found that GPs aspire to an 'ideal type' of professional who has the freedom to determine what is best for patients, but they believe their autonomy is threatened by financial constraints, greater accountability requirements, and more demanding patients. I put the very simple request to GPs in the study area "would you please rank the most important decisions you make" See results below.

What the decision was about	Number of GPs nominating N= 143
Patients	138
Family	102
Professional development	98
Work life balance	105
Quality assurance (including IT/IM)	90
The practice	56

Table 20: Importance of decisions to GPs

These findings reveal what decisions are important to GPs in the study area and infer how GPs value the autonomy to make patient related decisions in their practice. Thus different aspects of professional autonomy may be useful in understanding how GPs make decisions when adopting computers.

To elaborate here it is important to explore the concept of 'profession' in relation to medicine, for it carries with it the central idea of autonomy. In more recent times, it has been argued that governmental, organisational, technological and societal changes have reduced medicine's status (Harrison and Ahmad 2000; Eve and

Hodgkin 1997; Wilsford 1995; Haug 1988). Through interviews I was able to clarify the concept of profession to understand how GPs in the study area perceive of their autonomy and how this might affect their decision making, particularly in relation to the challenges they have faced since the review of general practice in 1994 and the challenges that are up coming with the introduction of decision support mechanisms.

One GP (case study 4) was able to define what he saw as professional autonomy - I have included this definition here – "it is the legitimated control that an occupation exercises over the organisation and terms of its work , this is particularly in relation to our member based RACGP".

I asked "Does this imply that you think that the profession is being de-professionalised?" "Well that may be so, to a point; we might be losing the monopoly over knowledge, and our ability to control expectations of us, and authority over our patients. This could be happening as a result of the way that the profession has shaped up since 1994 and since the introduction of computers. But there is another thing and that is the public belief in our service ethos. Because of changes in the organisation and management of practices I think that we make decisions in a very different way than we did when I started out as a GP, and we make decisions about different things now"

The data from interviews and surveys for this research supports this. GPs in the study area are now beginning to use clinical decision making support programs; they are supported by the profession in making decisions about patients, their practices and about introducing changes such as computerization. So in this way decision making appears to be more supported by a group, which indicates change which looks more like adjustments or translations than a major loss of professional autonomy.

10.4 Does the way that work "is" affect decision making?

In examining this further in interviews I wanted to know if the way that GPs in the study area experience work, the workplace and the workplace structure would affect the way they make decisions. One GP commented that she thought government initiatives have led to high output and low morale for these practitioners. In testing this statement I found that 43 of the GPs in the study area agreed with her. A majority of these 43 also reported increased and intensified workloads in more complicated workplaces as affecting the way that they make decisions and they feel they have to struggle for control of their medical work. However, (Warhurst and Thompson 1998) suggest that the tension between bureaucracy and professionalism is being recast rather than eliminated and the impact on different types of professionals varies enormously.
On reading the research of Warhurst and Thompson (op cit) I decided to include some questions paying attention to the difference between changes to frontline medical practice and changes to the process of decision making as a business person.

It appears that much of the discussion about decision making almost always drifted back to making clinical decisions about patients, and that GPs in the study area almost always interpreted any discussion about decision making in the context of evidence based patient doctor relationships – just as they had been taught to do in clinical practice from the time they were students. They seldom saw decision making out of this context. In fact when asked to list what they though were major decisions in their practice 138 of the 143 GPs interviewed stated that they thought patient related decisions were major decisions and business decisions were minor decisions. (See table 12).
"You can always get your business back on keel but it is pretty hard to get a life back", commented one GP. That they perceive themselves in this way is interesting.

An examination of the micro and macro levels of the profession also enlightens this research in regard to the decision making of GPs in the study area. As we saw in chapter 4, at the macro level the elite representatives of general practice in Australia negotiate with governments and health care organisations, and are responsible for knowledge, training, discipline and administration within the profession. This corporate body of medicine is able to retain its status as it is divorced from the rank and file (micro level) of doctors delivering services (Freidson 1988; Willis 1988).

Light (1995) goes further in arguing that when states or insurers challenge professions, the elite gain power at the expense of their rank and file colleagues. It is possible that policies agreed to by the elite might both strengthen the profession's social and cultural authority and diminish the autonomy of professionals delivering services on the frontline. 101 of the 143 GPs interviewed commented on this in one way or another. Mostly they referred to the demise of the RACGP prior to 2000 an era in the history the college referred to as "the troubles". During this time the college lost control of the post graduate professional development program as it was contracted out by government to an independent body. To regain financial status back from the brink the college made many alliances that in some GPs' eyes have not been to the benefit of the individual. As a result 98 of the interviewed GPs felt that a re-stratification within medicine could be the main outcome of reforms, with frontline clinicians losing autonomy.

In putting this to GPs in interviews the following remark was representative of thoughts about this. "There has certainly been an increase in rules, incentives and pressures to change how GPs work, as governments and insurers around the world have increased their attempts to contain the costs of care and increase the accountability of professionals and I think that I make decisions in a very different context than I did in the past, you can add to this the transformations occurring in GP-patient relations, in the rise of health consumerism, and in the corporate and legal climate of practice" (case study 6: interview 3 2005)

GPs in the study area are also challenged from within medicine and from other health professions. Challenges emerge from specialists taking over areas that were previously the domain of general practice, and there is concern that nurses, allied health practitioners, and complementary health care practitioners are engaging in practices once under GPs' control (Good 1998; Willis 1988; General Practice in Australia 2004). Interviewee 3 from case study 6 developed this further: "Once we only had to worry about what we thought at that moment with the information that we had then, but now we are expected to get more and more information, go on line for it and ask the patient what they think etc etc etc……. We are expected to report lots of things that we never had to in the past. This puts a big strain on the amount of time you have to think about business decisions."

A newly emerging challenge to the autonomy of GPs in Australia, is the buying up of general practices by corporations (White and Collyer 1998; Collyer and White 1997), which GPs fear will lead to them being subjected to control through quality reviews, incentive pay structures and practice restrictions. I will explore this further in the next chapter.

One important study of medical autonomy in the workplace (Schulz and Harrison 1986) divided autonomy into social and economic work freedoms, and clinical freedoms, then put forward seven dimensions of autonomy. In their conceptualisation, social and economic work freedoms are partitioned into: choice of specialty and practice location, control over earnings, and control over the nature and volume of medical tasks. They divided clinical freedoms into: acceptance of patients, control over diagnosis and treatment, control over evaluation of care and control over other professionals. In putting this to the GPs in the study area the general comment was "No, that is too complicated – patients come first then family." 140 of the 143 GPs interviewed said this when pressed to choose the most important decisions from the list in table 12.

I have not been concerned with generalizing results for Australian GPs, for this section of the study but in understanding how GPs perceive changes and

interpret them as threats to their role and their autonomy and how this affects decision making about innovations.

The GPs in this research operate with an ideal of what being a professional entails, but they perceived that their role and status is undergoing a process of contested reorganization. Social, economic and clinical dimensions of autonomy were all regarded as under threat from outside actors including government, patients, other health professionals, and lawyers.

10.5 General Practice as a profession - the ideal type:

GPs' perceptions of their role in its ideal form, as discussed in the interviews, is that they provide the entry point to, and coordination of, patient care in the Australian health care system. GPs deal with the whole spectrum of health and illness and, self-identify as 'specialists in generalism'. In this ideal form, GPs have continuing interactions with patients, act as gatekeepers to the health system, and fulfil a role as 'physicians of the soul'. A competent GP is seen as one who provides not only appropriately technical and skilled health care in individual consultations, but who also provides comprehensive and continuing care.

The interviews (included below) revealed that GPs operate with an image of their profession which corresponds to the early theoretical discussions of Parsons and other functionalists (Macdonald 1995). Autonomy and control and the possession of special skills were all seen as central, as was the notion that it is a special kind of occupation:

" there is a sense of vocation … I enjoy it, I think I'm good at it and I feel the need to keep doing it despite sometimes feeling a little bit wretched about it." (case study 5 2004-2005)

While this ideal exists in the minds of GPs, they also believe that the reality of their current work life is very different, and this difference is exerting an important impact on their understanding of themselves as professionals. Concerns expressed by GPs around increasing government control, are important not only in themselves, but also because they are indicators for GPs that their autonomy is under challenge. The 'ideal' professional that many GPs aspire to when they emerge from university, and which they consider to be integral to their position, appears to be increasingly out of reach. This feeling is encapsulated in the comment:
"This profession has been downgraded. We have no say." (case study 3 2005)
Loss of control was seen as resulting in a downgrading of their own self image:
"... I'm sure that erosion of our sense of professional autonomy and control [has] a really demoralizing effect on us." (case study 1)

10.6 Challenges to financial autonomy

The GPs in this research believed that they now have little or no control over their earnings, and that this has a major negative impact on other dimensions of social and economic work freedoms, in turn impacting on decision making processes that have to be used if a true business model is applied to general practice. It is here that I saw the real dichotomy between perceptions of themselves and the reality of themselves as business people.

Medicare, and bulk-billing in particular, is considered to have fundamentally eroded GPs' control over earnings. GPs fear the loss of patients to other practices if they stop bulk-billing, and also claim that they have to work long and hard simply to make financial ends meet:
"One important aspect, which I would like to have control over and which I should have control over, is my income, that's controlled by Medicare. I find myself working very hard, very long hours ... Because of the atmosphere of bulk-billing one doesn't dare to charge the patients because there are so many other doctors they can go to." (case study 1)

A related theme was the struggle to manage time. The sources of time pressure were diverse, ranging from the desire to spend more time with each patient than they feel they can (in financial terms), to increasingly demanding patients, to the need to balance work and family and social life, to working long hours because there are not enough doctors to simply not being able to control the events that occur over the course of a day.

With the female doctors, there was a discussion about male GPs getting through appointments faster than females because they were prepared to focus solely on the problem the patient came in with. On the other side of the doctor-patient relationship was an explicit recognition by female GPs that patients would happily go to male GPs about single problems and simple things, but insist on seeing a female when things were more complicated: *"[patients] see the male doctors first for coughs and colds and then they come to you and they say but this time I've got a real problem". (case study 3 2005)*

The tension between managing time in order to get through the appointments and providing holistic care was exemplified by the following comment:
"... you say to people is there anything else you'd like to discuss, before they leave. That's the classic [mistake] – now I'd like to tell you about my serial abuse ... or the problems that I'm having with my wife or my fears about my daughter who is drug taking ... I'm 12 minutes into this 15 minute consultation and then, shit, the cat's out of the bag and it's like 30 minutes after that..." (case study 7 2005)

10.7 Practice organisation issues

The choice of practice type and style was also discussed at some length in the focus groups. Some regarded moving to a group practice as a positive step in terms of control:
"... with the amalgamation I must say that there's a lot of merit in it ... I was in a solo practice for 21 years and I had no control at all, absolutely none..." (Group 2)

Others wished to remain in solo practice but were finding this increasingly difficult. While increasing practice size was often discussed, corporatisation as such was not. Type of practice choices extended beyond issues such as managing patients and time, to questions of balancing work with family and other non-work related roles. Choice of location was spoken about positively in the fringe rural/metropolitan area: *"I like working in a small town because it does give you that more holistic sense of care about people … If you have a better understanding of the environment in which they live I think it helps…" (Group 3)*

Many GPs spoke of clinical freedom as the most important part of their autonomy. While GPs have control in the surgery, an important element of their autonomy is intact. But here, as elsewhere, there was concern. Participants would often begin by stating that they felt they had clinical freedom, but the discussion would then shift towards a decline of this freedom:
"As far as clinical decision making … About 95% of the time I'd say that I'm in complete control of my recommendations to the patient … ultimately clinical decision making and clinical practice, I think I'm in quite complete control of that." (Group 3)
Such comments were soon followed by exchanges such as:
"I have control over what I do with patients in terms of what advice I choose to give them, what tests I choose to do, whether I choose to bring them back or not."
"Do you really have control over what tests you order when the government's telling you what tests you can order, what tests you can't? You can't order an ultrasound for a prostate, you can't do this, you can't do that. Do you really have control over what you prescribe to patients? You don't really, plus there are all sorts of authorities, which you've got to comply with." (Group 1)

Overall, the GPs who participated in these were experiencing a perceived loss of freedom and control on many fronts. Some participants recognised that it is because of their unique role in ensuring access to health care that they are being increasingly scrutinized:

"As frustrated as we are with Medicare, it really is a fantastic system in a lot of ways in providing equity. I think we have to accept that … we're providing a service and it's so desperately essential that … the community and the government … is going to have an inherent interest in what we do…" (Group 1)

10.8 Sources of challenges

In analysing the contest over the autonomy of GPs, the Federal Government and patients were identified by GPs as providing the major challenges to their professional autonomy and status. The Federal Government is seen as trying to tighten its control on General Practice. The Health Insurance Commission also came in for criticism in its own right, as did the (Victorian) State Government to a lesser extent.

