## Thesis

## Information Systems in General Practice: A Framework to Implement the Management and Prevention of Chronic Diseases

Daniel R. Carbone

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## SCHOOL OF MANAGEMENT AND INFORMATION SYSTEMS FACULTY OF BUSINESS AND LAW VICTORIA UNIVERSITY

### **Declaration**

"I, Daniel R. Carbone, declare that the PhD thesis entitled Information Systems in General Practice: A Framework to Implement the Management and Prevention of Chronic Diseases 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".

Signature

Date

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## Glossary of Abbreviations and Key Terms

Case Study	The collection and presentation of detailed information about a particular participant or small group, frequently including the		
CD	accounts of subjects themselves.		
CDIC	Chronic Disease or Condition		
CDIS	Chronic Disease Information System		
Validity	Seeks an agreement between a theoretical concept and a specific measuring device, such as observation.		
Credibility	A researcher's ability to demonstrate that the object of a study is accurately identified and described, based on the way in which the study was conducted		
CVx	Cervical Screening		
Data	Recorded observations, usually in numeric or textual form		
External	The extent to which the results of a study are generalisable or		
Validity FTF CD	transferable. See also validity		
	Full Time Equivalent General Practitioner		
Generalisability	conducted on a sample population can be applied to the population at large		
IM	Information Management		
Inductive	A form of analysis based on inductive reasoning: a researcher using		
analysis	inductive analysis starts with answers but forms questions		
<b>unu</b> <i>y</i> 515	throughout the research process.		
Internal	The rigor with which the study was conducted (e.g., the study's		
Validity	design, the care taken to conduct measurements, and decisions concerning what was and wasn't measured)		
IS	Information Systems		
IT	Information Technology		
IT/IM	Information Management / Information Technology		
MRS	Medicare Benefit Schedule		
Medicare	Medicare Australia is the new name for the old Health Insurance		
Australia	Commission (HIC) in charge of running among other things the MBS and PIP item payments to General Practice		
Reliability	The extent to which a measure, procedure or instrument yields the same result on repeated trials.		
Sample	The population researched in a particular study. Usually, attempts are made to select a "sample population" that is considered		
	representative of groups of people to whom results will be generalized or transferred.		
Triangulation	The use of a combination of research methods in a study. An		
C	example of triangulation would be a study that incorporated surveys,		
	interviews, and observations.		
Validity	The degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. A method can be reliable, consistently measuring the same thing, but not valid.		

## Dedication

To my family: Laura, Elisa, Nancy and Christian

### Abstract

The aim of this research project was to develop an implementation framework for the prevention and management of chronic diseases in general practice (Doctor's surgery). Chronic diseases (CDs) —or conditions as it is also commonly known, like Diabetes, Asthma, Cardiovascular Disease, etc., are persistent or recurring illnesses or impairments lasting for years that cannot be cured, however some can be prevented from becoming a chronic disease. Unfortunately, millions of chronic diseases sufferers worldwide end up dying prematurely and in many cases unnecessarily due to lack of appropriate care.

Information technology developments for healthcare providers have been seen for years as the perfect supporting tools to assist in the prevention and management of these conditions. However, and despite Government efforts both worldwide and in Australia, to incentivise the use of these technologies to reduce their economic and health impact have had very little success in affecting the uptake of computerised chronic disease care.

The study was designed to take the learnings from health and information systems literature and existing experience in successful implementations at Central Highlands General Practice Network (CHGPN) to develop an emerging framework and test it using the views and perceptions of hands-on implementers and users themselves in their own setting.

Cases Study design was the methodology chosen for this socio-technical study. Structured and unstructured interviews, direct observations and primary and secondary data collection methods were used. The final framework was developed from the testing of the framework, over three iterations at twenty-eight practices, representative of CHGPN population cross-section. More specifically, by hardware and software used, size (number of GPs), geographical position (suburban, semi-rural and rural) and diverse levels of CDIS implementation success involving an aggregated total of thirty-six interviews with GPs, practice managers, nurses and key staff.

At the end of the four year project, a final implementation framework for the prevention and management of chronic conditions in general practice was developed. Nine constructs were identified as part of a well defined process flow. The constructs identified were: 1-Factors driving change, involving the motivational forces within and without general

practice; 2 - Evidence based analysis, a central concept whereby a practice's own evidence gaps is used to support chronic condition care change; 3 - Capacity, where an initial capacity review assesses and secures the capacity needed to support change; 4- Adoption; a construct that suggests that at this point and with previous constructs resolved, practice decision makers would adopt the implementation of new computerised care models; 5 – Systems Implementation, this construct reflects the practical implementation process; 6 – Outcomes, the essential component of this framework's to measure multiple intended goals over CDIS implementation process; 7 – Practice champions, the vital human component that drives the internal engine of the framework; 8 – The external Change agent, critical human element that in tandem with the practice champion acts as the external driver of the framework.

The strength of the final framework is based on the learnings from the literature and confirmed through the voices of implementers and heavily involved users themselves. Supporting evidence for the framework comes from the breadth of more than seventy documented CDIS implementations, across more than eighty percent of the CHGPN's general practice population. More importantly, the twenty-eight participating general practices, all had at least one CDIS implemented, with the majority having multiple and sustainable implementations, even after three years (n=20, or 71%). More evidence in support of the effectiveness of the framework comes from the impact of the CDIS implementations on chronic conditions care. Among these, an almost doubling in both the cervical screening rates and the monitoring of Diabetics across participating practices.

In conclusion, the application of this socio-technical information systems framework for the prevention and management of chronic conditions in general practice developed through this thesis has the potential to affect the uptake of information technology in general practice. Moreover, it clearly supports the improvement of chronic conditions' clinical care. For policy makers, the framework has the potential to affect the negative budgetary and health outcomes due to current gaps in chronic conditions prevention and management.

> 'What is research but a blind date with knowledge? (Will Harvey, 2008)

### Acknowledgement

First and foremost, this thesis could not have been completed without the encouragement and enthusiasm of my supervisor, Dr Stephen Burgess. In times of doubt and serious illness he never allowed me to loose sight of the big picture. He gave me the freedom to experiment and develop my own research path and gave me the respect given to a peer rather than a student. To you, thank you for getting me here.

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A special mention must go to the management of Central Highland General Practice Network. I must thank them for allowing me to carry out my research and work unhindered throughout this project. Their support and goodwill will always be remembered. Special appreciation goes to one particular member of the management team, who not only was a voice of reason and support in bad times but also an outstanding peer and friend, Mrs Pamela Trethowan.

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## INTRODUCTION

### **CHAPTER ONE - Introduction to the Study**

*Research is what I'm doing when I don't know what I'm doing'* (Werner von Braun, 2008)

### Introduction

The purpose of this thesis is to develop an information systems framework to support the prevention and management of chronic conditions (also known as diseases) in general practices (Doctor's surgeries).

Chronic conditions are persistent or recurring illnesses or impairments lasting for years that cannot be cured, however some can be prevented from becoming one (National Academy on an Ageing Society, 1999); and despite the clinical differences across these chronic conditions, each illness confronts patients and their families with the same spectrum of needs: to alter their behaviour; to deal with the social and emotional impacts of symptoms, disabilities, and approaching death; to take medication; and to interact with medical care over time. In return, according to the best available clinical evidence, healthcare must ensure that patients receive the best treatment regimens to control disease and mitigate symptoms, as well as the information and support needed to effectively self manage their health and, in many instances, their death (E. H. Wagner & Groves, 2002). Failure to prevent and manage such conditions could escalate to more complex and costly health care problems culminating premature death (AIHW, 2008c; Wickramasinghe & Goldberg, 2008).

Unfortunately, most current western health care systems are based on responding to acute problems (*acute systems of care*); that is, they are focused on acute (emergency) and episodic (one offs) concerns of patients rather than systematic prevention or management of on-going long term conditions. Chronic care, according to best practice guidelines, unlike acute care, involves much more preventative and systematic (cyclical) ongoing care of these longer term afflictions. Preventive health care is inherently different from health care for acute problems, and in this regard, current health care systems worldwide fall remarkably short (WHO, 2008b).

These clinical failures are further exacerbated by the disinclination of general practitioners (doctors) to take up current clinical best practice (systematic preventative and management models of care) for a number of reasons that will be identified later on in the chapter, and by the slow adoption of information technology to support systematic (prevention and management) approaches to chronic condition care (AIHW, 2006; Department of Health and Aged Care, 2003; Grol et al, 1998; Gross, Leeder, & Lewis, 2003; HealthConnectSA, 2007; Nader, 2007; Schuster et al., 2003). According to the World health Organisation (2008c) Systematic approaches to chronic condition care supported by the introduction of technology include: the organization of patient information, tracking and planning of patient care, provision of support for patient self-management, scheduling of patient follow-up (recall and reminders), access to the latest clinical guidelines and communication between clinical team members and patients. They can take a variety of forms, and effective systems can be created even in very resource-poor settings. They may be paper-based, such as a chronic disease register kept in a notebook, and be linked to patient records, fully computerized, or a combination of the two (WHO, 2008c).

The current failure of the Australian —and most western world health systems to prevent and manage the alarming growth in chronic diseases as well as its escalating health costs is rapidly becoming the future major health area of concern for governments and health authorities (Berwick, 2002; HealthConnectSA, 2007; WHO, 2008a). The last few years have seen strong calls and financial incentives from the Australian Federal Government for the application of technological advances to contain escalating health costs (Australian Institute of Health and Welfare, 2004; Health Insurance Commission, 2003). These incentives have resulted in considerable uptake of computers (technology) in general practices; Unfortunately, this uptake of technology has failed to translate into the actual use of those technologies to support systematic approaches to care (Enrico Coiera, 2004; Littlejohns, Wyatt, & Garvican, 2003; Nancy Lorenzi, 2004; Richards, Bolton, Veale, & Quinlan, 1999; Sturnberg, Martin, & Pittman, 2003; Van Der Weyden, 2003).

These implementation approaches, appear to be only successful in the uptake of 'technology' exclusively. And their failure to affect the adoption of computer assisted systematic approaches to chronic condition's care in general practice lend support to the notion that the introduction of information systems do not just represent a 'technology' to be implemented, but an entity comprised of an assemblage of *technological, human*,

*organisational* and *environmental* dimensions (S. Bell & Wood-Harper, 2003; Noyes & Baber, c1999; Skidmore & Eva, 2004; Tatnall, Burgess, & Davey, 2003). Furthermore, and although there are almost fifty theories currently in use in the information systems field alone (Schneberger & Wade, 2006) and a lot is known about information systems barriers and enablers in a variety of health settings in general, there is actually very little specific knowledge about the factors, events and processes that are conducive to the successful implementation and adoption of information systems for the prevention and management of chronic conditions in general practices.

What is apparent is that at the very least, the adoption of these technology-supported systematic approaches in general practice require a major shift in current medical care models (Chew & Armstrong, 2002; Chew & Van Der Weyden, 2003; Rust & Cooper, 2007). This shift involves changing the existing clinical practice of treating a patient when they arrive at the surgery already disease stricken or inappropriately managed, to developing systems to assist the prevention of care so that patients are systematically and periodically seen by their doctor to avoid getting to that stage (WHO, 2008b). This requires significant change in the way clinicians (general name given to Doctors, Nurses, Allied Health Specialists, and so on) currently deliver their care. However, affecting change in any organisation is at best extremely difficult. Logical reasons for change do not automatically translate into changes in clinical behaviour or practice for a variety of reasons, this is just as true in general practice (Grol & Grimshaw, 2003; HealthConnectSA, 2007; Liaw & Humphreys, 2006).

In Australia, clinical change management methods in general practice settings have followed two approaches: the traditional dissemination pathway (journal article reading, conferences, and re-education) and the government led incentives for service pathway. These methods are supported through regionally based networks of organisations, called Divisions of General Practices funded by the Australian Federal Government to affect and support change in general practice through a number of incentives and educational programs. For example, and of relevance to this study, are the Information Technology/Information Management (IT/IM) Chronic Diseases Management programs, that have led to a number of chronic diseases information systems implementations (GPDV & GPT, 2007; Health Insurance Commission, 2002). However, these implementations

have been action based (hands-on, practical in nature) and have not been properly documented or researched from an academic point of view.

### **The Research Context**

Central Highlands Division of General Practice (CHDGP) —also referred to in this thesis as just 'the Division', and its chronic disease IT/IM implementation program was chosen as the research site. This regional body comprises more than one hundred and seventy thousand inhabitants, thirty eight general practices and more than two hundred general practitioners (GPs). While a significant number of chronic disease information systems (CDIS) adoptions were being achieved, the implementations were carried out in an ad-hoc way, with very little documentation. Nevertheless, it would provide the practical grounding in conjunction with existing literature to develop an appropriate initial conceptual (emerging) framework.

The CHDGP became an Industry Partner to the School of Information Systems - Victoria University, jointly funding an Industry Partnership Award (IPA) scholarship to their inhouse Information Technology/Information Management (IT/IM) practitioner (in this instance: 'the researcher'). This arrangement secured the local information system practitioner experience in their IM/IT Chronic Disease Management implementation program and, importantly, it became a valuable 'foot-in-the-door' into these general practices.

### The aim

The aim of this study was to develop an information systems framework to support the prevention and management of chronic conditions in general practice. This would be achieved by first developing an initial conceptual framework drawn from the literature and experience from field implementations in general practice, then testing it with key general practice informants to refine its propositions and then to finalise its development by a comprehensive testing and refinement phase.

The study also aimed at demonstrating that information systems implementation approaches can have a profound and sustainable effect on those adopting systems as well as those in charge of driving change in general practice.

### Contribution to knowledge

This thesis stands to contribute substantially to the body of knowledge in a number of the interrelated areas of theory and practice.

First and foremost, it will help to address the deficit in the theoretical understanding of genuine implementation of chronic diseases information systems in general practice; as well as providing a practical implementation framework for other information systems practitioners to use and adapt to their own contexts.

The methodologies and methods used to develop this knowledge will further add strength to the use of such paradigms in information systems research in the healthcare area. The findings of this study have the potential to inform and guide appropriate health and budgetary policy makers in current and future information systems deployment programs. The study is not directly concerned with direct patient health outcomes, however, an indirect and practical contribution of this research is the mounting evidence suggesting that general practices that have adopted these systematic approaches to chronic disease care have saved and/or improved the quality of lives of those suffering from chronic conditions.

### The Theoretical framework

A *theoretical framework* is defined in this study as the structure of concepts which exists in the literature, a ready-made map for the study (Liehr & Smith, 2001); it provides the structure for examining a problem and serves as a guide to examine relationships between variables (Ingelse, 1997).

Theoretical frameworks are important in exploratory studies, where the researcher does not know much about what is going on, and is trying to learn more. As Borgatti (1998) suggested:

'There are two reasons why theoretical frameworks are important here. First, no matter how little you think you know about a topic, and how unbiased you think you are, it is impossible for a human being not to have preconceived notions, even if they are of a very general nature'

(Borgatti, 1998)

A study of the literature reveals that there are many theories in use in the information systems field alone (Schneberger & Wade, 2006). The chosen theoretical framework in this thesis is socio-technical theory. This theory focuses on developing an optimal

organisational design by enabling the social subsystem, technological subsystem and the environment to work well together (Pasmore, 1988) which matches the researcher's 'world view', human values, theories, and data gathering techniques (Flood, 1990; Franz, 1994; Reich, 1994). More importantly, socio-technical researchers seem to be the most adept at trying to test and develop theory (Mumford, 2006). In other words, the socio-technical approach is not algorithmic but affords its practitioner the freedom to reinvent central concepts as needed (Stahl, 2007).

Although socio-technical theory provides guiding questions that practitioners can use to orient themselves, it cannot provide a blueprint for action (Cherns, 1976). Therefore, the necessity in this investigation is to develop a framework so as to achieve a better understanding of the conditions under which a general practice's social-technical system can be integrated and adopted to develop a blueprint for further potential action (implementations).

### **Research approach**

In general practice specifically, the understanding of socio-technical information systems to support the prevention and management of chronic conditions is not well known. The socio-technical information systems concepts and constructs (phenomena) require an approach that will deliver new knowledge based on a sound research approach.

From an information systems point of view, the wider context (i.e. social, technical, and environmental) in which general practice operates is not well known. The existing literature provides some isolated clues and the experience of the IT/IM Officer can potentially provide further procedural knowledge to develop an emerging conceptual framework from where to begin the study. For the purpose of this thesis, a conceptual framework is defined as a structure of concepts and/or theories which are pulled together as a map for the study (Ingelse, 1997).

This is essentially a socio-technical exploratory approach requiring a literature review and existing field experience to re-invent central concepts (constructs) as needed (Stahl, 2007). As Borgatti (1998) suggested, exploratory research is research into the unknown, ideally suited to investigate issues that are not understood at all, or not completely sure of what to look for (Borgatti, 1998). To this effect, this emergent framework is first tested in a

number of general practices where multiple implementation have occurred but from the point of view of key participants (Yin, 2003), also called practice champions in this study with full knowledge of their bounded practice systems (Burns, 1990). This serves two intertwined purposes; one is to refine the constructs identified in the emerging framework, aided by observations and reflections of the field implementer (IT/IM Officer), the second is that it prevents the misuse of busy research study participants' time in conducting very open and aimless exploratory endeavours. A second larger data collection phase then re-tests the revised framework on four participant types: General Practitioners (GPs), Nurses, Practice Managers (PMs) and staff. Their points of view are analysed in conjunction with observations and reflections to finalise a workable information system framework for the prevention and management of chronic conditions.

The very apparent need in this thesis to study socio-technical phenomena requires a research approach that has elements of both Post-Positivist and Interpretivist approaches.

### Methodology

The research approach selected requires a methodology that will be able to study phenomena (the implementation of an information system) in their own bounded contexts (general practices).

The best match to this approach is Case Study; whereby cases are analysed either to build up or validate models or theories, typically through collection of textual data through interviews and documentation (Burns, 1990; Nereu, Kock, McQueen, & Scott, 2000; Yin, 2003). Furthermore, taking into account that the researcher was and continued to be during the life of the study, the IT/IM Officer/implementer for CHDGP, the methodology also includes some aspects of Action Research; where information systems can be investigated within the full rigours of organisational reality (Marshall, De Salas, & McKay, 2006). The advantage of this method is that it satisfies the 'research-led' need of the researcher, but also satisfies the 'problem-led' need of the information system practitioner (employed to affect change) (D. Avison, Baskerville, & Myers, 2001; Marshall et al., 2006; McKay & Marshall, 2000). However, the dominant method employed is Case Study.

The data collection techniques in this study are semi-structured interviews, field observations, reflections and reviewing primary and secondary records. The data analysis

is both inductive and abductive. The final outcome is a theoretical framework as set out in the aims. Further justification is provided in the methodology chapter.

### The Research Framework Summary

Table 1 provides an overview of the research framework of this study; further justification for the use of this framework will be presented in the Methodology chapter (Chapter 2)



Figure 1 - The Research Framework Summary

### The Organisation of this Study

The thesis is organised in four distinct sections; an introduction and three stages as follows:

### INTRODUCTION

Chapter 1: Introduction to the Study (this Chapter): The chapter provides an

introduction to the study; allowing the reader an overarching view of the whole thesis.

### STAGE ONE: THE RESEARCH STRATEGY

This stage is concerned with the research strategy and context for the study. It is made up of three chapters:

**Chapter 2: Methodology**: The purpose of this chapter is to examine the theoretical foundation of the study, review and select appropriate research methods, data collection techniques and ethical considerations to develop an appropriate research design for the research aim.

**Chapter 3: Literature Review**: This chapter reviews the underpinning literature for the study. First, it defines what chronic diseases are and their place in the wider world and Australian contexts and their connection to the use of information systems. Then, it examines the existing wider body of knowledge in the field of information systems and health informatics to then focus on information systems in general practice specifically. It highlights barriers and enablers in past implementations and finally outlines potential constructs beginning to emerge from the preceding literature.

**Chapter 4: The Research Context**: This chapter first introduces the research setting from the wider Australian health system to the specific CHGPN profile and chronic diseases baseline data in which the study takes place and past CDIS implementations occurred. Then, it outlines the background to practical implementations and introduces the IT/IM Officer position and role in past CDIS implementations. Finally, this chapter compares the findings in the literature with the IT/IM Officer's experience and observations and begins to delineate the composition of emerging systems and subsystem constructs.

### STAGE TWO: THE EXPLORATION

The exploration stage is concerned with the actual research. It comprises three chapters: **Chapter 5: the Emerging Framework:** This chapter aims at developing the emerging (conceptual) framework drawn from the structure of concepts which exists in the literature (Chapter Three) and the field experiences in context (Chapter Four). This is the emerging framework to be tested over the two next data collection stages.

**Chapter 6: First Data Collection:** This chapter aims at testing this emerging framework by interviewing ten key informants/players heavily involved in past implementation processes as explained in the methodology chapter. A new revised framework is the outcome of this chapter.

**Chapter 7: Main Data Collection:** The purpose of this chapter is to finalise the testing of the revised framework by interviewing a much wider and diverse number of representatives from a larger number of practices; and in particular on the use of the

framework on other chronic conditions and with differing levels of success. Data is collected, analysed and results presented to highlight the revised constructs. Results are then supported by contrasting pre- and post- government documentation on chronic diseases indicators for the Division.

### STAGE THREE: THE OUTCOME

This stage is concerned with the final outcomes of the study and has two chapters: **Chapter 8: Discussion:** This chapter is concerned with the overall discussion and conclusions of tested constructs and process leading to the final framework. It concludes by providing a summary discussion of major findings.

**Chapter 9: Conclusions:** The purpose of this chapter is to provide concluding remarks for the study. The study is briefly re-visited; the contributions of the practical implementations; it suggested future research opportunities; the contribution of the study, its applicability, limitations and implications for theory, theory and practice.

To facilitate the navigation through this thesis, diagrams like the one below (Table 2) at the beginning of every phase of the study and/or chapter will highlight the current location of the reader in respect to the whole document.

For example, the following diagram highlights that this section of the study is STAGE ONE, Chapter 1: Introduction to the Study.



### Figure 2- The Organisation of this Study- INTRODUCTION - Chapter1

### Conclusion

The introduction provided the overarching perspective of the thesis. It provided an introductory literature overview to place the reader in context, provide the aim of the study and the contribution to knowledge. The theoretical framework was introduced as well as the research approach and methodology to finally summarising the research framework, the exploration phase and the organisation of the study.

### **CHAPTER TWO – Methodology**

"...the most common reasons for identifying a research problem arises from students having to find a topic for a research project. Some achieve this by reading the literature: by finding out what has already been done and where the gaps might lie. Others, who are already working in a professional field, have the opportunity to observe their work setting and identify problems and issues, which seem to require investigation'



Figure 3 - STAGE ONE: Chapter2: Methodology

### Introduction

The purpose of this chapter is to describe the research methods, data collection techniques and ethical considerations appropriate for the aim of this thesis.

It begins by describing the theoretical foundations of the study, including the research approach, theoretical framework underpinning the development of the thesis (sociotechnical theory), the review and selection of research methods, data collection techniques and analysis. It reviews the ethical considerations and finally describes the research design.

## The Theoretical Foundation of the Study *Introduction*

The aim of this section of the chapter is to provide the reader with a clear understanding of the research approach and nature of the theoretical framework being developed that underpins the researcher's world views and ways of knowing, to be able to construct an appropriate research design.

### The Research Approach

### The main traditions

Since the middle of the nineteenth century, researchers attempting to apply research methods used in the natural sciences to the social sciences, known as Positivists, have been seen to be at odds with those that emphasise the meaning made by people as they interpret their world, called Interpretivists (Williamson, 2002). Williamson (2002) tells us:

'These philosophies are sometimes referred to as ontologies, meaning they are approaches to social inquiry, which are based on particular assumptions...it is fundamentally epistemological, which means that it is concerned with questions such as: `what constitutes knowledge?' and 'how is this knowledge formed?'....' Williamson (2002, pp 25-26)

In other words, ontologies consist of the assumptions, beliefs and collection of human values that together form the candidate's view of what existence and reality are; this is the researcher's 'world view' (Reich, 1994). Epistemology defines how the researcher's ontological perspective on existence/reality relates to theory for each analysis and theoretical proposal (Love, 2001b)

At a very basic level, the positivist approach seeks to model research on what has been termed the 'scientific method'. Here the researcher is held to be involved in a linear process of: hypothesis-data gathering-analysis-results. In addition, this approach claims that the method leads to generalisability, that the researcher can be neutral and separate from the context, and control must be exerted by the researcher (Cocklin, 1997); in essence they see the world as knowable and predictable, they conduct research *on* participants, they are always objective and findings are always true and generalisable (Yin, 2003). In the 1960's, Post-positivists realised that the world might not be as knowledgeable or predictable as first thought, that the truth might never be able to be captured (Yin, 2003).

The nature of research for a post-positivist is much more holistic, the world is ambiguous, chaotic and very complex (Yin, 2003). The post-positivist researcher believes in participatory and collaborative paradigms; both *for* and *with* participants and is also subjective, that is, acknowledges being value bound (Yin, 2003).

Interpretivism is known to be an umbrella term, predominantly associated with qualitative methods of research, but where quantitative techniques can also be used. Research based on Interpretivism favours the naturalistic enquiry, where the field work usually takes place in the 'natural setting' (axiology) and is concerned with 'meaning'. The belief is that the social world is interpreted or constructed by people and therefore different from the world of nature (Williamson, 2002). Typically, the researcher undertakes a literature review to gain an understanding of their topic, developing theory and research questions and planning data collection. Data is then collected, analysed and then concepts, insights and understanding are developed from patterns in the data (Reneker, 1993).

The introductory chapter has already hinted at the lack of existing understanding of sociotechnical constructs of information systems implementations in general practice generally —and chronic diseases specifically, to be found in the literature. The existing literature, however, does provide a number of constructs, concepts, variables and measurables to inform the chosen theoretical framework (socio-technical) and support some of the existing field experiences of the IT/IM Officer/researcher to begin developing an emerging (conceptual) framework from these sources. This is consistent with Williamson's (2002) observation that information systems research and professional practice are inextricably linked (Williamson, 2002). This is true in this study, where the researcher is also the practicing IT/IM Officer in charge of systems implementation with the industry partner (CHDGP). This emerging framework is then examined in a number of general practices until the constructs and concepts identified are 'working well' and are clearly understood.

In this study, the research design is non-linear and iterative (meaning the various elements in the research are interwoven, with the development of those influencing decisions about the others)(Williamson, 2002). The interpretivist-post positivist approach is the more suited for the intended purpose of this study.

### The Theoretical Framework

Theoretical frameworks or perspectives, are what consciously or unconsciously guides each researcher in the development of their research and thesis (Love, 2001a). Research projects and their theoretical conclusions are founded on researchers' 'world views' (ontology), human values, the meaning ascribed to knowledge and its creation (epistemology), theories, and data gathering methods (Darlaston-Jones, 2007; Flood, 1990; Franz, 1994; K. Popper, 1976; Reich, 1994). A theoretical framework consists of the abstract and theoretical factors that shape the many decisions that a researcher makes and which determines their choice of analysis, background material, theories and research techniques (Lindsay, 1995; Sharrock & Anderson, 1986; Shipman, 1981). When a thesis is written, it is the researcher's exposition of their theoretical framework(s) that enable readers and examiners to follow the researcher's arguments, and reach the same conclusions (Phillips & Pugh, 1992). On a larger scale, the explication of the theoretical perspective that has been used by a researcher is what enables peer researchers to replicate the research so as to strengthen confidence in the conclusions that have been drawn (Stegmüller, 1976). Theoretical frameworks are even more important in exploratory studies, where the researcher does not know what is going on, and is trying to learn more. As mentioned in the introduction, Borgatti (1998, p. 1) suggests that there are two reasons why this is important: Firstly, no matter how little you think you know about a topic, and secondly, how unbiased you think you are, it is impossible for a human being not to have preconceived notions, even if they are of a very general nature. He further explains that ... 'not knowing what your real framework is can be a problem'. The framework tends to guide what you notice in an organization, and what you don't notice. In other words, you don't even notice things that don't fit your framework! We can never completely get around this problem, but we can reduce the problem considerably by simply making our implicit framework explicit. Once it is explicit, we can deliberately consider other frameworks, and try to see the organizational situation through different lenses' (Borgatti, 1998, p. 1).

The theoretical framework in this study —as follows, was based on the most appropriate information systems theory that explains the phenomena being studied according to the world view and ways of knowing of the researcher. The ontologies and epistemology of the researcher are found specifically in Chapter Four but also can be discerned throughout the thesis in the construction of arguments and conclusions.

### **Information System Theories**

The obvious reasons for information system research are for problem solving; evaluation; and improvement of services and systems and to provide information before introducing new systems or services (Williamson, 2002).

More importantly, in this study, the aim was to conduct information system research that was committed to both applying the methodology that best suited the research goals but also to better implement the practical components of the research (Benbasat & Zmud, 1999). More importantly, this ensured that research leads practice, as opposed to research 'chasing after practice'; and to have as much exposure to relevant and real-world context as much possible (Benbasat & Zmud, 1999).

The literature reveals that there are at least fifty theories in use in the information systems field alone (Schneberger & Wade, 2006). These vary in approach from strictly technological propositions, for example the Technology Acceptance Model (Wixom & Todd, 2005), to more organisational perspectives like: Organizational Knowledge Creation theory (Cook & Brown, 1999), to more human centred approaches like Critical Social Theory (Benoit, 2001). A comprehensive treatise of these theories can be found in the Theories Used in IS Research website (Schneberger & Wade, 2006).

Nevertheless, and in relevance to the aim of this study, the Socio-Technical Theory (or Socio-Technical Systems as it is also known) appears to be the most appropriate 'ready made map' from where to develop a conceptual framework (emerging framework) to base the study on.

### Socio-Technical theory

### A brief introduction

In a comprehensive review of more than fifty Information Systems theories, Schneberger & Wade (2006) concluded that in the middle of the 20th century some of the optimistic predictions on the impact of technology on business efficiency and productivity were being confounded. Many examples of the introduction of technology were associated with implementation problems often linked to resistance by the workforce and a failure to achieve the expected benefits (Schneberger & Wade, 2006).

Researchers, notably at the Tavistock Institute in London, with a background in the behavioural sciences (Sociology, Psychology, Anthropology) suggested that what was needed was a fit between the technical subsystems and the social subsystems which together made up an organization (Schneberger & Wade, 2006).

The technical subsystem comprises the devices, tools and techniques needed to transform inputs into outputs in a way which enhances the economic performance of the organization. The social system comprises the employees (at all levels) and the knowledge, skills, attitudes, values and needs they bring to the work environment as well as the reward system and authority structures that exist in the organization (Clegg, 2000). Later some authorities broadened the definitions to encompass the wider reach of the organization by including customers, suppliers, and the rules and regulations, formal and informal, which govern the relations of the organization to society at large. This became known as the environmental subsystem (Heller, 1997).

The cornerstone of the socio-technical approach, as the work of these researchers became named, was that the fit was achieved by a design process aiming at the joint optimization of the subsystems: any organizational systems will maximise performance only if the interdependency of these subsystems is explicitly recognised. Hence any design or redesign must seek out the impact each subsystem has on the other and must aim to achieve superior results by ensuring that all the subsystems are working in harmony (Mayers, 1999; Mumford, 2003, 2006; Pasmore, 1988; Schneberger & Wade, 2006; Williamson, 2002).

Furthermore, this theoretical perspective better matches the researcher's 'world view' (implicit framework – further discussed in Chapter Four), human values, theories, field experience and data gathering methods preferences making the researcher's framework 'explicit' as recommended in the literature (Borgatti, 1998; Flood, 1990; Franz, 1994; Liehr & Smith, 2001; Reich, 1994). More importantly, socio-technical researchers seem to be the most adept at trying to test and develop theory (Mumford, 2006); in other words, the socio-technical approach is not algorithmic but affords its practitioner the freedom to reinvent central concepts as needed (Stahl, 2007).

### Summary

In summary, socio-technical theories appear to sit very well with the postpositivist/interpretivist research approaches to be utilised in this study. This is the theoretical foundation of the study that will inform the research design of the study. The next section deals with finding the appropriate methodology to match the intended theoretical foundation.