The level of scheduled fees was described by GPs as an example of how their work is being subjected to government control, and is also seen as resulting in them spending more time worrying about financial and accounting issues, to the detriment of their capacity to focus on individual patients. Many GPs considered financial constraints to be in total opposition to the requirement of providing high quality health care: *"I think it's obscene that Government holds us to ransom financially … I think none of those things actually do anything for the patient, nor do they improve the doctor who cares for the patient." (group 4)*

A major concern for these GPs was that reforms have shifted control away from the profession to the government. Even practice accreditation and vocational registration, intended to improve the standing of General Practice as a profession, were discussed as a means to increase government control over GPs:
"… they're telling you: we want higher standards, we want better things, you've got to have a computer in the practice, you've got to have such and such." (Group 2)

Reforms of this type are considered by GPs to be the worst sort of paternalism, indicating that they are no longer able to organise their own practices. It is not only

governments, however, that are seen as challenging the autonomy of GPs. Even in their relationships with patients, which GPs find to be the most satisfying aspect of their work, there was a feeling that profound changes are occurring. Patients are becoming more knowledgeable and informed, high technology medicine promises better care, and these factors create high patient expectations which cannot be met. This was sometimes expressed as the need to ration care:

"Now I try to explain to them that you've got a cake that has to be cut up so that everybody can have a piece. If we do tests unnecessarily … the funds are gone completely…" (Group 2)

Other GPs spoke of patients just expecting them to be on tap, 24 hours a day, seven days a week: *"… patients say I rang and you weren't here. How dare you? What were you doing?"*

10.9 How are perceptions of themselves as GPs related to decision making processes about adoption of computer technology?

This research suggests that GPs have an ideal of what being a GP entails, which includes dealing with patients in a continuing way, and providing the entry point to governments, patients, and other groups creates a situation in which GPs perceive that many aspects of their professional autonomy are under challenge. Together with reforms directed at controlling the costs of health care provision, and making GPs more accountable, they feel under challenge from "above" and "below" (Calnan and Williams 1995). They also believe that their ability to make the right clinical decisions for their patients has been circumscribed.

In the context of changes over the last decade, GPs express uncertainty as to their role in the health care system, which is crucially linked to their perceived decline in autonomy. The government's control of Medicare rebate levels, the reforms to General Practice training, registration and accreditation, and changes such as an increasingly educated and demanding patient base, combine to produce a situation that GPs find difficult and threatening to their ideal notion of profession. Clearly, medical professionals in Australia as elsewhere view policy changes which impinge

on their professional autonomy with alarm, feeling themselves to be under threat (Hunter 1996). This is exacerbated by rising community expectations of health care, and more informed, articulate and demanding consumers.
The concerns expressed about loss of autonomy and control were centrally focused on government 'interference', reduced financial control and more demanding patients.

Returning to Schulz and Harrison's (op cit) framework clarifies how GPs conceptualise autonomy in the workplace. Economic freedoms are seen as having been reduced through the control of the level of scheduled fees and this was linked to reduced control over the nature and volume of tasks – or in the language of the case study interviewees, time management difficulties.
By using Actor Network as a framework for research I have gained insight into the difficulties that are faced by GPs in their decision making and this highlights the utility of using such a framework for drawing out a nuanced analysis of autonomy on the frontline which affects the way that decision are made.

As I explained in chapter 4, professional power is constantly renegotiated in general practice at the macro level, but at the micro level it occurs in a very different way – as the case studies showed. It is very important to the understanding of incomplete adoption of computers in general practice in the study area that I distinguish between the power and authority of the medical profession organization and the autonomy of GPs. It is also important that we understand how GPs themselves perceive their role and their autonomy if we are to have a more nuanced understanding of what is happening in adoption of computers in general practice in the study area. My case studies indicate that perceptions of self as a professional in the workplace of general practice contribute significantly to understanding of the changing nature of adoption patterns in the study area.

The hypotheses then is that general practitioners who feel less autonomy, or disconnected in some way, will make decisions about computerization that are less well reasoned than the decisions they are making about patients. In an effort to

develop discussion further in regard to understanding how decision are made I felt it was not enough to accept that GPs make decisions in the way that they "say" they do.

In interview GPs claimed they used a process for decision making - 134 of 143 said they used formal models to help them make decisions about business issues. In fact this was seldom the case in relation to computer adoption. They would decide with their friend, colleague, accountant, practice manager or as a result of family discussion, or put it off until there was no option then take advice from the RACGP or a colleague who was already computerized. When asked where they went to for advice on the use of computers these were the people who were listed, indicating that the process of decision making might be suspect. This may be because general practitioners do not have enough time to consider all aspects of computerization and this is the easier way to gather information.

Underpinning this, if GPs do not feel autonomous in making decisions there will be conflict during the process leading to decisions that are less well informed, made on the run, and without consideration for business needs. This may set the practice up for failure or for having less integrated systems. If this is a model for decision making then the GP may assume that all the information that is relevant to the situation is available and that this is completely accurate. Add to this the value for the decision itself – see table 12.

10.10 A suggestion about how decision making in general practice might occur in general practice and why it is a barrier to fuller adoption of IT/IM.

J.R. Gordon and D.D.van Fleet 2006 offers an explanation of how decision making occurs. I have adapted this explanation for this research to general practice. They claim in the real world *Tunnel Vision* occurs when people have mental blinders, such as individual biases, that restrict the search for an adequate solution to a relatively narrow range of alternatives. Mental blinders might be things that GPs think it is

important to make decision about. These biases can be as follows:

Bounded rationality

This means that people attempt to be rational but this rationality is constrained by their own values and experiences and by unconscious reflexes, skills and habits. For example, if a person has a history of making decisions in a certain fashion, he will probably continue to follow that same pattern, even when an objective observer might see a need for a new approach. Satisfaction is selecting the first minimally acceptable alternative, even though a more thorough search could uncover better ones. When you think the thing you are making the decision about is not really important then you are likely to choose this way of decision making. In the case of GPs, when you have been taught for years that making decisions about patients is the most important thing then you are more likely to have a bounded reality. This can be seen clearly in table 12 and from the comments that GPs have made about themselves which are included in this chapter.

Previous commitments

People who feel personally responsible for a previously selected bad decision often tend to commit additional resources to that alternative. The most significant implication is that the escalating commitment to a particular decision makes it increasingly difficult to objectively evaluate other alternatives and to change the already initiate course of action.

In the case of practices that decided early in the piece to adopt computer systems that were troublesome or did not give security, or did not operate in the manner providers claimed, the practice is likely to continue to spend or invest in these systems rather than adjust, this may be a particularly good explanation given that the decisions about the business are not important or time is of the essence. In case study 6 I saw just such an example. As this research progressed, this practice took the very brave step of “pitching” out the equipment and starting afresh.

Implicit Favourites

Many people select a favourite alternative early in the decision-making processes but continue to evaluate additional solutions. Subsequent alternatives are therefore distorted perceptually and evaluated using decision criteria that emphasize the superiority of the preferred solution.

Consider a person who is told to choose a site for a new plant. He quickly decides that it should be close to a place where he always wanted to live. He may unconsciously take steps to ensure this city is a prominent alternative and be biased in his choice.

In the case of decisions in general practice in the study area we can look to comments about where the doctors got the information for their computer set ups.

Lack of creativity

Creativity is the ability to generate ideas that are both innovative and functional (De Bono 2004). It is especially important in making non routine decisions. Unfortunately, creativity rarely receives adequate attention within organizations. The first reason for this neglect is that organizational policies and procedures are usually designed to promote order, consistency, and uniformity, thereby limiting creativity. (Neisbett 1998). This would certainly be the case in a general practice where process, protocols, procedures and guidelines are of the utmost importance. Second, managerial work is fast paced and action task oriented whereas creativity requires time for preparation, incubation, and inspiration (De bono 2004).

GPs do not have time and these days most of the decisions about computers are made for them by the profession or by practice managers or by the owners of the practice.

Groupthink

Groups tend to make riskier decisions. Because no single person shoulders the consequences of a decision made by a group, individuals may feel less accountable

and will accept riskier, more marginal solutions. In addition, groups may ignore individual expertise, opting instead for group consensus. Strong personality types and high-status group members may dominate the discussion, causing less assertive and lower-status members to go along with them. Cohesive groups may develop groupthink - a mode of thinking with a norm of concurrence seeking behaviour.

The symptoms of groupthink arise when members of decision making groups are critical of ideas outside the group, prefer to entertain ideas within the groups, and focus too heavily on developing concurrence within the group. It occurs most frequently in highly cohesive groups, particularly in stressful situations.

All of this would apply to decisions being made in general practice, even more so if the decision is being made by an outside body such as other owners of the practice in the case of the 4 corporative practices in the study area.

Thus far this chapter might indicate that my research agrees with the figure below, that doctor's responses in terms of making decisions about computers in general practice are underpinned by the issues listed. But this is not the end of the story for there is much more to it than that – as can be seen in figure 9 and the case studies in chapter 8. This is also supported by the way that GPs perceive themselves, as discussed earlier in this chapter. It is my belief that this is a very important aspect to barriers and enablers to the adoption and development and use of computers by general practitioners in general practice in the study area.

Rogers (1995) has a very different approach and suggests the "Innovation-decision process is the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new ides, and to confirmation of that decision". The innovation-decision process takes time - that is something that rural GPs have very little of - thus it may be that in not undertaking this process in a thorough manner the use of computers at the desk top is incomplete.

Rogers (1983) proposed one of the best-known models of the innovation-adoption process. According to Rogers, the process can be divided into five stages: (1) becoming aware of the innovation under consideration; (2) forming a favourable or unfavourable attitude toward it; (3) deciding to adopt; (4) implementing the innovation; and (5) deciding whether to keep the innovation after it has been implemented. Rogers' model of the innovation-decision process consists of five steps which are show in the following figure 10 (Rogers 2003): Knowledge; Persuasion; Decision; Implementation; Confirmation

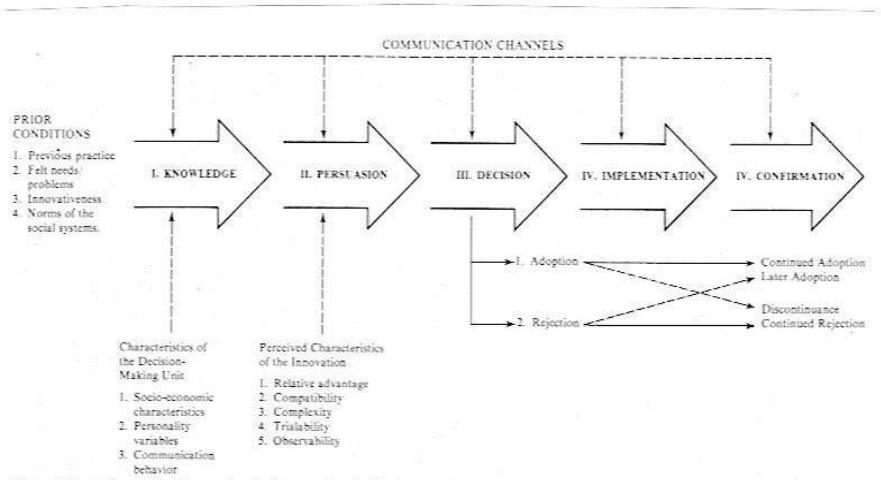


Figure 5-1. A model of stages in the innovation-decision process.

The *innovation-decision process* is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.

Note that for the sake of simplicity we have not shown the consequences of the innovation in this diagram.

Figure 7 Rogers decision making model (Rogers 2003)

In light of the above and the time that it would take to progress through the stages and to ultimately make decisions in this manner I think that Rogers' explanations do not offer enough, nor do they consider the effect of corporatisation of general practice nor the changing characteristics of general practice and general practitioners nor of the way that general practitioners perceive themselves.