### **Research Methods**

### Introduction

The aim of this section of the chapter is to outline the research method used by taking account of the theoretical foundations reviewed in the previous section to justify and select the appropriate research methods to develop an appropriate research design.

### Background

Information Systems (IS) is a discipline that overlaps other disciplines. IS studies are conducted applying the methods borrowed from related disciplines, such as organisational theory, behavioural psychology, and management science (Williamson, 2002). As such the use of these methodological approaches is sometimes criticised in the research literature and questions are asked about the purity of information systems as an independent academic discipline (Weber, 1997). As a field of study, information systems is very closely related to practice, and researchers and practitioners are constantly engaged in the reflective loop, where the researcher looks at the emerging data to reflect and re-direct the investigation. Information systems researchers draw problems for investigations from practice and the results of their studies usually generate theories (Williamson, 2002).

The methods of natural science however are viewed as both problematic and often, inappropriate, when applied in 'human' disciplines such as IS, for intelligent human agents can (and tend to) take action which can effect both the phenomena under study and the outcomes of the research (Checkland, 1991). For example, sample surveys and controlled experiments are often pointed to by positivists as the preferred types of research and inferential statistics the method to discover causal laws. However, even though survey research and controlled experiments are seen as providing a rigorous basis for the statements that are made, these methods are seen as cutting the researcher off from the discovery of non-deterministic and reciprocal relations in social systems (Jonsonn, 1991). The main methods used in human disciplines are:

### Ethnography

Ethnography is an approach to research which was developed initially by anthropologists but is also increasingly used by other social researchers as well. It relies heavily on participant observation by researchers who are seeking to be partially or wholly integrated into the group, community or social situation which they are observing. The emphasis here is on trying to understand why people do what they do or perceive things and situations in the ways that they do through sharing their experiences to some extent (Denscombe, 2003; DeVaus, 2001). This approach was not quite suited for this study as the time and resource limitations and ethical considerations would have made it difficult to carry out.

### Phenomenology

Phenomenology focuses on how people experience facets of their everyday lives and tries to make sense of them. It requires detailed description of these experiences from the point of view of those who are living through them; it is less concerned with collecting data to enable the researcher to interpret what is happening and more concerned with describing how the events get interpreted by those who are directly involved. To do this the researcher needs to approach the situation they are researching without predispositions based on their own experience and on existing theories about the phenomenon being studied. As an approach it can be particularly useful in trying to understand how people cope with particular kinds of life experience: being a patient, being a student teacher, being a parent caring for a child on the autistic spectrum, being a trainee, being a student, etc (Denscombe, 2003). As with the previous method this methodology was not suitable in this study. Mainly due to the limitations of participant availability, time and resources that can be devoted to the task.

### Grounded theory

Rather than do research to 'test' existing theories the researcher here starts out with an open (but informed) mind. This is akin to what is sometimes called exploratory research. The main aim of grounded theory is to analyse the data in order to generate theories where the hypotheses, research questions and key concepts emerge from the analysis of the data not the other way around. It shares some common ground with ethnography and phenomenology in that it tends to be used in small-scale social settings such as institutions, classrooms, workplaces, offices, etc. in order to describe and understand how people perceive and interpret the situation they find themselves in and act within it (J. Bell, 2001;

Denscombe, 2003; DeVaus, 2001). This approach assumes no pre-existing knowledge or theories underpinning a study, therefore it was not suited to this thesis.

### Action research

Action research is where practitioners in their workplace, whether they be teachers, lecturers, social workers, nurses, doctors, public health staff, managers, etc., engage in research in order (a) to improve their understanding of their practice and (b) to change or improve their practice in a systematic way. The key elements here are practitioners as researchers, researching their own practice and introducing and evaluating changes in that practice in a cyclical process of intervention (or action), evaluation of its impact, revisions to the intervention, further evaluation, further revisions, and so on until the practitioner is satisfied with the improvements that have been introduced (J. Bell, 2001; Denscombe, 2003). While there were some aspects of action research in this study due to the researcher's ongoing 'practitioner' role, this hands-on role is not so relevant for the purpose of this study, as the data collection occurred mostly after the direct involvement of the researcher in the implementation process.

#### Case Study

Case Studies focus on one or a very limited number of instances or examples of a particular phenomenon in order to construct an in-depth account of what happens or happened during that instance. The emphasis here is on depth rather than breadth of study. There is also an emphasis on studying things as they naturally occur rather than manipulating the situation by introducing specific changes and controlling certain variables, as in an experiment (J. Bell, 2001; Denscombe, 2003; DeVaus, 2001). Case Study is a flexible methodology allowing for a variety of research strategies; be they explanatory, exploratory or descriptive (Yin, 2003); Stake (1995) included three other types of research strategies: *Intrinsic* - when the researcher has an interest in the case; Instrumental - when the case is used to understand more than what is obvious to the observer; Collective - when a group of cases is studied (Stake, 1995). Moreover, the case study is flexible to the use of multiple data collection techniques to support these strategies. Case Study is better suited to examine the 'how' and 'why' questions where the investigator has little control over the events and when the focus is on a contemporary phenomenon within some real life context (Yin, 2003). This research method offered the most flexible and fitting approach to carry out this study, and hence was adopted.

### An argument for Case Study design

Although all general practices share some commonalities, they are intrinsically *unique*. This context makes 'practices' the most appropriate framework to utilise (Cruickshank et al., 2002; Williamson, 2002). Why? Because to qualify as a case study the subject/problem for study *must be a bounded system*, an entity in itself. A case study should focus on a bounded subject/unit that is either very representative or very atypical (Burns, 1990). The case research approach has its root in business studies. Cases are analysed either to build up or validate models or theories, typically through collection of textual data through interviews. Case Studies are multi-perspective analyses. This means that the researcher considers not just the voice and perspective of the actors, but also of the relevant groups of actors and the interaction between them. This one aspect is a salient point in the characteristic that case studies possess (Tellis, 1997).

A case study allows an investigation to retain the holistic and meaningful characteristics of real life contemporary events (Burns, 1990; Cruickshank et al., 2002) where the main techniques are *observation*, *interviewing* and *document analysis* (Burns, 1990). A hint of historical technique might be discerned in the initial development of the emerging framework where the researcher goes back in time when preparing the literature review to find out some *what* and *who* answers; however, the fact that the researcher was also a direct observer of the events and able to interview the key persons involved in the event makes a stronger case for a case study design than a historical one (Cruickshank et al., 2002).

While the observer/participant has the opportunity to perceive reality from the point of view of an insider; the researcher must be aware of the potential for bias. The investigator may become too closely involved and lose detachment, or assume advocacy roles detrimental to unprejudiced reporting (Burns, 1990). It was hoped to dilute this issue by minimising the self reported observations and the use of several practices within Central Highlands General Practice Network, recognising that use of a collection of practices can be used to represent a *whole* case study (Yin, 1994) and that the case study researcher can combine data collection sources such as archives, interviews, questionnaires and observations allowing them to accomplish descriptive studies, test theory or generate theory (Cruickshank et al., 2002; Williamson, 2002; Yin, 1994).

To summarise, general practices in this thesis are unique systems in themselves but also bounded by their geographical position, as they all belong to a single Division of General Practice boundary (Case Study), and by the common participation of the participantresearcher in pre-ceding implementations.

### Case Study design quality

Within any empirical social research design, the quality of the research design is paramount. Case study is one form of such designs and there are four main tests that have been developed to gauge the strength of the study. According to Yin (2003) these are:

 Construct validity: establishing correct operational measures for the concepts being studied.

To meet the test of construct validity, the researcher must select the specific types of changes that are to be studied and demonstrate that the selected measures of these changes do indeed reflect the specific types of changes that have been selected (Yin, 2003). Yin (2003) also suggests three tactics that are available to increase construct validity in practices; Tactic one is to use multiple sources of evidence like interviews, observations, case notes, documentation, etc. (data triangulation), as well as other sources of triangulation if available (investigator, theory and methodological triangulation); Tactic two is to establish a chain of evidence, that is the researcher allows the reader of the case study to follow the derivation of any evidence from initial propositions to case study conclusions. There are several implications that follow from this assertion. First, the reader must be able to determine from the evidence presented the nature of the argument, and why and how conclusions were drawn. Second, the reader must be able to determine, without doubt, the evidential nature of the case as published. Stated differently, the reader should be able to determine, without the benefit of the writers' 'head-notes' how the case was developed. Therefore, to reiterate, the evidence must follow convincingly and - when the purpose of the presented case is to move beyond description to explanation- should allow the reader to determine the basis upon which any generalization(s) are being advanced. And tactic three is to have a draft case study reviewed by key informants (Yin, 2003). Evidence for construct validity can be found from Chapters Four to Nine.

2- **Internal Validity:** establishing a relationship where certain conditions are shown to lead to other conditions.

This is suited to explanatory or causal studies only, therefore not relevant to this particular study, which looks for descriptive and exploratory explanation to phenomenona.

# 3- **External validity:** establishing the domain to which a study's finding can be generalised.

One of the common concerns about case studies is their apparent lack of scientific generalisation strength. Yin (2003) poses the question: *How can you generalise from one case study*?, and goes on to point out that even scientific experiments cannot answer this question (Yin, 2003).

In this particular study, and bearing in mind that every General Practice under study is defined as unique, the researcher is not trying to achieve statistical generalisation but analytical generalisation. That is, the researcher is not attempting to select representative samples to generalise to other practices but generalising to a framework instead. That is, rather than developing strict guidelines, the aim is to develop flexible frameworks that can be applied more generally.

To improve external validity and to further reduce the risk of bias, however, Yin suggests that the solution, as is the case with scientific experiments, lies in the use of multiple experiments that have replicated the same phenomena under different conditions. Multiple-case design can provide evidence that is often considered more *compelling*, and the overall study is therefore regarded as being more *robust* (Herriott & Firestone, 1983). Nevertheless, be it single or multiple-case, the research design must be *appropriate*. Upon selecting an appropriate research design, Yin (2003) reinforces the view that, just like with experiments, practices can be *generalisable to theoretical propositions* and not to populations and universes (Yin 2003, p10).

4- Reliability: demonstration that the operation of a study —such as the data collection procedures, can be repeated with the same results.

The goal of reliability is to minimise the errors and biases in a study. Yin (2003) pointed out that it is not an issue of replicating the results of one case study by doing another;

rather it is an issue of documenting appropriately the study protocol so that another investigator can follow the documented procedures (Yin, 2003).

To improve reliability, extensive documentation was included from Chapter Five to Seven so that the reader can discern how the study was conducted. For example data collection procedures in Chapter Six and Seven are fully explained and sample interview protocols are attached at the end of this thesis (Appendix A)

### Discussion

It must be made clear from the outset that case study research is not sampling research; however, selecting many sites to study (general practices) must be done so as to maximize what can be learned in the period of time available for the study (Stake, 1995; Tellis, 1997; Yin, 2003). Furthermore, the selection of a number of practices and individuals (Practice Managers, Nurses, Staff and GPs) to be interviewed should closely reflect the diverse nature of general practices within the case study (Central Highlands General Practice Network).

In this study and by definition, it was impossible to select a representative sample (all practices were considered to be unique) but also it was of interest in this research to select practices with certain characteristics (level of success –number of implementations, type of participant, workforce size, geographical location & technology used) to better provide external validity as Yin (2003) suggested earlier. It must be kept in mind that the study did not seek to generalise its finding to populations (other Divisions or practices) but to its theoretical propositions; that is, it did not need a sample to statistically generalise, but select multiple cases with varying characteristics to strengthen the analytical generalisations. Nonetheless, it is hoped that the final framework developed in this study has the potential to be generally applicable to other similar settings.

### Summary

Case study was identified as the most appropriate research methodology, as it is specifically suited to general practices as bounded entities and it is flexible enough to allow for a relevant variety of data collection techniques.

# Data Collection Techniques *Introduction*

The purpose of this section of the study was to select appropriate data collection techniques to match the methodology, and theoretical foundations of the study as identified earlier. According to Yin (1994) there are six primary sources of evidence in case study methodology, all with their strength and weaknesses as represented in the following table (Table 4):

Source of Evidence	Strengths	Weaknesses
Documentation	<ul> <li>stable - repeated review</li> <li>unobtrusive - exist prior to case study</li> <li>exact - names etc.</li> <li>broad coverage - extended time span</li> </ul>	<ul> <li>retrievability - difficult</li> <li>biased selectivity</li> <li>reporting bias - reflects author bias</li> <li>access - may be blocked</li> </ul>
Archival Records	<ul><li>same as above</li><li>precise and quantitative</li></ul>	<ul><li>same as above</li><li>privacy might inhibit access</li></ul>
Interviews	<ul> <li>targeted - focuses on case study topic</li> <li>insightful - provides perceived causal inferences</li> </ul>	<ul> <li>bias due to poor questions</li> <li>response bias</li> <li>incomplete recollection</li> <li>reflexivity - interviewee expresses what interviewer wants to hear</li> </ul>
Direct Observation	<ul> <li>reality - covers events in real time</li> <li>contextual - covers event context</li> </ul>	<ul> <li>time-consuming</li> <li>selectivity - might miss facts</li> <li>reflexivity - observer's presence might cause change</li> <li>cost - observers need time</li> </ul>
Participant Observation	<ul><li>Same as above</li><li>insightful into interpersonal behaviour</li></ul>	<ul><li>Same as above</li><li>bias due to investigator's actions</li></ul>
Physical Artefacts	<ul> <li>insightful into cultural features</li> <li>insightful into technical operations</li> </ul>	<ul><li>selectivity</li><li>availability</li></ul>

Figure 4-	Sources	of Evidence
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(Yin, 1994, p. 80)

The following is a rationale for their inclusion in the study.

### Primary and secondary records (Documentation and Archives)

Existing records often provide insights into a setting and/or group of people that cannot be observed or noted in any other way. This information can usually be found in document form. Lincoln and Guba (1985) defined a document as 'any written or recorded material' not prepared for the purposes of the evaluation or at the request of the inquirer. Documents can be divided into two major categories: public records, and personal documents (Guba & Lincoln, 1981). Public records are materials created and kept for the purpose of 'attesting to an event or providing an account' (Lincoln & Guba, 1985). Public records can be collected from outside (external) or within (internal) the setting in which the evaluation is taking place. Examples of external records are census and vital statistics reports, county office records, newspaper archives, and local business records that can assist an evaluator in gathering information about the larger community and relevant trends. Such materials can be helpful in better understanding the project participants and making comparisons between groups or communities.

The usefulness of existing sources varies depending on how accessible and accurate they are. In the hypothetical project, documents can provide the evaluator with useful information about the culture of the institution and participants involved in the project, which in turn can assist in the development of evaluation questions. Information from documents also can be used to generate interview questions or to identify events to be observed. Furthermore, existing records can be useful for making comparisons (e.g., comparing project participants to project applicants, project proposal to implementation records, or documentation of institutional policies and program descriptions prior to and following implementation of project interventions and activities)(The National Science Foundation, 2008).

In this study external documentation was certainly used as a source of evidence to compare baseline data (for example, Medicare PIP data - Chapter Four) and later findings in the outcomes phase of the study. Internal documentation (personal notes and archival records) was sparingly used to minimise privacy issues as a source of evidence but was certainly used to select cases and individuals in the study.

### Interviews

Interviewing in interpretivist or naturalistic research aims at understanding people from their own point of view. Exploratory and other in-depth interviews are very appropriate in interpretivist methods. Furthermore, exploratory interviews can be very useful in the early stages of most research projects (Burns, 1990) and are frequently used in case studies (Williamson, 2002).

The advantages of interviews have been well documented in the literature: better response rate (compared to surveys), more likely to attain complex and complete responses, the opportunity to observe the respondent and their environment, face-to-face contact increases rapport and motivation amongst respondents, a degree of control of the context to focus the respondent on the issues at hand, richer data and flexibility to follow up on interesting leads (Burns, 1990; Cocklin, 1997; Wiersma, 1995; Williamson, 2002). The disadvantages are that they are expensive in time and money, interviewer and inter-interviewer variability (in studies when more than one interviewer is used); interviewer effect may compromise validity and reliability (by for example, leading the interviewee or not following strict question protocols). Interviews can be divided into three types: Unstructured; Semi-Structured; and Structured:

**Unstructured interviews:** These interviews take the form of a conversation between interviewees and researcher. They focus in an unstructured way on the informant's perception of themselves, of their environment and of their experiences (Wiersma, 1995). Unstructured interviews are sometimes called exploratory or in-depth interviews and are useful for exploring a subject or gaining insights into people, and are often used in case studies to collect extensive data from key people, allowing the respondents to talk expansively on the main subject and/or raising topics within it in any order he/she wishes (Williamson, 2002). However, the disadvantages mentioned earlier are further enhanced by the fact that unstructured interviews are difficult to record and analyse, needing to be transcribed; an exercise that is expensive and time consuming (Williamson, 2002). The use of unstructured interview to explore this issue was not required in our study design due to the fact the emerging framework had already been drawn from the literature review and field experience.

**Semi-structured interviews:** These interviews have a standard list of questions but allow the interviewer to follow up on leads provided by the participants for each of the questions
involved. Furthermore, they are closer in nature to in-depth or open-ended (unstructured) interviews due to the opportunity for the interviewee to further expand on the topics investigated (Williamson, 2002). However, as it turned out, mainly due to the lack of *further open comments* by the participants, some of these semi-structured interviews ended up looking like more structured interviews when reported in the thesis. The line between the two was at times somewhat blurred.

This technique was perfectly suited and used throughout both data collection sections of the study. During the first data collection (Chapter Six) stage, semi-structured interviews were suited because the interview protocols were already narrowed down and focussed by the emerging framework drawn from the literature and field experience; a graphical representation of the framework was also shown to draw participant's comments. The need at this stage was to pre-test these propositions during the two pilot interviews and, upon confirming that the protocols were appropriately sound, the same technique was used to elicit responses from the ten key respondents in this section of the study.

This technique was particularly suited in the second and main data collection section of this study (Chapter Seven). The first data collection (Chapter Six) had refined the framework to such an extent that the questions needed for the main data collection could well have been defined and conducted in a much more 'structured' way; however, because a complete set of new interview questions were devised to suit a variety of participants and contexts, narrowing down the protocols in a structured way was not appropriate to gauge their unique views. More importantly this technique minimised respondents' time spent in the interview process, seen as a key aspect of the research design.

The use of the graphical representation of the protocol could have potentially introduces some bias in the study, so to lessen any potential effect it was only shown to participants after the appropriate questions about the framework were asked. The graphical framework in this case was only used to confirm their previous answers and to perhaps be a medium for them to make further comments to confirm or refute their previous answers. One technique used to do this was to ask them upon viewing the framework to name any other potential factors that could be added to the existing ones.

**Structured interviews:** in this interview type, respondents are asked exactly the same questions (closed-ended) in a fixed sequence to allow direct comparisons across respondents. These are commonly used in health settings research. However, the lack of flexibility of this method does not allow for personal beliefs, feelings or perceptions to be

collected (Wiersma, 1995). Furthermore, if respondents are not allowed to express their own opinions within the interview, it is seen as a survey questionnaire (Williamson, 2002). The need to allow participants to express their own views made this method inappropriate (Yin, 1994).

### **Recording Interview Data**

Detailed recording is a helpful component of interviews since it forms the basis for analyzing the data. The major advantages are its completeness and the opportunity it affords for the interviewer to remain attentive and focused during the interview. The major disadvantages are the amount of time and resources needed to produce complete transcriptions and the inhibitory impact that voice recording has on some respondents (The National Science Foundation, 2008).

There are a number of approaches to recording data. In the approach used in this study, interview data was recorded on a digital voice recorder, with permission from the participants. The interviewer listened to the tapes and wrote a verbatim account of everything that was said. Transcription of the raw data included word-for-word quotations of the participant's responses. Sometimes notes from the interview were written on the question protocols to collect documentation data that were pre- or post- interview when the digital recording was stopped.

## Participant Observations

Observational techniques are methods by which an individual or individuals gather firsthand data on programs, processes, or behaviours being studied. Participant observations are one of the most flexible techniques or set of techniques for doing research (Williamson, 2002). They provide evaluators with an opportunity to collect data on a wide range of behaviours, to capture a great variety of interactions, and to openly explore the evaluation topic. By directly observing operations and activities, the evaluator can develop a holistic perspective, that is, an understanding of the context within which the project operates. This may be especially important where it is not the event that is of interest, but rather how that event may fit into, or be impacted by, a sequence of events. Observational approaches also allow the evaluator to learn about things the participants or staff may be unaware of or that they are unwilling or unable to discuss in an interview or focus group (The National Science Foundation, 2008).

## The Role of the Observer

There are various methods for gathering observational data, depending on the nature of a given project. The most fundamental distinction between various observational strategies concerns the extent to which the observer will be a participant in the setting being studied. The extent of participation is a continuum that varies from complete involvement in the setting as a full participant, to complete separation from the setting as an outside observer or spectator (Glesne & Peshkin, 1992). The participant observer is fully engaged in experiencing the project setting while at the same time trying to understand that setting through personal experience, observations, and interactions and discussions with other participants.

This technique is better described by Glesne and Peshkin (1992) in the following continuum:



(Glesne & Peshkin, 1992)

## Figure 5 - Role of the observer continuum

The outsider or complete observer stands apart from the setting, attempts to be nonintrusive, and assumes the role of a 'fly-on-the-wall'. The extent to which full participation is possible and desirable will depend on the nature of the project and its participants, the political and social context, the nature of the evaluation questions being asked, and the resources available. Patton (1990) suggested that, the ideal is to negotiate and adopt that degree of participation that will yield the most meaningful data about the program given the characteristics of the participants, the nature of staff-participant interactions, and the socio-political context of the program (Patton, 1990).

Due to the pre-existing and continuing relationship of the IT/IM Officer, individual settings were observed for a number of years before, during and even after the study. The amount and type of observation from practice to practice varied considerably during this time. Observation could be counted in days per year on some practices or just a few hours in others, the role of the observer varied from a 'complete observer' to 'full participant'.

This potentially would have provided an unbalanced view of certain practice types; so in order to avoid the potential bias by the researcher/implementer in using this technique, as Yin (1994) suggested, the documentation of observations were kept to a minimum in the thesis, in preference for the interviewee's own direct point of view/responses; and only used when there was a very explicit need to shed light on aspects of the framework.

# Other Techniques in use in Information Systems

## Focus groups

Williamson (2002) suggests that focus groups are groups of seven to ten people with certain characteristics in common with a topic, are reasonably homogenous and unfamiliar with each other. Qualitative data are collected regarding perception, feelings and opinions; data and insights are produced though group interactions in an interview process. Discussion focuses on a small number of issues within a predetermined topic and the researcher determines the topic and acts as moderator. Focus groups are particular appropriate when the goal is to explain how people regard and experience an idea or event (R. A. Krueger, 1994).

The advantages of focus groups include the allowing of respondents to react to, and build up on, the responses of other group members, the ability to produced large and concentrated amounts of data on precisely the topic at hand, being quick cheap and relatively easy to organise and the opportunity for further clarification (Williamson, 2002). The disadvantages are:

- the potential domination by some participants, discouraging others from contributing fully;
- the moderator can create bias (for example, by leading the participants);
- there are limits to generalisations, as focus groups can provide trustworthy naturalistic data that also lead to important insights about human behaviour, but they are not set up to generalize in the same way as survey research (Fern, 2001);
- summarisation and interpretation is difficult and the moderator must be properly trained, for example, among the many skills needed, the moderator/researcher must listens not only for the content of focus group discussions, but for emotions, ironies, contradictions, and tensions (R. A. Krueger & Casey, 2000)

Apart from the disadvantages mentioned above, the potential focus group participants in the available population at CHGPN with similar characteristics were very familiar with each other, making its use inappropriate in this study (Williamson, 2002). Even if this was discounted, the other constraint would have been the limited opportunity to do so. The CHGPN from where the participants are drawn are very much geographically apart and almost impossible to organise in one place at one time.

## Surveys

Survey research involves the collection of primary data from all or part of a population in order to determine the incidence, distribution and interrelationship of certain variables. Techniques vary from questionnaires (print or electronic), structured interviews (face-to-face or telephone) and observation techniques (Williamson, 2002). Surveys have a number of strengths, but also many weaknesses:

## Strengths:

- Surveys are relatively inexpensive (especially self-administered surveys).
- Surveys are useful in describing the characteristics of a large population. No other method of observation can provide this general capability.
- They can be administered from remote locations using mail, email or telephone.
- Consequently, very large samples are feasible, making the results statistically significant even when analyzing multiple variables.
- Many questions can be asked about a given topic giving considerable flexibility to the analysis.
- There is flexibility at the creation phase in deciding how the questions will be administered: as face-to-face interviews, by telephone, as group administered written or oral survey, or by electronic means.
- Standardized questions make measurement more precise by enforcing uniform definitions upon the participants.
- Standardization ensures that similar data can be collected from groups then interpreted comparatively (between-group study).
- Usually, high reliability is easy to obtain--by presenting all subjects with a standardized stimulus, observer subjectivity is greatly eliminated.

## Weaknesses:

- A methodology relying on standardization forces the researcher to develop questions general enough to be minimally appropriate for all respondents, possibly missing what is most appropriate to many respondents.
- Surveys are inflexible in that they require the initial study design (the tool and administration of the tool) to remain unchanged throughout the data collection.
- The researcher must ensure that a large number of the selected sample will reply.
- It may be hard for participants to recall information or to tell the truth about a controversial question.
- As opposed to direct observation, survey research (excluding some interview approaches) can seldom deal with 'context.'

(Colorado State University, 2008)

It is precisely these weaknesses that are contrary to the research approach already outlined in the chapter that precludes the use of this technique in this study.

# Data Analysis

There are a number of data analysis strategies available to a researcher, however not all are appropriate for the intended research design; for example:

**Deduction**: aims at determining the necessary consequences, relying on logical provable coherence between premises and conclusion. In Popper's (1979) concept of 'Logic of Science', growth of knowledge is due to a procedure of 'trial and error' (Karl Popper, 1979). Its ultimate function is to statistically generalise to populations or universes (Yin, 2003). As stated earlier in the chapter this is not the aim of this study.

**Induction**: aiming at empirical probable coherence between the premises and experience, in order to derive *a probable generalization*. Induction only classifies the data and therefore is more suited at generalising to theoretical propositions not populations or universes (Yin, 2003). This method is suitable for the research design and will be used throughout his study.

**Abduction:** furnishes the 'reasoner' with a problematic theory explaining the causal relation among the facts. Back in 1958 the writings of Peirce suggested that abductive

reasoning constituted the 'first stage' of scientific inquiries and of any interpretive processes. Pierce saw 'Abduction' as the process of adopting an explanatory hypothesis by covering two operations: the selection and the formation of plausible hypotheses; further suggesting that as a process of finding premises, it is the basis of interpretive reconstruction of causes and intentions, as well as of inventive construction of theories (Peirce, 1958).

According to Wirth (1998), a researcher, motivated by the observation of a surprising fact or an anomaly that disappoints an expectation, can use abductive reasoning as a strategy of solving problems and discovering relevant premises. It is 'inference to the best explanation'. Abductive reasoning has the logical form of an inverse modus ponens (affirming the antecedent) and is 'reasoning backwards' from consequent to antecedent (Wirth, 1998).

From a logical point of view, reasoning backwards is no valid form of inference. It is conjectural or presumptive thinking, aiming at matching pragmatic standards of plausibility, guided by the reasoner's 'guessing instinct' (CP 7.46). However, Peirce claims that abduction is logical inference, because it can be represented in a 'a perfect definite logical form': 'The surprising fact, C, is observed; But if A were true, C would be a matter of course, Hence, there is reason to suspect that A is true' (Wirth, 1998).

This reasoning strategy is particularly important in the development of each of the structures of concepts (constructs) in the emerging framework and subsequent revisions. More importantly, it is the abductive processes which formulates a multitude of propositions in the framework (s) that are then tested by induction in the data collection phases

## **Ethical considerations**

Conducting research in general practice needed to consider the potential to cause any physical or emotional harm. For example:

- violating informants' right to privacy by posing sensitive questions or by gaining access to records which may contain personal data;
- observing the behaviour of informants without their being aware (concealed observation should therefore always be crosschecked or discussed with study supervisors with respect to ethical admissibility);

- allowing personal information to be made public which informants would want to be kept private, and
- Failing to observe/respect certain cultural values, traditions or taboos valued by your informants.

(The International Development Research Centre, 2008).

For example, observational techniques are perhaps the most privacy-threatening data collection technique for staff and, to a lesser extent, participants. Staff fear that the data may be included in their performance evaluations and may have effects on their careers. Participants may also feel uncomfortable assuming that they are being judged. Much effort may be needed to assure project staff and participants that they will not be adversely affected by the evaluators' work and to negotiate observer access to specific sites (The National Science Foundation, 2008). To this end, no 'personal' observations were made or recorded in this study.

Furthermore, information systems research in organisations like general practices raises a number of ethical issues; these include questions of intellectual property, access, and data quality, changing interpersonal relationships due to computer-mediated communication, gender issues in the IS industry, and new knowledge (power) structures in organisations (Stahl, 2007).

Several methods for dealing with these ethical issues were used in this study:

- Informed and written consent was acquired before the interview began.
- Even though good relationships were established with the informants before the study began, very explicit sensitive issues were not explored.
- Confidentiality of the data was respected throughout the research process. Where data important to the validity of the research clashed or presented a risk to privacy and confidentially issues they were not used.
- Respect for practices and informant's unique cultures were already observed before the study begun and therefore respected during the data collection process.
- Although kept purposely to a minimum, some sensitive questions regarding services, organisational, cultural or personal aspects relating to the study were asked; all recorded information was deliberately coded and even sometimes data

were omitted if the informant could in any way be identified from their responses during interviews.

The study had received Ethics approval by the Human Research Ethics Committee at Victoria University.

## The Research Design: The Exploration Framework

The stated aim of the study was to develop an information systems framework to support the prevention and management of chronic diseases in general practice.

# An Emerging Framework:

This objective was to be achieved by developing an emerging conceptual framework drawn from a literature review and existing experience in chronic diseases information systems implementations at Central Highlands General Practice Network. A brief explanation follows.

Literature review: A comprehensive literature review in the areas of Information Systems, Health Informatics from a broad health perspective to the more specific in relation to chronic conditions and systems implementations in general practice was carried out. The aim of this review was to draw both generic and specific information that would create or support field experience propositions or constructs proposed in the framework. This can be found in Chapter Three.

Practical implementations: The considerable number of chronic disease information systems implementations at Central Highlands General Practice Network provided the opportunity to use the IM/IT Officer's practical experience in constructing a workable framework. The purpose of this exercise was to provide field input to better target the elements drawn from the literature or observed in practice. These were supplemented by contextual and baseline data support to draw comparisons from. Field experiences are found in Chapter 4. The added advantage of this study is that the CHGPN's (or also referred to as the Division's) IM/IT Officer is also 'the researcher' in this thesis and almost guarantees access to the majority of practices for this study.

The analysis for the construction of the emerging (conceptual) framework drawn from both the literature and the field experience are presented in Chapter Five. This chapter identified the emerging constructs and elements thought to make up a workable framework to be tested in following phases of the study.

This initial framework and they way it was developed has the potential to introduce bias and to influence the inquiry towards an agreeable result. Therefore, every aspect of the framework was tested and re-tested with diverse participant types and practice types to avoid such bias.

### The Revised Framework

As identified in the previous exercise, the exploration was broken up in two data collection sections. A first data collection section to further explore, pre-test and revise the conceptual (emerging) framework developed in the previous chapter (Chapter 5). This framework was tested with individuals from practices that had been identified as having multiple implementations, all leading to adoptions (a high success rate compared to others that still were in the implementation stage with no adoption yet confirmed). This testing was performed by interviewing key informants heavily involved in their own multiple implementations and adoptions. For the purpose of this thesis key informants are also called 'practice champions', meaning individuals who drove or encouraged the implementation process in their practice setting. These data was supplemented with field observations and critical examination in the final analysis. The result was a revised framework that allowed the refinement of the interview protocols for the final and much larger main data collection section. Further details and the outcome of this revision are presented in Chapter Six.