10.11 Conclusion - Decision making and Actor Network Theory

In being able to follow the actors in this research I have been able to gain insight into the minutiae of decision making in general practice. In spending time with the doctors in their practice, undertaking a survey and reinterviewing I have been able to gain a long term view of their perception of themselves in the decision making process. I would not have been able to do this if I had not used the more personal approach of following the actors and letting them guide me to the information. I have been in a position where I have asked questions responding to their information to me and not just asked a set of questions that directed their responses. Their information has taken me through the process not the other way around. In this way I have a far richer understanding of what has been occurring.

CHAPTER11: GENERAL PRACTICE AS SMALL BUSINESS

Aim for chapter 11

In light of the micro factors that affect GPs in the study area in decision making this chapter will focus on the importance of general practice as small business. The reason for doing this is to illustrate that there exists a dichotomy for GPs in the study area. Where on the one hand they function as small business they are juxtaposed by the way that they were inculcated into the persona of carer. This will be shown by contrasting what GPs say they want and what they are required to do in acting as a small business.

11.1 Introduction and the importance of perception in the small business of general practice:

The perception of themselves that most GPs still generally have in the study area, i.e. as gatekeepers of health and as independent practitioners, is juxtaposed to the requirements of functioning as a small business. How has this acted to both enable and inhibit the uptake of IT/IM in the study area, not by the practice but by the general practitioners? It is the intention of this chapter to draw this out and to examine how this has affected the uptake of IT/IM both in the business of general practice and as general practitioners.

The twenty first century brings with it a push for a more business oriented approach to general practice driven by a move to corporatisation. (RACGP 2006). With this push for a more business like approach to general practice come many expectations, one of which is to show more productivity - research in Great Britain shows that this will only come with the further use of IT/IM by general practitioners, particularly in the decision making arena of general practice. (Short, Fischer, Bashford 2004)

This research, the case studies (chapter 8), and the introduction of PIP (chapter 5), raise the interesting aspect of general practice as small business. General Practitioners traditionally would have viewed themselves as carers and guardians of health care. This was the overriding emphasis of their training (General Practice Training Review 2006). In the past general practitioners would not have viewed themselves as small business people. Many comments throughout this research have pointed this out.

11.2 What are the foci of general practice in 2007?

There is an increased focus on outcomes in Australian general practice, (RACGP Position Statement for General Practice 2006) driven by government funding and a move to a business approach, changing perceptions by general practitioners and the patients will continue to drive change; the increased use of information technologies and changing structures are likely to put aside the traditional ways that general practice has been organised.

In the old days, to spot a doctor's surgery, you had to look carefully. Discretion was the key – nothing but the doctor's name on a brass plaque (with a reassuring patina) and a red lamp near the entrance set it apart from the other freestanding bungalows in a suburban street. In the musty waiting room the chairs never matched.

Across the study area the change is clear, these days it's quite likely to be a highly visible piece of retail real estate, with signs advertising any number of health related programs. Inside, seated on matching chairs in tasteful colours, patients leaf through the latest magazines, until it's their turn to be seen by the GP who is on a five-year contract.

Increasingly, in the study area doctors work in multi-purpose medical clinics as employees of larger organizations - some of them corporate – along with pathologists, radiologists, specialists and even in one case a pharmacist under the same roof. Many consumers in the study area tell me they welcome the convenience. Others bemoan

the demise of the solo family doctor. And the trend is dividing the medical profession (Rawlin 2006).

It might come as a surprise to hear, particularly in light of chapter 5, but some doctors in the study area are having a difficult time making a good living.
Thirty years ago, it was a different matter. Doctors set the price they charged for a consultation. The number of doctors per head of the population was low enough for doctors to be able to charge what they wanted. A GP could expect to earn a very comfortable living.

Things changed in 1983 (and the argument as to whether GPs were public servants or small business people emerged) with the introduction of the Federal Government's universal health insurance scheme, Medicare. Under this scheme, doctors could charge the government directly for patients' consultation fees. For the first time it was the government that set the price they would pay doctors to see patients. Medicare would pay them 85 per cent of a set amount – the 'schedule fee' – if they billed the government directly. “Of course doctors didn't *have* to bill their patients this way. But increasing numbers of graduates from new medical schools had given rise to an oversupply of doctors, especially in the inner suburbs of Australian cities. If doctors charged what they wanted to charge, patients tended to desert them for other doctors who bulk-billed. So bulk-billing become the standard way doctors were paid”. (Rawlin 2006)

Around this time, medical centres that specialised in seeing large numbers of bulk-billed patients were set up. Because of concerns that some doctors were over-servicing – seeing patients more often than they needed to – and because of the threat of Medicare costs blowing out, successive Federal Governments kept the annual rises in Medicare payments at a very modest level. Increases in Medicare payments were lower, in fact, than rises in the cost of running a practice – staff salaries, equipment costs, rents on practice premises and so on. (Case studies 2003 - 05; Productivity Commission Report 2004)

Meanwhile, the administrative burden of running a practice grew. New laws covering staff entitlements and employment contracts, the need for computerised medical record systems, and other facets of running a small business were making the old cottage industry model of running a practice an increasingly inefficient one. Some doctors realised that they couldn't go on as they were. Many merged their practices into group practices, sharing premises and the costs of staff and equipment. (Case studies 2,4,6,7 2003 -04)

11.3 What were the benefits of these foci?

This had several benefits. The costs to each doctor of running the practice were lowered dramatically, making their practice more profitable. By running a roster, they could offer patients an extended-hours service. An individual doctor could get time off for study or a holiday. They could afford additional services – perhaps a practice nurse, or additional diagnostic equipment. They could employ someone to do administrative tasks like hiring reception staff, organising the purchase of equipment, and doing the accounts (this person is known as the practice manager and the role of the practice manager expanded dramatically with the introduction of IT/IM payment within the PIP).
Gradually the group practice became the preferred model, to the extent that the traditional solo practice became the exception rather than the rule. In the study area there were 32 solo practices in 1980 but by 2007 there were only 3.

11.4 Enter corporatism:

The health industry in the study area reflects that of the National pattern and had traditionally been organised along the following lines. On the one hand there were large public hospitals, all owned and maintained by the government. On the other hand there were small private concerns – doctors' surgeries and some (usually small) private hospitals.

In the 1980s, some private investors started investing in the health industry – especially private hospitals, pathology companies and radiology companies. If well-managed, these facilities were good investments – thanks to the aging population, and the fact that people will always be prepared to pay for health care, especially since their expenses are usually underwritten by Medicare and/or private health insurance.

These investors were especially interested in pathology and radiology because of the high returns these businesses generate. Health companies began approaching pathologists, offering to buy their practices for a lump sum, and then paying them a wage to remain with the company. Within 10 years or so, the entire pathology sector became dominated by a few large companies. A similar process began in radiology.

As these companies grew larger they consolidated further, forming vertical chains of pathology companies, radiology companies and private hospitals. ("General Practice in Australia 2004") General practices, though, were off limits. It was illegal for a third party to contract doctors to offer services to the public. GPs' surgeries could only be owned by doctors. But in 1996, a law was passed allowing third parties to contract doctors. The health corporations began to look seriously at general practice. "Using cash flow from other areas of their businesses, often with additional funds from investors, the corporates began buying up general practices as fast as they could." (Case study 1 interview June 2004)

The big players were Foundation, Endeavour, Primary Health Care/Gribbles, and Mayne Health. These groups offered GPs enticing deals – large cash sums, typically $100,000 to sign on for about five years – plus a generous split (usually 50 per cent) of the fees they generated. When you consider that if the doctor were to try and sell their practice to another doctor they would get nothing for it – in other words, the goodwill of the practice was zero – this sign-on fee was pretty attractive. And losing 50 per cent of billings to the corporation was no worse than losing the same percentage as overheads.

And it didn't end there. The corporates offered GPs:
Plush, new, well-equipped buildings
Expensive diagnostic equipment
A 'one stop shop' for patients, with practice nurses, pathology, radiology, and even a pharmacy under the same roof.
Relief from administrative headaches like computerised record keeping, accounts, company tax returns, and so on.

It was, in fact, the 'group practice' that medicine was moving towards anyway, except that the corporates offered to do it all for them – and fund it generously.
Today, about 2,500, or 10 per cent, of Australia's GPs are employed by a corporate medical entity. In Western Australia the figure is around 40 per cent. Collectively, the corporate players have stated their target is to own around 50 per cent of all general practices. In the study area 4 of the practices are corporates.

The change in the law in 1996 and the greater uptake of IT/IM in general practice over the past 5 years (as a result of the PIP) has led to the greater emphasis on general practice as small business. With government funding providing infrastructure support and a regulated market through the PIP, equity of access to health care is ensured. However this has limited the capitalisation of many privately owned practices. General practices in the study area tended to operate as practices owned by the general practitioners working there. However an interesting finding is illustrated in remarks such as “yes, I would see myself as a solo GP” – this remark made by a GP in a practice of 3 others (the business was owned in partnership).

Remarks of this nature appeared 29 times in interviews, despite the high level of corporatism in the study area. This is consistent with the Australian picture of how general practitioners ‘see” themselves. Campbell Research (2001) found that 46% of general practices classify themselves as solo practices. Therefore it stands to reason that general practitioners would scrutinise the cost effectiveness of such innovations as information technology adoption and only adopt when the incentives are offered

such as PIP. This is in conflict with how they perceive themselves – i.e. as carer first then business people second.

However, in 2003 Burgess et al found that the use of IT by GPs reflects patterns of use in small business. Previously, Burgess and Trethowan (2002) found that if general practices use IT then in many cases it is for perceived cost savings rather than for adding value

General practice business generated a gross business income (before deduction of practice costs) of $2,836.3 million and had an operating profit before tax of $778 million. This represents a margin of 27.6%. By far the greatest proportion of income came from fee for service medicine. GPs average medical service income was estimated at $124,992. The average business income per medical practitioner employed (without deduction of expenses) was $136,200. Average wages and salaries paid to medical practitioners employed by general practice medical business was $51,200. (General Practice in Australia 2000:172) in light of these figures it is little wonder that the adoption and use of IT/IM accelerated when support for IT/IM was implemented. It is little wonder that general practice is perceived as small business rather than the traditional view that GP's have of themselves.

In viewing general practice as a business the Department of Health and Ageing offer a clear recognition that in the past few years the concept of general practice as an industry is very clear. It functions on three levels – that of the individual practitioner, that of the practice, and that of the profession overall. (Dept.of Health and Aged Care 2004).

11.5 General Practice as Small Business and the use of IT/IM

In General Practices information management focuses of the better management of information that can assist in promoting improved clinical, patient and practice outcomes. We have seen from the case studies that information management in

general practices can provide additional functionality that may be available and not being used such as:

- Electronic data availability and exchange (eg on-line pathology/radiology ordering and reporting).
- Patient information databases such as patient registers including patient age, sex and disease; recall and reminder systems.
- Practice administration and management such as electronic staff rosters/pays, billing and claiming; stock ordering on-line; GST statements.
- Contribution to research activity such as adverse drug reporting; electronic contributions to approved clinical research activities.
- Electronic diagnosis and treatment support such as drug-drug interaction alerts; patient medication and clinical histories.

- A situation analysis carried out by the GPCG (2002) suggests that Information Management in General Practice should focus on the better management of information that can assist in promoting improved clinical, patient and practice outcomes. (see p55).

But all of this assumes that the technology will be used in all general practices in some way or other. Throughout this research report it has become clear that progress has been made in terms of adoption of information technologies, (see tables 1 through to 6). However in light of viewing general practice as a small business and the trend to corporatism the dichotomy between reality and perceptions is important to acknowledge because many general practitioners still do not foresee any benefits for their own practice even while the potential efficiency and quality gains for both patient and government were more obvious. Even though many GPs in the study area were in partnership practices they still do not see themselves as business people. Staff at the study area division office quote surveys that show 68% of the 143 general practitioners in the area still “see themselves as solo GP”.

However many general practitioners are more than happy to leave the "hard stuff" to their staff, particularly in relation to the business end of IT/IM. This is consistent with data in tables 1 to 6 that show it is the practice that adopted the use of computers not GPs, who still have a long way to go. I asked the GPs at a forum I conducted in 2006 at RACGP why this was so. Their responses are aptly represented by this statement from one GP. "Why should we do that work? We are highly trained to look after people and to make decision about their health; we have their life in our hands. So when they have perfected to IT/IM systems that will help me make decisions about care that is when I will embrace technology. I am not paid to do the other" While this GP was one of those who had not gone very far down the road to use of IT/IM his comments do represent a school of thought that use of technology is for the office not for the doctors, unless they really have to to get the PIP payments. Not much has changed since a review of GP web sites in Australia by Burgess and Trethowan (2002) determined that a lower proportion of general practices have web sites than small business, and that the web site was used mainly to display simple information such as the physical location of the practice, contact details, email addresses, information about the practitioners, and latest news. A very small percentage provided automated services, such as automatic recalls or the ability to make online appointments." (Tatnall et al 2003). In repeating this review in 2007 I found that many more of the practices in the study area now had web sites, however these web sites were basic and provided no avenue for automated services. "Why would we want to do that, we are not big business" was an oft repeated comment from general practitioners in the study area.

This indicates to me that despite the changes that have taken place we are still caught up in the way the GPs "see" themselves and the expectations that government and consumers have from them. "Meeting the needs of shareholders through customer service is good business practice, but the needs of patients and shareholders will not always coincide. In such a situation, if GPs are not able to put their patient's needs before the needs of the corporation their patients lose". (Interview 52 2005)

"Governments, health consumer representatives, health professionals and managers of health corporations must clearly understand that GPs have a role as honest brokers for their patients in the healthcare system, and must ensure GPs are free to stand up to third parties such as insurers or corporations in the event of competing interests." (Rawlin 2006)

Dr Rawlin (Director if Education Service RACGP) is not the first to respond to the potential for doctors to experience competing interests. After ministerial inquiries into the provision of male impotency services and the cosmetic surgery industry, (1999) the NSW Government introduced amendments to the *Medical Practice Act 1987 (Medical Practice Amendment Act 2000)*. The Act can now exclude an employer, manager or director from involvement in any company providing medical services if he or she is found to have incited doctors to unsatisfactory professional conduct, or is party to either payment of pecuniary benefits for unnecessary services or directing referrals.

Although some States are prepared to act to the extent of their powers to ensure corporations do not influence clinical practice, the Commonwealth Government has encouraged corporatisation of medical practice through its own inertia. It is responsible, through the payment of Medicare rebates by the Health Insurance Commission, for most of the expenditure in this market, where listed corporations are making shareholder profits largely from the public purse. As an example, the Commonwealth Government permits vertically integrated corporations to share profits from internal referrals while continuing to enforce regulations that prohibit the sharing of profits from referrals between traditional practices. In the study area this has meant that the 4 practices that are corporative are able to develop and respond to changes much more rapidly. (Practice managers meeting 2005)

Despite reservations for the business/corporative structures of general practice that appear to be moving into the study area there seems to be some acceptance of them despite the perceptions that GPs have of themselves. At a forum held (2006) at RACGP for GPs in the study area it became clear that they felt there were

important differences between the newer models of corporations and traditional corporatisation models and the environment in which each operate. Features of newer models include:

- corporations are listed companies with access to capital markets;
- the market favours vertically integrated models;
- the rate of acquisition by corporate groups has increased;
- ownership of diagnostic imaging business by the corporations is common;
- increasing integration of specialists in corporate centre;
- goodwill payments have increased considerably;
- the potential to harness and direct the significant market referring power of general practitioners.

The discussion forum (2006) illuminated factors influencing a clear move to a business focus in the study area including:

1. The pace and nature of corporatisation, including:
    - the parlous state of General Practice remuneration;
    - the paucity of specific practice management training, in both core College training programs and elsewhere;
    - increasing expectations of the public in relation to hours, premises, equipment, etc;
    - the length of hours required to earn target incomes;

2. GP situations and attitudes to the factors above are influenced by:
    - more GPs are working part-time with ownership being shared with, or relinquished to, third parties;
    - interest in other lifestyle activities/quality of life (family friendly working conditions) as a priority has increased;
    - many doctors now have less interest in management and ownership.
    - Business management is not included in medical training. They are not inculcated into a business mind in the same way that they are into the persona of a medico.

3. GPs feel that the community demands a high quality service at an unrealistically low price;

- the shortage of Locums and lack of holiday relief;
- the absence of new workforce to share practice loads;
- the requirement to provide 24hr cover;

4. The increasing cost and complexity of practice management:

- Practice Accreditation
- GST red tape including BAS
- PIP paperwork

5. Enhanced Primary Care MBS Item Number implementation.

- growth in alternative health care providers, e-health and the increasing sophistication and demands of consumers;
- the development of large corporations in pathology and diagnostic imaging markets, driven by economies of scale in these capital intensive areas;
- recognition that large sums paid for goodwill for pathology and radiology could be spent in vain if a competitor gains control of the general practitioners and re-directs the referrals to its own facilities;
- it may be cheaper to purchase the general practice goodwill, and thereby capture the pathology and radiology goodwill, than to purchase the pathology and radiology goodwill from established specialist practices; and,
- capping of Medicare rebates for pathology and diagnostic imaging services, so corporations are now fighting for market share rather than their previous strategy of increasing service numbers. Amalgamating GPs together and co-locating diagnostic imaging services may well result in capturing many of the GP referrals.

6. The GP Market

A number of trends have led to an environment that is conducive to non-medical investors:

- Many practices are under-capitalised and/or have not been able to capitalise on or realise potential efficiencies. This professional and financial crisis is due

to poor morale generated by both government and public pressure on general practice to accept unrealistic remuneration arrangements.

- Recent public listings of medical centre chains have resulted in the market determining unsustainable valuations of medical practices purchased by those chains, unless seen in the context of capturing income from all the referrals. Applying normal commercial valuations to previously low value general practices is seen as an easy way of generating value in the market, as investors look to the market value of listed assets.
- Corporations must make a return on investment and there is the risk that demands for greater return will lead to less support services for corporate GPs (both staff and facilities).
- Vertically integrated General Practice companies can capture income flowing from GP referrals to co-located diagnostic imaging services.
- Long term growth is expected due to an ageing population and growth in service utilisation among the general population. Advances in technology and emerging approaches to funding and delivery (eg. integrated and coordinated care) suggest an increasing role for primary care and for GPs as gatekeeper into the future.
- Although the GP market is fragmented and operates predominantly on a small business basis, it forms a substantial part of the Australian economy. The large volume of transactions highlights the potential gains to investors from a substantial market share and improving margins through economies of scale and vertical integration.

The KPMG scoping paper (2000) on GP Corporatisation made three recommendations that are of particular relevance to the above:

_ Rec 34 (p121) proposed the development/implementation of a program to assist general practices to embrace micro-economic reform, including improved practice and workforce efficiencies, amalgamation, and other models of cooperative working.

_ Rec 35 (p121) proposed that, following the implementation of the program (above), a planning framework be developed to address the distribution of general practices and to encourage the establishment of new practices in areas of need. (Such

rationing of GP practices might seem to produce short term gain but will undoubtedly produce long term pain as the corporations will purchase the licenses as was the case in pathology.)

_ Rec (112) recommended that the organisations representing general practice assist owners of medical practices, and doctors who work for them, by developing equitable model agreements.

(This issue may be of particular pertinence to corporative models in which doctors remit a percentage of their fees to the owner.)

In 2006 the RACGP stated "from a professional perspective the gold standard is that doctors should maintain a controlling interest in facilities that are their principal place of medical practice. This not only ensures their professional independence, but also gives GPs the freedom to act as their patient's agent, not as the agents of a third party" (Review of post graduate education standards 2005 ongoing)

With the acceleration of computerization this is not likely to be the model adopted by government who will have a higher regard to business structures. (General practice red tape task force 2006) The argument is that the greater emphasis on business structures and models, - and even the purchase of general practices by investment corporations - in combination with government surveillance initiatives are fundamentally restructuring the business of general practice in Australia.

There are three components to this argument, operating at the sociological, the political- economic, and policy levels. First, within sociology, any recourse to the theoretical model of 'medical dominance' no longer holds the explanatory power it once did to explain the position of the medical profession.

Secondly, at the level of political economy, it is argued that the development of corporate investment will significantly transform general practice, away from non-profitable interventions, the servicing of at risk groups, or those in the non-urban areas, to population groups and interventions that are profitable.

Thirdly, at the policy level, it is suggested that these developments raise important questions about the continued funding of a universal health care system, where public moneys are being accessed for private corporate investors, backed by speculators on the share market. The importance of this issue cannot be overstated in the context of 'vertical integration' - the ownership of general practices, radiology, and pathology services, under the one corporate umbrella - where these companies anticipate that this integration will be a way of producing referrals from the GP through the system, with the goal of increasing profitability. *"Practice ownership isn't the Holy Grail it once was for GPs, but some registrars still long to be their own boss. So how do they develop the necessary business skills?"* (Interview 71 2006)

11.6 What individual GPs want:

Juxtaposed to the above discussion are examples from the case studies of single GPs and their aspirations for the future - some GPs still plan to buy their own practice. The examples of this follow:

Dr Kath wants to own her own practice in the study area, her reason, to gain autonomy. "If you own the practice, you can do what you want," she says.

A decade or two ago, this doctor tells me she would have been just one of many GP registrars with practice ownership ambitions, but today she is part of a rare breed. The image of overworked and underpaid GP principals has made many registrars think twice about practice ownership. Also, with a hefty HECS debt (see glossary) already weighing them down, buying into a practice often features low on their list of financial priorities. But that doesn't stop some registrars dreaming of one day owning their own practice. However, the challenge is to gain the necessary business skills.

Dr Paul plans to start his own practice next year so he can pursue the areas of general practice he prefers. While he doesn't believe he's picked up any business skills in his training, he attended a RACGP conference on business skills on the Gold Coast late last year for pointers and has also questioned a friend who has a practice.

Likewise, Dr Neda, a recently graduated GP, plans “somewhere in the back of my mind to buy into a practice down the track”. She says the move will give her more flexibility and the ability to run a practice the way she wants to.
Dr Neda concedes that the business side of her training has been weak and, at present, she’s unprepared for such a move. However, so as not to be thrown in at the deep end she plans to work for other practices for a few years to gain experience, and might also do further business study.
Key sources of knowledge about running your own practice are practice managers or supervisors.

Despite extensive business experience (Dr Kath) — (in the past decade, she and her husband have built up five businesses , distribution, carpet cleaning, IT consulting and computer parts) and are about to start a sixth — she doesn’t feel overly prepared to run her own practice.

“I feel well equipped in terms of employing staff, making sure a business runs efficiently and in back-end accounting,” she says, but she admits she lacks an understanding of how a practice runs in areas such as procedures and policies, Medicare and the HIC, and how payment is obtained. She plans to ask a family friend who is a practice manager for help in these areas.

“Business skills are again something you learn in the apprenticeship model of GP training by watching how your training practices run.” General Practice Training Tasmania RLO Dr Rachael Boland agrees. “From what I can gather, most general practice registrars who are interested in how general practice runs (whatever their intentions for business) get most of their information from their supervisor or practice manager. It also depends on the practice. There are some practices that feel that it is part of your training to understand how the business works and therefore involve you in decisions in some way.”

In the three years since she qualified as a GP, Dr Anna has built up a medical practice in the study area. Yet, she says her GP training left her ill equipped to set up a

business and she was largely thrown into the deep end when she started out. “I am quite inquisitive, so I ask lots of questions,” she says. “If I had a problem with, say, Medicare, I’d pick up the phone and ask them all the questions.”

She advises registrars wanting to pick up business skills to ask their supervisors lots of questions and to spend time sitting with the practice manager. “Use the opportunity to see how different practices run ... Keep all the good bits you pick up for how you’d like to run your own practice,” she says. For Dr Anna, human resources, especially dealing with the different personalities of practice staff, was the hardest element to come to grips with. But while there were lots of decisions to be made at the start, and lots of hard work, she says the experience has been rewarding, especially seeing the practices grow and run smoothly.

The questions raised by these GPs in regard to better training as business managers, size of practice and support after graduating are some of the business deterrents to computerization of general practice. Small practices incur relatively larger costs (see tables in chapter 5). They are also likely to lack the critical mass to upgrade computers if they do computerize. The impact of this on the data networks within the healthcare system is interesting. Many of the doctors in the study area do not see that the government will support practices which are not cost effective simply for this reason. They believe that the business model for delivery of health care will come to dominate and it will be accelerated by computerization and integration of care. They think the one cannot happen without the other and that is the most cost effective way for the government to provide equity of access.