### The final framework

Having identified, revised and created new constructs for final testing in the previous section; and with a stronger understanding of *what*, and to *who* to pose targeted structured questions, the exploration now concentrated in the main data collection phase. The finer details of what was tested, who was asked, and the observations and critical examinations during this section of the study and the outcomes culminating in the final framework are presented in Chapter Seven.

Table 6 is graphical representation of the exploration framework in the research design.



*Figure 6 - The Exploration framework* 

# Conclusion

The aim of this chapter was to review and justify the methodology used in this study. First, it argued for an interpretive-post positivist approach, based on socio-technical theory providing the theoretical foundations for the study. To appropriately match the theoretical framework, the case study methodology was selected to be complemented by a variety of data collection techniques including: interviews, documentation (records) and observations. The data analysis was to be inductive and abductive in nature and the outcome of the two data collection phases were to produce a final refined information system framework for the prevention and management of chronic diseases in general practice. At this stage, this framework is meant to be explanatory (that is, framing the phenomena observed) rather than predictive.

# **CHAPTER THREE - Literature Review**

'The function of protecting and developing health must rank even above that of restoring it when it is impaired'.



Figure 7 - STAGE ONE: Chapter 3 – The Literature Review

### Introduction

This chapter reviews the underpinning literature for the whole study. First, it defines what chronic diseases are and their impact on the wider world as well as the Australian context in which the study is set. Then it continues with the examination of the potential for systematic approaches, supported by information systems to improve the care of chronic disease in light of the medical context. It provides typical examples to outline the shortcomings of existing care approaches. At this point, information systems in healthcare are investigated, including the current level of investment in technology to improve health outcomes. Also examined will be information systems in general practices, specifically noting the lessons learnt from the health and business information systems sectors. The final section reviews the specific elements and characteristics, including theories of change and change management that are required for the successful implementation of a chronic disease specific information system. In the conclusion, the identified factors and concepts that have begun to surface from the literature review are noted. The findings from this chapter will support and complement the practical experience to be drawn from the field

experience in the next chapter (Chapter Four) to finally develop an emerging conceptual framework in Chapter Five.

## **SECTION ONE - Chronic Diseases**

This section introduces the reader to the broader issues of chronic diseases from a worldwide perspective and the Australian context to set the significance of chronic conditions within the study.

### **Defining Chronic Conditions**

Chronic diseases, or chronic conditions as it is also referred in this thesis, can be difficult to define. An article in the Australian Medical Journal (Gross, 2003b), noted the difficulties and concluded that it is usually defined by a minimum duration; for example diseases lasting three or six months, continuously or intermittently, may be termed chronic (Mathers & Penm, 1999a). Moreover, a chronic condition has also been defined as persistent or recurring health consequences lasting for years; they are illnesses or impairments that cannot be cured (National Academy on an Ageing Society, 1999). For the purpose of this study, the United States Institute of Medicine definition will be used, that is: a chronic disease is a condition that requires ongoing medical care, including monitoring, treatment, and coordination among multiple providers, limits what one can do; and is likely to last longer than one year (Committee on Rapid Advancement Projects: health care finance and delivery systems, 2002). Furthermore and of importance in this study, chronic diseases are largely preventable by modifying their risk factors, for example: adopting healthy behaviours such as controlling body weight, eating nutritious foods, avoiding tobacco use, controlling alcohol consumption and increasing physical activity all of which can prevent or delay the development of many chronic diseases (AIHW, 2008c). Included are diseases like heart disease, stroke, cancer, chronic respiratory diseases, diabetes, cervical cancer, and hundreds more.

### A world-wide health problem

According to the World Health Organisation (WHO), chronic diseases are by far the leading cause of mortality in the world, representing 60% of all deaths. Out of the 35 million people who died from chronic disease in 2005, approximately half were under 70 and half were women (WHO, 2008a). In 2002, the leading chronic diseases — cardiovascular disease, cancer, chronic respiratory disease, and diabetes, caused 29 million

deaths worldwide (Yach, 2004). By 2030, the four leading causes of death globally are projected to be ischaemic heart disease, cerebrovascular disease (stroke), HIV/AIDS and chronic obstructive pulmonary disease (WHO, 2007).

Here are some further examples from the World Health Organisation's web page (WHO, 2008a):

## Cardiovascular Diseases

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels and include:

- Coronary heart disease disease of the blood vessels supplying the heart muscle
- Cerebrovascular disease disease of the blood vessels supplying the brain
- Peripheral arterial disease disease of blood vessels supplying the arms and legs
- Rheumatic heart disease damage to the heart muscle and heart valves from rheumatic fever, caused by streptococcal bacteria
- Congenital heart disease malformations of heart structure existing at birth.
- Deep vein thrombosis and pulmonary embolism blood clots in the leg veins, which can dislodge and move to the heart and lungs.

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can also be caused by bleeding from a blood vessel in the brain or from blood clots.

# Facts about cardiovascular diseases:

- CVDs are the number one cause of death globally: more people die annually from CVDs than from any other cause;
- An estimated 17.5 million people died from CVDs in 2005, representing 30% of all global deaths. Of these deaths, an estimated 7.6 million were due to coronary heart disease and 5.7 million were due to stroke.
- Over 80% of CVD deaths take place in low- and middle-income countries and occur almost equally in men and women. By 2015, almost 20 million people will die from CVDs, mainly from heart disease and stroke. These are projected to remain the single leading causes of death.

• At least 80% of premature deaths from heart disease and stroke could be avoided through healthy diet, regular physical activity and avoiding tobacco smoke (WHO, 2008a).

### Diabetes

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, or alternatively, when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels (WHO, 2008a).

### World Health Organisation (WHO): Facts about Diabetes

- The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030 (Wild, Roglic, Green, Sicree, & King, 2004).
- The World Health Organization (WHO) estimates that more than 180 million people worldwide have diabetes. This number is likely to more than double by 2030.
- In 2005, an estimated 1.1 million people died from diabetes.
- Almost 80% of diabetes deaths occur in low and middle-income countries.
- Almost half of diabetes deaths occur in people under the age of 70 years; 55% of diabetes deaths are in women.
- WHO projects that diabetes deaths will increase by more than 50% in the next 10 years without urgent action. Most notably, diabetes deaths are projected to increase by over 80% in upper-middle income countries between 2006 and 2015.

(WHO, 2008a)

### Asthma

Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. Symptoms may occur several times in a day or week in affected individuals, and for some people become worse during physical activity or at night. During an asthma attack, the lining of the bronchial tubes swell, causing the airways to narrow and reducing the flow of air into and out of the lungs. Recurrent asthma symptoms frequently cause sleeplessness, daytime fatigue, reduced activity levels and school and work absenteeism. Asthma has a relatively low fatality rate compared to other chronic diseases (WHO, 2008a).

# WHO: Facts about asthma:

- WHO estimates that 300 million people currently suffer from asthma. Asthma is the most common chronic disease among children.
- Asthma is a public health problem not just for high-income countries; it occurs in all countries regardless of the level of development. Most asthma-related deaths occur in low- and lower-middle income countries.
- Asthma is under-diagnosed and under-treated. It creates substantial burden to individuals and families and often restricts individuals' activities for a lifetime.

(WHO, 2008a)

# Chronic Obstructive Pulmonary Disease (COPD)

Chronic obstructive pulmonary disease (COPD) is a lung ailment that is characterized by a persistent blockage of airflow from the lungs. It is an under-diagnosed, life-threatening lung disease that interferes with normal breathing and is not fully reversible. The more familiar terms of chronic bronchitis and emphysema are no longer used; they are now included within the COPD diagnosis.

# WHO: Facts about COPD:

- Chronic obstructive pulmonary disease (COPD) is a life-threatening lung disease that interferes with normal breathing it is more than a 'smoker's cough'.
- An estimated 210 million people have COPD worldwide.
- More than 3 million people died of COPD in 2005, which is equal to 5% of all deaths globally that year.
- Almost 90% of COPD deaths occur in low- and middle-income countries.
- The primary cause of COPD is tobacco smoke (through tobacco use or second-hand smoke).
- The disease now affects men and women almost equally, due in part to increased tobacco use among women in high-income countries.
- COPD is not curable, but treatment can slow the progress of the disease.
- Total deaths from COPD are projected to increase by more than 30% in the next 10 years without interventions to cut risks, particularly exposure to tobacco smoke.

(WHO, 2008a)

# Cervical Cancer

Cancer of the cervix, at the base of the uterus—kills more women annually than childbirth. Cervical cancer is the second most common type of cancer among women, and was responsible for over 250 000 deaths in 2005, approximately 80% of which occurred in developing countries. It is estimated that it could affect as many as 750,000 women by 2020 and as many as one million new cases by 2050. Without urgent action, deaths due to cervical cancer are projected to rise by almost 25% over the next 10 years (WHO, 2008a). Most women who die from cervical cancer, particularly in developing countries, are in the prime of their life. They may be raising children, caring for their family, and contributing to the social and economic life of their town or village. Their death is both a personal tragedy, and a sad and unnecessary loss to their family and their community. Unnecessary, because there is compelling evidence that cervical cancer is one of the most preventable and treatable forms of cancer, as long as it is detected early and managed effectively (WHO, 2008a).

### The economic cost of chronic conditions

A World Health Organization report indicated that 35 million of the 58 million worldwide expected deaths in 2005 were due to chronic, non-communicable diseases. It further projected that 388 million people will die of chronic disease in the next ten years. The majority of these deaths will occur in the most productive age groups and 80% of the deaths will be in low and middle income countries (Abegunde & Stanciole, 2006). Diseases in general and chronic diseases in particular deprive individuals of their health and productive potential. The burden of chronic diseases may invariably challenge individual or household income and savings, and compete with investment activities. From a country's perspective, chronic diseases reduce life expectancy and ultimately economic productivity, thus depleting the quality and quantity of that country's labour force. This may result in lower national output and income (Gross Domestic Product and Gross National Income). There has been some description in the literature of how diseases reduce intergenerational skills and wealth transfer. Schooling of the children is affected, propagating the spiral of ill health and poverty (Abegunde & Stanciole, 2006).

An extreme simplification of these channels and linkages is presented in Figure 8 below.



*Figure 8 - Linkages between chronic diseases and the economy: The poverty spiral (Adapted from Abegunde & Staciole, 2006)* 

# Chronic conditions in the United States

In the US, two reports from the Institute of Medicine (*To Err is Human: Building a Safer Health System*, published in late 1999 and *Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century*, publisher in 2001) have raised the concern that there are serious problems with the quality of care that patients with chronic conditions receive. The Quality Chasm report in particular called attention to the detrimental state of chronic conditions, with only 20 to 50% of people with common chronic conditions under suitable control (Solberg, 2003).

The following statistics reflect the severity of the problem:

- Seven of every 10 (70%) Americans, who die each year, or more than 1.7 million people, die of a chronic disease.
- More than 90 million Americans live with chronic illnesses.
- The medical care costs of people with chronic diseases account for more than 75% of the nation's \$1.4 trillion medical care costs.
- The prolonged course of illness and disability from such chronic diseases as diabetes and arthritis results in extended pain and suffering and decreased quality of life for millions of Americans.

(Centers for Disease Control and Prevention, 2008)

# Cost-Effectiveness of prevention in chronic conditions

In 2008, the Department of Human Services in the US Health and the Centers for Disease Control and Prevention web page suggests to us that chronic diseases—such as cardiovascular disease (primarily heart disease and stroke), cancer, and diabetes—are among the most prevalent, costly, and preventable of all health problems. For example:

- For every \$1 spent on water fluoridation, \$38 is saved in dental restorative treatment costs.
- For a cost ranging from \$1,108 to \$4,542 for smoking cessation programs, 1 quality-adjusted year of life is saved. Smoking cessation interventions have been called the gold standard of cost-effective interventions.
- The direct medical costs associated with physical inactivity was \$29 billion in 1987 and nearly \$76.6 billion in 2000. Engaging in regular physical activity is associated with taking less medication and having fewer hospitalizations and physician visits.
- For each \$1 spent on the Safer Choice Program (a school-based HIV, other STD, and pregnancy prevention program), about \$2.65 is saved on medical and social costs.
- For every \$1 spent on preconception care programs for women with diabetes, \$1.86 can be saved by preventing birth defects among their offspring.
- According to one Northern California study, for every \$1 spent on the Arthritis Self-Help Program, \$3.42 was saved in physician visits and hospital costs.
- For the cost of 100 Papanicolaou tests for low-income elderly women, about \$5,907 and 3.7 years of life are saved.

(Centers for Disease Control and Prevention, 2008)

# The chronic condition problem in Australia

In Australia, the most authoritative source on health matters (funded by the Australian

Federal Government) is the Australian Institute of Health and Welfare (AIHW). The

following is a summary from their latest report 'Chronic Diseases and Associated Risk

Factors in Australia, 2006' (AIHW, 2006):

- Chronic diseases are common: in 2004–05, 77% of Australians had at least one long term condition; common were asthma (10.0% of the total population), osteoarthritis (7.9%), depression (5.3%) and diabetes (3.5%).
- Chronic diseases can be a problem at all ages: almost 10% of children 0–14 years had three or more long-term conditions; this figure increased to more than 80% for those aged 65 years and over.
- Many people are at risk of developing chronic diseases: for example, 54% of adult Australians are either overweight or obese.
- Some people are affected much more than others: for example, compared with other Australians, Aboriginal and Torres Strait Islander persons have higher mortality from diabetes (14 times higher), chronic kidney disease (8 times) and heart disease (5 times).
- Chronic diseases are a drain on the health system: in 2000–01 they accounted for nearly 70% of the total health expenditure that can be allocated to diseases.

- In 2004 the major chronic diseases (excluding depression) accounted for almost 50% of all deaths in Australia; the leading single cause of death was coronary heart disease (25,000), followed by stroke (12,000).
- These same diseases were implicated in 21.6% (or 1.5 million) of all hospital episodes of care in 2003–04; chronic kidney disease alone accounted for nearly 0.8 million episodes.
- Chronic diseases (including cancers) were responsible for more than 80% of the burden of disease and injury; the conditions reported here accounted for 42% of the total burden.

(AIHW, 2006)

# Burden of disease in Australia

Chronic diseases contribute much to illness, disability and mortality rates. The top 10 causes of disease burden in Australia are chronic diseases (see Table 9 below). These diseases alone account for nearly 43% of the total disease burden in Australia. Please note that DALY counts equivalent years of 'healthy' life lost due to poor health or disability and potential years of life lost due to premature death (AIHW, 2004, 2008c).



Figure 9 - Top ten leading causes of disease burden in DALYs terms, Australia, 1996 (Mathers, Vos, & Stevenson, 1999)

The following is a brief summary about common chronic diseases in Australia:

**Coronary heart disease:** CHD is the largest single cause of death in Australia. It also contributes significantly to illness, disability, poor quality of life and the associated health care costs in Australia (Australian Institute of Health and Welfare, 2006).

**Stroke**: Stroke is the second leading cause of death and a major cause of disability in Australia. Death can occur very soon after a stroke: about one-fifth of people having a first-ever stroke die within a month and one-third within a year. After one year, about half of stroke survivors remain dependent on others for activities of daily living. Some patients, particularly those with 'transient' attack, recover within 24 hours. However, transient strokes are a major risk factor for disabling stroke, with a 13-fold increase in the risk of such a stroke in the following year (AIHW, 2008b).

**Chronic Obstructive Pulmonary Disease (COPD)**: It is a major cause of mortality, illness and disability, making it a leading cause of disease burden in Australia (AIHW, 2008b).

**Depression**: It is the fourth leading cause of disease burden in Australia, with high associated costs including reduced work productivity, days of lost work, educational failure, poor family functioning, poor social functioning, and diminished sense of wellbeing and increased use of medical services. It is also a major risk factor for suicide and self-inflicted injury. Among males in Australia, suicide was the eighth leading cause of death in 2002 (AIHW, 2008b).

**Diabetes**: Type 2 diabetes accounts for about 85-90% of all cases of diabetes in Australia and is largely preventable. It is classed as a chronic disease because it usually takes several years to develop and persists in most cases for the rest of a person's life (Australian Institute of Health and Welfare, 2006).

**Asthma**: Australia has a high prevalence of asthma, relative to other countries. The disease causes particular problems in children, for whom it is a frequent cause of visits to hospital emergency departments and admission to hospital, and older people, in whom the disease overlaps with chronic obstructive pulmonary disease. Asthma is also a common reason for visits to general practitioners and for use of medications. Hence, it has a substantial impact

on health care costs. However, asthma is not a major cause of death in Australia, with less than 400 deaths in 2002 (AIHW, 2008b).

**Cervical cancer:** Cervical cancer was the 18th most common cause of cancer mortality in Australian women in 2005, accounting for 216 deaths in 2005 compared with 329 in 1991. In Australia approximately 1000 women are saved annually from developing cancer though cervical screening as 92.5% of this cancer is preventable (PapScreen Victoria, 2002), compared with the disease (cervical cancer) being fully developed (Dalrymple, 2003). The age-standardised mortality rate from cervical cancer halved between 1991 and 2005 from 4.0 deaths per 100,000 women to 1.9. The numbers and rates of new cases of cervical cancer have continued to decline. There were 718 new cases in Australia in 2004 compared with 1,090 in 1991 (13.2 per 100,000 women of all ages) when the organised screening program commenced. In the two year period 2005-6 the proportion of women aged 20–69 years participating in cervical screening was 60.6% (AIHW, 2008a).

For a more extensive view, the reader could visit the Australian Institute of Health and Welfare web (<u>http://www.aihw.gov.au/</u>) page for more localised information.

## Summary of Section One

Chronic diseases were defined as medical conditions that require ongoing medical care, including monitoring, treatment, and coordination among multiple providers, limiting what sufferers can do and as a consequence are likely to last longer than one year. The financial and health significance to economic budgets, health systems and individuals of these serious conditions have been briefly outlined across the world and in the Australian context.

### **SECTION TWO - Systematic Solutions to Chronic Diseases**

The first section defined chronic conditions and showcased the financial and health burden across the world and Australia. This section will review the literature that argues that preventative measures for the management and prevention of chronic diseases can be well supported by the adoptions systematic (and computer assisted) approaches to care. These approaches are then shown to be in line with new evidence-based medicine paradigms of care. Current shortcomings in the systematic care of cervical cancer prevention and diabetes management are presented as common examples of the current chronic disease problems.

### Introduction

From a medical point of view, there are many clinical differences across the hundreds of chronic conditions that meet the definitions adopted in this paper. Some conditions however, can benefit from more *preventative* systems; for example, cervical cancer is a case in point, a condition that can be well managed if caught early in its development. To achieve this early detection (prevention) it is necessary that females have a Pap smear test (screening) at a well defined periods of time (approximately two years in most cases). Other conditions like Diabetics, who already have the condition fully developed, would benefit much more from the *management* system to monitor their existing condition (WHO, 2008b).

At this stage is probably worth noting that in this study, the line between management and prevention of chronic diseases can be quite blurred, in fact it could be said that both are preventative measures of varying degrees. For example, what lay people commonly call *prevention* is referred to in the health field as *primary prevention* which deals with *screening* healthy people before they develop a disease, as in the case with cervical cancer previously mentioned. *Management* on the other hand is termed in the health field as *Secondary prevention*, as in the case with diabetics, whereby someone already has the disease but ongoing *monitoring* prevents it from becoming life threatening (Swan, 2004). Nonetheless, as Wagner and Groves (2002) pointed out earlier: each condition confronts patients and their families with the same spectrum of needs: to alter their behaviour; to deal with the social and emotional impacts of symptoms, disabilities, and approaching death; to take medicines; and to interact with medical care over time. In return, healthcare must ensure that patients receive the best treatment regimens to control disease and mitigate

symptoms, as well as the information and support needed effectively to self manage their health and, in many instances, their death (E. H. Wagner & Groves, 2002).

### Acute vs. Chronic Diseases models of care

At the present time, most current health care systems are based on responding to acute problems (acute care system of care), urgent needs of patients, and pressing concerns. Testing, diagnosing, relieving symptoms, and expecting a cure are hallmarks of contemporary health care. While these functions are appropriate for acute and episodic health problems, a notable disparity occurs when applying this model of care to the prevention and management of chronic conditions. Chronic Disease health care is inherently different from health care for acute problems, and in this regard, current health care systems worldwide fall well short (WHO, 2008b). Studies show that 30 to 40% of patients do not receive care according to current scientific evidence (known as Evidence Based Medicine –EBM), while approximately 20% of the care provided is not needed or is potentially harmful (Grol et al, 1998; Schuster et al., 2003). More specifically, there is growing evidence suggesting that there are serious problems with the quality of care that patients with chronic conditions receive (National Institute of Clinical Studies, 2008); with the literature suggesting that only 20 to 50% of people with common chronic conditions were under good control (Institute of Medicine, 2001; Schuster et al., 2003; Solberg, 2003; Veale, 2003). The advent of evidence-based medicine, as opposed to acute care models, and in particular the production of best practice clinical guidelines (minimum standards of care), has been a significant recent advance in medical science. However, a consistent finding in health services research is the gap between the evidence and actual medical practice (T. Bodenheimer, 1999b). It's been estimated that it can take up to 17 years for new clinical evidence to be put into practice at the general practitioner level (E. A. Balas & Boren, 2000). Furthermore this failure to translate new medical research findings into practice does not only manifest in chronic conditions or the use of emerging technologies and pharmaceuticals, but also in the most routinely treated medical problems like the common cold; for example, researchers in several different studies showed that physicians continue to prescribe antibiotics for the common cold in 40-60 per cent of patient visits even though there is no evidence that antibiotics are effective for the cold virus (Gonzales, Steiner, & Sande, 1997; Manious, Hueston, & Clark, 1996; Nyquist, Gonzales, Steiner, & Sande, 1998).

A potential solution postulated by the World Health Organisation is the introduction and use of new technologies (computers) to support systematic approaches to chronic care. Computer assisted clinical information systems are known to have a positive outcome on preventative and management approaches to chronic diseases care (WHO, 2008c). Furthermore, The World health Organisation suggests that well-designed, locally relevant and sustainable clinical information systems are essential if the goal of coordinated longterm care is to be achieved. These systems enable the organization of patient information, tracking and planning of patient care, provision of support for patient self-management, and scheduling of patient follow-up and are effective when they encourage communication between clinical team members and patients. They can take a variety of forms, and effective systems can be created even in very resource-poor settings. They may be paperbased, such as a chronic disease register kept in a notebook, and be linked to patient records, computerized, or a combination of the two (WHO, 2008c).

Another important characteristics of chronic diseases care is that it cuts across several different health-care disciplines, such as primary care (general practices and hospitals —in acute cases), secondary care like community health centres and allied health care providers (podiatrists, diabetes or asthma educators, physiologists, ophthalmologists, etc) and specialist (heart surgeons, endocrinologists, etc) from a number of specific medical fields. Multidisciplinary health-care teams, either residing in a primary health care setting (i.e. nurses or general practitioner) or external (Allied Health providers), are an effective means of achieving this goal and of improving health-care outcomes (WHO, 2008c). This situation requires information systems that can support, communicate and interact with each other.

The systematic solutions to prevention and management of chronic conditions proposed by the World Health Organisation appear quite simple and commonsense but the current situation in current health systems is somewhat different.

### Systematic shortfalls in cervical cancer prevention in the Australian context

In Australia, and despite the massive expenditure and media campaign efforts by both Federal and State governments and organisations, cervical cancer screening rates are well below the optimum and falling (Australian Institute of Health and Welfare, 2007;

Department of Health and Ageing, 2003). Despite existing efforts there is still one female in 101 at risk of developing the disease (PapScreen Victoria, 2004).

One of the shortfall stems from relying on state based registers. These state based registers provide general practices with quarterly listings of females that had last performed a pap smear at their practices in the past two years; the register then recalls these females for further tests, usually by sending recall letters. The recall process is almost completely removed from the practice itself.

A further problem is that some of these registers do not cover the entire female population at risk. For example, the Victorian Cytology register covers fewer than 50% of females in the state (PapScreen Victoria, 2004). If females were not tested for a long period of time or they have moved to a different address they either do not show up on the state registers or cannot be contacted due to dated contact details. This situation precludes many females from having a recurrent test and is fraught with many risk management (medico-legal) dangers. This issue was further highlighted by one of the general practice accreditation bodies not too long ago. They warned practices, after an event with the Queensland register (not sending reminders for a number of months), to only rely on their own practice register (AGPAL, 2003).

The link to the introduction of technology supported information systems had been quite clear to the government of Australia, to the point that incentives were put into place in 2002 for general practitioners (GPs) and their practices to develop such systems (Health Insurance Commission, 2003). However, despite expenditure and media campaign efforts, screening rates ranged around the 50% mark (Department of Health and Ageing, 2003) and seemingly falling in Victoria (PapScreen Victoria, 2004). In fact, after three years of offering incentives only a handful of practices had reached the stipulated screening rate benchmark of 35% for the first year (GP Access Branch, 2005).

Oliver Frank, then Chairman of the Royal Australian College of General Practitioners (RACGP) and its Information Management Committee, also concluded that Government (State based registers) and Divisions of General Practices are not efficient alternatives to practice based systems (Frank, 1997).

It appears that the solution hinges on localised (Practice) cervical screening information systems able to provide up-to-date information to create strong practice registers that would be able to recall and remind females for their corresponding screening tests. This stems from the fact that about 88% of Australians visit a GP at least once in any given year (Knox, Harrison CM, Britt HC, & Henderson JV, 2008).

#### Systematic shortfalls in diabetes management in the Australian context

The best available evidence suggests that a well managed diabetic treated in general practice would have at least two pre-determined visits organised throughout the year (a cycle of care). During these pre-set visits certain measurements (height, weight, blood pressure, etc.) and blood test (Hba1c, Cholesterol, Micro albuminuria, etc.) would be systematically taken. At this point also, a number of set interventions would be put in place (medication reviews, feet checks, eye checks, education, and lifestyle counselling, etc.). These essential checks and yearly tests to monitor the patient's disease progression would help define the medical course to take (Diabetes Australia, 2007; UK Prospective Diabetes Study Group, 1998; E. Wagner, 2000). Furthermore, Evidence from the UK Prospective Diabetes Study suggests that intensive control of a patient's blood glucose and blood pressure levels results in improved clinical outcomes and fewer diabetes-related complications (UK Prospective Diabetes Study Group, 1998).

The reality in Australian general practices, although improving over the last few years, was not conducive to good management as could be expected. For example, the International Diabetes Institute suggested that only 59% of diabetics are being screened for foot ulcers, yet it was the most common cause of non-traumatic amputation and also the second most common cause of blindness and dialysis in patients under 50 (International Diabetes Institute, 2004). Furthermore, and despite the known benefits in intensive monitoring, screening rates for Micro albuminuria and lipids in Australia remained low (Audehm, 2004b; Mangione et al., 2006). Medicare data suggested that only 27% of people with Diabetes met the criteria for Hba1c testing in 1999-2000 (Australian Institute of Health and Welfare, 2002). Since then, the exact number of patients without Hba1c tests has been contested by a number of other studies; for example: a 2006 report quoting 2000 data revealed that only 46% complied with recommendations (Steering Committee for the Review of Government Service Provision (SCRGSP), 2006); in another two studies the

rates were 74.8% (2005) and 60.6% (2003) respectively (McDermott RA, Tulip F, & Schmidt B, 2004).

In general practice Diabetes care remains patchy and ad-hoc and the benefits of technology supported systematic approaches to manage diabetes sufferers are yet to be fully realised.

# Summary of section two

This section suggested that preventative measures for the management and prevention of chronic diseases can be well supported by the adoption of systematic approaches to care in general practice. These approaches were then shown to be in line with new evidence-based medicine paradigms of care; and current shortcomings in the systematic care of cervical cancer prevention and diabetes management were presented as common examples of the current chronic disease problems faced in Australian general practices.

## **SECTION THREE – Information Systems in Health**

The first section introduced the reader to chronic conditions in order to set the significance of the study. The second section highlighted the poor outcomes of current chronic diseases care in general practices and the potential for systematic approaches using evidence-based guidelines.

This section attempts to inform the reader on current information systems developments in health to improve health outcomes, mainly focused on large hospital implementations. It will give a brief introduction from a number of countries' perspectives, including Australia. The literature on health information systems failure is then briefly recognised.

### The world wide investment in technology to improve health outcomes

The current failure of most western world health systems to prevent and manage the alarming growth in chronic diseases such as diabetes, asthma, cervical cancer and so-on, as well as its escalating health costs is rapidly becoming a major concern for governments and health authorities (Berwick, 2002; HealthConnectSA, 2007; WHO, 2008a). While some studies have found that the introduction of information systems does not contribute to improved outcomes (Linder, Ma, Bates, Middleton, & Stafford, 2007), the overwhelming majority of studies do suggest that the benefits of using information systems support the improvement of health outcomes (Committee on Data Standards for patient Safety, 2003; Committee on Rapid Advancement Projects: health care finance and delivery systems, 2002; GAO, 2003; Institute of Medicine, 2001; News-medical.net, 2004; WHO, 2008c).

Regardless of the negative impact that a small number of studies suggest, the potential benefits to affect health outcomes have not been lost on governments and health authorities worldwide where enormous investment has gone into computerised hospital information systems (Littlejohns et al., 2003). A brief background to some western countries' health outcomes and information systems situation is outlined for the reader's benefit.

### The United States

In the US in 2001, US1.4 trillion was spent on health care, an amount that represents 14.1% pf GDP and an increase of 8.7% over the previous year (Center for Information Leadership, 2003). It is estimated that it would climb to 17.7% by the year 2012 (Health Affairs, 2003).

Reducing mishaps from medical management is central to improve quality and lower costs in healthcare; since nearly 100,000 patients were estimated to die from preventable deaths annually, in hospitals in the United States; which is estimated at a cost of 9 billion US dollars (Barach & Small, 2000). This toll exceeds the combined number of deaths and injury from motor and air crashes, suicides, falls, poisonings and drowning (Lazarou, Pomeranz, & Corey, 1998). Furthermore, under-reporting of adverse events is estimated to range from 50 to 60% (D W Bates et al., 1995). It has also been established that manual systems have accounted for one in three adverse reactions to drugs where a 'known allergy' had slipped through (D W Bates et al., 1995).

In a recent report by the United States General Accounting Office (2003), 10 Health care delivery organizations reported 13 examples of cost savings and other benefits resulting from the use of information systems and included:

- \$8.6 million in annual savings by replacing outpatient paper medical charts with electronic health records.
- Over 1200 wrong drugs or dosages were prevented by using bar code technology
- A 53% decrease in claims rejected due to eligibility checks during registration
- Reduction of 28 staff positions needed to handle paper records with over \$700,000 in associated cost savings.
- 40% decrease in new orders for portable chest x-rays, with over \$1 million saved in associated costs
- Increase in patient safety
- Improved communication and documentation
- Reduction in average length of Hospital stays 7.3 to 5 days.
- Improved quality of care, with a 48% increase in the number of patients with good or excellent Diabetes control

The latest figures show that the US trails other countries in the use of electronic medical records (these are computerised databases that collect patients' clinical information). The rate being 20-25% for hospitals (Burt & Sisk, 2005; Goldsmith & D. Blumenthal et al., 2003; Hillestad, Bigelow, Bower, & et al, 2005). Furthermore, of these hospitals, only about 5% require their doctors to use them (Tanne, 2004).

# The United Kingdom

In the United Kingdom, the publication in 2002 of the Wanless report (a review of the long term trends affecting the health service and the resources required over the next 20 years) convinced the Department of Health to commit to a fully integrated national information system (Wanless, 2002). This national programme for information technology meant an

investment of £6.2bn ( $\textcircled$ .2bn, \$11.1bn) over a 10year programme of change. It promised to modernise information and communications technology across the NHS and provide the tools to help streamline the healthcare services. It would create a basic health record for all 50 million patients, enabling quick and easy access to the essential information that anyone making health decisions about a patient needs to know. It would connect more than 30 000 general practitioners and 270 acute, community, and mental health trusts in a secure system and it promised to 'improve the convenience and quality of care' by having the right information in the right place at the right time (Humber, 2004). Conversely in 2002, 98% of general practices in the United Kingdom were already computerised in 2003 (Wanless, 2002).