11.7 Conclusion:

GP’s perceptions of themselves as gatekeepers, the need for autonomy, the lack of business training, and a rapidly changing health care system, all come together to provide barriers to the adoption and fuller use of IT/IM in general practice in the study area. This conflicts with the reality acknowledged by questions raised by GPs in the study area in regard to the adoption of a business model by government. This dichotomy will continue to influence the use of computers.

CHAPTER 12: CONCLUSIONS AND REFLECTIONS

12.1 Introduction:

Previous research into computerization in Australian general practice has tended to assess the degree to which computers are used for various clinical and administrative tasks including electronic health records, automatic recall, electronic prescribing, decision support/reference, feedback, and research or evaluation. This research has taken a different perspective and examined the barriers and enablers to adoption of computers by comparing two theories of adoption.

12.2 This research found the following:

1. In the outcome it is clear that using Actor Network Theory as the basis for explanation was more informative than Rogers' Diffusion of Innovation Theory. How does ANT measure up? Lee and Hassard (1998) and Latour (1999) have suggested that ANT is not a theory of anything. They have suggested that it is a research strategy. I have found the ANT approach to be both radical and confronting in applying it to organisational study. What I have tried to do is not examine the structures or the important people but I have tried to apply ANT by examining the networks. What I have discovered is that ANT gives a platform to show how structures, agents and policy become an entangled and consolidated whole. This whole will in turn bring about "matters of fact".

2. This research found that a GP's relative position in the lighthouse model can be determined by measuring their level of realisation along each of the dimensions that plot their location. I expected that GPs not adopting IT for use in various elements of their practice will typically have 'low' scores along one or more of the model's dimensions (axes). This was not always the case. I thought that the lighthouse practices identified by CHDGP would generally be found in the region of the model where the progression along the axes will be relatively high in all dimensions. Initially I identified this as the 'lighthouse region' of the model (see figure 2).

3. Some of the key factors shaping the uptake of information technology are perceptions of the usefulness of that technology; feelings of anxiety or trepidation surrounding computer use; decision making in general practice; changes in the way that general practice is structured – i.e. the move from solo practices to larger and corporate practices; age of the practitioners; access to support.

4. Computers are clearly at use in general practice in the study area, but have not been fully adopted by GPs. Use of information technology (IT) and information management (IM) is an obvious avenue for support that has been pursued by general practice. In the study area more than 90% of general practices now use clinical software packages and, about two-thirds keep at least some patient records electronically. However results from this study remind us that we are still far from an IT utopia, but the computers are on GPs' desks, ready to be used for a variety of applications. Further, this study shows how rapidly computers have been integrated into general practice over the past decade. However, while the physical presence of computers in practices has increased significantly, there is still reluctance among GPs to fully embrace the technology for clinical processes.

5. Computers were initially used in general practice only for administrative purposes, but over the past decade general practitioners have increasingly been using them for other tasks, such as prescribing, referring, ordering investigations, receiving test results and seeking assistance with clinical decision making.

More recently, government incentives for Australian general practices to computerize have increased the uptake of computer technology. Since 1998, computerization has been included as components of the Practice Incentives Program (PIP), whereby practices attract a payment from the Federal Government if they prescribe electronically, have the capacity to transfer clinical information electronically, and use bona fide electronic prescribing software that includes a patient medical record.

PIP practices in 2004 covered about 80% of Australian general practice patients. 93% of PIP practices were prescribing electronically and had the capacity to send and/or receive clinical information via use of computer technology. GPs in our study were using the internet and email, however the research found that having the

capacity for these services satisfies PIP requirements but does not guarantee their use by individual GPs.

6. It is clear that the creation of a new career in practices has emerged – that of the practice manager.

7. In the later parts of this research adoption of e-health was being accelerated by the Australian and State Governments. So it is clear that the computerization of general practice is a prerequisite for the success of a communication network across the health care system.

The decision of the Australian Department of Health and Ageing to cease funding support for the General Practice Computing Group in August 2005 suggests an assumption that general practice has achieved a "satisfactory" level of computerization. The number of practices reporting computer availability at accreditation or claiming PIP payments may have influenced this assumption. The extent to which individual GPs use computers for clinical purposes in the study area is still unknown. If GPs are being coerced into adopting a system in which they have little confidence, at a cost to be borne by themselves and the software vendors, and with no funding for technical support, it is unrealistic to expect an electronic health information system linking health providers to succeed.

8. The research shows a distrust of the reliability of computer systems, evident in comments about "down times" and "crashes" and in claims by many that data stored on computer are being backed up with a paper copy. This double-handling for already time-constrained GPs highlights their lack of confidence in their computer systems. Furthermore, in some practices, patient information is being recorded on paper by some GPs and in a computer by others, for the same patients. In some practices, this occurs only at times when the system is down, but in others, the inconsistency seems to stem from a lack of agreement between practitioners. A reasonable assumption is that neither version of the patient record is complete — certainly, neither is likely to be as comprehensive as could be assumed if all patient information was kept in one format.

Only one in eight GPs in the study area uses the computer to its full capacity and keeps all patient information in the one record. These GPs are the only participants in this study who would be able to provide comprehensive current data exchange

with other areas of the health sector. Some reasons for the lack of commitment to electronic systems were offered by the GPs in this study: prohibitive upkeep costs, lack of confidence in computer systems, privacy and security issues, disagreement among partners, patients' attitudes, lack of knowledge of the software, and the inability to type as quickly as writing. Whatever the issues, they will need to be resolved if general practice is to fully adopt e-health initiatives.

9. Practice size affects adoption of computers. Larger practices in the study area are more likely to be computerized than smaller practices. Ninety-six percent of practices with three or more GPs are computerized, whereas only 80% of two doctor practices have computers. Slightly less than three quarters of solo practices are computerized (73%).

10. Rurality does not affect use of computers. Those in large rural centres and all other rural areas are substantially more likely to be computerized. Computers are more likely to be used for administrative than clinical tasks. Administrative functions concerned with the collection of patient details and the issue of bills and receipt of payment are the most highly computerized tasks after word processing. For clinical functions, writing prescriptions, preparing referral letters for patients, receiving or storing pathology results electronically and running a recall or reminder system, are all reported by more than half the sample.

However, less than one-third of computerized practices access educational material for their patients or use the decision support systems available on computers. Computer usage is greatest for general administrative activities, somewhat less for patient oriented administrative activities and least for specifically clinical functions.

11. There were variations in use by practice size

General and patient oriented administrative computer use varies more across different sized practices than clinical computer use does, with larger practices tending to have higher computer use. General administrative use also increases directly with practice size, with the highest levels of use being found in practices with three or

more doctors. Differences with respect to geographical location are not marked. There are no significant differences in computer use for patient oriented and general administrative functions between urban and rural practices and only one significant difference between rural and remote practices and capital city practices in clinical use.

12. The development of boundaries and how Actor Network Theory confirms their development in a system. While the size of the practice did not influence adoption of IT/IM the development of boundaries (both within practices and within the study area) did influence the adoption of computers. These boundaries were not always geographical but more of a political nature. They relied on the processes of convergence and divergence. These processes in the case study area were important and relied on the dynamics of networks developing three phases which could be distinguished - emergence, translations and development. These are underpinned by the intermediaries (the political players) that operate within the networks.

Emergence:
Networks are put into place by actors. However, since there is no actor without a network, new networks emerge out of already existing ones. Sometimes this happens through subtle changes, sometime as the results of revolutionary developments which might push into the background the element of continuity that is part of every dynamic. Defining a beginning as a method of defining a boundary is a necessary. Some examples of things that could serve as beginnings were examined by John Law and Michel Callon (1992) who traced the beginning of a failed project for a British military aircraft back to a policy decision for rationalization of the aircraft industry. This decision, however, in itself contested, functioned only as an intermediary, (re)connecting existing networks of industry, labour and government to begin aligning themselves for the development and production a new aircraft.

Therefore it is possible that at the beginning of a network there is an intermediary which is activated by a network in order to align more/different actors for the

network's own interest. In other words, the attempt of an existing actor to grow and include new participants can be a good starting point to observe the emergence of a network and define its boundary.

Networks can be so large and stable that they appear to be independent from the actors, such as the RACGP. This, however, is a misconception. While they can (and do) seriously constrain the range of action for certain actors, they always need actors. Any given actor might be replaceable, but only by another actor. There is, therefore, no gap between the individual and the structure which is made up of individuals which are made up of structure which is made up of individuals and so on, endlessly. For Bruno Latour "the two extremes, local and global, are much less interesting than the intermediary arrangements that we are calling networks." (1993, p.122)

To observe the emergence, formation and growth of a network, one has to look at the intermediaries that are put into circulation, who sends them, where they suddenly appear, what they do there, as well as how they are translated and put into further circulation.

Development:
A network can develop in two different directions, towards convergence or towards divergence of its actors. Adding new actors to a network at first increases their divergence. The processes of translation by which the will of one actor is transferred to another actor become initially more difficult because each new actor is already included in other networks that might have aligned him/her/it for different goals. What to do in and how to account for new situations, how to assess the meaning of an intermediary is unclear at the beginning. The divergence of a situation or an element of the network is its "interpretative flexibility" (Bijker, 1994).

There is a process of mutual shaping between a new actor and an existing network. In the end neither the network nor the actor now included remains the same. The changes can be so subtle that they are negligible or they might be massive for either one or for both of them.

Translation:
Translation is a process that is performed by one actor (A) on another actor (B). Translation is at the beginning always an attempt which might or might not be successful. The most simple translation process theoretically possible, the one including only two actors, consists of three parts. A, an intermediary (I), and B. I is what is passed between A and B; it is what connects the two. I, therefore, bears the inscriptions of both actors and is therefore an ideal object to describe a network boundary.

12.3 The author reflects:
For networks to operate successfully, the circulation of intermediaries needs to be coordinated. This means the included actors do not, or may only to a limited extent, contest their own translation. Actors thrive toward an internal agreement which allows for an optimal circulation of intermediaries, because their strength depends on the coordination within the networks. In networks where the actors have successfully converged, i.e. are strongly coordinated, the network as a whole stands behind any one of the actors who make it up.

The way agreement can be reached, the scope of the translations possible, shapes the form of the network. In other words, "the network is constructed according to the translation's own logic." (Callon, 1992, p.84) The stronger the coordination of the circulation is, the more the different elements are aligned, the more stable and predictable it becomes. The more stable a network is, the better it defines its components. The possibilities decrease for other networks to untie the connections in order to redefine an actor for his/her/its own purposes. The setting turns into a black box.

Actors do not necessarily need to be successful in their attempt to optimize the circulation of intermediaries. The translation process can be denied. People might not want to become users and not buy a product, or they might stop being wilful citizens and overthrow their government. A machine can fall apart because of a construction

error; a new invention may render old solutions obsolete and channel money and other resources into new directions. The circulation of intermediaries within a network, then, becomes more and more difficult and the alignment of actors becomes weaker and weaker, the actors begin to diverge and the setting to disintegrate. The black box loses its integrity, the edges become fuzzy.

Convergence and divergence point at the directions into which a network can move, either towards stabilizing itself or towards disintegration in which it becomes easier and easier to reverse its connections. Convergence in a network does not mean that every element acts or becomes the same. It "simply means that any one actor's activity fits easily with those of the other actors, despite their heterogeneity." (Callon, 1992 p.87)

We have now arrived at the classic problem for any deconstructionist theory. We have accounted for the openness of any development (within certain "existentialist" restrictions) and for the multiple determination and interpretative flexibility of every element within a network, as well as the network itself. However, our society of humans and non-humans works quite well and in a surprisingly stable fashion. We flip a switch and the light turns on. Our planes take off and land precisely enough to plan a trip around the world in a couple of minutes. Strategic plans can be set years ahead. How do we account for such an incredible success of networks?

Stabilization:
Nothing succeeds like success, as the saying goes. In other words, networks that are not able to stabilize themselves to a certain degree disappear from the scene, while those which were able to achieve a certain convergence proliferate and become the necessary starting point for any new network.

An actor-network thrives due to stabilization because none of the entities which make it up would exist without that network in that form. The promotion of a network is a way to ensure the actor's existence and development. It is, therefore, in the interest of all actors within a particular network to stabilize the network which guarantees

their own survival to a higher or lower extent. The stability of a network depends on the "impossibility it creates of returning to a situation in which its [current form] was only one [of many] possible option among others" (Callon, 1992, p.89). In other words, stabilization, or closure "means that the interpretive flexibility diminishes. Consensus among the different relevant social groups [or more broadly, actors] about the dominant meaning of an artefact merges and the 'pluralism of artefacts' decreases." (Bijker, 1994, p.86)

Once forged into an artefact, embedded social relations remain stable as long as the artefact is used. Bruno Latour details in his programmatic essay, Technology Is Society Made Durable, how the social relations embedded in artefacts are a stabilizing factor of society:

> "Society and technology are not two ontologically distinct entities but more like phases of the same essential action. By replacing those two arbitrary divisions with syntagm and paradigm, we may draw a few more methodological conclusions. The description of socio-technical networks is often opposed to their explanation, which is supposed to come afterwards. ... If we display a socio-technical network - defining trajectories by actants' association and substitution, defining actants by all the trajectories in which they enter, by following translations and, finally, by varying the observer's point of view - we have no need to look for any additional causes. The explanation emerges once the description is saturated. ... There is no need to go searching for mysterious or global causes outside networks. If something is missing, it is because something is missing. Period." (1991, pp. 129-130)

Heterogeneity is another, central aspect of a stable network. The more the diverse elements are interrelated, the more complex and stable a network becomes. In a heterogeneous network each element is kept in place through a set of heterogeneous ties to other actors and in order to untie such multiple determined actors, multiple connections have to be untied.

The size and the heterogeneity of a network are related. The larger it becomes the more heterogeneous it becomes because it develops additional elements just to keep all other elements in place. In the language of systems theory this development is called "differentiation" (Parsons, 1968). The network starts to develop its own trajectory, supported by its elements which themselves depend on the network as environment. A network therefore starts to "become heavy with norms of all sorts" (Callon, 1992, p.91) in the course of stabilization. This means, of course, nothing else than that more actors are integrated or created.

A network which stabilizes itself does “not only resist competing translations but also restrict[s] the number of possible future translations. This means in order to establish other links and set-up new translations you would first have to undo those which already exist, and change the equivalence in operation, which would in turn mean mobilizing and enrolling new alliances. ... Thus non-linearity and path dependence can be seen to be integral to the dynamics of [a network]." (ibid, p.92)

12.4 Project Limitations and Generalizability

Looking back over this project, the data collected, data actually used and the vignettes actually told, I find a that Actor Network Theory has provided me with the tool to be inter-disciplinary I find that I have drawn on psychology, sociology, anthropology and cultural studies research method. Using ANT has supported this collaborative research effort between these disciplines. This has some significance for research in the health care fields given the emphasis for collaboration in the delivery of health care. But this narrative style raises the question of what I left out. By leaving some information out I have not meant to give the impression that these were not important, but I have left this information out in an effort to (as my supervisor discussed with me) “clarify and focus the research, if you do not, Patricia, this research will grow out of hand, and you will not be able to interpret any of the data that you have collected”.

Therefore the limitation of un-recounted data from the case studies does exist. I defend this on the ground that one of the basic ideas behind my research has been to be holistic in this qualitative research and follow the guide of Yin (1994). Holistic in the research has meant for me to take an overall look at the players in the stories and consider how I will draw together this range of sources without going insane. Thus, this qualitative research is holistic only in so far as the data collection draws on a range of sources and the analysis process admits the possibility that human and nonhuman factors play a role in the case or phenomenon under investigation.

This would lead to a recommendation for other researchers – there is a lot more to be told and analysed, so others might like to extend the study to include more divisions so that a comparison could be made.

The second limitation arises out of this recommendation. The division that I used as my study area prides itself of being very forward in the support, adoption rates and use of computers in its area. Statistics that have been presented to DoHA support that this division has higher rates of early adoption than other divisions. However this may mean that the picture I have painted presents one side of the story. I have attempted to address this by using the case study approach. Thus a recommendation would be that greater use is made of this approach as when it is informed by ANT it becomes a reliable tool for gathering data at a micro level. This micro information explains well the intricacies of the adoption process.

A third limitation may centre on the juxtaposition of organizations as actors versus the practices and individuals. What I have attempted to do is to take a drilling down approach. I have examined some of the external forces (actors) that have played a part in the adoption of computers then drilled down and down to the micro level of individuals in practice. Overall I have attempted to give a narrative of how the whole fits together. Again a recommendation arises out of this in terms of research at either end of the scale.

A result of limiting the data gathering in phase two of the research may complicate the research for some of you. However, if I had continued with all initial case studies I would never have finished this research.

The fourth limitation is that detailed descriptions of changes to the technology are absent. I never set out to examine the technology itself, but simply to count it as an actor in the vignettes that were the case studies. I have dealt with the technology in a general way for this specific purpose. I have not spent time describing the problems that arise out of use of this system or that, not use of this software or that because it distracted from my goal of identifying the barriers and enablers to adoption. Having said that, I recommend that a study be undertaken to examine these factors in the process of adoption and how they have played a part in the general practitioners “flick passing the main use of computers to the practice managers, for it is only now that systems and software are enabling the dreams of the early 1990’s”. As Wenn (2005) found in his PhD thesis “It is important to remember that the way these technologies function also contributes to the shape of the socio-technical network at any given time”.

An interesting finding for me was about the creation of boundaries of networks. I thought at the beginning of this research that they would not exist as the networks would be so flexible that they would not have boundaries. I was not correct about this at all, and should have realised that to be stable and have power they needed to have boundaries. I would have liked the time to investigate how these were delineated, sustained and protected from destabilising from the edges. So that then becomes a limitation of this research in that I could not go as far as I would have liked.

Generalizability from this research

Usually it is hard to generalise from qualitative research. In the health field--with its strong tradition of biomedical research using conventional, quantitative, and often experimental methods--qualitative research is often criticized for lacking scientific rigor. To label an approach "unscientific" is peculiarly damning in an era when

scientific knowledge is generally regarded as the highest form of knowing. The most commonly heard criticisms I encountered while out in the field were, firstly, that my qualitative research would end up being an assembly of anecdote and personal impressions, strongly subject to my researcher bias; secondly, they argued that my research would lack reproducibility--the research is so personal to the researcher that there is no guarantee that a different researcher would not come to radically different conclusions; and, finally, “they” said that I could not expect to be able to generalize from it.

Mason (2002) refers to theoretical generalization “... a range of strategies based on different logics, some of which are more obviously ‘theoretical’ than others” (2002, p.195). I refer you back to my methodology where I have done just that. By using these approaches I have ensured that the data I have gathered and the interpretations that I have given you are reliable. Therefore in doing so the case studies were a preferred strategy when I wanted to undertake phase two for the "how" or "why" questions that I was posing. I thought I had no control over what had become history or control over the events but my focus is on a contemporary phenomena in a real life context. Thus my method has been to implement exploratory and descriptiveness informed by ANT.

I decided the tools of my methodology were my preference because they would “often be the preferred method of research as they may be epistemologically in harmony with the reader's experience and thus to that person a natural basis for generalization" (Stake 2000, p.19). Therefore, since the intended audience would be general practices, a project undertaken in individual general practice would enable other general practices to make comparisons and determine if my findings are relevant to them.

By studying the general practices as individual case studies cross-comparisons can be made. In doing so, either a *'literal replication'* or a *'theoretical replication'* (Yin 1994, p.46) can be made. A literal replication occurs when the intended replication of measured outcomes is achieved. In a theoretical replication, the intended

replication does not produce comparable measurable outcomes. However, these different outcomes generate explanations to account for the lack of comparability in terms of the variables in the design. These explanations could lead to the creation of hypotheses.

Finally, throughout this thesis I have presented views by breaking from the tradition and asking the data to present itself in the manner of discovery. This has facilitated integrating approaches to revealing information as needed. I urge researchers to consider alternative ways of satisfying the way that research is written. By doing this I raise the possibility of presenting research that is a combination of traditional approaches to "writing up" and a further step in the direction of "writing up" a la Latour. This qualitative research was based on many qualitative tools and the resulting insights have only instigated a longing to never finish this write up. I have been free to break with tradition and present my findings in discovery-oriented ways – for that I am glad.

Glossary

ACIR - Medicines Coding Council of Australia

AGPN – Australian General Practice Network (updated name for ADGP)

ADGP - Australian Divisions of General Practice

AMA – Australian Medical Association

ANT – Actor Network Theory

ARC – Australian Research council

ARWAG - Australian Rural Workforce Agencies Group

BEACH – Bettering the Evaluation and Care of Health

BULK BILLING - is a payment option under the Medicare system of universal health insurance in Australia. The health service provider, usually a physician, is paid 85% of the scheduled fee directly by the government by billing the patient via their Medicare card. The service provider receives only 85% of the scheduled fee, but avoids the costs and risks of billing and debt collection—it could be described as a form of factoring.

The alternative to bulk billing is for the service provider to collect the fee directly from the patient (there is no restriction on this fee and it is determined by the provider). In order to claim the Medicare rebate, the patient then has to visit a Medicare office, fill out a claim form (for unpaid claims, and claims where cash is not being refunded) and claim 85% of the scheduled fee from the government (100% for general practitioner services).

Under Medicare, it is not permissible to charge the patient a co-payment with bulk-billing, i.e. a service provider who bulk-bills for a service may not charge the patient further for that service.

Service providers may freely choose whether or not to use bulk billing. Most general practitioner services are bulk billed, but less so in more affluent areas and in rural, regional and remote areas of Australia where there is a greater shortage of doctors and health care services.

CAC - Coding Advisory Committee

CHDGP - Central Highlands Division of General Practice

COAG - Council of Australian Governments

CSIRO - Commonwealth Scientific and Industrial Research Organization

DoHA - Department of Health and Aging

GP – General Practitioner

GPFG - General Practice Financing Group

GPCG - General Practice Computing Group

GPAC – General Practice Advisory council

GPSRG - General Practice Strategy Review Group

HIC – Health Insurance Commission

HECS Debt - The Higher Education Contribution Scheme (HECS) is a charge that eligible domestic students are liable to pay towards the cost of their University tuition. This scheme was replaced by the HECS-HELP loan scheme in 2005.

IT/IM – Information technology/Information management

Lighthouse model - A multi-dimensional model based on a synthesis of enablers and inhibitors was examined to ascertain its relevance in this study area. A 3-D model has been developed to chart a GP's position in 3-D space relative to the 'lighthouse' practices. This preliminary model, termed the 'lighthouse model', is shown in Figure 2 chapter 2 of this thesis; it uses the dimensions of *Technical Support, Computer Literacy* and *Motivation*. Results examined the factors influencing adoption by GPs more closely.

Lighthouse Practice - A practice that is a leader in the study area. This practice would be highly computerised and mentor others in the adoption of computing.
NCC - National Computer Committee

NHIA - National Health Information Agreement

NHIG - National Health Information Group

NHIM - National Health Information Model

NHIMAC - National Health Information Management Advisory Committee

NHIMG - National Health Information Management Group

NHMRC - National Health and Medical Research Council

NHS – National Health Scheme

PHCRED - Primary Health Care Research, Evaluation and Development

PHC RIS - Primary Health Care Research and Information Service

PIP - Practice Incentive Program

PKI - Public Key Infrastructure

RACGP - Royal Australian College of General Practitioners

RDAA – Rural Doctors Association of Australia

RRMA **-** Rural, Remote and Metropolitan Areas

SIP - Service incentive payment

SWPE - Standardized Whole Patient Equivalent

TAM – Technology Acceptance Model

TPB - Theory of Planned Behaviour

TRA - Theory of Reasoned Action

Appendix A: A brief history of this project

This research commenced in March 2003 when I was awarded an ARC Industry Linkage scholarship for a PhD program with Victoria University

As a result of this my supervisors were already set in place and this supervision continued in a reliable and profitable manner throughout the research

During May of 2003, the Ethics Application was prepared, and approval obtained. I also spent time preparing the literature review and methodology at this time.

During August of 2003 I began at the CHDGP firstly, with 2 weeks of familiarity. Then interviews followed with officers at the division, including interview with the IT/IM officer.

The first phase of data collection began in September 2003 with visits to practices and interviews with GPs and practice managers.