#### New Zealand

New Zealand is described as having one of the most technology-enabled and integrated health sectors in the world (Orr, 2005). It is the only country in the world with a national health index, a unique national identifier that enables disparate patient management systems to share information. The federal government is working strategically and collaboratively towards electronic health records and a fully integrated health information system. The national framework for achieving this clearly delineates local, regional and national roles (Rillstone, 2003).

### Australia

Health expenditure in Australia stands at \$72.2 billion dollars, which is 9.5% of GDP; with some \$23,371 million going to Hospital expenditure, which doubled over the last four decades (Australian Institute of Health and Welfare, 2004). Hospitals also account for more than 50% of States and Territory Government's total health expenditure, plus a couple of billions on capital expenditure and consumption (Australian Institute of Health and Welfare, 2004). Australia spends a similar proportion of its GDP on health as Canada and France and more than Japan, New Zealand and the United Kingdom, but less than the US (Australian Institute of Health and Welfare, 2004).

As early as 1995, it was reported that between 10,000 and 14,000 preventable deaths may occur in Australian Hospitals each year, however this is the tip of the iceberg when it is taken into consideration that for every death, there are many potentially preventable serious complications (Hillman, 1999). This is further complicated by a 'voluntary'

reporting system that does not provide 100% of certainty regarding 'near-misses' and other morbidity data that might clarify what is actually happening (Noble, 2003). And yet, Australian hospitals still rely on paper-based drug charts and outdated reference texts to support the management of inpatients' medication (Stephenson, 2001).

While general practitioners are rapidly embracing the Internet as a real-time source of clinical knowledge, many hospitals do not offer doctors and healthcare professionals Internet access on the wards. This deviation represents a reversal of fortune for Australian hospitals, which have provided doctors with electronic access to patients' laboratory results for many years (Stephenson, 2001). Furthermore, the commitment to 'legacy' systems (an old computer system or application program that continues to be used because the user or typically an organization, does not want to replace or redesign it) has prevented large hospitals from embracing evolving technologies (Stephenson, 2001).

These legacy systems, which have been purchased over the past decade at enormous cost, provide access to patient management information and clinical results. Due to the proprietary nature of these systems, adding new applications can be both costly and time-consuming. Many hospitals are essentially locked into a cycle of dependence upon a single software provider that can only be broken by significant investment in system design (the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements ) and integration (the bringing together of the component subsystems into one system and ensuring that the subsystems function together as a complete system). Unfortunately, given the range of proprietary systems used within Australian hospitals, there cannot be a 'one size fits all' solution (Stephenson, 2001).

Hospitals have also suffered from the lack of practical solutions for the clinical interface. While the nature of most general practice consultations remains compatible with the use of a desktop computer, it is impractical (and prohibitively expensive) to expect medical officers to carry laptops on ward rounds, or to continually log on to computers located at every bedside (Stephenson, 2001).

Nevertheless, Australia is currently developing a network of electronic health records, called Health*Connect* that aims to improve the flow of information across the Australian health sector. It involves the electronic collection, storage and exchange of consumer

health information via a secure network and within strict privacy safeguards. Health*Connect* gives doctors, and other health professionals, quick and secure access to important and potentially lifesaving medical information. Health*Connect* will be implemented nationally on a state-by-state basis and is expected to improve the quality and safety of health care for all Australians. Participation in Health*Connect* is voluntary and participants may choose to withdraw at any time (Health Connect, 2005). Health*Connect* is expected to realise the following benefits:

- Rapid access to vital and accurate health information;
- Reduced duplication of services;
- More time available for direct care;
- Greater portability of health records for an increasingly mobile population;
- More control for consumers over who can access their health information;
- More active participation by consumers in decisions about their health care;
- Better quality information exchange between health care providers for improved diagnoses and better quality care; and
- A more comprehensive picture of Australians' health to promote advances in the diagnosis and treatment of illnesses and better-targeted decisions about health care. (Health Connect, 2005)

The issues outlined above are also present in non western countries as well, where health outcomes and information system issues are somewhat similar all the way from South Africa (Littlejohns et al., 2003) to Hong Kong (Chan JT, 2000) and across all over to Europe (Aarts, Doorewaard, & Berg, 2004; News-medical.net, 2004). The one characteristic that seem consistent in the literature about health information systems is that the majority of them, when evaluated, appear to have failed (Aarts et al., 2004; Clarke, Coakes, Hunter, & Wenn, 2003; Gauld, 2007; Littlejohns et al., 2003; Schuster et al., 2003; Silverstein, 2007; Sittig, 2001; Surmarcz, 2003); even in New

Zealand (Gauld, 2007).

## Summary of section three

The above review suggests that investment in technology to improve health outcomes across western worlds including Australia has been gaining pace. However, most of these large investments appear to be focusing solely on the introduction of technology and on the most part appear to have failed. Likewise, general practices across the world appear to be at various stages of development; where some countries like New Zealand appear to be well advanced in the implementation and use of technology in general practice meanwhile others like the US appear to lag behind.

### Lessons from the Business Information Systems Sector

The abovementioned findings are well supported by evidence from the Business Information Systems field, which is well versed in the failure of *technological* approaches to implementations in the business sector. These failures support the view that the introduction of information systems does not just represent a 'technology' to be implemented, but a complex entity comprised of an assemblage of *technological, human, organisational* and *environmental* dimensions (S. Bell & Wood-Harper, 2003; Noyes & Baber, c1999; Skidmore & Eva, 2004; Tatnall et al., 2003).

#### **Development and implementation of Information Systems**

The process of creating or developing an Information Systems focuses on the identification, analysis and implementation of computerised business systems to support the management control and administration of an organization (Skidmore & Eva, 2004). The implementation of a system is defined as the process of making the system operational in the organization (Alter, 1996); which includes the process of preparing people for the new system (Zwass, 1992).

The number of steps or phases to develop and implement a system varies according to many authors (D. E. Avison & Fitsgerald, 1995). However generally there are two main school of thought or traditions, the *Computer Centric* tradition, of older roots, where the computer expert is the centre of the system. This tradition has been lately superseded by the *User-Centric* tradition, where the user is the centre of the system (S. Bell & Wood-Harper, 2003; Bowman, Gregg, Williams, Engelgau, & Jack, 2003; Clarke et al., 2003; Schuler & Namioka, 1993; Tatnall et al., 2000). Given the distinct user-centric needs identified in the previous section, only the user centric views are reviewed in this section.

User-centric views have roots in the Scandinavian; UK and American traditions (Beynon-Davies, 1989). While these traditions differ from one another, they all share user-centric or participatory design development and implementation principles, these can be summarised in the following way:

*User Participation:* unlike 'user involvement' in older designs, it aims at meaningful *participation* of the user and social scope (Hirscheim, 1983).

*Empowerment:* emphasises the rights and abilities of people to *participate as equals in decisions* about the affairs that affect them (Clement & Besselaer, 1993).

*Work Analysis:* Emphasis on the *context* of the current work situation (Beynon-Davies, 1989).

Job Design: Emphasis is not just on the development of technical design but on *the design* of work as well (Beynon-Davies, 1989).

*Cooperative design and prototyping:* Emphasises a *design process* where both *users and developers* are participating actively and creatively, drawing on their different qualifications (Bodker & S. Gronboek, 1991).

*Mutual learning:* Where users gradually learn about the technical possibilities and developers gradually learn about the work of organizations (Beynon-Davies, 1989). *Design by doing:* Where early experimentation and testing is designed to capture breakdowns and reflect on the evaluations of such experimentation (Beynon-Davies, 1989).

*Low-technology prototyping:* The use of non-computer prototypes plays a role in designing when computer-based (high-technology) prototypes get in the way of effective design in that they are predicated on a level of understanding which the user community may not currently have (Beynon-Davies, 1989).

Table 10 reflects graphically the cyclical user centred development designs, and that the number of phases also vary from author to author.

The literature further suggests that it is not yet clear where development stops and implementation starts, and how these subdivisions vary from author to author (Table 10); but typically as the following figure suggests there is a *Problem-solving phase*, an *Implementation phase* and a *Maintenance phase* (Tatnall et al., 2003; Tatnall et al., 2000). The *Problem-solving phase* can be divided into *Problem identification*: where the issue is first identified and defined; *Planning*: where systems objectives are set, constraints and feasibility studies are conducted; *Analysis*: where the study is stated, participants are organised and performance criteria is set; *Designing*: where details system designs are prepared and alternate systems are identified evaluated.

As Tatnall et al (2000) would suggest, problem solving does not occur in a vacuum and most problem situations relate to systems whether manual or computer-based, already in existence. This draws the suggestion that often a system development is actually modifying, extending or improving a system that is in some shape or form already in place (Tatnall et al., 2000).

The *Implementation phase* involves planning and announcing the system to be implemented to the organisation, secure hardware and software, preparation of databases and physical facilities, training of participants and users and moving to new system. The *Maintenance phase* involves the normal use of the system, auditing its behaviour looking for any types of problem and conducting on-going maintenance of the system.



*Figure 10 – Two development and implementation approaches (Tatnall et al., 2000) p 57 & 58.* 

The methodology shown above is essentially a top-down approach, where problems are solved by fragmenting them into separate parts and then deriving a solution for one part at a time (Tatnall et al., 2000).

A further methodology used for the development and implementation of systems is the *Soft Systems Methodology*; which involves a more holistic approach which is intended to incorporate the human element of such systems into the systems design work. It is claimed to be the most appropriate in the analysis of systems that are messy, poorly defined, or specially complex (Checkland, 1991; Tatnall et al., 2000). The basis of this methodology is a comparison between the existing world and a model of the world as it might be; attempting to keep these two worlds separate while ensuring an appropriate mapping between them. By comparing the ideal models with the real situation, discussion becomes the basis for how systems could be improved (Tatnall et al., 2000). This methodology can be seen in light of seven steps:
- 1. **The problem situation: unstructured.** The researcher begins by investigating and experiencing the problem situation whilst making as few assumptions about its nature as possible.
- 2. **The problem situation: expressed**. A detailed description or rich picture is developed. This picture tries to capture peoples' relationships and value judgements.
- 3. **Root definition of relevant systems:** The essence, or essential nature, of each of the relevant real systems is considered under the following headings:

Customer/client: Those who benefit from the system.

Actors: people who carryout activities that transform inputs and outputs.

**Transformation:** The core processes in the human activity system that causes the conversion of inputs into outputs.

**World view:** The image or model of the world, held by members of the organisation under investigation, that makes the particular human activity system important. **Owner:** The entity with the power of veto.

Environmental constraints: From outside the system boundary.

- 4. **Making and testing conceptual models:** From the root definitions the researcher develops models of how a system like this might ideally function; without taking account of how the system actually works.
- 5. **Comparison of the conceptual; models with reality:** How these conceptual models differ from reality so that suggestions can be made to improve them.
- 6. **Identification of feasible and desirable changes:** Changes are only feasible if they are technically possible and also fit in with the culture of the organisation. They are desirable if they represent improvement in the eye of the customer and the owner.
- 7. Action to improve the problem situation: These desirable and feasible changes are finally put into practice.

The relevance of these methodologies is important when existing implementations are examined (Chapter Four) and their contribution to the emerging framework noted (Chapter Five).

#### **SECTION FOUR - Information Systems in General Practices**

The first section introduced the reader to chronic conditions in order set the significance of the study. The second section highlighted the poor outcomes of current chronic diseases care in general practices and the potential for systematic approaches using evidence-based guidelines. The third section informed the reader on current information systems developments in health (mainly large hospitals) to improve health outcomes from a number of countries' perspectives, including Australia.

This section will introduce the reader to information systems in general practice specifically, beginning by highlighting the implementations shortcomings in general practice. It will also review the learnings from past implementations in conjunction with the knowledge existing in the Business Information Systems sector to begin understanding the 'what' and 'how' of information systems so that they can be implemented and adopted in general practice.

#### Introduction

Internationally, there have been moves to invest in information technology as part of the infrastructure necessary for a systematic approach to general practice care. Governments in New Zealand and the United Kingdom have recognised computerisation as a necessary precursor to quality improvement, which has driven the computerisation of general practice in those countries (Brimacombe & Rowe, 2003; Health Care and Informatics Review, 2002). In turn these initiatives have provided impetus to similar developments in Australia (Richards et al., 1999).

Almost 90 per cent of British general practices had computers by the early nineties (Benson, 2002; NHS Management Executive, 1993), and computers are considered an essential technology for health care in the United States (Dick, 1991; GAO, 2003), although their physician use of electronic health records is lagging behind most other English speaking countries at 15-20% (Burt & Sisk, 2005).

In Canada, health information technology is at an earlier stage of development with approximately 70% of general practices using computers for electronic billing in 2000 (HealthConnectSA, 2007). Only 12% of GPs were using an electronic patient management system for complete medical records, although 57% of GPs actually had such systems (but they were used mostly for administrative purposes) (Didham & Martin, 2004 ). Nevertheless, specific regional initiatives such as the Alberta Physician Office System Program and the Ontario Family Health Network ePhysician Project, were some of these programs have more than 80% of physicians currently using or converting to electronic medical records (Gregoire, 2006).

In Australia, there is a general social acceptance that general practice services must be accessible to those who need primary medical care, and that general practitioners should provide quality services that are effective (Richards et al., 1999). Nonetheless, health outcomes that are directly attributable to information technology (IT) are questionable at one end (Sturnberg et al., 2003), while others suggest that evidence for positive health outcomes due to its use is growing (Audehm, 2004a; Ball, Douglas, & Lillis, 2001; Lin, 2004; UK Prospective Diabetes Study Group, 1998).

Although the last few years have seen strong calls and financial incentives from the Australian Federal Government for the application of technological advances to contain escalating health costs (Australian Institute of Health and Welfare, 2004; Health Insurance Commission, 2003) which have resulted in considerable uptake of computers (technology), this has failed to translate into the actual use of those technologies to support systematic approaches to care (Enrico Coiera, 2004; Littlejohns et al., 2003; Nancy Lorenzi, 2004; Richards et al., 1999; Sturnberg et al., 2003; Van Der Weyden, 2003). This situation seems to suggest that the implementation process was partially successful in adopting the technology but failed to achieve the intended application of it. That is, the effective use of the technology to improve patient care.

#### The Implementation shortcomings in general practices

Most studies of the impact of information systems in organizations tend to see the implementation process as a 'rollout' of technology, as a technical matter removed from organizational dynamics (Aarts et al., 2004). In the UK, critics also recognise that the term 'national programme for information technology' is misleading because the programme isn't just about technology. Its successful implementation will affect the ways in which people work and services are delivered. (A good example is the electronic booking of appointments, which will require clinicians—who have traditionally been very independent—to relinquish, to administrative staff, some control over their diaries). The national programme must spend money on facilitating these changes. Otherwise, the result could be good information and communications technology but no change in the way things are done (Humber, 2004).

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In Europe, the work of Berg, et al (1998) suggests that for example, data entry has always been a major obstacle to healthcare professionals' acceptance of electronic records (Royal College of Physicians, 2004; Walsh, 2004). Most input makes use of structured data entry, where the user has to select relevant clinical terms from a predefined list. This is restrictive, and extracting this information from a narrative (plain text written during a patient consultation) requires more work from the clinician. Also, entering structured data can subtly change the meaning of the item coded (Mann & Williams, 2003). Furthermore, creating a standardised clinical set of terms and keeping these up to date is resource intensive. Rather than placing the burden of coding on the doctor, the developers of electronic records systems should be more oriented towards creating tools that support medical work as a social, interactive process (Berg & Langenberg et al, 1998). Others added that medicine is complex, many doctors type badly, few medical computer systems are user friendly, and indeed some time ago doctors in one hospital group rebelled and refused to use them (Dunea, 2004; Walsh, 2004).

Conversely, not all implementations fail; some have even provided useful information on how to implement information systems. For example:

- A computer-based nursing documentation system on four wards of the University Hospital of Heidelberg was introduced and systematically evaluated its preconditions and its effects in a pre-test-post-test intervention study. They demonstrate the importance of computer experience and acceptance of the nursing process on a ward but also point to other factors such as the fit between nursing workflow and the functionality of a nursing documentation system (Ammenwerth, Mansmann, Iller, & Eichstädter, 2003).
- A successful implementation of PACS (Picture Archiving Communication Services) at the Southern Ohio Medical Center (SOMC) can be seen in the amount of money and usable space this hospital has saved. The workhorse of Agfa's IMPAX system is the EMC Symmetrix enterprise storage system, which provides about 42 TB of raw storage, Stewart says. Since all images are now stored digitally, about 1,700 square feet of floor space has been reclaimed, and the hospital was able to reduce its film library work force from 15 full-time employees to nine (Rogoski, 2004).
- The capabilities for customisation, individualization, and innovation are important considerations when choosing or developing a product for computerized POE (Physician Ordering System). Every health care facility is unique in terms of personnel and politics (Schuster et al., 2003)

In Australia, Health*Connect* (already described in the previous section) is a clear example of the mindset of current health and political authorities; choosing to invest in an 'IT rollout' project with little regard to the implementation issues (for example: the large amounts of education time and budget needed for practitioners to able to use the technology) on the ground, where implementation is often left in the hands of individual

players and partnerships with minimal budgets (DGPG, 2005; King, 2005; Ryan, 2005; Victorian Government Health Information, 2005; WA Country Health Services, 2005). In this context, the takes up of information systems is mostly seen to be driven by the perceived *benefits* that *technology* (IT) can bring to general practice; some of these can be grouped into specific process functions; some of these benefits and/or advantages can also serve more than one function (Adkins, 1997; General Practice Strategy Review Group, 1998; IBM Consulting Group Health Practice, 1997); for example:

# Administrative/organisational functions

- More efficient storage and retrieval of clinical information;
- Ability to obtain and provide data for research on population health;
- Enhanced security and integrity of records;
- Avoidance of, or reduction in the difficulty involved in the production and storage of forms.
- Enhancing the safety of prescribing through automated interaction and dosage checking, and reduction in the time and effort required to produce legible, properly formatted prescriptions;
- Enhanced rural practitioner communication, support and retention;
- Ability to obtain and provide data for research on population health;

# **Political functions:**

- Confidence for the consumer that their practitioner has the necessary support and information to effectively manage and coordinate the delivery of their care and to facilitate the best health outcomes;
- Enhanced rural practitioner communication, support and retention;
- Reduced cost of health insurance claims management and benefits payment;

# Clinical functions (Patient care, diagnostics, quality of care):

- Improved capability to implement evidence-based and outcome-oriented assessment, disease management and resource use approaches by making relevant information available at the time of decision-making;
- Greater access by practitioners to information on how the practice is performing both clinically and financially to promote a higher level of consistency & quality of patient care;
- Enhanced health promotion through development of registers for recall and screening;
- Enhancing the safety of prescribing through automated interaction and dosage checking, and reduction in the time and effort required to produce legible, properly formatted prescriptions;
- Enhanced patient education opportunities.

# Legal functions (Risk Management, etc):

- Diminution of risk to patient and practitioner through the provision of automated alert and reminder systems;
- Enhanced health promotion through development of registers for recall and screening;

- Enhancing the safety of prescribing through automated interaction and dosage checking, and reduction in the time and effort required to produce legible, properly formatted prescriptions;
- Reduced cost of health insurance claims management and benefits payment;

## **Financial functions**:

- Greater access by practitioners to information on how the practice is performing both clinically and financially to promote a higher level of consistency & quality of patient care;
- Reduced cost of health insurance claims management and benefits payment;

# **Communication functions**:

- Enhanced connection and flow of information between general practice and diagnostic test providers, hospitals, specialists, other general practitioners, other health service providers and patients;
- Enhanced rural practitioner communication, support and retention;

(Adkins, 1997; General Practice Strategy Review Group, 1998; IBM Consulting Group Health Practice, 1997)

Consequently, as this list suggests, the health implementation focus has been on the *advantages* and *benefits* the technology brings to a number of process functions. Some are not even of direct benefit to general practice, but to those outside general practice (funding bodies) that would well benefit from its introduction in general practice (by for example streamlined communication processes and cost savings). Hence, development and implementation models for general practice have inevitably been '*technology-driven*' (Enrico Coiera, 2004). This technology-driven view has been further perpetuated, by successive commonwealth governments, through payment incentive programs (to take up computers) (Department of Health and Aged Care, 2003); in the hope that cost savings could be achieved as a result of GPs utilising the technology (Nader, 2005; Van der Weyden & Armstrong, 2004).

This technology-driven intervention has succeeded in getting computers on general practitioners' desks and reducing significantly the costs in mistakes caused by erroneous drug interactions (computerised prescribing can produce warning signals when a physician is about to prescribe a drug that would have an adverse interaction with a patient's existing medication or allergy). However, this is only a minor win, involving only the general practitioner (GP) in the practice (McInnes, Saltman, & Kidd, 2006). There is an enormous potential for the development of useful practice-wide chronic disease management systems

that include the participation of not just the GPs but also nurses, staff and allied health professionals. All in their relevant roles, for the integrated care of patients including the use of computerised disease registers, assessment of risk factors, reviewing of chronic disease guidelines and prescribing information. Nonetheless, these practice-wide changes have been much less successful (McInnes et al., 2006).

Furthermore, the adoption of these technologies (computers on desks) to support the systematic approaches to care in general practice (seen earlier in section two of this literature review) require a major shift in current medical care models (Chew & Armstrong, 2002; Chew & Van Der Weyden, 2003; Rust & Cooper, 2007) This shift (a clinical dimension), as previously explained, involves changing the existing practice of treating a patient when they come in already disease-stricken (acute care models), to developing systems to assist the prevention of care so that patients are systematically and periodically seen by their doctor to avoid getting to that stage (preventative models of care) (WHO, 2008b). This of course involves planned change and change management strategies.

#### Change management functions of an implementation framework:

Effecting change in any organisation is at best extremely difficult. Logical reasons for change do not automatically translate into change in behaviour or practice for a variety of reasons, this is just as true in general practice (Grol & Grimshaw, 2003 ; HealthConnectSA, 2007; Liaw & Humphreys, 2006). For example, the health sector has had many strategies to translate medical evidence into clinical practice. These include passive dissemination methods such as mail-outs and active engagement in the form of educational outreach and reminders, as well as multifaceted interventions targeting the barriers to change. The success of these strategies has varied. A few systematic reviews have been conducted recently on the studies of implementation effectiveness and their evaluation was as follows:

- Passive dissemination is generally ineffective
- •Active approaches are more likely to be effective but are also more costly
- •Interventions based on addressing barriers to change are more likely to be effective
- •Multifaceted interventions targeting different barriers to change are more likely to succeed than single interventions.

(Grimshaw, Thomas, Maclennan, & et al, 2004; Grol & Grimshaw, 2003)

The health sector cannot appear to effect change successfully with their existing strategies. In essence, it appears that to succeed in implementing chronic condition information systems, the framework must be able to address the change management shortcomings examined in the literature. To this effect, it is important that change management theories and strategies are further examined and well understood in the context of developing the proposed information systems framework.

#### **Change Management Theories**

There is a wide body of knowledge in regards to theories of change from a number of perspectives that might (or might not) be partially relevant for the purpose of this review. For example: 'individual change theories'; these include: Cognitive Change: Emotional Change: Behavioral Change and Changing Relationships (Shapiro, 2005). However, for the purpose of this study as seen earlier, it was recognized that changing GP behaviour (individuals) did not achieve the practice-wide systems expected at the organisational level (social/organisational change) (Enrico Coiera, 2004; Van Der Weyden, 2003; WHO, 2008c). Therefore only theories of relevance to this study will be reviewed. A recent report aptly called 'GP Change Management Strategy' published in Australia in 2007, reveals the lack of new theoretical knowledge available to effect change management in general practice. The authors of the report proceed to delineate four theories of change management, three of which were developed in the late sixties (HealthConnectSA, 2007; F. Nickols, 2006); nevertheless, a more extensive examination of these theories, found in Nickols (2003) and reproduced next, might yield support to the development and implementation of the intended framework later in Chapter 5 (Bennis, Benne, & Chin, 1969; Chin & Benne, 1969; Fred Nickols, 2003):

#### **Empirical-Rational**

The underlying assumption behind this theory is that people are rational beings and will follow their self-interest – once it is revealed to them. Successful change is based on the communication of information and the proffering of incentives. For the most part, people are reasonable and they can be reasoned with. In short, they can be persuaded. Value judgments aside, they can also be bought. This is the 'carrot' side of carrot-and-stick management. But for reason and incentives to work, there has to be very little in the way of a downside to the change and/or the upside has to greatly outweigh it. If there is a big downside and it's not offset by an upside that is big enough and attractive enough to offset

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the down-side and null out any risk involved, people will indeed be rational; that is, they will oppose or resist the change – overtly or covertly.

The change strategy here centers on the balance of incentives and risk management. This strategy is difficult to deploy when the incentives available are modest. Why risk what we have for an uncertain future that promises to be no more than modestly better than the present? This is especially true when people currently have it pretty good. One stratagem of use here is to cast doubt on the viability of the present state of affairs. You can attempt to convince people that they are on a burning platform (not a good choice if they really are not) or you can simply try to persuade them that the current state of affairs has a short shelf life. In either case, the story you tell has to convince them, not you.

A by-product of this strategy consists of converts, that is, people who buy the story. Some will see the light and want to sign on. These people can be very helpful. However, depending on their stature in the organization, you might not want them.

Another stratagem here is to systematically target converts, that is, through leaders and influencers who, if they buy the story and buy into helping make the change, will influence others.

(Bennis et al., 1969; Chin & Benne, 1969; Fred Nickols, 2003)

#### Normative-Re-educative

In this theory, people are social beings and will adhere to cultural norms and values. Successful change is based on redefining and reinterpreting existing norms and values, and developing commitments to new ones. For the most part, most people do want to 'fit in' and 'go along.' They will 'go with the flow.' The trick here is figuring out how to establish and define the flow. Again, set aside value judgments and you will see such commonplace practices such as advertising, positioning, and so on. Central here also is charismatic and dynamic leadership. It is also the case that the influence of the informal organization is felt strongly here, especially in the form of communities of practice.

The change strategy here focuses squarely on culture – what people believe about their world, their work and themselves and the ways in which people behave so as to be consistent with these beliefs. Ordinarily, culture does not change quickly and certainly not overnight. This, then, is not the strategy of choice in a turnaround situation on short deadlines. Moreover, an organization's culture is as much in the grip of the informal

organization as it is the formal organization. For this reason, this strategy works only when the relationships between the formal and informal organizations are at least cordial and hopefully harmonious. If they are at odds with one another, this change strategy is denied to management.

Still, there is an avenue or two open here. Almost all change efforts have long-term as well as short-term goals. To some extent, the long-term change strategy will have to incorporate some normative-re-educative actions. Enlisting and involving the informal leaders of the organization and keeping them involved is one such avenue. (It should be kept in mind that the formal and informal organizations often overlap in the form of people who lead or influence large or important constituencies and who also hold powerful positions.)

(Bennis et al., 1969; Chin & Benne, 1969; Fred Nickols, 2003)

#### **Power-Coercive**

People are basically compliant and will generally do what they are told or can be made to do. Successful change is based on the exercise of authority and the imposition of sanctions. This can range from the iron hand in the velvet glove to downright brutality – 'My way or the highway.' The basic aim here is to decrease peoples' options, not increase them. Surprisingly, in many situations, people actually want and will readily accept this approach, particularly when all feel threatened and few know what to do. This is the 'stick' side of carrot-and-stick management.

Two major factors influencing the choice of this strategy are time and the seriousness of the threat faced. If the organization sits astride the fabled 'burning platform,' the threat is grave and the time for action is limited. The metaphor of a burning platform is useful but only if all concerned can in fact see that the platform is on fire. This is rarely the case in an organization. Few companies are filled with people who understand the way the business works, and fewer people still appreciate the threats it faces or the opportunities it encounters. It has been argued that change-minded leaders should create a burning platform. That idea might have merit in extreme situations but it also entails considerable risk – to the organization, to its people, and to the leader who attempts it.

A mitigating factor here is the culture. If the culture is basically one of a benign bureaucracy that is clearly threatened, its members are likely to go along with a sensible program, no matter how high-handed. Conversely, if the culture is laced with autonomy and entrepreneurship but has grown fat, dumb and happy, people will resent and perhaps oppose or resist authoritarian moves. In this case, key positions might have to be filled with new people.

(Bennis et al., 1969; Chin & Benne, 1969; Fred Nickols, 2003)

#### Environmental-Adaptive

People oppose loss and disruption but they tend to adapt readily to new circumstances. Change is based on building a new organization and gradually transferring people from the old one to the new one.

This strategy seeks to shift the burden of change from management and the organization to the people. It exploits their natural adaptive nature and avoids the many complications associated with trying to change people or their culture. Essentially, this is a strategy of self-cannibalization, that is, you set out to eat your own lunch – before someone else does. Also known as 'the die-on-the-vine' strategy, this hinges on the commonplace observation that, although people are often quick to oppose change they view as undesirable, they are even quicker to adapt to new environments. Consequently, instead of trying to transform existing organizations, it is often quicker and easier to create a new one and gradually move people from the old one to the new one. Once there, instead of being able to oppose change, they are faced with the prospect of adapting to new circumstances, a feat they manage with great facility. The old organization, then, is left to die on the vine.

The major consideration here is the extent of the change. This strategy is best suited for situations where radical, transformative change is called for. For gradual or incremental change, this is not the strategy of choice. Time frames are not a factor. This strategy can work under short time frames or longer ones. However, under short time frames, a key issue will be that of managing what could be explosive growth in the new organization and, if it is not adequately seeded with new folks, the rapid influx of people from the old culture can infuse the new organization with the old culture.

Another factor to consider is the availability of suitable people to 'seed' the new organization and jump-start its culture. Some can come from other organizations but some can come from the old organization, too. In the old culture can be found rebels, misfits and other non-conformists who are precisely what is needed in the new culture. They must be chosen with care; however, because of the politics and the possibility that some will bear grudges against some members of the old culture.

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Another consideration here is perhaps best termed as 'bad apples' (i.e., people from the old organization who simply cannot be allowed into the new one).

(Fred Nickols, 2003)

These are not the only potential theories available in the field of the study; others include:

## **Critical Mass**

Drawing implicitly on diffusion of innovation theory, many practitioners discuss the importance of developing a 'critical mass' of individuals who have adopted constructive conflict resolution knowledge and skills in initiating positive social change. When this critical mass of individuals exists, change spreads rapidly and crystallizes to become self-sustaining in society (E. M. Rogers, 1995; Shapiro, 2005).

## **Ripple** Effects

In understanding how small-group conflict interventions can create large-scale social change, many practitioners discuss the impact that participants can have on those within their personal and professional constructs of influence. Often referred to as a ripple effect or transfer effect, program's suggest that the individual and relational changes that occur during small-group interventions will have ever-widening circles of impact as participants take their new learning back into their respective communities and organizations (Shapiro, 2005).

## **Overcoming Resistance**

Although their methods practically address such issues, practitioners rarely focus explicitly on the importance and difficulties of dealing with resistance to change. Lewin's (1951) model of unfreezing-movement-refreezing is useful in focusing on the processes of overcoming resistance to change such as basic conservative tendencies and system justification (Lewin, 1951; Shapiro, 2005).

## **Strategy Selection Considerations**

Earlier in the chapter, it was acknowledged that general practices were similar in some aspects but quite unique in their contextual makeup (Richards et al., 1999). Hence there might be a need to consider carefully the type of strategy (theory) to use in the development of the framework. Nickols (2003), a well published change management consultant (F. Nickols, 2006), suggests that selecting a strategy over another depends on a number of factors:

- •**Degree of Change:** Radical change or transformation argues for an environmentaladaptive strategy (i.e., 'wall off' the existing organization and build a new one instead of trying to transform the old one). Less radical changes argue against this strategy.
- •**Degree of Resistance**: Strong resistance argues for a coupling of power-coercive and environmental-adaptive strategies. Weak resistance or concurrence argues for a combination of rational-empirical and normative-re-educative strategies.
- •**Population:** Large populations argue for a mix of all four strategies, something for everyone so to speak. Diverse populations also call for a mix of strategies. This implies careful segmentation.
- •Stakes: High stakes argue for a mix of all four strategies. When the stakes are high, nothing can be left to chance. Moderate stakes argue against a power-coercive strategy because there is no grand payoff that will offset the high costs of using the power-coercive strategy. There are no low-stakes change problems. If the stakes are low, no one cares, and resistance levels will be low. Avoid Power-Coercive strategies in low stakes situations.
- •**Time Frame:** Short time frames argue for a power-coercive strategy. Longer time frames argue for a mix of rational-empirical, normative-re-educative, and environmental-adaptive strategies.
- •Expertise: Having available adequate expertise at making change argues for some mix of the strategies outlined above. Not having it available argues for reliance on the power-coercive strategy.
- •**Dependency:** This is a classic double-edged sword. If the organization is dependent on its people, its ability to command and demand is limited. On the other hand, if the people are dependent on the organization, their ability to oppose is limited (Mutual dependency almost always signals a requirement to negotiate).

(Fred Nickols, 2003; F. Nickols, 2006)

# Managing Change in Organisations

As examined in the methodology chapter (Chapter 2), as a field of study, information systems is very closely related to practice, and researchers and practitioners are constantly engaged in the reflective loop, where the researcher looks at the emerging data to reflect and re-direct the investigation. Information systems researchers draw problems for investigations from practice and the result of their studies usually generates theories (Williamson, 2002). This is true in this study, where the researcher is also the practicing information systems implementer (IT/IM Officer) with the industry partner as further examined in Chapter 4.

However, despite this observation, the purpose of this section of the literature review is not to gain understanding to engage in change management implementations in the study, but to understand the strategies utilised in existing implementations at CHGPN. As was well explained in the methods section, most of the data collection was to eventuate well after the implementations (The Research Approach - Chapter 2). This understanding will help

evaluate the outcomes of the implementations in The Outcomes phase of the study (Chapter 8 and 9).

The best source of information accessed in this review so far, was from Nickols' (2006) online information pages. He suggests that managing change is a thankless task and *more a matter of leadership ability than management skill* (F. Nickols, 2006, p. 1); and then suggests a number of practical recommendations.

- •The first thing to do is jump in. You can't do anything about it from the outside.
- •A clear sense of mission or purpose is essential. The simpler the mission statement the better.
- •Build a team. 'Lone wolves' have their uses, but managing change isn't one of them. On the other hand, the right kind of lone wolf makes an excellent temporary team leader.
- •Maintain a flat organizational team structure and rely on minimal and informal reporting requirements.
- •Pick people with relevant skills and high energy levels. You'll need both.
- •Toss out the rulebook. Change, by definition, calls for a configured response, not adherence to prefigured routines.
- •Shift to an action-feedback model. Plan and act in short intervals. Do your analysis on the fly. No lengthy up-front studies,
- •Set flexible priorities. You must have the ability to drop what you're doing and tend to something more important.
- •Treat everything as a temporary measure. Don't 'lock in' until the last minute, and then insist on the right to change your mind.
- •Ask for volunteers. You'll be surprised at who shows up. You'll be pleasantly surprised by what they can do.
- •Find a good 'straw boss' or team leader and stay out of his or her way.
- •Give the team members whatever they ask for except authority. They'll generally ask only for what they really need in the way of resources. If they start asking for authority, that's a signal they're headed toward some kind of power-based confrontation and that spells trouble. Nip it in the bud!
- •Concentrate dispersed knowledge. Start and maintain an issues logbook. Let anyone go anywhere and talk to anyone about anything. Keep the communications barriers low, widely spaced, and easily hurdled. Initially, if things look chaotic, relax they are.

(F. Nickols, 2006)

Nickols (2006) then further goes on to outline the skills and strategies needed in change

management:

# Skills & Strategies to manage change

Managing the kinds of changes encountered by and instituted within organizations requires an unusually broad and finely-honed set of skills, chief among which are the following:

#### **Political Skills**

Organizations are first and foremost social systems. Without people there can be no organization. Lose sight of this fact and any would-be change agent will likely lose his or her head. Organizations are hotly and intensely political. And, as one wag pointed out, the lower the stakes, the more intense the politics; change agents dare not join in this game but they had better understand it. This is one area where you must make your own judgments and keep your own counsel; no one can do it for you.

#### **Analytical Skills**

Make no mistake about it, those who would be change agents had better be very good at something, and that something better be analysis. Guessing won't do. Insight is nice, even useful, and sometimes shines with brilliance, but it is darned difficult to sell and almost impossible to defend. A lucid, rational, well-argued analysis can be ignored and even suppressed, but not successfully contested and, in most cases, will carry the day. If not, then the political issues haven't been adequately addressed.

Two particular sets of skills are very important here: (1) workflow operations or systems analysis, and (2) financial analysis. Change agents must learn to take apart and reassemble operations and systems in novel ways, and then determine the financial and political impacts of what they have done. Conversely, they must be able to start with some financial measure or indicator or goal, and make their way quickly to those operations and systems that, if reconfigured a certain way, would have the desired financial impact. Those who master these two techniques have learned a trade that will be in demand for the foreseeable future. (This trade, by the way, has a name. It is called 'Solution Engineering.')

#### **People Skills**

As stated earlier, people are the sine qua non of organization. Moreover, they come characterized by all manner of sizes, shapes, colors, intelligence and ability levels, gender, sexual preferences, national origins, first and second languages, religious beliefs, attitudes toward life and work, personalities, and priorities — and these are just a few of the dimensions along which people vary. We have to deal with them all. The skills most needed in this area are those that typically fall under the heading of communication or interpersonal skills. To be effective, we must be able to listen and listen actively, to restate, to reflect, to clarify without interrogating, to draw out the speaker, to lead or channel a discussion, to plant ideas, and to develop them. All these and more are needed. Not all of us will have to learn Russian, French, or Spanish, but most of us will have to learn to speak Systems, Marketing, Manufacturing, Finance, Personnel, Legal, and a host of other organizational dialects. More important, we have to learn to see things through the eyes of

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these other inhabitants of the organizational world. A situation viewed from a marketing frame of reference is an entirely different situation when seen through the eyes of a systems person. Part of the job of a change agent is to reconcile and resolve the conflict between and among disparate (and sometimes desperate) points of view. Charm is great if you have it. Courtesy is even better. A well-paid compliment can buy gratitude. A sincere 'Thank you' can earn respect.

#### System Skills

There's much more to this than learning about computers, although most people employed in today's world of work do need to learn about computer-based information systems. For now, let's just say that a system is an arrangement of resources and routines intended to produce specified results. To organize is to arrange. A system reflects organization and, by the same token, an organization is a system.

A word processing operator and the word processing equipment operated form a system. So do computers and the larger, information processing systems in which computers are so often embedded. These are generally known as 'hard' systems. There are 'soft' systems as well: compensation systems, appraisal systems, promotion systems, and reward and incentive systems.

There are two sets of systems skills to be mastered. Many people associate the first set with computers and it is exemplified by 'systems analysis.' This set of skills, by the way, actually predates the digital computer and is known elsewhere (particularly in the United States Air Force and the aerospace industry) as 'systems engineering.' For the most part, the kind of system with which this skill set concerns itself is a 'closed' system which, for now, we can say is simply a mechanistic or contrived system with no purpose of its own and incapable of altering its own structure. In other words, it cannot learn and it cannot change of its own volition. The second set of systems Theory (GST) and it deals with people, organizations, industries, economies, and even nations as socio-technical systems — as 'open,' purposive systems, carrying out transactions with other systems and bent on survival, continuance, prosperity, dominance, plus a host of other goals and objectives.

#### **Business Skills**

Simply put, you'd better understand how a business works. In particular, you'd better understand how the business in which and on which you're working works. This entails an understanding of money — where it comes from, where it goes, how to get it, and how to keep it. It also calls into play knowledge of markets and marketing, products and product

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development, customers, sales, selling, buying, hiring, firing, EEO, AAP, and just about anything else you might think of.

(F. Nickols, 2006)

The importance of these skills and the role they play in change management strategies within the development of the intended framework will become very relevant to the study as will be appreciated later in the thesis.

# Identification of lessons from past information system implementations

Although past implementations in health settings have been based on technologicallydriven approaches, there should be a substantial number of lessons learnt from these past implementations to suggest other issues more conducive to adoption success. Implementation failures and partial adoptions, just as much as success stories can provide valuable knowledge to support further, better informed implementations. These key learnings are almost inevitably seen in the literature as either barriers or enablers; in other words enablers acting as motivational factors and barriers acting as de-motivational ones. A number of researchers in the field have found motivation to be essential in promoting change in health settings, and to provide the impetus to disturb the normal equilibrium of existing often habitual practice (Lovatt, 1999; McGovern & Rodgers, 1986). Barriers to adoption of health information technology in the international literature include:

- High costs; although some studies found this to based solely on perception.
- Lack of certification and standardization,
- Concerns about privacy and a disconnect between who pays for EMR systems and who profits from them.
- Lack of a common shared goal
- Conflicting competition
- Poor trust
- Control and ownership concerns
- Confusion over finance
- Problems with data sharing (D. W. Bates, 2005; Hillestad et al., 2005; Kaushal, Blumenthal, Poon, & et al, 2005).
- Inappropriate change management strategies
- Unrealistic timelines
- Poor morale
- Concerns over short-term loss of electronic functionality

(Hendy, Reeves, Fulop, Hutchings, & Masseria, 2005)

- Failure to take into account the social and professional cultures of healthcare organisations and to recognise that education of users and computer staff is an essential precursor
- Underestimation of the complexity of routine clinical and managerial processes

- Dissonance between the expectations of the commissioner, the producer, and the users of the system
- Implementation of systems is often a long process in a sector where managerial change and corporate memory is short
- 'My baby' syndrome (where individuals, while meaning well, hinder the implementation by not allowing other to partake in the process of implementation)
- Reluctance to stop putting good money after bad
- Failure of developers to look for and learn lessons from past projects

(Littlejohns et al., 2003)

Enablers of adoption of health information technology in the international literature

include the following:

- Collaboration with clinicians
- Partners feeling valued
- Community support
- A shared vision
- Strong clinician involvement
- Strong leadership
- Involvement of the health department
- Sustainable funding
- Effective change management strategies
  - (N. Lorenzi, 2003; McDonald, Overhage, Barnes, & Schadow, 2005)
- Involvement of GPs
- The development governance, policy, accreditation and migration towards a paperless practice guidelines (The Joint Computing Group of the General Practitioners Committee and the Royal

College of General Practitioners, 2003)

- Investment is needed to in change management and training to ensure successful implementation of IT.
- Training devoted to workflow changes as well as to process changes
- Social engineering is 75% to 90% of the effort to implement technology solutions; technical implementation is 20% to 25%.
- A major proportion of the quantifiable benefit is related to process improvement and reduction in manual effort.
- Provider and customer satisfaction are crucial to successful IT implementation
- Involvement of providers in design, development and implementation
- Recognition of the importance of managing security issues

(GAO, 2003)

# Barriers and Enablers specific to Australian General Practices

The local literature on implementation and adoption seems to vindicate what has been researched in the international literature. The barriers associated with implementation are consistent throughout the sector (Liaw & Schattner, 2003; Nancy Lorenzi, 2004; National

Electronic Decision Support Taskforce, 2003; Richards et al., 1999; M. H. Ward, 2003), and include:

• Lack of software sophistication

- Lack of national coding standards
- Lack of typing skills
- Training and support not readily available
- Cost effectiveness not demonstrated
- Privacy issues: confidentiality, security, ownership, access and consent.
- Data safety issues in centralised systems
- The cost associated the purchase and introduction of computer systems
- Particularly, the need to develop 'user centred' systems instead of expecting the intrinsic value of the technology to actualise adoption:
- Unless the needs and aspirations of GPs are the driving force for change, there will be resistance and less than successful outcomes.
- GPs becoming intimately and explicitly engaged in all stages of the design and implementation process for these new technologies
- Failure to engage the end users of systems in all stages of design and implementation

General practitioners in Australia function under a number of different practice models in a wide variety of settings, with very diverse resources and therefore have different expectations of information systems. Some of these important issues affect the capacity, and readiness for uptake of practice wide systems; yet, they seem to be notably absent from the current literature of information systems in general practice. However, a number of authors have recognised the following issues:

- Workforce shortages.
- Cultural and attitudinal issues
- Political issues.
- Change Management and Organisational issues.
- Education and training.
- Workflow issues.
- Increased bureaucracy, including:
- Accreditation issues,
- Red tape in delivering fee-for-service care,
- Practice incentive payments,
- Substitution for their care: Allied Health Services & Nurses.
- Shifting paradigms of care: from acute-care to evidence-based care models;
- High volume service vs. preventive care shifts.
- Demands of the National Prescribing Service (PBS);
- Demise of IT/IM Divisional support due to funding cuts,
- Medicolegal threats: Risk Management
- Interference by, software, drug marketeers and pharmaceutical companies;
- Lack of government and specialist college recognition;
- Corporatisation of Practices: economies of scale, patient vs. shareholder's interests.

#### • Poor remuneration; and

• Top-down governmental changes without prior meaningful consultation (Breen, 2004; E. Coiera, 1999; Dearne, 2004; Dickinson, 2002; Fithgerald, 2002; Kikano, 2000; Komesaroff, 1999; Nancy Lorenzi, 2004; Sturnberg et al., 2003; M. H. Ward, 2003).

From these initial identified barriers and enablers a number of specific key themes or factors begin to emerge. For example, some are technological themes like: the lack of software sophistication and data safety issues in centralised systems; others are administrative themes like: change Management and organisational issues. To better describe the implications of these key factors they will be subsumed under relevant subheadings. The themes or factor headings were selected with no preconception in mind, but to reduce the amount of information to a manageable level. The reader is free to agree or disagree with the factors selected. The findings would however, contribute to the building blocks of an emerging implementation framework as suggested in the methodology chapter (Chapter 2).

From the outset a few challenges were identified:

1- Some of the barriers and enablers identified appear to fit in more than one factor type and so were placed in more than one grouping.

2- Some findings, although identical (for example: involvement of GPs/ strong clinician involvement/ collaboration with clinicians) are purposely repeated to emphasise their recurrence in the literature; as a measure of their importance in potential system implementations in health settings.

3- The factors identified could further be reduced to two major groups according to their internal or external influence.

The following breakdown of factors by subheadings under six internal and three external influences summarises the health information systems barriers and enablers drawn from the previously mentioned and other past studies (Adkins, 1997; D. W. Bates, 2005; Breen, 2004; E. Coiera, 1999; Dearne, 2004; Dickinson, 2002; Fithgerald, 2002; GAO, 2003; General Practice Strategy Review Group, 1998; Hendy et al., 2005; Hillestad et al., 2005; IBM Consulting Group Health Practice, 1997; Kaushal et al., 2005; Kikano, 2000; Komesaroff, 1999; Littlejohns et al., 2003; N. Lorenzi, 2003; Nancy Lorenzi, 2004; McDonald et al., 2005; Oldroyd et al., 2003; Richards et al., 1999; Schuster et al., 2003; Sturnberg et al., 2003; The Joint Computing Group of the General Practitioners Committee

and the Royal College of General Practitioners, 2003; J. E. Ward, J. Gordon, et al., 1991;

M. H. Ward, 2003):

# *Internal Motivational Factors* 1- Administrative Factors Barriers:

- •Lack of certification and standardization,
- Poor levels of trust
- •Control and ownership concerns
- •Inappropriate change management strategies
- •Unrealistic timelines
- •Underestimation of the complexity of routine clinical and managerial processes
- •Implementation of systems is often a long process in a sector where managerial change and corporate memory is short

# Enablers

- •Collaboration with clinicians
- •Community support
- •A shared vision
- •Strong clinician involvement
- Strong leadership
- •Effective change management strategies
- •Involvement of GPs
- •Devote training to workflow changes as well as process changes
- •A major proportion of the quantifiable benefit is related to process improvement and reduction in manual effort.
- •Provider and customer satisfaction are crucial to successful it implementation
- •Involve providers in design, development and implementation
- •Identification of key personnel,
- •Discussion and dialogue between key personnel,
- •Addressing specific problems,
- •Education and orientation of the target group,

- 'My baby' syndrome (where individuals, while meaning well, hinder the implementation by not allowing other to partake in the process of implementation)
- •The development governance, policy, accreditation and migration towards a paperless practice guidelines
- •Initial implementation,
- •Demonstration project (time study) to foster acceptance
- •Ongoing enhancement
- •Familiarization with the system
- •Feedback and improvement
- •Workforce shortages.
- •Cultural and attitudinal issues
- •Change management and organisational issues.
- •Education and training.
- •Workflow issues.
- •Accreditation issues,
- •Red tape in delivering fee-for-service care,
- •Particularly, the need to develop 'user centred' systems instead of expected the intrinsic value of the technology to actualise adoption:

# **2-** Social, Cultural and Organisational Factors Barriers

- •Lack of a common shared goal
- •Poor levels of trust
- •Control and ownership concerns
- •Poor morale
- •Failure to take into account the social and professional cultures of healthcare organisations and to recognise that education of users and computer staff is an essential precursor
- •Underestimation of the complexity of routine clinical and managerial processes
- •Implementation of systems is often a long process in a sector where managerial change and corporate memory is short
- 'my baby' syndrome (where individuals, while meaning well, hinder the

# Enablers

- •Collaboration with clinicians
- •Partners feeling valued
- •Community support
- •A shared vision
- •Strong clinician involvement
- Strong leadership
- •Effective change management strategies
- •Involvement of GPs
- •Devote training to workflow changes as well as process changes
- •A major proportion of the quantifiable benefit is related to process improvement and reduction in manual effort.
- •Involve providers in design, development and implementation
- •Identification of key personnel,
- •Discussion and dialogue between key personnel,
- •Addressing specific problems,
- •Education and orientation of the target group,
- •Initial implementation,
- •Demonstration project (time study) to foster acceptance
- Ongoing enhancement
- •Familiarization with the system
- •Feedback and improvement

implementation by not allowing other to partake in the process of implementation)

- •High volume service vs. Preventive care shifts.
- •Lack of typing skills
- •Training and support not readily available

- •Workforce shortages.
- •Cultural and attitudinal issues
- •Change management and organisational issues.
- •Education and training.
- •Workflow issues.
- •GPs becoming intimately and explicitly engaged in all stages of the design and implementation process for these new technologies
- •Accreditation issues,
- •Red tape in delivering fee-for-service care,
- •Demise of it/im divisional support due to funding cuts,
- •Particularly, the need to develop 'user centred' systems instead of expected the intrinsic value of the technology to actualise adoption:
- •The needs and aspirations of GPs must become the driving force for change, to minimise resistance and facilitate successful outcomes.
- •Engage the end users of systems in all stages of design and implementation
- •Every health care facility is unique in terms of personnel and politics

# **3- Clinical Factors: Barriers**:

- Problems with data sharing
- •Underestimation of the complexity of routine clinical and managerial processes
- •Substitution for their care: allied health services & nurses.
- •Shifting paradigms of care: from acutecare to evidence-based care models;

# Enablers

•None

# 4- Legal Factors:

# **Barriers**:

- •Concerns about privacy
- Problems with data sharing
- •Failure to recognise the importance of managing security issues
- •Medico-legal threats: Risk Management

## Enablers

•Involvement of the health department

# 5- Financial Factors:

## **Barriers:**

- •Confusion over finance
- •Reluctance to stop putting good money after bad
- •Practice incentive payments,
- Poor remuneration
- •Cost effectiveness not demonstrated
- •The cost associated

# Enablers

•Sustainable funding

- •High volume service vs. Preventive care shifts.
- •Demands of the national prescribing service (PBS);
- •Medico-legal threats: risk management

- •Privacy issues: confidentiality, security, ownership, access and consent.
- •Data safety issues in centralised systems

- •High costs; although some studies found this to base solely on perception.
- •A disconnect between who pays for electronic medical records (EMR) systems and who profits from the implementation.
- •Investment is needed to in change management and training to ensure successful implementation of it.

# 6- Technical factors: Barriers:

- •Problems with data sharing
- •Concerns over short-term loss of electronic functionality
- •Failure of developers to look for and learn lessons from past projects
- •Failure to recognise the importance of managing security issues
- •Ongoing enhancement

# Enablers

•Capabilities for customisation, individualization, and innovation

## *External Motivational Factors* 7- Political and Institutional Factors: Barriers:

- •Conflicting competition
- •Poor levels of trust
- •Control and ownership concerns
- 'My baby' syndrome (where individuals, while meaning well, hinder the implementation by not allowing other to partake in the process of implementation)
- •Dissonance between the expectations of the commissioner, the producer, and the users of the system
- Provider and customer satisfaction are crucial to successful IT implementation
- •Top-down governmental changes without prior meaningful consultation

- Political issues.Substitution of GP care by Allied
- Health Services & Nurses.
- •Accreditation and regulatory bodies
- •Interference by software, drug marketers and pharmaceutical companies;
- •Lack of government and specialist college recognition;
- •Corporatisation of Practices: economies of scale, patient vs. shareholder's interests

# Enablers

## •none

# 8- The Patient Factor

# **Barriers:**

- •Patient lack of compliance with GPs' recommendations
- •Belief that the patient will not change their unhealthy behaviour,
- •GPs believed that some patients want them to take overall control of their condition
- •Failure to Llsten to and help them deal with their problems (not just treat their symptoms),
- •Educate them,
- For older patients, provide social contact.
- •They also want their GP to ensure they have an adequate quality of life. GPs felt that this places great pressure on them

- •Familiarization with the system
- •Need for feedback and improvement
- •Lack of software sophistication
- •Lack of national coding standards
- •Data safety issues in centralised systems

# 9- Change Management Factors Barriers:

- •Inappropriate change management strategies
- •Implementation of systems is often a long process in a sector where managerial change and corporate memory is short
- •Unrealistic timelines
- •Control and ownership concerns

## Enablers

- •Shared vision
- •Strong leadership
- •Effective change management strategies
- •Training devoted to workflow changes as well as process changes
- •Involve providers in design, development and implementation
- •Identification of key personnel,
- •Discussion and dialogue between key personnel,
- •Addressing specific problems,
- •Education and orientation of the target group,

'My baby' syndrome (where individuals, while meaning well, hinder the implementation by not allowing other to partake in the process of implementation

- •Initial implementation,
- •Demonstration project (time study) to foster acceptance
- •Ongoing enhancement
- •Familiarization with the system
- •Feedback and improvement
- •Cultural and attitudinal issues
- •Change Management and Organisational issues.
- •Education and training.

The recurrence of similar themes in the preceding literature on implementation and adoption of information systems in health settings seems to suggests that the barriers and enablers (motivational factors) associated are quite consistent throughout the sector (Liaw & Schattner, 2003; Nancy Lorenzi, 2004; National Electronic Decision Support Taskforce, 2003; Richards et al., 1999; M. H. Ward, 2003).

However, the sheer volume of some themes appear to be key issues to be carefully taken into account in any informed emerging implementation framework; and although not thoroughly analysed yet, the administrative and organisational barriers and enablers seem much more cited than any technological issue. This finding was not lost on some researchers when they concluded that of the effort to implement technology solutions social engineering was seen as representing 75% to 90% of the effort and the technical implementation only 20% to 25% (GAO, 2003).

Furthermore, many authors pointed to the lack of participation (of users) and the focus on the technology exclusively –among others, for the dismal successes in implementation and

adoption in health settings (Aarts et al., 2004; Clarke et al., 2003; Littlejohns et al., 2003; Schuler & Namioka, 1993; Schuster et al., 2003; Surmarcz, 2003).

The principal findings so far suggest that there are major internal and external influences that either motivate or de-motivate the adoption of an information system in health settings. Of interest is the lack of positive enablers in some of the factors. For example, the patient factor, the technical, the legal and the clinical. In summary, these issues seem to represent unresolved challenges not well-addressed in past implementations. This is by no means an exhaustive examination; further analysis will be performed later in the chapter.

In summary, the 'what' works/does not work can probably be delineated from the preceding literature but there is very little as to 'how' it is supposed to be put together and implemented in health settings. At this time, it is worth drawing upon knowledge gathered by the more mature, Business Information Systems sector; particularly the 'how' factors (development and implementation), supportive of implementations and adoption coming up in the next chapter.

## Summary of Section Four

This section briefly examined the literature on information systems in general practices internationally and in Australia. It reflected on the technologically-driven approaches to implementations and the limited success in adoption of the technology for the development of integrated and practice wide systems (systematic approaches to care). Nevertheless, the literature on information systems adoptions in health provided a number of motivational factors (the 'what') from where to begin to build further knowledge. The following section begins to outline potential constructs for the emerging framework.

# SECTION FIVE – The Building Blocks (constructs) of a Chronic Diseases Information System for General Practice

The first section introduced the reader to chronic conditions as a background to the study. The second section highlighted the poor outcomes of current chronic diseases care in general practices and the potential for systematic approaches using evidence-based guidelines. The third section informed the reader on current information systems developments in health (mainly large hospitals) to improve health outcomes from a number of countries' perspectives, including Australia. The fourth section introduced the reader to information systems in general practice, by highlighting the implementation shortcomings and reviewed the learnings from past implementations in the health sector, highlighting a number of motivational factors.

This section will begin drawing from the literature some of the wider building blocks or constructs which will be used to develop the emerging conceptual framework as suggested in the methods chapter (chapter 2).

These building blocks or constructs —as are also referred to here, are a collection of previously reviewed factors, characteristics, elements and influences that will make up, with the aid of practical knowledge in Chapter Four, the components of the emerging conceptual framework (Chapter Five). This exploratory review of phenomena (constructs) aims at revealing fully or partially some of the potential systems and sub-systems associated with the socio-technical theoretical framework underpinning the study, as suggested in the methods chapter, Chapter Two.

## Searching for relevant system constructs

In previous chapters, it has been highlighted that information systems development and implementation models for general practice have been '*technology-driven*'; traditionally tending to see the implementation process as a technical matter removed from organizational dynamics, human and environmental factors (S. Bell & Wood-Harper, 2003; Enrico Coiera, 2004; Noyes & Baber, c1999; Skidmore & Eva, 2004; Tatnall et al., 2003). Furthermore, it is generally accepted that the traditional top-down methodologies are not adequate to understand the relevant constructs that facilitate implementation of information systems (Tatnall et al., 2003). Nonetheless, for some authors it is less clear what these constructs are for health specifically (Aarts et al., 2004).

The aim of this section is to describe phenomena that will suggest constructs relevant to the development of the emerging conceptual framework:

From a clinical point of view, GPs need to practice clinical management that closely reflects the needs of their chronic patients (Chew & Van Der Weyden, 2003). The design of a chronic disease information system framework must take into account that the chronic care paradigm encompasses preventative and therapeutic care and both must incorporate risk-factor management (Chew & Van Der Weyden, 2003). Chew and Weyden further suggest that the issues that the framework must address are: patient centred care, community-based, coordinated, continuous, cost effective and the ose of clinical information systems (Chew & Van Der Weyden, 2003). However, and although all general practices and general practitioners share some commonalities (for example: they all must be registered as clinicians and conform to accreditation rules), they are intrinsically unique; they operate under a number different practice models (human resource, financial, organisational and environmental) in a wide variety of settings and therefore, have different expectations of information management (Richards et al., 1999).

Aldroyd et al (2003) reported in the Australian Medical Journal the views of 54 Australian GPs providing healthcare to people with chronic conditions. The authors commented that while the majority saw the *computerisation of practice procedure* as 'vital', and *registers and recall systems* as 'crucial'; the overall view of was, among many other things, that it would require flexible systems, that took into account the GP-Patient relationships, both as a business and clinical relationship, as well as changes to practice infrastructure, not always affordable or easily implemented (Oldroyd et al., 2003).

Hence, a fixed and prescriptive 'chronic disease information systems model' would not be functional for all practices. Consequently, an Information Systems framework, for the purpose of this study, needs to be a 'generic model', flexible and comprehensive enough to fit into the idiosyncrasy of all practices and take into account the technological, organisational and human components and characteristics identified in the literature. Breaking down all these unique characteristics, elements and influences within broader concepts or constructs and matching these to chronic condition care needs, can help us determine what constitutes an effective framework to develop, implement and succeed in the adoption of information systems for chronic conditions in general practice. However, it would be worth keeping in mind that implementing a system is, by its very nature, unpredictable (Orlikowski, 2000). It is worth recognising that in this process some elements are clear-cut and fit into a specific group or construct but others are not, potentially forming part of one or other group; and even two or more groups (constructs).

Earlier in the chapter it was identified that some factors were essentially of two types; of an internal and of an external nature. The same distinction is kept for the purpose of this examination.

#### The internal constructs

These are constructs that are dependent on internal factors, characteristics and process within the organisation and individuals.

#### The Technical Construct

In dealing with chronic conditions, it has been recognised that it is not so much that GPs do not know how to treat conditions like Diabetes clinically, but that there can be a problem of *process* (knowing who the patients were, keeping track of them, making sure they were receiving appropriate care, etc) (White, 2000). This tells us that whatever the hardware/software used, there are a number of issues that the technology must be able to address (the 'technological' construct). Robert Mittman (2004), a technology forecaster and strategist in the US, recognised the following aspects and needs that IT must provide to deal with the processes of treating chronic conditions:

## Distinguish who in the population has the disease: Registers

Jane Metzger (2004) defines a register, in the context of chronic diseases, as a computer application for capturing, managing, and providing access to condition-specific information. It is a list of patients to support organized clinical care which ideally provides aggregated information about cohorts of patients who share a clinical disease or demographic characteristics. Ideally it includes electronic feeds from laboratories, pharmacies and clinical encounters (Metzger, 2004).

In a two year long study, Harris, et al (2002) compared the quality of care provided by general practitioners participating in diabetes care using registers with that provided by GPs not using registers. They found that GPs using the registers had more patients with diabetes, and saw those patients more frequently, than GPs not using registers. 'Register' GPs also ordered tests (for HbA1c and microalbuminuria – blood tests used in screening and monitoring of Diabetes) more frequently than 'non-register' GPs; concluding that GPs who used diabetes registers were more likely to provide patient care that more closely adhered to evidence-based guidelines than those who did not (Harris, Priddin, Ruscoe,

Infante, & O'Toole, 2002). However, other studies, confirmed the increased incidence of testing, but found no improvement in the metabolic control of diabetes (Jones R & J., 2004).

#### Track how the patient is being treated: Recalls/Reminders

Recalls or reminders are typically interchangeable names for the act of contacting patients for whom one or more procedures have become due (Frank, 1997). Studies that have measured the cost of manual versus electronic recall have found them to be very cost effective; up-to one-tenth in an American study (Rosser, 1991) and from \$31 down to \$2-4 in another Australian study (Flahgerty, 1993; Mills, 1994).

#### Prompt the provider to use clinical (evidence-based) guidelines:

There is an extensive list of studies that confirm the benefits of using reminders and clinical guidelines (sometimes called protocols) in patient care (E. Balas, S. Austin, et al., , 1996; Hunt, 1998). For example: reminders have proven to increase preventative care by 40% (Frank, 1997);

#### Provide health outcomes feedback

A consistent finding in health services research is the gap between the evidence and actual medical practice (T. Bodenheimer, 1999b). Little feedback is being provided to GPs on their own clinical practice, even though feedback has been recognised as a valid clinical change management strategy (Del Mar & Mitchell, 2004).

#### Support for a full range of chronic care process

Specifically, system processes should support outreach to those with a given disease who are missing aspects of their care; and should operate at the point of care, providing both decision support and documenting the clinical encounter; as well as population profiling and reporting (Mittman, 2004).

#### A patient-focused and longitudinal approach

An effective clinical IT system must be able to give the provider a current and complete picture of the patient's care and outcomes, particularly in complex conditions with many co-morbidities (meaning more than one condition) (Mittman, 2004).

#### Application across the continuum of care

The system must be able to track the whole continuum of care, from the patient's home to the testing laboratory, pharmacy, office visit, and other sites of care; and should ideally be accessible to the entire care team not just one provider (Mittman, 2004).