The division of general practice was most helpful in assisting me with contacts for practices and introduced me to the managers. This assisted in gaining access to confidential information and further interviews during 2004.
During 2004 and 2005 phase 2 of the project was undertaken. During this time I had to have a knee reconstruction and so the progress slowed down markedly. I was not able to come back to full time on the research until 2006.

Appendix B: Planning & Report Summary for the year 2003 – 2004 Report Summary

Evolution of the Division over the Five Year Funding Agreement:
The Central Highlands Division of General Practice 2003-04 Business Plan has reflected a significant shift in the leadership, expertise and organizational capacity of the Division. This is evidenced in the direction and emphasis of the Division's work and in the consolidation of programs and resources in marked contrast to the program structures and funding mechanisms of earlier years which were characterized by disparate activities initially through project based funding.

The Division's work is now firmly focused on the development of models, and provision of consultancy and support services within practices to apply and utilize practice support systems. An emphasis on systems and resources which support best practice and improved population health outcomes is a significant aspect of this.

The CHDGP's recent strategic planning process which commenced in 2003 has drawn on an extensive member satisfaction and needs summary, the outcomes of five strategic planning forums which canvassed planning and program delivery issues with GPs from across the Division, and a dynamic two day planning workshop conducted in association with GPDV and key presenters who included Dr Jane Gunn and Dr John Litt. A key outcome of the Strategic Planning process and the planning workshop has been the adoption of a whole of practice approach inclusive of practice nurses, practice managers and administrative staff.

Population Health data for the CHDGP region confirms a higher than average incidence of diabetes and cardiovascular disease, with a comparatively poorer health status for persons residing in rural and remote rural areas compared with the metropolitan cohorts. In seeking to address these issues, the Board of the CHDGP has elected to focus on improved prevention and disease management targeting diabetes in the first instance. A three year program to improve the prevention and management of diabetes across the Division is presently being developed. Additionally, introduction of the SNAP program - smoking, nutrition, alcohol and

physical activity - across the Division, will form the basis of a heightened emphasis on risk factors associated with both cardiovascular disease and diabetes.

Alterations & New Activities

The Central Highlands After Hours Medical Service (CHAHMS) has been operating successfully since December 2003. The project has been funded through an AHPMC grant until June 2004. It was then announced by Tony Abbott, Federal Minister for Health, that the service would be extended to 30 June 2006.

The CHAHMS has made significant improvements to the West Vic systems on which the service is based. The database has been extensively modified to aid usability, while the use of cordless phones has allowed greater flexibility for nursing staff. It is envisaged that further development of the communication systems will occur in the third year of operation, with the use of PALM pilots, mobile electronic protocols, blue tooth technology and other systems implemented to deliver a "state of the art" hospital based triaging and care coordination centre.

In August 2003, the Division convened a Collaborative Opportunities Forum, which was attended by 18 representatives from Shires, Hospitals, Community Health Centres and Primary Care Partnerships. The purpose of the forum was to provide an overview of the Division's Strategic and Business Plans, to promote improved primary health care integration, to identify opportunities for collaboration, and to develop foundations for the establishment of a broad primary care collaborative to trial a population health program.

A secondary objective of the forum was to clarify the role and core business interests of the Division and to dispel misconceptions about the role of Divisions and their capacity to engage with non funded initiatives such as DHS funded PCP's. An outcome of this discussion was recognition and acceptance that Division's require additional non OBF resources to support State grant funded programs and initiatives. The forum succeeded in fostering an informed appreciation of the Division's role, business interests and capacity to engage with and support significant interests including general practice.

Two Service Coordination projects (funded through the DHS $10k small grants) have been undertaken with Central Victorian Health Alliance (PCP) and Lower Hume PCP to develop resources to support improved feedback between GPs and their service providers in the Mt. Alexander Shire, and to promote the uptake of the Statewide Referral Tool using Medical Director software in the Mitchell Shire.

The Division has also been involved in a number of specific projects which aim to increase service coordination amongst GPs and other health care providers. These have included the facilitation of a Macedon Ranges Aged Care Forum which attracted 44 participants from local general practices and other health care services. This forum clarified the roles of GPs and other services in the delivery of aged care, identified optimum referral and feedback processes, and outlined the MBS & EPC items available to GPs for multidisciplinary care of the aged.

The CHDGP is one of several Divisions nationally who have been successful in securing resources to establish and pilot a communications system which will enable the transmission of a wide range of clinical information in a secure manner, to business partners and their organisations. The Division will implement 9 Virtual Messaging Frameworks which will be undertaken in three stages:

1. The first stage will allow GPs to receive laboratory and radiology reports, as well as discharge summaries from hospitals;
2. The second stage will enable GPs to receive and send summary data to a CHDGP database and use a regional provider directory to be held by the Division; and
3. The third stage includes specialist letters in the mix of messages communicated using established practice management systems.

Key achievements

1. Commencement of the Central Highlands After Hours Medical Service at Kyneton District Health Service in December 2003. This service involves hospital nurses providing telephone triage to patients phoning after-hours, and has resulted in 30%

of callers being given homecare advice, and not requiring the intervention of a GP. A follow-up of patients who have called the service has also identified a high level of consumer satisfaction with the service.

2. The Division's Better Outcomes in Mental Health Care Allied Health Project is now providing additional counselling services in 3 locations throughout the Division. During this period, 258 counselling sessions were provided to 61 clients.

3. Division practices have been involved in the RACGP Smoking Cessation and Practice Nurse project, facilitated by Dr John Litt. Dr Litt has also facilitated a number of additional educational events for the Division during this period, around population health & illness prevention and motivational interviewing techniques.

4. 93% of practices are now using patient registers and recall and reminder systems to some extent.

5. 65% of eligible practices have employed one or more practice nurses using the Practice Nurse Incentive payments.

6. 4 practices with 22 GPs are now signed up for PKI.

7. 92% of eligible practices are now at the 90+% fully immunized level required for GPII outcomes. The level of fully immunized children in the Division rose again to 92.6% at end June 2004.

8. 136 GPs (68.58%) attended one or more Division-facilitated educational events, with 94.5% reporting they found them relevant and useful to their practice.

9. 6 practices were involved in the CALM alternative dispute resolution project, with 90 GPs, staff and nurses attending 5 training sessions.

10. All practices (except new and non-vocational) are now accredited.

11. The Division provided a study program for Overseas Trained GPs, Registrars and non-vocationally registered GPs, with 29 doctors involved to varying degrees. As a result, 7 Registrars and 3 OTDs successfully gained their FRACGP.

12. 10 new GPs were recruited to the Division area, and 8 registrars have agreed to stay in the Division for their subsequent term.

13. 20 GPs, 10 partners and 16 children participated in a Division-facilitated GP Health Weekend.

Barriers Experienced & Future Challenges

The Division's work continues to expand, whilst core funding remains the same, which has created a number of barriers and challenges for the Division, including:

1. Effectively and consistently engaging with state-funded Primary Care Partnerships (of which the Division is a member of 5) and continuing to roll out PCP integration initiatives such as the state-wide referral tool without dedicated funding from DHS. The Division recognises the importance of such work but the current funding level does not provide adequate staffing to implement this work whilst also meeting Commonwealth requirements.
2. Continuing to support practices with IT/IM systems development, without dedicated IT/IM or CDM funding. To complement systems support provided by the Division, practices will be required to engage private IT consultants, but uptake will depend on costs and practice commitment.
3. Improving the usage of the Better Outcomes in Mental Health Care Allied Health project despite a decrease in the funding available to cover Division staff support, and whilst also acknowledging ongoing GP concerns related to the 3-step mental health process, referral systems & level of data collection involved. The Division intends to monitor this program for opportunities for systems improvement, and will continue to pass on GP feedback to the Commonwealth and BOMHC implementation committee.

Future challenges for the Division also include:

4. Ongoing exploration of funding opportunities for the rollout of the Prevention is Better than Cure pilot, particularly in relation to the Koori community in Seymour.
5. Ongoing liaison with Rumbalara Aboriginal Cooperative in Mooroopna, and exploration of funding opportunities in conjunction with the Jaambie Neighbourhood Centre in Seymour, aimed at securing funding for health service delivery by an Aboriginal Health Worker in this area. The Division intends to apply for the recently announced Innovations Pool funding as soon as applications are sought.
6. Supporting staff to effectively manage an ever-increasing workload within the current budget and staff allocations. To do this, the Division will be restructuring and changing the way staff work with practices in the coming financial year (2004-05).

Appendix C: Interview with Professor Kidd by Norman Swan (Radio National, The Health Report, Monday 16 November 2002)

Summary: A couple of months ago Health Ministers gave their approval to a plan called Health Connect. It'll be set up within 5 years and the idea is that crucial health details will be computerized as an Electronic Health Record. Rae Fry reports on how this will work.

Norman Swan: A couple of months ago, Health Ministers gave their approval to a plan that could fundamentally change the way the health system keeps track of you. The grand vision is called 'HealthConnect'. It'll cost more than $400-million; it'll be set up within five years; and the idea is that crucial health details will be computerized as an electronic health record, which not just your doctor, but all your health practitioners can have access to.

So how will it work? And is there anything in it for you?

Before Rae Fry tells you the story I should declare an interest, in that I have shares in and advise a company which produces electronic health records. But here's Rae with her take on the issue.

Rae Fry: Back in my student years I had a part-time job at a pathology lab. Every day I took several hundred little forms, each with a patient's name, address, and instructions for whatever tests were to be done on that sample of blood or urine, and entered that information into the computer.

That was when I learned that the old cliché about doctors having appalling handwriting was true. I had to become some kind of detective, familiarizing myself with Dr So-and-So's quirky way of looping their Ls or crossing their Ts.

So some sympathy for your pharmacist, who has to decipher doctors' orders for drugs with weird and often similar-looking names. It's hardly surprising that mistakes do

sometimes get made.

Well from the middle of next year, the plan is that doctors will be printing out their prescriptions on a computer, so that mistakes get made less often. And the government would also like you to have a computerized record of all the prescription medications you're taking, that can be looked at not just by your GP, but say by the pharmacist, the hospital, maybe even your naturopath.

That electronic medications record will be Stage 1 of your Electronic Health Record. Later, things like your immunization history, any allergies you have, and conditions like, say, epilepsy, will be added. And that student job I had might no longer exist, as blood tests will be able to be ordered, and the results delivered, online.

It's a hugely controversial proposal. The upside will be fewer mistakes and faster sharing of information. But consumer groups are outraged about potential breaches of privacy, and the AMA has warned that information might be sold to pharmaceutical companies.

Whether you have an Electronic Health Record will be your choice. All your health practitioners will still keep separate records on you. And if you do opt in, you'll be able to choose which people have access to what kind of information. So given the possible risks, is it worth it?

Professor Michael Kidd is Head of the Department of General Practice at the University of Sydney, and Chair of the General Practice Computing Group, which is a partnership between GPs, the medical software industry, consumer, and government. They're helping to develop the standards and protocols for the electronic health record, and he says that people with chronic health problems, who regularly see a number of different health practitioners, have the most to gain.

Michael Kidd: Well a lot of people with chronic health problems have multiple health problems. So you may have problems with your heart, you may have problems with

your lungs, you may have problems with your kidneys, and you may be seeing different specialists for each of those organ systems as well as your local GP. You may go and see other GPs and we're often looking at very strong medications which may interact with each other, which may interact with the other medical problems that this person has.

Rae Fry: So something you're taking for your heart might have nasty side effects on your kidney, and your kidney specialist might not know that you're taking that?

Michael Kidd: That's the sort of issue. So what we're looking at is trying to get all the medications that someone may be taking in the one place, and then we'll be able to run it through computer programs which will pick up if there's going to be any potential problems.

Rae Fry: Other kinds of advantages, apart from medications? Where else might it be of benefit?

Michael Kidd: Well one of the times when people are most at risk in the health care system is when they cross the boundaries in the health care system. So if people are in hospital and they're sent home to the care of their GP, but the GP doesn't receive information about what's happened to them while they've been in hospital, discharge summaries often are sent out weeks or months after someone's been hospitalized, to the GP. Now an Electronic Health Record would allow a lot of that critical information to be shared between people's health care providers.

The other big advantage for patients and consumers, the general public, is that for the first time they'll also have access to a complete record of all the important critical aspects of their own health care.

Rae Fry: At the moment, believe it or not, you don't actually own your medical record. Under Freedom of Information provisions, you can get access to hospital records, but legally your doctor's file on you is their intellectual property.