#### **Real world applicability**

Specifically, the system must, as much as possible, draw on existing data flows or integrate easily into existing workflows. It must be 'tuneable' to fit different conditions, initiatives, and approaches to chronic care (Mittman, 2004). A secondary finding in an Australian study concluded that sustained high-quality chronic-disease management requires changes to practice infrastructure that are not always affordable or easily implemented (Oldroyd et al., 2003).

**Structured record keeping:** One area that has been shown to benefit patient health is that of structured record keeping (Mann & Williams, 2003). The ability to capture unstructured electronic text is one of many clinical requirements that have been identified for clinical information systems (Royal College of Physicians, 2004). However, the additional argument that structured records somehow disrupt clinical reasoning must be challenged. The evidence shows that structured records improve clinical performance at the point of care as well as information retrieval (Mann & Williams, 2003). These benefits exist in paper systems as well as electronic and do not require coding. Coding becomes useful when the data is extracted and used for other purposes (e.g. public health, decision support and tracking disease progress).

#### The Organisational Construct

For the purpose of summarising this review, the organisational construct groups and includes a broad number of elements or factors: from the human (for example: general practice champions) to the administrative (for example: processes and procedures); the economic (financial incentives) to the legal (risk management) and many more:

**'Buy-in'** of the organization is important and users must clearly see the need for the change if they are to support it (Souther, 2001). There must be a clear understanding that

significant change occurs in multiple stages, and that errors in any of the stages can have devastating consequences (Kotter, 1995).

**Leadership:** One of the most important lessons that pioneers in this field have learned is that people-based skills such as cooperation, leadership, and creative thinking are just as important as the technology itself (Sittig, 2001).

**Local champions**: Or practice champions as already defined in Chapter Two, must actively and enthusiastically promote the system, build support, overcome resistance, and ensure that the system is actually installed and used (Ash, 1997; Sellitto & Carbone, 2007).

**Change management and organizational development:** Activities must accompany the introduction of an information system, while often 'ahead of the organization' in this regard, must not be so far ahead of the process that it causes the organization to give up before the race is over (HealthConnectSA, 2007; Hendy et al., 2005; Nancy Lorenzi & Riley, 2000; F. Nickols, 2006; Sellitto & Carbone, 2007; Sittig, 2001).

**Local Context (uniqueness):** The literature often fails to recognise that although all general practices and general practitioners share some commonalities, they are intrinsically unique; they operate under a number of different practice models (human resource, financial, organisational and environmental) in a wide variety of settings and therefore have different expectations of information management (Richards et al., 1999). Its essential to accommodate the individual and organisational contexts (Grol & Wensing, 2004).

**Senior management**: Must be able to understand and address the challenges ahead and capitalize on opportunities for quality improvement and cost reductions (Pare & Elam, 1998).

**Complexity of incentives:** In 2002, the Federal Government introduced chronic diseases incentives to offset practice costs in the hope that appropriate treatment would yield massive savings in hospital admissions and years (and cost) of lives lost (Swerissen, 2004). The most useful financial incentive item was deemed to be care planning, because it involves other staff, coordinates care, encourages patients to take responsibility for their own care and gives a message to patients that their doctors are taking more interest in

them. However, changes to the criteria for use and added paperwork have resulted in many GPs feeling that the items are more trouble than they are worth (Oldroyd et al., 2003; Richards et al., 1999). The case-conference item was generally dismissed as impossible to implement (Mitchell, 2002).

**Medico-legal issues**: As explained in section two of this chapter, practices need to have their own risk management systems to follow up patients if for example, as it happened in the past, state-based registers fail (AGPAL, 2003). To improve patient compliance with follow-ups a variety of strategies were used to encourage patients to keep appointments, such as limiting the number of repeat prescriptions to end about the time the next visit was due. However, GPs wondered who should bear the responsibility for patients failing to attend recall visits, as perceived software problems appear make tracking recalls difficult (Oldroyd et al., 2003)

**Accreditation:** As more practices seek the professional and financial benefits associated with accreditation, there might be an opportunity to harness the momentum for population health objectives (Department of General Practice, 2001).

**Physical Infrastructure:** In an Australian study, the following question was pertinently put forward: '*What is the point of recalling patients if there is no room (access) for them???*' (Oldroyd et al., 2003). The same could be said for housing a multidisciplinary team that includes nurses, allied health care providers (Diabetes Educators, Podiatrist, Physiotherapists, and so on) and non-clinical staff for patient monitoring, recall, and care planning (Oldroyd et al., 2003).

**Incentives for prevention:** As explained earlier, while practice financial incentives have been put into place in 2002, these are more focused on monitoring (secondary prevention) than true preventative screening (primary prevention). Hence the general dissatisfaction in general practice with the lack of payment for provision of true preventative services (Frank, 1997).

**Evaluation delay factor:** It must be recognized that it can take at least 6 months of system usage before any decisions about the success of the technology introduction (particularly in

terms of individual worker productivity) can be made (Blignaut, McDonald T, & Tolmie CJ, 2001).

**The Clinical Construct: Evidence based medicine:** Any approach should involve GPs early on in topic definition as well as extensive consultation around enablers and barriers; using a multifaceted range of dissemination strategies including:

- •Local adaptation
- •Educational interventions
- •Structural and organisational support that facilitate both uptake and sustained use of protocols (evidence-based guidelines)
  - (Department of General Practice, 2001; Grol et al, 1998; Gross et al., 2003).

Lack of accepted norms: Protocols, processes and infrastructure to support the screening and management of chronic conditions (Audehm, 2004b).

The complexity factor: Adding to the complexities are:

- •The nature of chronic-disease management
- •The tension between patients' and GPs' goals for care
- •The time-consuming aspects of care.

(Oldroyd et al., 2003)

**The conflicting pressures:** that prevent GPs engaging in structured multidisciplinary care; for example, team-based care involving, nurses, allied health care providers (Diabetes Educators, Podiatrist, Physiotherapists, and so on) and non-clinical staff systems for patient monitoring, recall, and care planning (Oldroyd et al., 2003).

**Level of patient involvement:** GPs described how patient compliance, motivation and capacity influence the type of care given: 'In chronic care, you need the cooperation of the patient; it's a team effort involving the practice and the patient.' Factors such as the severity of the patient's condition, his/her social situation, level of education and attitude towards the illness all need to be taken into account (T. Bodenheimer, E. & Wagner et al, 2002).

# The External Constructs

These are composed of a number of external and environmental factors, characteristics and processes outside the control of the practice or individuals in it. They are the norms and obligations that they may or may not need to conform.

# **External Organisations Constructs Government: Practice Incentives Program (PIP)**

As explained earlier, in 2002, the Federal Government introduced chronic diseases incentives to offset practice costs in the hope that appropriate treatment would yield massive savings in hospital admissions and years of lives lost (Swerissen, 2004). This programme was designed specifically to improve outcomes in Asthma, Diabetes, Mental Health, Cervical Screening and the uptake of Nurses in general practice though the use of financial incentives in the Practice Incentives Program.

According to the Medicare Australia website the broad aims of these incentives were:

- 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' (RACGP) *Standards for General Practices*.
- 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 these 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.
- Payments focus on aspects of general practice that contribute to quality care. These include the use of IM/IT, provision of after hours care, student teaching and better prescribing. A rural loading is paid to practices in rural and remote locations.
- PIP payments are mainly dependent on practice size, in terms of patients seen, rather than on the number of consultations performed.

(Medicare Australia, 2007)

A three tier incentive was typically provided for practices who agree to provide data to the government (*a Sign-on Payment*) for each individual that gets a specific service (a *Services Incentive Payment-SIP*); and for some conditions where there is a measurable outcome (*an Outcomes Payment*)

The incentives relevant to this study are:

# **Cervical Screening**

•*Sign-on Payment:* Payment to practices that agree to provide data to the Australian Government.

- •*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 30 months.

## 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.

#### 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 Cycle of Care for patients with moderate to severe asthma, payable once per year per patient.

#### **Practice Nurses / Allied Health Worker**

•Payment to practices that employ or retain the services of a practice nurse or allied health worker.

(Medicare Australia, 2007)

Since 2002, to the present time, the number of new incentive and modifications to old ones has grown considerably adding further complexity to systems.

#### **Pharmaceutical Companies**

Bias in sponsored pharmaceutical companies has been well documented; for example at the simplest level Doctors are encourage to only prescribe their own drugs, to the exclusion of other that might be just as effective or of lesser cost to the patient (Costa, 2005; Herald Sun, 2005; W. A. Rogers, Mansfield, Braunack-Mayer, & Jureidini, 2004).

#### **Corporatisation of Medicine**

Another influence gathering momentum in general practice is the Corporatisation of medical ownership and associated operational structures. The federal government encourages larger practices though its Link program , as a means of achieving modernisation, economies of scale and co-location of health services. In 1998/99 an incentive payment to encourage mergers between small practices was introduced (Wooldridge, 1998). However, another parallel movement is occurring on a larger scale
and at a more rapid pace, driven by the commercial interests of large health care and medical corporations (Department of General Practice, 2001).

### **Other institutions**

Like the Royal Australian College of General Practitioners (RACGP), Divisions, State and Federal health organizations, as well as the Internet, are constantly promoting new health guidelines and patient awareness campaigns of the 'recommended' clinical management of chronic conditions, which in turn encourages patients to challenge outdated care practices. For example, the systematic checking of blood pressure, feet, and diet at minimum intervals. A report by the Department of General Practice at the University of Melbourne (2001); identified tensions between the need to establish an evidence base for population health interventions in general practice versus the need to identify interventions that are likely to be actually adopted by Australian general practices (Department of General Practice, 2001)

### The Human Construct

Within the human members in general practice (general practitioners, practice managers, nurses and administration staff) there is a key subgroup that is crucial to the success of any implementations as seen in the previous literature review section: the practice owners.

### **Practice owners/Decision makers**

Nancy Lorenzi (2000), a professor of biomedical informatics suggested that those who want to introduce computers in a health setting usually fail to consider a number of key issues (Nancy Lorenzi & Riley, 2000). These are outlined in no particular order:

- •Underestimating the complexity of the new system and the changes that it will cause in your practice
- •Not having a clear vision for the changes you are proposing
- •The requirements for your new system is to continuously expand, but you fail to renegotiate deadlines or resources to support the expanded criteria
- •You have management and organisational issues, and you are trying to solve these by installing an information system
- •Ineffective listening and communication with both vendors and your staff
- •You become so technology oriented that you seek the newest system (whether it has been tested or not)
- •You do not invest enough time in training on the system
- •You become so emotionally committed to your system that people will not tell you when it is not on track for fear of your reaction
- •You fail to have your staff 'own' the system

#### **The General Practitioner**

General practitioners have a history of independent practice, and have tended to perceive their accountability to be predominantly to the patient on the basis of fee-for-service remuneration, not to the wider community, health insurers or governments. GPs have not perceived their role as encompassing the provision of data on patient or population health outcomes to a third party (Richards et al., 1999). Their individual mindset has the tendency to practice in isolation and do things their own way, ultimately working harder not smarter (Solberg, 2003)

In an Australian study, some GPs talked about a tension between the GP as a businessperson, the GP as a patient support consultant and the GP as an evidence-based clinician. A small number indicated they try to avoid chronic-disease care and to dissuade prospective patients with chronic diseases from coming to the practice (Oldroyd et al., 2003). Many GPs felt there was a conflict between their long-term clinical goals and patients' shorter-term quality-of-life goals, between a systematic evidence-based approach and a patient-centred approach, and between patient satisfaction as an outcome versus achieving high-quality care (Oldroyd et al., 2003).

In the same study, GPs indicated that the goals of chronic-disease care are not as clear as those of acute care, progress is hard to define, and therefore providing chronic-disease care is less satisfying; GPs also described how patient compliance, motivation and capacity influence the type of care given: 'In chronic care, you need the cooperation of the patient; it's a team effort involving the practice and the patient.' Factors such as the severity of the patient's condition, his/her social situation, level of education and attitude towards the illness all need to be taken into account (Oldroyd et al., 2003). Some GPs stated they were not aware of what multidisciplinary programs or services are available, or how to access them. A number described the teamwork associated with chronic care as a burden, time-consuming and costly; others described it as a great advantage. To deal with both the patient's and the GP's agendas, GPs felt that longer consultations are needed. Home visits allowed more time with patients and better quality of care, but they were not cost-effective for GPs who bulk-billed (Oldroyd et al., 2003).

Other earlier studies list a number of GP related issues:

•Lack of Doctor's time;

- •Belief that the patient will not change their unhealthy behaviour,
- •A perceived lack of training in how to facilitate behavioural change in patients;
- •Disagreement with preventive recommendations;

#### •Fear of over servicing.

(J. E. Ward, J. Gordon, et al.,, 1991)More specific to chronic conditions, GPs ask themselves:Is it important?Am I likely to be effective?Can I make the outcomes visible?

- •What will assist getting a quick return?
- •Is it desirable?
- •Is it doable?
- •Can we make it routine as part of the practice?.

(Audehm, 2004b)

#### **The Patient**

At the centre of general practice is the fundamental principle of caring for the patient. This is partly supported by the literature where: GPs felt chronic care was rewarding because it enabled them to get to know their patients better, where they could help the patient prevent complications, and patients felt happier and appreciative of the GP's efforts. Patients also seem to come to terms better with the chronicity of their illness (Oldroyd et al., 2003).GPs believed that some patients want them to take overall control of their condition, listen to and help them deal with their problems (not just treat their symptoms), educate them, and, for older patients, provide social contact. They also want, as reported earlier, their GP to ensure they have an adequate quality of life. GPs felt that this places great pressure on them (Oldroyd et al., 2003). Patients can perceive 'recalls and reminders' as a method of drumming up business (Oldroyd et al., 2003). Patients attend several doctors, problems in overseeing long term-care rises (Oldroyd et al., 2003)

However, the literature also warns that: medical paternalism and passive patienthood have been challenged by new changing social expectations of health care; scientific cures, technological advances, etc. (Kearley K., Freeman G., & Health A., 2001; Sturnberg et al., 2003); Ageing populations; less community cohesion and social support; (Gross et al., 2003; Jack, Boseman, & Vinicor, 2004; Sturnberg et al., 2003). Even the Internet has become a challenging medium often used by patients to 'question' GPs on possible diagnosis and treatments. However, this is not always so, in an Australian study: GPs believed that some patients want them to take overall control of their condition, listen to and help them deal with their problems (not just treat their symptoms), educate them, and, for older patients, provide social contact. Patients also want their GP to ensure they have an adequate quality of life. GPs felt that this placed great pressure on them (Oldroyd et al., 2003).

#### **Practice nurses**

Practice nurses are seen as playing a key role in providing patient education, generating recalls and reminders, undertaking routine clinical tests, assisting with paperwork, coordinating care and sometimes undertaking reception duties. Many GPs, especially solo practitioners, indicated that they could not afford to employ a practice nurse, despite incentives such as the PIP, Enhanced Primary Care (EPC)-item rebates or sharing nurses between practices (Oldroyd et al., 2003).

Overseas research shows that one of the critical factors for improving chronic-disease management is the effective use of non-GP care providers and patient-care teams (Poulton & West, 1999; E. Wagner, 2000).

#### **Receptionists/Administrative Staff**

Are described as 'the eyes and ears of the practice', their roles vary from practice to practice; they can be almost providing a management role in some cases overseeing other junior staff to very narrow and task-oriented in others. Their employment models also vary extensively; full-time, part-time, and so on; receptionists were viewed as playing a valuable role in greeting patients, identifying problems, providing extra (local) information, downloading pathology results and arranging recalls (Oldroyd et al., 2003).

### **Practice Managers**

Practice managers, where present, were seen to have a limited role in chronic-disease management, mainly associated with implementing government initiatives and doing the associated paperwork. Some GPs envisaged a possible role for the practice manager in setting up systems to facilitate chronic-disease care; however, running the system for patient recall, auditing and monitoring was not being recognised by GPs (Oldroyd et al., 2003). Many solo practitioners expressed regret that they were unable to afford a practice manager (Oldroyd et al., 2003).

### The Change Management Construct

According to Nickols (2006), managing change is itself a term that has at least two meanings: One meaning of 'managing change' refers to the making of changes in a *planned and managed* or *systematic* fashion: The aim is to more effectively implement

new methods and systems in an ongoing organization. The changes to be managed lie within and are controlled by the organization. (Perhaps the most familiar instance of this kind of change is the 'change control' aspect of information systems development projects). The second meaning of managing change, is change that might have been triggered by events originating outside the organization, in what is usually termed 'the environment' (as it was similarly labelled in this review). The response to changes over which the organization exercises little or no control (e.g., legislation, social and political upheaval, the actions of competitors, shifting economic tides and currents, and so on). Researchers and practitioners alike typically distinguish between a knee-jerk or reactive response and an anticipative or proactive response (F. Nickols, 2006).

Earlier in the chapter (section four), it was suggested the adoption of technologies (the technical construct) to support the systematic approaches to care in general practice requires a major shift in current medical care models (Chew & Armstrong, 2002; Chew & Van Der Weyden, 2003; Rust & Cooper, 2007). This shift as previously explained, involves changing the existing practice of treating a patient when they come in already disease-stricken (acute care models), to developing systems to assist the prevention of care so that patients are systematically and periodically seen by their doctor to avoid getting to that stage (preventative care model) (WHO, 2008b).

To affect this state of affairs involves *planned change* and *change management strategies* as it concerns, as the earlier sections in the chapter revealed, not just the technological construct, but also the clinical, organisational, human and environmental as well. This would be a central feature in the development and implementation of any information system framework.

#### The socio-technical perspective: Preliminary systems and sub-systems

Conclusions drawn from the literature in this chapter allow the piecing together of a number of workable preliminary system and sub-systems constructs. However, it would surely be premature to do so at this stage; as the research design (Chapter 2) called for the development of an emerging (conceptual) framework to be drawn from *both* the literature review (this chapter – Chapter 3) *and* practical existing field experience (Chapter 4). At this stage only half the desired picture is at the researcher's disposal. The next chapter (Chapter 4) will provide the background and feedback from practical field experiences, were valuable lessons in developing and implementing dedicated chronic

diseases information systems have been learned and some adoptions have already taken place. At that point then, there should be sufficient information to begin the final analysis and identification of emerging constructs to begin developing an emerging (conceptual) framework for the prevention and management of chronic conditions in general practice. Nonetheless, there is enough evidence to begin putting forward, albeit tentatively, a few emerging constructs underpinning the socio-technical perspective of this framework.

As already examined in the methodology chapter (Chapter 2), the cornerstone of the dociotechnical approach (as the best theoretical framework for this study) was the fit that was achieved by a design process aiming at the joint optimization of the sub-systems; further suggesting that any organizational systems will maximise performance only if the interdependency of these subsystems is explicitly recognised. Hence any design or redesign must seek out the impact each subsystem has on the other, and design must aim to achieve superior results by ensuring that all the subsystems are working in harmony (Mayers, 1999; Mumford, 2003, 2006; Pasmore, 1988; Schneberger & Wade, 2006; Williamson, 2002).

The preliminary findings noted in this chapter (see 'Constructs' in section five) from the literature appear to identify and describe some of these systems and sub-systems; furthermore and in conjunction with the factors identified in section four, the interdependencies of these systems and sub-systems can be begin to be derived.

### The Technical Sub-Systems

- •Structured record keeping
- •Real world applicability
- •Application across the continuum of care
- •A patient-focused and longitudinal approach
- •Support for a full range of chronic care process
- •Provide health outcomes feedback
- •Prompt the provider to use clinical (evidence-based) guidelines
- •Track how the patient is being treated: Recalls/Reminders
- •Distinguish who in the population has the disease: Registers

### The Organisational Sub-Systems

- Financial
- •Incentives for prevention:
- Workforce
- •Change Management
- •Leadership
- •Ownership

- Champions
- •Senior management
- •Evaluation delay factor
- •Local Context (uniqueness)
- (uniqueness
- Administrative

- •Complexity of
- Incentives
- Accreditation
- •Legal
- Physical Infrastructure

#### The External Environment Sub-Systems

Government: Chronic Diseases Initiatives and the Practice Incentives Program (PIP)
Other institutions

- The Clinical Sub-Systems
- •Evidence based medicine
- •Level of patient involvement
- •The conflicting pressures:

- •Corporatisation of Medicine
- •Pharmaceutical Companies
- •Practice Nurses / Allied Health Worker
- •The complexity factor:
- •Lack of accepted norms:

### Change Management Strategies Sub-Systems

- Change Management Theories
- •Degree of Change:
- •Degree of Resistance
- •Population:
- •Stakes:

## The Human (Social) Sub-Systems

•Owners/Decision makers

- •The General Practitioner
- •The Patients

- •Time Frame:
- •Expertise:
- •Dependency:
- •Managing Change
- •Skills & Strategies
- Practice nurses
- •Receptionists
- •Practice Managers

The patient or customer, as is commonly referred to in the business sector, appears in all facets of the literature review, as the ultimate recipient of healthcare (an object of strong political, economic and health-related significance); as mainly a barrier (at time demotivating GPs and exerting a number of pressures); and playing a triple role as an internal and external influence as well as 'the centre', of any general practice system supporting chronic disease care. These characteristics place the patient in this emergent analysis in a system of its own.

#### The Patient Sub-Systems

- •Patients expectations of the GP.
- •Patient lack of compliance with GP recommendations.
- •Belief that the patient will not change their unhealthy behaviour.

#### The Implementation Sub-Systems

As described in the literature, where development stops and implementation starts is not clear cut, it varies from author to author and experiences in the field. This is quite evident when the elements in the 'constructs' are analysed. Development and implementation go hand in hand in a continuous loop (as described in section four in this chapter); nowhere is this more obvious than in the change management construct; where the lines between managing change and implementation are truly blurred. For this reason implementation is also given it own place in the findings.

- Low-technology prototyping
- •Design by doing
- •Mutual learning:
- •Cooperative design and prototyping
- •Job Design
- •Work Analysis
- •Empowerment
- •User Participation
- •Action to improve the problem situation
- •Identification of feasible and desirable changes

- •Comparison of the conceptual; models with reality
- •Making and testing conceptual models
- •Environmental constraints
- •Owner
- •World view
- Actors
- •Customer/client
- •Root definition of relevant systems
- •The problem situation: expressed
- •The problem situation: unstructured

(Mayers, 1999; Mumford, 2003, 2006; Pasmore, 1988; Schneberger & Wade, 2006; Williamson, 2002).

At this point, the literature has produced a number of elements and concepts in the form of motivational Factors and the identification of systems and sub-systems that will inform and potentially be corroborated by the field experience sought in the next chapter (Chapter 4).

## Section five summary

This section examined the chronic diseases literature on the specific characteristics, elements and influences that would make up relevant care; these were collated and grouped according to broadly defined constructs that will form part in the emergent conceptual chronic disease framework in Chapter 5. Then, the literature on theories of change and managing change in organisations relevant to information systems were showcased.

### Conclusion

In the first section of this chapter chronic diseases were defined as medical conditions that require ongoing medical care, including monitoring, treatment, and coordination among multiple providers, limiting what sufferers can do and with consequences likely to last longer than one year. Then the financial and health significance of these conditions were briefly outlined across the world and in the Australian context.

The second section of this chapter found that preventative measures for the management and prevention of chronic diseases could be well supported by the adoption of systematic approaches to care. These approaches were then shown to be in line with new evidencebased medicine paradigms of care. Two specific samples were given to highlight the current shortcomings in systematic care. The third section showed that investment in technology to improve health outcomes across western world including Australia, have been gaining pace. However, most of these large investments appear to be focusing solely on the introduction of technology and on the most part appear to have failed. Likewise, general practices across the world appeared to be at various stages of development; where some countries like New Zealand appear to be well advanced in the implementation and use of technology in general practice while others like the US appear to lag far behind. A brief overview of lessons learnt from the information systems business sector was introduced.

Section four briefly examined the literature on information systems in general practices internationally and in Australia. It reflected on the technologically-driven approaches to implementations and the limited success in adoption of the technology for the development of integrated and practice-wide systems (systematic approaches to care). It then described the common implementation shortcomings and identified internal and external motivational factors pertinent to the study.

Section five began by piecing together the building blocks of a preliminary framework, then presented the indentified constructs as the potential systems and sub-systems to form part of an emerging socio-technical chronic disease information system for general practice.

These preliminary findings will be used in conjunction with the field experience in the coming chapter (Chapter Four) to develop the emerging conceptual framework on which to base the rest of the study.

# **CHAPTER FOUR – Context and Practical Experience**

'The only source of knowledge is experience'

(Albert Einstein, 2008)



Figure 11 - STAGE ONE: Chapter 4 - Context and Practical Experience

### Introduction

Chapter two provided the theoretical foundation, the methodology to be used and the research design of the study. Chapter three provides a literature review on chronic conditions, health information systems and proceeded to expand into the literature regarding information systems in general practice and the issues that affect the adoption of information systems in chronic condition care. It culminated by identifying a number of factors and constructs from the literature that could potentially inform an emerging information system implementation framework for the prevention and management of chronic conditions in general practice.

This chapter's overall aim is to frame the case study. Three distinct sections provide the necessary content to achieve this unified aim. The first section provides the context in which the study took place (Part One). The second complements and enhances the findings in Chapter Three in the form of practical knowledge acquired as part of practical chronic diseases information systems implementations in general practices (Part two). The third section provides a background to the implementation framework that was carried out before the study begun (Part Three).

Another purpose, as the methodology chapter indicated (Chapter Two), by appropriately documenting the study's context and protocols so that another investigator can follow the documented procedures, is that reliability is expected to be increased (Yin, 2003). As well as creating a 'chain of evidence' by allowing the reader to follow the derivation of this evidence from initial propositions to conclusions (Yin, 2003).

Another subtle outcome of this chapter is to make explicit any conscious or unconscious 'world views' that are guiding the researcher — in his double role as IT/IM officer at CHGPN. As explained in the methodology chapter, these 'world views' influence the researcher's arguments and conclusions by determining the choice of background material, theories and research techniques (theoretical framework) used or omitted in the study (Darlaston-Jones, 2007; Flood, 1990; Lindsay, 1995; Reich, 1994). Therefore, when the thesis is written, it is the researcher's exposition of their own 'world views' that enable readers and examiners to follow the researcher's arguments, and reach the same conclusions (Phillips & Pugh, 1992). This is achieved by providing a background to the implementer and the implementation process before the study began.

#### Part One: Context of the study

This section of the chapter provides a brief overview of the broader Australian Health systems context, General Practitioners and Divisions of General Practices; and specifically the context around Central Highlands General Practice Network as the key stakeholder and partner organisation in which the study took place (the Case Study). This section also includes chronic diseases baseline data, and activities that relate to the practical implementations knowledge used in the study.

#### Australian Health System

Since 1901 Australia has been an independent nation having a federal system of government, with its origins in the British system of government and law. The Constitution established a Commonwealth (federal) Government, giving its Parliament powers in specified fields. Each of the six States and two Territories within the Commonwealth has a parliament; in the States these parliaments have powers in all areas not specified in the constitution as Commonwealth powers. Within States there are local governments such as municipal and shire councils (Medicare Australia, 2008c).

The Commonwealth currently has a leadership role in policy making and particularly in national issues like public health, research and national information management, and it

funds most medical services out of hospital, and most health research. The Commonwealth, States and Territories jointly fund public hospitals and community care for aged and disabled persons.

The States and Territories deliver public acute and psychiatric hospital services and a wide range of community and public health services including school health, dental health, maternal and child health and environmental health programs (Medicare Australia, 2008c). The aim of the national health care funding system is to give universal access to health care while allowing choice for individuals through a substantial private sector involvement in delivery and financing.

The major part of the national health care system is called 'Medicare'. Medicare provides high quality health care which is both affordable and accessible to all Australians, often provided free of charge at the point of care. It is financed largely from general taxation revenue, which includes a Medicare levy based on a person's taxable income (Medicare Australia, 2008c).

The Federal Government's Department of Health and Ageing (DoHA) is responsible for the policy development of Medicare and the Medicare Benefits Schedule (MBS) (subsidised Medicare services listing). Medicare Australia (formally known as Health Insurance Commission - HIC) is responsible for:

- •Ensuring Medicare benefits are paid to eligible health care consumers for services provided by eligible medical practitioners, and
- •Assessing and paying Medicare benefits for a range of medical services, whether provided in or out of hospital, based on a schedule of fees determined by DoHA in consultation with professional bodies (Medicare Australia, 2008b).

### **General Practitioners**

In Australia, the majority of general Practitioners (GPs) are self-employed and work in private businesses called General Practices in which they are employed or own outright. A small proportion consists of salaried employees of Commonwealth, State or local governments. Salaried specialist doctors in public hospitals often have rights to treat some patients in these hospitals as private patients, charging fees to those patients and usually contributing some of their fee income to the hospital. Other doctors may contract with public hospitals to provide medical services. There are many independent pathology and diagnostic imaging services operated by doctors (Medicare Australia, 2008a).

## The Divisions of General Practice Program

In 1992, the Australian Government Department of Health and Ageing funded 10 demonstration Divisions of General Practices, these were formalised local networks of GPs working within the same geographic area. The success of these demonstration projects meant that funding was extended with the Divisions of General Practice Program covering the whole of Australia. Current funding for the Divisions Program extends to 2012. The aims of the Divisions of General Practice Program have remained the same since the inception of the program. Its main aim is to improve health outcomes for patients by encouraging GPs to work together and link with other health professionals to upgrade the quality of health service delivery at the local level.

The Divisions Program also supports such common aims such as:

- Providing a mechanism for individuals and groups to contact local GPs and for GPs to respond as a group in local health issues;
- Allowing GPs to be involved in health policy decision making at the local level;
- Improving the quality of health service delivery at the local level in order to provide better access to available and appropriate health services;
- Addressing local issues to meet the special needs of groups such as Aboriginal and Torres Strait Islander peoples (these are local indigenous groups), people from non-English speaking cultures and people with low incomes;
- Facilitating the introduction of other elements of the general practice strategy e.g. accreditation, peer review and training initiatives;
- Enhancing the quality of educational and professional development opportunities for GPs and undergraduates; and
- Improving the cost effectiveness of service delivery at the local level thereby contributing to a more appropriate allocation of Commonwealth funding (Primary Health Care Research & Information Service, 2008b)

Divisions are supported by State-Based Organisations (SBOs) and the Australian General Practice Network (AGPN). At 30 June 2007, there were 119 Divisions of General Practice covering all of Australia (123 in 2000). Table 12 below, provides an organisational chart of the Division's network. Headed by a national body, Australian General Practice Network (AGPN) that connects to the Federal Government and State Based Organisation (SBOs) (one in every state) and a number of divisions in each state that work with their SBOs. Divisions vary greatly in geographical size, number of general practitioners and population in their area, as well as in resources, infrastructure and their activities (Department of Health and Ageing, 2008).



Figure 12- Division of General Practice -Organisational chart

(Department of Health and Ageing, 2008)

# **Central Highlands General Practice Network**

The Central Highlands General Practice Network (CHGPN), formally known as Central Highlands General Practice (CHDGP) is one of the 119 Divisions around Australia. The Central Highlands General Practice Network includes the areas to the north, north-west and west of Melbourne in the State of Victoria; and covers an area of approximately 6000 square kilometres (see Table 13 below).



*Figure 13 - Central Highlands General Practice Network - Geographical position* (CHGPN, 2008)

This Division (CHGPN) commenced formal operations in November 1993 and established its offices in January 1994. The Division is managed by a Board of Governance made up of elected local GPs.

The GP Network includes two large suburban satellite towns (Sunbury and Melton), a number of provincial centres and towns (Castlemaine, Seymour, Kilmore, Broadford, Gisborne, Woodend, Mt Macedon, Trentham, Riddells Creek, Romsey, Lancefield, Daylesford, Kyneton, Wallan and Wandong), as well as smaller rural communities. It boasts a population of more than one hundred and seventy thousand inhabitants; more than two hundred GPs and more than forty general practices; five hospital and seven community health centres (see Table 14).

The industries at CHGPN have traditionally included mixed farming, light industrial and service industries. Many of the residents in the southern and western areas of CHGPN commute to the Melbourne metropolitan area for employment. The area is well served by major state highways including the Hume, Calder and Western Highways (CHGPN, 2008). Figure 14- CHGPN - Summary Profile - 2008

Population in the region	173,261 (2001 ABS census)
Number of GPs	245 (full, part-time and includes GP registrars/GPs in training)
Number of Practices	43
Nature	A mixture of rural, provincial and outer-urban towns
Hospitals	Five Public Hospitals
Community Health	Seven Community Health Centres
Pharmacies	34
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. 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.

(CHGPN, 2008)

# CHGPN: Context Data (2002/2003)

While the previous section provided a snapshot of the current (2008) profile of the CHGPN Division; the following data present the contextual data in which the practical implementation begun to take place in 2002/2003.

Back in 2002/03 the Division profile was somewhat different; less population totalling just over one hundred and fifty thousand inhabitants and less GPs as is to be expected following normal population growth trends. The number of practices however, has dropped and this was due to a number of amalgamations between smaller practices and the retirement of older GPs. The result is less general practices but larger in size; the rest remained somewhat constant over the following years; see Table 15 for more details.

Population in the region	155,324
Number of GPs	186 (full, part-time and includes GP registrars)
Number of Practices	49
Nature	A mixture of rural, provincial and outer-urban towns
Hospitals	Five Public Hospitals
Community Health	Seven Community Health Centres
Pharmacies	34
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. 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.

Figure 15 - CHGPN Summary Profile 2002/03

(Primary Health Care Research & Information Service, 2004)

## Chronic Diseases Data 2002/03

The following data are a summary of baseline data as reported by the then Health Insurance Commission (HIC) (now Medicare Australia) in 2002/03 (General Practice Victoria, 2003). HIC data, for a number of reasons does not always reflect measures accurately. To improve understanding of the HIC data, the IT/IM Officer's 'insider' knowledge is presented in a text box and in *Italics* to help the reader interpret the data. For example: Of the 46 practices reported in the above profile, during the Period November 2001 to June 2002, only 30 practices were actually accredited (regulations and performance indicators necessary to be deemed worthy of certification as a reputable general practice), and therefore eligible, for the Government's Practice Incentives program (PIP) program already explained in Chapter Three. Further information on the specific Medicare Benefit Schedule (MBS) item numbers used by general practices can be seen below in Figure 14.

The lack of accreditation meant that no data was collected by the HIC from these practices, and that these practices had no access to the financial incentives (PIP). This was (and still is) a misinterpretation of the reality, as some of these non-accredited practices were either not providing orthodox GP services (instead delivering alternative medical services like naturopathy, acupuncture, an so on and so forth) or these practices were 'satellite' practices belonging to other central general practice sites already accredited, but could not claim payments as they are not registered as a 'separate' business (general practice) on their own. Other reasons for not seeking accreditation are the imminent retirement of GP business owners or the intent of merging the business with other provider. Red-tape (time consuming and complex paper-work) was often another reason.

Even then out of those 30 practices, not all chose to sign on for all PIPs; for example, HIC data for the period August-October 2003 Quarter (Table 4): only 29 (comprising of a total of 148 GPs) chose to register for the Cervical Screening PIP programs (93%) and 27 (90%) for the Diabetes component. The baseline data for the three major chronic conditions relevant to this study were as follows:

**Cervical Screening:** Of the 148 GPs only 43% used the Practice Incentives Program (PIP) item numbers averaging 3.1 items during the six monthly terms, well below the State average of 4.5 items per GP. While the low (43%) number of GPs can be explained by the fact that not all GPs in a practice do Cervical Smears, female GPs (only +38%) are more likely to engage and be favoured by female patients to do smears. Worst of all, the practice coverage rate at the Division at the time was a low 31%, when the government benchmark was 65% over two years (later changed to 50% as the target was more appropriate). To give an indication of the deficiencies, one of the 'lighthouse' practices (term describing high achievers) had, according to the HIC, a cervical screening rate of 31% in 2003

#### Table 16.

This was not just a localised or State wide problem. According to Australian Institute of Health and Welfare (2007) national figures showed that two-year participation rates had peaked at 63.4% in 1998–1999 but had significantly declined to 60.7% in 2002–2003. Furthermore, from 1996–1997 to 2004–2005 it showed that there was a steady decline in participation among women aged less than 35 years and continued improvement in participation for women aged 40 years and over (Australian Institute of Health and Welfare, 2007). Moreover, women aged 20–69 years from regional and remote locations experienced higher incidence and mortality rates for cervical cancer compared with women in major cities (Australian Institute of Health and Welfare, 2007).

**Diabetes:** Of 148 providers (GPs) only 34% —not necessarily a bad figure as not all GPs treat Diabetics, had an average item use of 10.4 per term as opposed to 13.4 State averages. Although no data was available for the 2001/2 period, data from the November 2003 Quarter report –a year later- when the effects of system implementation were already taking effect, was showing a Division average covering rate of no more than 17%; needing to be a minimum of 20% per quarter to satisfy the 80% annual minimum benchmark (Table 4).

**Asthma**: At this time, only 29 GPs (20%) out of 148 provided a total of 268 services for the semester at an average of 9.2 services; and although this is a very low figure this was higher than the state average of 6.3 (Table 4)

Table 4 below provides information to each Victorian division of general practice for the period August-October 2003 Quarter. The first column denotes the name of the Division by their assigned number (from 301 to 332 – total of 32) in the state. The second column represents the number of practices accredited at each Division. The next grouping of two columns refers to the Sign-On activity for Asthma, Cervical Screening and Diabetes (showing the percentage of practice participation and the SWPEs (statistical derived number of patients) covered by the participating practices for each condition. The next two groups of columns refer to Outcomes payments for Cervical Screening and Diabetes respectively; representing the number of practices signed-on for the scheme, the number of

practices already receiving payments, practice participation rates, the number of patients covered and the last column the percentage of patients covered.

						5 5		Novemb	er 2003 Pa	yment Qu	arter			9	25		
							The SIPs a	re generated t	by activity cond	ucted during A	Aug 2003 - Oc	t 2003					
		Acthma sim.	nn navment	Cervical scre	ening sign-	Diahetes sign.	on navment		Cervical Scree	ening Outcom	es payment			Diabete	s Outcomes	payment	
		% Practice	SMPEs	% Practice	SWPEs	% Practice	SMPEs	No of signed	No of signed	% Practice	SWPEs	Average	No of	No of	% Practice	SMPEs	Average
Victorian Divisions	Practices in each Division	Participation	covered by practices participating	Participation	covered by practices participating	Participation	covered by practices participating	on practices	on practices receiving an outcomes payment	Participation	covered by practices participating	practice coverage rate	signed on practices	practices receiving an outcomes payment	Participation	covered by practices participating	practice coverage rate
301 - Melbourne	72	%88	128,384	88%	128,384	85%	127,369	8	33	37%	50,980	34	61	18	30%	39,296	16
302 - North East Valley	56	95%	158,628	95%	160,458	95%	158,628	53	20	38%	73,256	32	53	22	42%	67,084	17
303 - Inner Eastern Melbourne	51	82%	129,185	84%	132,903	82%	129,185	43	22	51%	78,557	34	42	15	36%	35,173	14
304 - Southofty GP Services	20	86%	116,849	30%	120,309	86%	116,201	45	21	47%	64,245	35	43	16	37%	28,910	20
305 - Westgate	8	67%	83,437	%08	93,838	80%	93,838	24	3	13%	6,760	27	24	11	45%	30,239	14
306 - Western Melbourne	8	92%	165,231	94%	165,638	94%	166,821	59	8	10%	16,696	26	59	32	53%	65,038	27
307 - North West Melbourne	8	87%	176,954	88%	179,668	86%	172,258	61	6	15%	25,062	29	59	22	37%	63,950	30
308 - Northern Melbourne	62	%06	148,640	92%	152,719	92%	150,749	57	7	12%	14,165	28	57	18	32%	53,115	18
310 - Whitehorse	57	33%	185,197	%96	189,229	33%	184,537	55	19	35%	65,761	32	53	15	28%	42,348	16
311 - Greater South Eastern	20	%88	127,964	%06	129,408	88%	123,772	45	80	18%	24,460	29	44	12	27%	28,204	14
312 - Monash	34	%88	72,936	91%	75,722	91%	75,722	æ	5	16%	17,195	29	31	12	40%	30,330	21
313 - Central Bayside	46	%96	134,653	%96	134,653	36%	134,653	44	18	41%	68,456	34	44	15	34%	49,898	14
314 - Knox	35	94%	118,571	91%	117,371	94%	118,571	32	7	22%	31,091	30	ŝ	<del>1</del> 0	30%	36,700	16
315 - Dandenong	09	87%	175,151	88%	180,288	87%	175,112	53	10	19%	34,082	30	52	25	48%	79,540	18
316 - Mornington Peninsula	46	76%	162,246	80%	165,157	83%	166,193	37	10	27%	54,458	29	38	16	43%	65,372	16
317 - Geelong	47	87%	162,881	89%	165,355	85%	161,885	42	7	17%	31,986	28	40	15	37%	56,417	15
318 - Cartrol Harkenda	80	%86	103,016	%26	104,907	80%	99,945	29	5	17%	21,056	31	27	11	39%	41,579	17
319 - North East Victorian	25	100%	82,225	100%	82,225	100%	82,225	25	9	24%	15,486	30	25	10	40%	36,861	20
320 - Eastern Ranges	44	91%	121,332	33%	123,831	89%	119,846	41	15	37%	44,745	31	39	13	33%	33,771	16
322 - South Gippsland		*	*		*	*	*		*	*	¥	8 <b>4</b>	*		*		*
323 - Central West Gippsland	20	95%	78,430	95%	78,430	80%	76,593	19	2	11%	9,733	29	18	ø	32%	21,323	15
324 - Otway	27	%96	92,860	%96	92,860	%96	92,860	26	9	23%	27,341	31	26	11	42%	32,469	19
325 - Ballarat and District	23	%96	83,314	%96	83,314	91%	82,749	22	0	%0	0	27	21	o	41%	32,604	19
326 - Bendigo and District	21	100%	60,845	100%	60,845	100%	60,845	21	80	38%	30,940	31	21	00	38%	17,316	20
327 - Goulburn Valley	20	80%	70,052	85%	71,500	30%	72,725	17	m	18%	20,267	29	18	11	63%	33,179	8
328 - East Gippsland	17	94%	57,023	94%	57,023	94%	57,023	16	0	%0		30	16	<b>б</b>	56%	35,987	25
329 - Border	19	%68	68,905	%68	68,905	95%	69,942	17	-	6%	5,993	28	18	11	59%	41,964	24
330 - West Vic	21	95%	55,338	100%	66,806	80%	51,352	21	0	%0	2	25	19	σ	50%	20,746	19
331 - Murray Plains	15	33%	48,283	83%	48,283	33%	48,283	14	2	14%	11,326	28	14	9	43%	21,334	19
332 - Mailee	18	100%	57,886	100%	57,886	100%	57,886	18	3	17%	14,910	29	18	9	33%	12,704	15

Figure 16 - CHGPN Baseline Data 2002-2003

**Error! Reference source not found.** below further details the key information from the above table that is relevant to the study. This data represents the thirty Victorian Divisions' ranking in the uptake of government incentives. The shaded cells show CHGPN's 2003 outcomes for the Service Incentives Payments (SIPs) for the three main chronic conditions (Cervical Screening, Diabetes, Asthma) as component of the Practice Incentives Program (PIP) already outlined in Chapter 3, section five.

Table 17 – Service Incentives Programs (SIPs) outcomes for CHGPN 2003 below shows the Division's baseline data at the time of the initial implementations (2003). For example, column one (% signed on practices with SIPs) shows CHGPN to be at the 27<sup>th</sup> position out of the then 30 Victorian Divisions, and represents the percentage of practices participating in the Cervical Screening incentive (SIP) scheme. The second set of two column, shows the similar measurements but for Diabetes (column 3) and the percentage of practice participation (column 2). And so on with the third set of columns (4 and 5).

Se	rvice Incentive F	Programs (SIP:	s) 2003	
% signed on practices with SIPs	% practice participation	% signed on practices with SIPs	% signed on practices with SIPs	% eligible providers# receiving SIPs
*	*	*		ļ
*	27%	*	*	*
81%	25%	*	*	*
80%	24%	88%	*	*
75%	21%	81%	*	28%
75%	20%	71%	*	26%
73%	20%	71%	*	22%
71%	20%	70%	*	20%
70%	20%	68%	*	19%
70%	20%	67%	*	17%
67%	19%	67%	*	17%
67%	19%	67%	80%	14%
63%	19%	67%	54%	14%
63%	19%	67%	52%	14%
62%	18%	67%	<mark>50%</mark>	12%
62%	18%	66%	49%	12%
62%	17%	64%	49%	12%
60%	17%	63%	46%	11%
58%	16%	63%	43%	11%
57%	16%	63%	42%	10%
55%	16%	63%	41%	10%
55%	16%	61%	40%	10%
55%	16%	59%	38%	10%
54%	15%	59%	37%	10%
53%	15%	58%	35%	10%
53%	15%	56%	35%	9%
52%	14%	55%	33%	8%
52%	14%	54%	33%	7%
51%	14%	49%	32%	7%
50%	14%	47%	31%	6%
			31%	6%

Figure 17 – Service Incentives Programs (SIPs) outcomes for CHGPN 2003

(General Practice Victoria, 2003)

This is the baseline data from HIC (now Medicare) and will help determine the impact of the implementations when compared to the outcomes in later years at the end of the study.

While the Health Insurance Commission (HIC) —now Medicare Australia, provided less than up-to-date - and difficult to interpret data, they will be used as the official measuring instrument to compare outcomes in this study. Most of the inaccuracies are due to lack of Division specific data due to the fact that CHGPN shares boundaries and practices in them with five other Divisions; and data from those practices in boundary town were not necessarily reflected in HIC reports for CHGPN. To make matters worse, the Division's boundaries do not align with any of the statistical areas (by shire, or health area) that are used in calculating these tables. Therefore, most of the data are statistically inferred (by the HIC) by the percentage assigned of each boundary practice to the Division, even though the implementations were wholly the labour of CHGPN; and vice versa with programs delivered by other Divisions to our shared practices. It is important to note that the fact that Practices or GPs were not claiming PIP incentives does not mean that the delivery of care was not being provided to patients. Rather, that it wasn't being monitored by HIC without this process.

### **CHGPN Activities 2002**

Divisions provide funding providers (Department of Health and Ageing) yearly activity reports. And this primary documentation resource will be quoted to set the implementations in context.

During 2002, the only instance where a chronic condition (Diabetes) was mentioned as an activity was under the heading: 'SERVICES TO GPS'; where the education goal was to: '*support quality prescribing*'; to this account: 45 GPs (41 for group case study and 4 for 1 on 1) were visited for Diabetes educational visit (process); where 44% (12) of GPs visited reported they had been prompted to change their management of Type 2 diabetes (impact)(Primary Health Care Research & Information Service, 2008a).

### **Information Management/Technology**

At this point in time (2002) the Division already possessed another very dedicated and competent IT officer (as separate to the new IT/IM position) that had an influential impact

in computerizing practices and training GPs throughout the Division; however the purpose of this role was more technically skewed.

In this regard, the 2002 annual report states: under the heading 'SERVICES TO GPS' -Information Technology/Information Management, that the aiming of the program was to provide: 'support to GPs & to Practices to maximise opportunities to utilise Information Technology'. And the strategy was to: 'raise awareness about, and provide training and support in the ways in which IT can be integrated into general practices' (Primary Health Care Research & Information Service, 2008a, p. 1)

The processes and impacts for the 2002 year ending period were:

## **Process:**

- •18 individual training sessions in clinical software provided for GP's.
- •GP training night (one) conducted on the use of recalls and reminders.
- •6 IT/IM mail-outs conducted & newsletter articles on IT/IM regularly provided.
- •IT/IM focus group, consisting of interested GP's developed.
- •3 Practice Managers trained in using medical software to produce recalls and reminders systems.
- •Manuals to support IT/IM in Practices developed and distributed

## Impact:

- •90% of GP's trained reported increased confidence in using clinical software.
- •79% of Practices computerised- an increase of 5% from 12 months ago
- •50% of Practices download pathology results- an increase of 3%
- •70% of Practices enrolled in PIP- an increase of 5%.
- •These figures reflect an Increasing use of IT/IM to manage patient data.

(Primary Health Care Research & Information Service, 2008a)

The important conclusion from this section was that by the time the IT/IM Officer began work at the Division, 79 percent of practices that were already computerised (including possessing medical/clinical software) were also the practices that were accredited (30) and therefore PIP capable (although only 70 percent had enrolled in the scheme at the time). From a computerization point of view, one hundred percent of practices that could participate in the chronic disease initiatives were already technically (hardware/software) capable. Further questions remained about the number of GPs and staff trained in the use of the technology and their level of training.

## Part two: A Background to Practical Implementations

This section provides a more specific background into the wider environment and activities in which the chronic diseases information systems were successfully implemented and adopted (prior to the study) by the CHGPN IT/IM Officer. It then proceeds to clarify from the IT/IM Officer's point of view the constructs (and more importantly the process) observed as they took place over the implementation period. This is the practical experience adding to the literature review findings to later develop an emerging conceptual framework in the next chapter (Chapter 5).

In August 2002 and to facilitate the uptake of the Practice Incentives Programs (PIPs) aimed at improving the prevention and management of chronic conditions, the CHGPN Division employed a dedicated (30 hrs per week) IT/IM Officer to achieve these aims (to remind the reader, the IM/IT Officer is also *the researcher* in this study).

The stated tasks of the position were:

- Identification of education, information and training needs of GPs , staff and other relevant health services providers in the detection and management of chronic conditions
- Provision of education, support and information to practices about:
  - The requirement for PIP payments (recall and reminder systems)
    - The activities that make up the PIPs.
    - The requirement for PIP outcomes payments.
- Establish and develop linkages between general practices and other healthcare providers, consumers and local communities, relevant government and non government to improve access to integrated care for people with chronic diseases.
- Facilitate appropriate access to continuing professional development and quality assurance and clinical audit in chronic disease prevention and management.
- Provide appropriate information on standards based IT/IM systems to ensure that general practices have the tools and information to effectively manage chronic disease.

Unfortunately, at the time, these very broad statements were the only guidelines, as the position was newly created and no one, at any level, had any idea of 'what' the particular details of the description were or 'how' these were meant to be applied. What was clear though was the interventions were of an educational, technical and some kind of hands-on support-based nature. This situation, coupled with the trust given to the IM/IT Officer by management (perhaps given his past experience as a Computer Educator at a previous Division), opened the door to develop the complete program form a more *holistic information systems perspective* from the ground up.

## The IM/IT Officer

The IM/IT Officer employed had three previous years experience as a Computer Educator at Inner Eastern Melbourne Division of General Practice (IEMDGP). During this time developing general practice specific computer training sessions for GPs, nurses and staff; with more than two thousand face-to-face contact hours of training in a computer laboratory environment located at IEMDGP. The computer centre possessed almost all available GP specific clinical software's programs (close to 30 programs). At this Division, the IT/IM officer had accredited the site as a nationally accredited Registered Training Organisation (RTO); where the only specialised *Certificate II: Information Technology in General Practice* in Australia was awarded to those completing the full training course. The training approach used was computer education of health professionals. The basis for this approach was the IT/IM officer's postponed Doctor of Education (EdD) research study at the time in that setting (Thesis: A minimalist approach to computer education of health professionals – Charles Sturt University). Furthermore, from an educational perspective the IM/IT officer had a Master's Degree in Education (Administration) and a Bachelor's degree in Teaching - Vocational Education and Training (VET).

Prior to this he was a business owner (Building Industry Trade Company) and a self taught computer and Internet enthusiast. All these experiences and education were to influence the framework, approaches and strategies chosen to develop this program. By late 2003, when the opportunity came along through the School of Information Systems

at Victoria University to get involved in a PhD study, the IM/IT officer had already achieved a number of milestones that were appropriate to framing this study and the context to conduct the research, including:

- Access to almost every practice in the Division
- A well developed working relationship with key (champions) in every practice.
- A clearer understanding of the practical requirement of implementations.
- Already developed and written implementation guidelines for Cervical Screening systems and (partially) for Diabetes
- Already presented some practical learning and findings at two of national conferences (*D. Carbone & D. Batterham, 2003; D. Carbone & R. Batterham, 2003*)
- Already achieved a number of very immediate key adoptions; ten to be precise representing a 30% rate of adoption (some with multiple systems) of all possible accredited practices. This high adoption rate was very uncommon in the literature in any information implementation field, let alone the Health arena at the time.

### Part Three: The Chronic Diseases IM/IT Implementation Framework

This section seeks to link the findings in the literature review (Chapter Three) and what was experienced in practice by the Division IT/IM Officer. This will inform and support the initial emerging framework in the next chapter (Chapter Five).

### The Implementation Experience vs. Literature Review

To this end, systems and subsystems and their individual constructs that have emerged from the literature and reported in the concluding summary in Chapter Three, will be presented again to allow the IM/IT officer to discuss and compare the generic and salient key points in the literature review their relevance to his experience in the field. As well as highlighting the implementation strategy used in his practical implementations to guide the 'how to' development of the framework. These reflections will be noted in text boxes and '*Italics*'.

### Systems and Sub-Systems:

As already noted, the cornerstone of the Socio-technical approach (as the best theoretical framework for this study) was the fit that was achieved by a design process aiming at the joint optimization of the sub-systems; further suggesting that any organizational system will maximise performance only if the interdependency of these subsystems is explicitly recognised. Moreover, it is these sub-systems that provide the motivational or change driving factors that will encourage practices to take on systems implementations.

IM/IT Officer: Even though I never labelled these factors in terms of system and subsystems, it was essentially the way I approached things. I used to call this a 'complete solution'; where perceived desire for improving some aspect of chronic diseases care was used as a motivational force to improve every other aspect of chronic disease related system issue. For example; it stands to reason that if you want to improve your process through better management (Clinical sub-system) of for example; Diabetes, at least you want to have a reliable follow-up system (Technical sub-system) to support it. Then again, you also want the clinical time you spend in the care of that patient to be remunerated appropriately (financial sub-system); you might also want the Nurse to drive that recall system in tandem with the receptionist (Workforce system) to make the endeavour more productive (Administrative sub-system), and to make sure that every patient gets his due care (Risk management sub-system) that can hopefully be monitored by the Practice Manager (Monitoring-Outcomes sub-system). The sum of these interdependent sub-systems is what makes a full (Diabetes) Chronic Disease Information System (CDIS). I know that piecemeal approach of looking at just one aspect of it, just has not worked for me in the past. It needs to be a full system supported by every sub-system to be fully functional and adopted.

In summary, the socio-technical approach of optimising systems and sub-systems, as supported by the literature, matched the way the IT/IM Officer was able to introduce chronic disease information systems, even if it was not recognised or labelled as such during implementation process before the study —and literature review.

## The Technical Sub-system

The literature review in Chapter Three summarised the following concepts relating to the technical sub-systems that need to be considered in the development of a chronic diseases implementation framework:

•Structured record keeping

- •Real world applicability
- •Application across the continuum of care
- •A patient-focused and longitudinal approach
- •Support for a full range of chronic care process
- •Provide health outcomes feedback
- •Prompt the provider to use clinical (evidence-based) guidelines
- •Track how the patient is being treated: Recalls/Reminders
- •Distinguish who in the population has the disease: Registers

IM/IT Officer: In my experience, first training GPs and nurses in the use of clinical programs and during implementations, the root of the problem is a lack of appropriate training and awareness of what their existing systems can do. In my particular context, all practices were computerised. I did not have to 'sell' the technology to anyone; so that needs to be taken into account.

More importantly perhaps is the notion that these technical systems are not generic but customised to the user and context. This also extends to all the software brands and hardware configurations used in the study. This is not to say that they do not share commonalities, they certainly do, as they all try to achieve more or less the same outcomes. Individual nuances from each system/practice would be too specific to be reflected in the framework regardless of how well interpreted they might be. Another reason that the technical aspect was perhaps not as important was the fact that the implementation included much targeted training to achieve the individual and overall system aims counterbalancing the weakness in training; and practices also benefited from having the IM/IT support at their disposal. This included GPs and staff as well.

However, there are technical concepts from the literature that are the bread and butter of a fully functional chronic disease information system framework

## Data Extraction:

IM/IT Officer: During the initial stages, I perfected 'on-the-spot' techniques and strategies to extract data from databases to showcase deficiencies in —for example cervical screening rates and shortcomings in patient Diabetes clinical management; although external documentation was needed to complete a thorough analysis. For example, for cervical screening, the records from the Victorian Cytology register would be compared with practice numbers to ascertain screening rates; the same with Pathology (Hba1c) records to compare the number of actual Diabetics coded in the system with a test performed according to current guidelines.

### **Disease Registers:**

IM/IT Officer: A comprehensive list of patients with a particular condition is the key to a quality CDIS; and while gains can be achieved by random screening and management, the truth is that only targeted screening and management can produce quality results. This is perhaps the difference between the implementation in this Division and other implementations in other settings that still get good results. Every system implemented a complete and comprehensive disease register. This concept was the key to the successful implementations in this context; therefore the development of registers was quite purposely constant in all practices where they were implemented.

### **Recall and Reminders:**

IM/IT Officer: This is perhaps the easiest element in systems to implement, but the most misunderstood. Most individuals in practices could not tell the difference between the two. For all intents and purposes I needed to create a definition to develop adequate and usable

protocols. A recall is a follow- up action that has clinical and therefore, risk management consequences, and a reminder can be seen as a business marketing strategy to simply attract people to the practice with no clinical or risk associated. But it may be rewarding in other ways (financially, marketing, client satisfaction, etc). The implications are quite different and the methods or strategy to resolve the two are very much linked to each individual practice's view of risk, liability, duty of care and business processes. This uniqueness in perception is why the approach adopted varies so widely from practiced to practice. This is, in my view, the key to customisation and ultimate adoption of a system that fits 'them'. These are also coloured by other capacity issues at practices like workforce capacity: having or not having a Nurse can have a drastic effect on how these are set up and run.

### **Outcomes Measurements:**

As a trained Educator, I was well aware of my professional need to collect baseline data to evaluate my program at a later point in time. For this purpose, every encounter and data extraction was collected in personal notes attached to every practice visit in paper documentation and spreadsheets to analyse a number of aspects of the work. However, pre-thesis, it was too early for any systematic evaluation as most cycles took at least a year (Diabetes) and two for Cervical Screening to see any real outcomes. Except for the initial pilot practices, where nominal evaluations provided ample evidence of success that was formally audited, documented and even presented at a couple of national conferences (D. Carbone & D. Batterham, 2003; D. Carbone & R. Batterham, 2003); the overall implementations were monitored using HIC (Medicare) Division PIP uptake indicators.

### **Resources and tools development**

IT/IM Officer: It became evident very early on that practices' capacity to carry out implementations was very disparate. And while I was personally involved in most implementations for training and support, I had to create back-up resources to allow practice champions to train their own staff (a train-the-trainer approach). This meant creating a number of resources to support the training and therefore, the implementation of these systems. Amongst these I produced a complete process and procedures Risk Management Handbook for Pathology testing; developed a written Cervical Screening information systems implementation plan that included a computerised risk management component in the system; Decision support tools: and a Diabetes financial benefit analysis plan in spreadsheet format (that automatically calculated income, expenditure and profits to showcase during engagements), These had the added effect of showcasing a business plan for the introduction of a Nurse to the practice to enhance chronic conditions care. Electronic clinical guidelines were developed for inclusion in the system setup; Electronic shortcuts to speed-up electronic record keeping; customised hundreds of clinical templates for different software; and developed a handbook to clean up Diabetes registers. These resources supported the implementation process in some practices more than others depending on their own capacity to develop their own.

### The Organisational Sub-system

Chapter Three recognised the following concepts associated with the organisational sub-

systems:

- Financial
- •Incentives for prevention:
- Workforce
- •Change Management
- Leadership
- Ownership
- Champions
- Senior management

- •Evaluation delay factor
- •Local Context (uniqueness)
- Administrative
- •Complexity of Incentives
- Accreditation
- •Legal
- Physical Infrastructure

IM/IT officer: While every concept listed above played a role in the implementation process over time, there are few that I feel were truly important, for example: The notion of 'uniqueness' is, to me, perhaps the most underrated concept in the literature and perhaps the simplest and most powerful tool for an implementer of information systems in general practice. Every practice, as far as I have experienced, is quite unique; there are no two alike and I feel they should not be treated in a generic way. I suspect that this observation might even apply beyond the implementation of information systems. As Grol and Wensing suggested in the literature, its essential to accommodate the individual and organisational contexts (Grol & Wensing, 2004).

Another relevant concept in this section of the literature is the mention of the Champion. In my experience it has been practice champions that have made all the implementations achieved at the Division possible. Their leadership skills were sometimes intrinsic in their own make-up, and at other times coached along by my own leadership training education (through the Master in Educational Administration). Some were given the power to lead by their GP Principals but the majority were not. The local champions were essential to every implementation in my experience, and many times there would be two or more champions. Practice champions in my own implementation strategy had a prominent place; as I would train them in every aspect of the sub-systems (financial, use of incentives, risk management, technical, etc); except in some technical issues that might not have been relevant until needed, to take over my role of trainer. I clearly used a 'train-the-trainer' educational component in my implementation approach. This was necessary as I would not have had the time to look after forty plus practices in the division and the long term purpose was to make them self-sufficient.

If I had to summarise the organisational sub-system, I would say that the internal organisation was left in the hands of the champion/s, but only after they were well trained in the many challenges they were likely to face, with a lot of support along the way from my IM/IT role. I will re-state that each champion had their own set of unique circumstances to deal with, some were good at dealing with them, but others needed more support and empathy.

### Infrastructure capacity (Barriers to implementation)

In the literature review chapter a pertinent question was highlighted: 'What is the point of recalling patients if there is no room (access) for them???' (Oldroyd et al., 2003).

IM/IT Officer: From the outset, it took me by surprise how automatic the negative responses were to the suggestion of implementing chronic disease systems, even when some had a clearer understanding of the benefits. This echoed what the literature has been saying.

This negativity was not just from GPs but from all stakeholders in practices. However, some of these barriers —unlike what the literature in chapter three revealed, I observed to be perceived and not necessarily real. For example, PMs would almost inevitably say that their hardware and particularly software was not capable of doing recalls and reminders. In my experience, having learned and trained on the majority of clinical software packages this was a major misunderstanding on their part; a product I would guess of their lack of training and misconceptions. The same could be said for infrastructure, where the emphasis was in the lack of extra rooms to carry out any extra tasks; obviously not realising how minor and discreet the tasks were when done by computer compared to the full office needed to do paper mail outs. The issues of workforce were much more real on all fronts; however, the lack of understanding of what systems were supposed to achieve provided the greatest anxiety. For example, in promoting Cervical Screening, GPs would say they do not have time for extra tasks in their already busy work schedule, not knowing that their tasks were going to be minimised, not increased, and PMs would be concerned about having to employ extra staff to do the administration of the system, not realising that the tasks were so minimal and much more efficient than current paper tasks. These concerns could very quickly be dispelled by showing them how easy these tasks were to carry out. Added to that was their need to resolve more pressing issues like risk management, accreditation, financial, etc. sub-systems as I started to realise early on that were concerns conspicuously tied into the chronic disease systems I was trying to introduce. These concerns were also very adaptive to computer-based systems approaches prompting me to consider developing these sub-systems and integrating them into the chronic disease I was 'selling' at the time.

To summarise, it was conceded that barriers to implementation were present, but in reality, were more perceived that real. This was due mainly to the lack of understanding of what capacities they already had and how some of these barriers could be easily overcome with very little effort. This was, in general terms, in the experience of the IT/IM Officer contrary to what the literature was suggesting.