According to Michael Kidd, another advantage of the Electronic Health Record is that individuals' information can be de-identified, that is, the names and addresses removed, and used to gather much better data about, say, how many people have a particular kind of health problem and how they're treated in different parts of the country, or in different parts of the health care system. This, he says, would tell us where health resources are most needed, removing existing inequalities in who gets how much of the health care dollar.

Michael Kidd: I think there are classic examples where we see funding going to, for example, a hospital in a marginal electoral seat, where there may not actually be a good health reason for money going to that area, and it would be much nicer if we were able to distribute money more equitably amongst the population.

Rae Fry: An obvious concern for patients is that while they may see a definite advantage in it being accessible on some big computer, that they're allergic to penicillin, so if they present at an emergency room, unconscious, whoever's treating them is going to know that that's a risk. But there's no advantage necessarily in those people knowing that that person has a history of, say, a psychiatric condition or a sexual health problem. How do we negotiate that very sensitive issue of access to what's really very personal information, that could be misused?

Michael Kidd: There is the potential to be able to suppress aspects of the Electronic Health Record, so that only the providers that you choose are able to access for example, a sealed section of your health record which contains that sort of information.

Rae Fry: That's a really difficult one, isn't it, because it could be very important for all health care providers to know what medications you are taking, because if you're taking anti-depressants for example, they may have harmful interactions with other medications. But having an anti-depressant medication on your pharmaceutical record makes it obvious that you have a psychiatric record. What privacy protections are

already in place?

Michael Kidd: There's already privacy legislation in place; there's currently a revision of the privacy legislation at the Commonwealth level, and also new legislation which is being developed to allow the Electronic Medication Record to be implemented in Australia. It protects you against misuse of the information, about people being able to access the information who should not be able to access it, and provides very significant penalties. It allows for the establishment of independent complaint bodies; it also provides the framework where information may be able to be accessed in a de-identified way to allow health planning at a national or a regional level. If people are worried about the whole system, then perhaps the ideal thing is now to opt in at the start, but to see how it pans out.

Rae Fry: What can patients expect to see from the middle of next year when the system is introduced? Will all doctors be opting in?

Michael Kidd: Well for the Electronic Medication Record, initially it's only being offered in general practice, in private medicines, through your local specialists, and through community pharmacies. The plan eventually is to move to allow hospital pharmacies, hospital doctors, access as well, but that will happen over time. So if your general practitioner is computerized, those doctors will be able to opt in. We envisage that the majority of pharmacies will be involved as well.

Rae Fry: I think a lot of people would be surprised to hear that there are problems with the way that records are kept and shared at the moment; for example, if you've been in hospital and had surgery, that critical information is not automatically passed on to your GP. Is there a danger with an opt in system, that if you don't opt in, we won't fix up the current problems with the paper records, that are leading to some adverse event?

Michael Kidd: We still need to work actively to improve information exchange in other ways, and so for example, many providers are looking at electronic exchange of

information, for example emailing referral letters, people looking at even systems of just faxing the information so it gets out to the GP the day that someone is discharged from hospital rather than appearing weeks or months later in the post if you're lucky. And of course the issue with fax machines is you have to make sure that you actually fax the information to the right fax number.

Rae Fry: Other critics have said that the danger of an Electronic Health Record is that it may perpetuate mistakes which of course do happen, and that mistake could carry on and lead to more problems.

Michael Kidd: Yes, that's a really important issue, and it's particularly concern for people with mental health problems. But also a lot of times a diagnosis is made and then subsequently it's discovered that that was not the actual diagnosis, and the diagnosis is revised. The advantage of people having access to their own Electronic Health Record means that they will be able to look at that information, and they'll be able to advise their attendants if information needs to be annotated or corrected over time.

Rae Fry: I would imagine that a lot of this information de-identified, will be very valuable, not just for research and policy and planning, but also commercially. Will it be able to be sold?

Michael Kidd: My understanding is that the information being gathered as part of the Electronic Health Record, being overseen by the Commonwealth, will not be able to be on sold to other groups. However it is possible that other groups could approach individual doctors or individual hospitals and ask to access de-identified information from their medical records that they store themselves. Now whether that will happen in the future or not, I think we've got to watch very closely.

Rae Fry: If the information is to be shared between different providers, it'll obviously need to be in a consistent electronic format. Who will own that format, that software? That'll make them quite a powerful company, I would presume.

Michael Kidd: Yes this is a very important issue which is being debated at length. At the moment, it looks as if the Health Insurance Commission –

Rae Fry: That's Medicare?

Michael Kidd: Yes, that's the Commonwealth's – will be responsible for the Electronic Medication Record, but that's still being worked through, and who actually owns the software as we expand into the wider electronic health record, is still evolving.

Norman Swan: Professor Michael Kidd, of the University of Sydney, talking to Rae Fry.

I'm Norman Swan and you've been listening to The Health Report. We'll be back next week.

Appendix D

The dominant interests of Professor Kidd in relation to computerization of general practice were developed over a long period - he has a long and venerable academic record and a long record of service to the RACGP. He has assisted the RACGP to prepare for accreditation by the Australian Medical Council in 2003. He is a past chair of the RACGP National Informatics Committee and past member of the Victoria Faculty Board. He chaired the scientific program committee of the 2001 RACGP Annual Scientific Conference in Sydney and has chaired 3 past RACGP Computer Conferences.

Currently, he chairs three national committees at the invitation of the Commonwealth Minister of Health and Ageing (the Better Medical Management System, the National HIV Committee, and the General Practice Recognition Eligibility Committee). He has been the elected chair of the General Practice Computing Group since 1997.

At the time of this research he was President of the Royal Australian College of General Practitioners. He was inaugural chair of the General Practice Computing Group (GPCG) and also chaired the Australian Government's MediConnect project. He is a member of the Board of HealthConnect, and a member of the Australian Health Information Council. He is convenor of the Informatics Working Party of the World Organisation of Family Doctors and is co-chair of the Primary Care Working Group of the International Medical Informatics Association. He is co-editor of the textbook *Health informatics: an overview* and authored the chapter on Computers in the consultation in the *Oxford Textbook of Primary Care Medicine*. His current NHMRC project grants include funding for the creation and evaluation of an internet-based tool for error reporting by general practitioners, and the evaluation of a clinical decision support tool in general practice

At an international level, the Professor chairs the Informatics Working Party of the World Organisation of Family Doctors (WONCA) and chairs the Primary Care Working Group of the International Medical Informatics Association (IMIA). He

recently authored the chapters on "Computers in the Consultation" and "HIV/AIDS" in the new Oxford Textbook of Primary Medical Care. The Professor has had extensive involvement in community. He also has a regular talk-back spot on radio speaking on health. The professor often represents general practice in media interviews.

Appendix E .

Table A: Interview details phase one. The codes derived from interview number were assigned to interviewees who can also be identified by site and then their alias, these de-identifiers were carried through to phase two. Some interviews were not directly used so have not been listed here.

Site	Function	Interview number	Alias	Date & Number
A1	CHDGP staff	18	IT/IM officer	June 2003
A1	CHDGP staff	16	Sally	June 2003
A1	CHDGP staff	15	Peter	June 2003
A1	CHDGP staff	13	Margaret	June 2003
A2	Practice staff	21a	Mathew	August 2003
A2	Practice staff	21b	Petra	August 2003
A3	Practice staff	27a	Paula	August 2003
A3	Practice staff	27b	Mary	August 2003
A4	Practice staff	29a	Sonja	September 2003
A5	Practice staff	33a	Jill	September 2003
A6	Practice staff	35a	Patience	September 2003
A6	Practice staff	36b	John	September 2003
A7	Practice staff	38a	Phillip	September 2003
A7	Practice staff	39b	Betty	September 2003
A2	Practice manager	22	Sam	November 2004
A3	Practice manager	30	Fred	November 2004
A4	Practice manager	31	Harry	November 2004
A5	Practice manager	34	Katie	November 2004
A6	Practice manager	37	David	December 2004
A7	Practice manager	40	Winston	December 2004
A8	Practice manager	41	Claudia	December 2004
A2	GP	21c	Father	May 2005 & 2006
A2	GP	21d	Son	May 2005
A2	GP	21e	Kathy	May 2005
A3	GP	27c	Duke	June 2005
A3	GP	27d	Earl	June 2005
A3	GP	27e	Manny	June 2005
A4	GP	29b	Freddy	July 2005
A4	GP	29c	Melanie	July 2005
A4	GP	29d	Mandy	July 2005

Appendix F
Observation Details—Phase 1

Observations of computer use were made principally in 2003 - 2004. These observations were made to see if research that had been undertaken previously and figures that were reported by Divisions translated into reality. In the early stages of this research and to my untrained eye there at first appeared to be a correlation between reported figures and activity. I was later to find out that this correlation was incorrect as the activity that represented computer use by GPs varied a lot over time and also from practice to practice.

Appendix G Observation Details—Phase 2
Practices selected for in-depth case studies were revisited again in 2005 -2006.

Appendix H
Table B Interview Details—Phase 2

Code	Position in practice	Interview number	Alias	Date
A2	GP	71a	Father	March 2006
A2	GP	71b		March 2006
A2	GP	71c	Neda	April 2006
A3	GP	74a	Anna	April 2006
A3	GP	74b	Helina	April 2006
A4	GP	60a	Paddy	April 2006
A4	GP	60b	Rose	April 2006
A5	GP	61a	Lily	April 2006
A5	GP	61b	Iris	April 2006
A6	GP	62a	Cherry	April 2006
A6	GP	62b	Ralph	April 2006
A7	GP	64a	Chris	May2006
A7	GP	64b	Ben	May 2006
A2	Practice manager	71d	Sam	March 2006
A3	Practice manager	74c	Fred	April 2006
A4	Practice manager	60c	Harry	April 2006
A5	Practice manager	61c	Katie	April 2006
A6	Practice manager	62c	David	April 2006
A2	Principle of practice	71e	Son	March 2006
A3	Principle of practice	74d	Duke	April 2006

A4	Principle of practice	60d	Poplar	April 2006
A5	Principle of practice	61c	Elm	April 2006
A6	Principle of practice	62d	Cedar	April 2006
A7	Principle of practice	64c	Euchy	May 2006

Appendix I
Publications arising from this thesis

1. Deering, P. and Tatnall, A. (2007 (forthcoming)).
"Adoption of ICT in an Australian Rural Division of General Practice: A Socio-Technical Analysis using Actor-Network Theory. *Encyclopaedia of Healthcare Information Systems*. Wickramasinghe, N. and Geisler, E. Hershey,

2. P. Deering 2005 "The barriers and enablers to adoption of computers in rural general practice" paper presented at Qualitative Researchers Association bi-annual conference 2005

3. P Deering 2005 "Undertaking multi partner, multi stakeholder research" paper presented at ethics in research conference Melbourne 2005

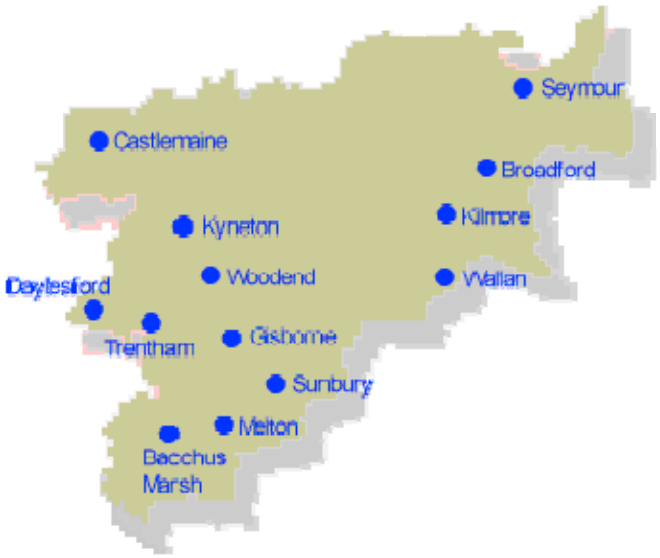
4. A Tatnall and P Deering 2004 "A study of the adoption of information and communication technologies by rural general practitioners": in Information Systems: exploring applications in business and government. chap 12 Hunter and Dhanda 2004

Appendix J

http://www.med.monash.edu.au/srh/resources/cgi-bin/echidna/divgp/cnthigh.pl

Central Highlands

Division of General Practice



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