### The Clinical Sub-System

Chapter Three highlighted the following concepts within the clinical Sub-System:

•Evidence based medicine

•The complexity factor

•Level of patient involvement

•Lack of accepted norms

•The conflicting pressures

IM/IT Officer: None of implementation introduced at the division ever dealt with the clinical aspects of managing a chronic patient. This would be beyond my expertise; however, every implementation did deal with the 'clinical evidence' for need to better manage these patients. For example, in the case of Cervical Screening, data existing in the clinical databases would give an estimate of how many females from the ages of 20 to 69 were being screened at the practice; a quick count of the paper report that most practices get from Victorian Cytology register would let the practice know how many of them have had a Cervical test (Pap test); The difference between the two, which was usually huge due to dirty data (lack of coding, miscoding, inactive patients, and so on), would indicate the number of females that lack 'cervical screening care'. As explained earlier this has legal ramifications of concern to the practice as well, adding strength to other features that needed to be tackled by the system.

This is also true in the case for the introduction of Diabetes systems. For example, I would have searched their database for patients coded with the diseases and would find typically not that many, due mainly to lack of coding. Then I would have looked for the drugs that Diabetics would take as part of their medication and crosschecked the two lists, to find that this would have yielded many patients on medication that were not coded at all. Furthermore, I would have asked them to request a two year list from their pathology company of the corresponding blood tests (Hba1c) that Diabetics are meant to go through every year. This list would add further patients to the list (not coded or not taking medication, as diabetics can also be diet controlled) and then would have looked at how many of the total patients would have had the test over each year. The result was usually bad enough to surprise even the best GPs about their own clinical management of Diabetes practice. This powerful evidence feedback strategy was used on a regular basis to convince GPs of their need to introduce more systematic care; and of course with the many advantages and solutions a comprehensive information system would bring to support it. One aspect that appeared early on in a number of initial implementations was that as the improvements began to take effect, and be seen by all the players involved, they were very quick to get me back to set up 'the next' Chronic Disease Information System (CDIS), even when no formal evaluation was presented back to them. This was both unexpected but a very welcome development in the implementation process; an obvious indication that the approach was working very well, although not quite clear as to why this was so.

### The Human Sub-System

Chapter Three recognised the following individuals as important concepts and key

components of the human (Social) sub-system:

- •Owners/Decision makers
- •The General Practitioner
- •The Patients

- •Practice nurses
- •Receptionists
- •Practice Managers

### **Owners/Decision makers**

IM/IT Officer: Practice principals or GPs that own the practice are those that I reasonably assumed to have the final say in the introduction of information systems. My

experience was such that I never, or in very few cases, ever dealt personally with these individuals. I had learned very early on that engaging GPs was not the best way to introduce systems. More often than not, GPs were not interested at all in systems implementations for a number of reasons. One is that generally they did not perceive any problems with their systems (making my attempts irrelevant to them) and secondly it was too hard for them to work all of it out, and for other reasons like seeing implementations as the role of the practice manager, not their own, and a certain feeling that I was (at least before they got to know me) somehow pushing a government agenda, among others. My plan, as with most other strategies, involved having the practice champion armed with their own internal knowledge, trained and prepared to approach the decision makers with a complete and fully worked-out solution specific to their practice context ready for them to approve. This approach goes against all of what the literature says, but it worked in these cases.

### The General Practitioner

IM/IT Officer: The distinction here is that unlike principals who are typically very busy and do not have the time to contemplate changes, these individuals, who normally work under different conditions, do have more time to be pro-active. These individuals, usually younger graduates, can sometime become champions for a particular cause (disease) or personal interest and should always be considered as a human resource in implementations.

### Practice nurses

Practice nurses are seen as playing a key role in providing patient education, generating recalls and reminders, undertaking routine clinical tests, assisting with paperwork, coordinating care and sometimes undertaking reception duties. Many GPs, especially solo practitioners, indicated that they could not afford to employ a practice nurse, despite incentives such as the PIP, Enhanced Primary Care (EPC)-item rebates or sharing nurses between practices (Oldroyd et al., 2003).

IM/IT Officer: While the literature is clear on the potential for nurses to affect the care of patients with chronic diseases; at CHGPN in 2002/2003 only two nurses, that I was able to identify, were involved in any measure with chronic disease care. This was confined in

both cases to cervical screening and was only due to their training in performing smear; a particular type of certification that very few nurses appeared to have at the time. Nonetheless, Nurses have always been an integral part of my agenda in the implementation framework used. The reason for including nurses in my strategy was that first and foremost their potential use in CDIS was well known in the literature and also to encourage practices to take up the Practice Nurse-PIP incentives as part of my own role description. It did not take me too long to realise (beyond what I had read) their true potential in the implementation themselves. They are not only key in affecting and driving many of the subsystems mentioned above; but also, due to their proximity to the GP and patients can become true drivers of further clinical change; particularly if they have the relevant training (Diabetes Educators, Pap test accredited, Asthma Educator and so on).

### Administration Staff /Receptionists

In Chapter three, they were described as 'the eyes and ears of the practice' and their roles vary from practice to practice.

IM/IT Officer: This is completely true and they can play very important roles in the administration of CDIS. Furthermore, some were instrumental, particularly those that had de facto practice manager roles in the initial engagement process to introduce CDISs.

### Practice Managers

In the literature review it was suggested that practice managers; where present, were seen to have a limited role in chronic-disease management, mainly associated with implementing government initiatives and doing the associated paperwork. Some GPs envisaged a possible role for the practice manager in setting up systems to facilitate chronic-disease care; however, running the system for patient recall, auditing and monitoring was not being recognised by GPs (Oldroyd et al., 2003).

IM/IT Officer: This statement is completely contrary to the experience in these implementations. I would further say that the majority of champions would have been Practice Managers, and that they are ultimately 'the key' to CDIS. Their role in most cases were as champions; be they active in the running of systems or supporting them, and is perhaps the most valuable of all members of the practice team.

### The Patient Sub-System

Patients themselves were given a separate sub-system status as their presence in every

aspect of the literature review seemed to suggest:

- •Patients expectations of the GP.
- •Patient lack of compliance with GP recommendations.
- •Belief that the patient will not change their unhealthy behaviour

IM/IT Officer: Before and throughout the study, while the initial implementations were taking place, patients did not seem to affect any area of the implementation process undertaken; even though the purpose of whole implementation outcome was to improve their health. This is somewhat inconsistent with the prominent place given to the patient concept in the literature review.

Perhaps this lack of acknowledgement on my part is due to the lack of personal contact with patients themselves within the implementation process. The only mention of patients has been feedback relayed to me by champions and staff in relation to increasing patient satisfaction levels at feeling well looked after, rather than systems implementation issues per se.

### The External Environment Sub-System

The literature made it clear that external factors do influence systems implementations by

highlighting the following concepts:

- Government: Chronic Diseases Initiatives and the Practice Incentives Program (PIP)Other institutions
- •Corporatisation of Medicine
- •Pharmaceutical Companies
- •Practice Nurses / Allied Health Worker

IT/IM Officer: External influences played a double and contradicting role in many implementations; for example, the incentives program could be seen as well deserved payment for improved services rendered to patients but also as an unwelcomed intrusion on behalf of the government to change the way clinicians practice medicine. If anything, a lot of interpretation and translation was needed to occur for practices to understand the potential benefits and avoid the pitfalls of those influences. The same could be said of Pharmaceutical Companies. Other institutions like insurance companies and other clinical players (i.e. Nurses, Allied Health Workers, and so on).In short, while the external influences were there, they seemed to be malleable enough to support system implementations, providing that their influences were pre-digested for the practice so that they could see the positive side of those influences.

### **Change Management Strategies Sub-Systems**

Chapter Three made it clear that change management was a key component of any information systems implementation strategy in healthcare settings; by highlighting the following concepts as important to consider:

- •Change Management Theories
- •Degree of Change:
- •Degree of Resistance
- •Population:
- •Stakes:

- •Time Frame:
- •Expertise:
- •Dependency:
- •Managing Change
- •Skills & Strategies

However, the literature did not provide clear indications of how this change management was to take effect. The following reflects how the IT/IM Officer resolved this issue in practice.

IM/IT Officer: From a hands-on professional point of view, perhaps the most striking observation from the literature review is that most of the sources quoted in reference to health systems implementations in the health sector as seen throughout Chapter Three, fail to even mention the use of change agents to affect change. There is talk of change management theories and approaches but very little on 'who' does it. This point however is not overlooked from the business side of the equation as Nickols (2006) in Chapter 3 (Section five) was a notable contributor.

In dealing with these implementations I had used many theoretical approaches, which I had learned though my Master degree's focus on change management and leadership. For example I definitely and purposely used empirical-rational theories in the engagement process with the practice champion; as this 'empirical' evidence (gap in care) was going to be transmitted by the champion to the GP principals for consideration. Furthermore, this approached suited what I knew about GPs' mind-frame; that they are trained to think in terms of empirical evidence to apply a medical intervention; so it stood to reason to use such a method.

However, that was not the case when dealing with champions in relation to helping them change the internal status quo; for example, in any change that required a change in the culture in the organisation a more normative-re-educative theoretical approach was used to train the champions very subtly in doing so (although not all champions needed help with this).
Other changes, were less planed I am sure, and happened as a consequence of adaptation to new structures and ways of doing things; perhaps this is what the literature called environmental-adaptive theories of change (Chapter 3).

In my many years of working and implementing systems in general practice; I do not believe that the expertise to affect these wide-ranging changes to introduce CDIS ever existed in the general practices I have ever worked with; and in my limited experience outside general practice, in any other health settings in general. What is meant here is that none of these implementations would have been possible without a purposeful Divisional program (IM/IT Officer) acting as a change agent. This situation however changed over time as champions or dedicated individuals were trained internally (and purposely by the IT/IM Officer) in all aspect of system implementations, and their confidence rose enough to do it by themselves in later implementations.

## The Practical Development and Implementation Process Flow

The summary from Chapter Three offered the following concepts to consider:

- •Low-technology prototyping
- •Design by doing
- •Mutual learning:
- •Cooperative design and prototyping
- •Job Design
- •Work Analysis
- •Empowerment
- •User Participation

- •Action to improve the problem situation
- •Identification of feasible and desirable changes
- •Comparison of the conceptual; models with reality

Furthermore, according to the development and implementation literature seen in Chapter Three, there are a number of models that could potentially represent the method in which the development and implementation of a system normally takes place. Typically there is a Problem solving phase, an Implementation phase and a Maintenance phase (Tatnall et al., 2003; Tatnall et al., 2000). Or in the case of Soft Systems Methodology, which involved a more holistic approach which was intended to incorporate the human element of such systems into the systems design work. Moreover it was claimed to be the most appropriate in the analysis of systems that are messy, poorly defined, or specially complex (Checkland, 1991; Tatnall et al., 2000). These followed seven classic steps:

- 1. **The problem situation: unstructured.** The researcher begins by investigating and experiencing the problem situation whilst making as few assumptions about its nature as possible.
- 2. **The problem situation: expressed**. A detailed description (or rich picture) is developed. This picture tries to capture people's relationships and value judgements.
- 3. **Root definition of relevant systems:** The essence, or essential nature, of each of the relevant real systems is considered under the following headings:

**Customer/client:** Those who benefit from the system.

Actors: People who carryout activities that transform inputs and outputs.

**Transformation:** The core processes in the human activity system that causes the conversion of inputs into outputs.

**World view:** The image or model of the world, held by members of the organisation under investigation, that makes the particular human activity system important.

**Owner:** The entity with the power of veto.

Environmental constraints: From outside the system boundary.

- 4. **Making and testing conceptual models:** From the root definitions the researcher develops models of how a system like this might ideally function; without taking account of how the system actually works.
- 5. **Comparison of the conceptual; models with reality:** How these conceptual models differ from reality so that suggestions can be made to improve it.
- 6. **Identification of feasible and desirable changes:** Changes are only feasible if they are technically possible and also fit in the culture of the organisation. They re desirable if they represent improvement in the eye of the customer and the owner.
- 7. Action to improve the problem situation: These desirable and feasible changes are finally put into practice. (Tatnall et al., 2000).

IM/IT Officer: In my opinion the approach that I had used in these past implementations was a hybrid of the two models mentioned earlier and consisted of three very distinctive phases.

First, as with both methodologies mentioned above, there was a major focus on problem definition; that is trying to find the localised evidence, within their own databases for 'gaps' in the care chronic disease patients.

However, the engagement process used a prior step; I had to get key individuals interested in 'the problem' to start with, before I was given the privilege of looking into their database records. This was done by a number of approaches; sometimes presenting the known 'shortcomings in chronic disease care literature' that got them thinking and asking them if they would like me to have a quick look at their records to give them some instant 'preliminary' feedback. Or alternatively, sometimes tapping into the their 'fear of litigation' due to risk management issues (a very hot topic at the time) and again showing to them in risk terms of how many patients were, for example, not following-up for a cervical screening test. An immediate observation here is that both these approaches actually did the same thing but focused on different aspects (sub-systems) of the same problem. This is what perhaps was mentioned in the literature as the interconnectedness of sub-systems. I would have also used the financial incentives' potential to improve the practice's financial outcomes or even other growing concerns like accreditation requirements (to have recall and reminders in place); and sometimes I believe that they had no clue about what they needed to do (as the role of practice managers, for example, was very fluid at the time and not very professionalised) so the key individuals approached were very happy to be told what to do. Other key individuals were far more aware of the issues and ready for someone to get them started, and support them in the implementation of these systems; although these were few and far in-between. It must be noted that in most cases these key individuals were in the main 'practice managers', nurses or staff; very rarely I would engage a GP to talk about the implementation of CDISs. Preferring to let the key individuals do that when the right time and opportunity arose using their internal knowledge.

In conclusion, a short and purposeful search through their databases inevitably, and in every single case, gave evidence to suggest to the champion the need for urgent action.

At the second phase, started when these key players were really motivated to act on the problems at hand; I would have suggested that before approaching the decision makers with what we had found, that we should expand the initial brief investigation to give the decision makers much stronger evidence of what the issues were and how the introduction of a computerised system could improve all of the issues encountered (gaps in care, risk management liabilities, financial opportunities missed, etc). To this end, typically a second appointment was made, with sometimes the inclusion of other champions in the practice to overview the potential changes and the impacts of what the new systems would bring. Two

specific issues were looked at; one was to get from the databases clear data that would support their arguments and secondly, to outline potential systems that would work in their context. In essence, we were working out all the possible solutions to the potential deterrent that decision makers would throw at the idea of a computerised system. Among these potential deterrents:

*Options for system design: We looked a number of designs that would suit the practice that would make the best use of the existing capacities.* 

Human workforce capacity: That is, having the staff, nurses or GPs for that matter to include or not in the system design; including role definition change and willingness to participate by nurses and GPs specifically.

IT Capacity: Making sure that the computer terminals existed in order to process the information system's requirements. And that the software was capable of doing its job (recalls, reminders, print bulk letters, and so on).

Infrastructure capacity: Is there a spare room? Do we need a spare room or simply do the work during the time GPs are not in session? Or any other potential and simple alternative at their disposal.

Educational capacity: The lack of knowledge of what these systems could do was a prime feature of my initial engagements; so I was to train everyone (staff, nurses, GPs, practice managers) in the use of these systems as required. Eventually training, where possible an individual that could take over the training themselves in the long run.

Only when all these issues were thoroughly considered and the key person or champion had all the potential answers, would I have encouraged them to approach the decision makers to introduce the idea of a computerised information system to deal with chronic condition care and associated issues.

This strategy appeared to have worked very well in the majority of cases; and I suppose that a great part of that success was due to the use of 'inner knowledge' of the champion to approach the decision makers when the time was right.

The third stage was when the decision was made to go ahead to develop and implement a chronic disease system. This was perhaps the really hands-on part of the whole approach and here everything was revisited; that is the real problem definition, implementation and maintenance began as suggested in the business literature.

The details are perhaps not so important for the purpose of developing a flexible framework. As I said earlier every design and implementation were quite unique; only the main aspect would be of interest to this study. I could perhaps concur with the literature that there were problem definition, analysis, implementation and adoption process issues involved; and that perhaps, as part of the maintenance phase, it also would require measuring, or an evaluation, of outcomes requirement. As explained before, positive outcomes seemed to encourage practices to take on more chronic disease information systems later on.

## Conclusion

This chapter contributed to the study by providing contextual information to improve the reliability of the study and to later gauge the degree of implementation success at the end of the study.

This chapter also provided the study with practical knowledge gained in the field by allowing the voice of the IM/IT officer to discuss and compare the finding in the literature and enhancing the existing evidence to develop the proposed emerging framework. The next chapter, (Chapter 5) will bring together and combine the learning from this chapter and the literature chapter (Chapter 3) to develop an informed emerging information systems framework for the prevention and management of chronic diseases in general practice. This emerging framework will then be tested in the next stage of the thesis.

## **STAGE TWO: The Exploration**

## **CHAPTER FIVE – The Emerging Conceptual Framework**

'As long as acute care models dominate health care systems, health care expenditure will continue to escalate, but improvements in population health status will not'



Figure 18 – STAGE THREE: Chapter 5 - The Conceptual Framework

## Introduction

The introduction, Chapter One, revealed that the purpose of this thesis was to develop an information systems framework for the prevention and management of chronic conditions in general practice.

Chapter Two provided the methodology employed in the study, including the theoretical foundations, research methods, data collection techniques and the research design for the whole study. Chapter Three introduced the literature review to first draw attention to chronic conditions and the need for systematic solutions in order to set the significance of the study. It also introduced the known literature on information systems from a health and business perspective to conclude with the identified elements and concepts that might begin to inform an emerging framework to support the prevention and management of

chronic condition systems in general practice specifically. Chapter Four then introduced the context of the study as well as field experiences accumulated in past practical implementations to support the research design and conclusions of the study. The purpose of this chapter is to draw both the practical and theoretical knowledge from the previous chapters and develop an emerging framework to be then examined in the study. The chapter will initially highlight the emerging components of the framework and offer a graphical representation of its contents to then outline the main constructs and explain their reason for inclusion as they relate to the already identified literature and practical implementation experience.

Although the literature reviewed provided many avenues to widely extend the study into many fields of activity beyond just information systems, it is prudent at least at this stage of the research to limit this emerging and conceptual framework to the 'main' constructs identified.

#### **Developing the Emerging Conceptual Framework**

A *Conceptual Framework*, as defined by Liehr & Smith (2001) in Chapter Two, is described a structure of concepts and/or theories which are pulled together as a map for the study (Liehr & Smith, 2001). The resulting framework is a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate this. Such a framework should be intended as a starting point for reflection about the research and its context.

This particular emerging conceptual framework is drawn from the structure of concepts which already exists in the literature as already reviewed in Chapter Three and the field experiences in context in Chapter Four. As explained in the methodology Chapter Two, this is achieved by abductive reasoning (as a strategy of solving problems and discovering relevant premises) or 'inference to the best explanation' (Wirth, 1998, p. 1). According to what can be inferred from the previous chapters, there are three distinct aspects to developing a conceptual framework; first there are the individual '*elements*' or building blocks as expressed in earlier chapters (Chapter 3); then there are the structure of concepts or '*constructs*'; defined by Inglese (1997) as a term or label invented by the researcher for a specific purpose to describe a phenomenon or group of phenomena; a summary of thoughts related to a phenomenon (Ingelse, 1997). (For the purpose of this study the terms concepts and constructs are interchangeable). And thirdly, the purposeful

and sequential linkage of these constructs, in this thesis referred to as '*process flow*'. In other words, how these constructs are perceived to be ordered.

First, a short summary is provided on the major aspects of the framework so that a full graphical representation of the proposed emergent conceptual framework (Table 19) can be displayed for the benefit of the reader, so that then more detailed explanations can follow to further help the reader place the framework in context.

#### **The Framework Process Flow**

The literature provided vast information on specific phenomena in relation to information systems implementation in healthcare settings. However, there were no specific strategies of how these were to 'flow' in an implementation process specific to chronic diseases in general practice. The business literature however, did provide some methodologies from where to base the observations of the IM/IT Officer into some kind of context in the previous chapter (Chapter Four). For this purpose, the flow sequences (moving from one action to the next) that shape the framework are based on the experience, observation and reflexions of existing implementations provided earlier in Chapter Four.

The observations and field experience by the IT/IM Officer in Chapter Four suggest four stages that would provide the backbone to the flow process. The first appears to be associated with an engagement process in which motivational factors appear to be at work, including the recognition of localised data. The second, which seems to coincide with a more hands-on engagement process by the IT/IM Officer, is where capacity issues appear to be discussed and de-mystified. A third process, again coincides with the actual technical implementation by the IT/IM Officer, and a fourth that appears to be driven by the successes achieved in the first implementation, self-creating or closing a process loop back into a new chronic disease implementation process.

This sequential ordering or flow process is represented in the flowchart in Table 19; where the linkages between constructs are represented by arrows that describe how they connect and who are the participants in that construct. A thicker arrow represents a 'stronger' observed relationship and the arrow heads indicate in what direction the relationships were seen to flow, be it unidirectional, bi-directional or multi-directional.

#### **The Constructs**

The literature review in Chapter Three had already produced a large number of single elements that were then used to build relevant larger concepts or constructs. In Chapter Four, with the feedback provided by practical implementations these constructs were discussed and compared. For example, GP involvement is a well known element of successful (and unsuccessful) implementations in the literature. If other elements are added, for example, the engagement of practice managers, nurses or administrative staff and perhaps, the way in which they are engaged; we might call this grouping of elements a 'construct'; which could for example be labelled the 'engagement or human construct as was the case in Chapter Four. However, for the purpose of developing an emerging framework for testing that is going to be flexible enough to be applied to a number of very unique general practices, more generic and less defined constructs will be better suited to this study. This also fulfils a need to narrow the study significantly, as the study of every single element —which cuts across a number of different fields of study, would be impossible to test within the scope of this PhD thesis and the expertise of any researcher. The following is a summary of how the constructs are formulated for each stage in the process flow outlined before; and are represented in Table 19. Further and more detailed explanation will follow later in the chapter.

**Stage One:** There are four elements discerned from the literature and field experience at this early stage. One relates to motivational forces; that could be divided into 'internal' and 'external', as well as the well documented 'patient needs'. While some of these elements were somewhat observed in past implementations, they were mostly drawn from the literature. For example, it would have been impossible for the field officer to observe patient behaviour or measure patient involvement within the scope of the study, so it is included due to its own weight in the literature. It should also be noted that 'patient need' is not what clinicians perceive is needed to care for their patients, nor is the need of health authorities to supply a clinical need to patients to avoid complications and cost. It refers exclusively to '*the influence that patients themselves place in the development of the framework*'. For example, a patient would request from the GP a treatment he/she has heard of from the Internet; or the request for a systematic approach for care (sending of reminder letters, etc.) putting pressure/motivation on clinicians to implement new systems of care. To reinforce the point, the placement of 'patient needs' in this framework obeys to their place in the literature, not an observed phenomenon in past implementations.

The other element is the 'health care problem'; that was an observable phenomenon but was not particularly documented in the literature. For the purpose of 'labelling' this construct the name *Factors Driving Change* is chosen as it implies what the construct appears to be suggesting.

**Stage Two:** There are three elements that make up this construct. One element named here and labelled 'general practice capacity' is characterised by the already well-documented barriers and enablers of implementations in the literature (Chapter Three). The second is the ever-present IT/IM Officer as a 'change agent'; both a factual presence and an ingredient (change management) vital in the literature for successful implementations. The third was another individual that was observed by the IT/IM Officer to be a constant in every successful implementation; that is a 'practice champion'. As defined earlier: an individual (or individuals) at the practice that are willing to drive and affect change for the betterment of all concerned.

The name chosen for this construct is *Practice Capacity*.

**Stage Three:** This stage is borrowed almost entirely from the information systems literature; as at this time the implementation cycle appeared to match what the IT/IM Officer was doing 'practically' when setting up systems in practices. However, a further refinement was added to the implementation cycle, as it was observed and supported by the literature. That is, the need for the inclusion of an 'outcomes' element as it was observed to be both key in the implementation process, and also appeared to have a further motivational effect resulted in the further development of new chronic disease information systems (CDISs). The name chosen for this stage is *Development and Implementation Cycle*.

**Stage Four:** This stage did not seem to be identified in the literature, but was observed in the implementation process by the IT/IM Officer; where practices were keenly looking for further CDIS implementations as soon as they saw that their systems were succeeding or even beginning to succeed.

#### The Flowchart

Table 19 below provides an overview of the basic generic and essential constructs and process flows that are believed to support the successful development and implementation

of an information system framework for the prevention and management of chronic conditions in general practices.

The graphical description presented here is a combination of what the literature is able to underpin and the experiences in practical implementations by the IT/IM Officer. In particular, how the framework was seen to flow and the sequence and weight of elements as supported by the literature and field experience. Further explanation of the diagram follows below (Table 19).



Figure 19 - The Emerging Conceptual Framework

## **The Emerging Framework Details**

The elements and constructs in this emerging framework are designed and underpinned by the literature in Chapter Three and informed by the practical knowledge from Chapter Four.

#### Factors Driving Change Construct

The *Factors Driving Change Construct* is concerned with the identification of a health (chronic disease) care problem. This construct is concerned with raising 'awareness' of a health problem at the practice. As explained in Chapter One, at the academic health literature level there is growing evidence that there are serious problems with the quality of care that patients with chronic conditions receive. With some studies suggesting that only 20 to 50% of people with common chronic conditions are under good control (Institute of Medicine, 2001; Solberg, 2003; Veale, 2003). There appears to be often little 'translation' of the problem from the world of research to the everyday practice level. This is also supported by the literature where, it is estimated that it can take up to 17 years for clinical evidence to be put into practice at the GP level (E. A. Balas & Boren, 2000). The idea behind this construct is that general practices often lack appropriate information to motivate them to change their clinical behaviour. This construct suggests that there are types of information that highlight awareness of their own gaps in care that motivate practices to implement systems.

The ultimate aim of this construct is to identify a 'chronic disease' care problem at a given practice. The construct identifies and considers the effects of the many motivators exerting pressure for change or inhibiting change at a practice-wide strategic level. These factors represent not just the technical construct (databases search), but also the human (who does what), environmental (internal and external influences), managerial (support from the inside), and financial (potential rewards for effort) arenas as well. The framework suggests three distinct areas of motivation – internal motivators, external motivators and patient needs. Some of these factors are further discussed next:

#### **Internal Motivators**

Internal motivators, within this construct are those elements that may or may not play a role at encouraging practices to make informed decisions about change. Typically, these are based on the personal values and beliefs of GP principals (business owners), since it is

expected that they would be the ones to make strategic decisions at this level as supported by the literature in Chapter Four. Here are some of these elements:

At the centre of general practice is the fundamental principle of 'patient care'. As identified in Chapter Three, Oldroyd et al (2003), in a study of Australian GPs' perception of chronic care, found that GPs saw themselves as coordinators of care as well as advocates for patients; including educating them about their illness, helping them to understand specialist recommendations and working in partnership with them. Some GPs talked about a tension between the GP as a businessperson, the GP as a patient support and the GP as an evidence-based clinician. However, some even indicated they try to avoid chronic-disease care and to dissuade prospective patients with chronic diseases from coming to the practice (Oldroyd et al., 2003). On the other hand, GPs also felt that chronic care was rewarding because it enabled them to get to know their patients better, they could prevent complications and patients appreciated them and felt happier. Patients also seem to come to terms better with the chronicity of their illness (Oldroyd et al., 2003). The strategic level of this framework must be able to tap into these values and beliefs to motivate GPs. On the other hand, unlike typical small businesses where decisions are mostly based on the 'bottom line', a 'GP business' does not seem to subscribe to the bottom line alone. Practices are also influenced by 'clinical level strategic decisions', these are well recognised in the health literature. For example, many researchers, including Ralph Audehm (2004), a well known GP, academician at Melbourne University and clinical systems promoter outline a number of researched strategic questions that GPs will ask themselves to make sense of the issues at hand; for example, some of these are: Is it important? (burden of illness), am I likely to be effective? (Role, impact); can I make the outcome visible? (feedback, observable/measurable); what will assist getting a quick return? (reward/reinforcement); is it desirable? (win-win, all stakeholders); is it doable? (realistic); can we make it a routine part of practice? (Sustainable) (Audehm, 2004b; Nancy Lorenzi, 2004; Sturnberg et al., 2003). These multiple bottom lines must be taken into account within the framework to be able to effectively motivate GPs The framework must also take into account that GPs can be very weary of investing resources into their practices, and with good reason, sometimes, much of what is 'pushed on them' by external bodies (including Governments) is not necessarily of benefit to themselves as identified in Chapter Three. For example, it is well known that many of the benefits of the introduction of information technology in general practice accrue to other

sectors of the health system, such as hospitals and pathology companies, rather than directly to the practice (Nancy Lorenzi, 2004; Sturnberg et al., 2003).

However, GPs are not the only players to influence strategic decision making and developing awareness at the internal level. For example, 'Local champions' are an important feature of systems in the literature, who must actively and enthusiastically promote the system, build support, overcome resistance, and ensure that the system is actually installed and used (Richards et al., 1999). This was also observed in practical implementations by the IT/IM Officer.

In summary, internal motivators appear to be one of the keys to creating effective awareness of the health care problems at the strategic level. From a practical point of view, a user of the framework must be able to understand those forces and situations to gain an insight into the practice's readiness for change.

#### **External motivators**

External forces can play a vital role in facilitating or complicating the adoption of systems, as explained earlier in Chapter Four.

For example, the offer of financial incentives (by health authorities) for the completion of pre-determined cycles of care to individual chronic disease sufferers can be important. For example, if a GP performs a six month and a one year review of a Diabetic patient, by way of taking certain measurements and performing certain blood tests to monitor the disease, the GP gets an extra amount of money on top of the normal consultation. These Practice Incentive Payments (PIPs) promote integrated delivery systems though the use of practice guidelines; preventive care interventions and disease management programs (Ash, 1997). The framework must also tap into these external bodies, which can play a determinant role in motivating practices to act on the perceived shortcomings as explained in the literature review (Chapter Three). Bodies like the Australian General Practice Accreditation Limited (AGPAL) are providers of quality improvement that support primary care practice teams to increase efficiency, reduce risk and stay current with trends and best practice (Department of Health and Aged Care, 2003). Practices seek accreditation as a way of showing their customers (patients) that there is an appropriate standard of care at their practice.

One of the burning issues in general practice these days relates to Evidence Based Medicine. A report by the Department of General Practice at the University of Melbourne, Australia (2001) reflected on the tensions between the need to establish an evidence base for population health interventions in general practice and the need to identify interventions that are likely to be adopted by Australian general practices (AGPAL, 2005). This has an impact on motivation to introduce systems, mostly negative in nature since sometimes GPs feel that there are political interests rather than health outcomes at the centre of these guidelines.

In summary, external factors can be instrumental within this framework in facilitating motivation for strategic decision makers. As with the previous factors, a user of the framework must be informed and willing to use these forces to affect the need for change in general practice when required.

**Patient factors:** As explained in Chapter Four, some GPs believe that the patient will not change their unhealthy behaviour (Department of General Practice, 2001). GPs have described how patient compliance, motivation and capacity influence the type of care given: 'In chronic care, you need the cooperation of the patient; it's a team effort involving the practice and the patient.' Factors such as the severity of the patient's condition, his/her social situation, level of education and attitude towards the illness all need to be taken into account (J. E. Ward, J. Gordon, et al., 1991). These were not observed in practice but they appear to be of obvious importance to GPs.

**Competition/market forces:** Another influence gathering momentum in general practice is the corporatisation of medical ownership and associated operational structures. The Australian federal government encourages larger practices through its 'Link' program, as a means of achieving modernisation, economies of scale and co-location of health services. In 1998/99, an incentive payment to encourage mergers between small practices was introduced (Oldroyd et al., 2003).

**Infrastructure:** Sustained high-quality chronic-disease management, according to some authors, requires changes to practice infrastructure that are not always affordable or easily implemented (Wooldridge, 1998).

**Divisions of General Practice:** Division support has been instrumental in commencing the attitudinal and cultural shifts necessary at the local level for general practitioners to comprehend the potential uses of information technology (Oldroyd et al., 2003). The establishment of divisions of general practice has helped to break down the historical isolation of general practitioners from other parts of the health system (and from each other). Through divisions, general practitioners are able to explore the benefits of information sharing within the context of emerging team approaches to the care of individuals and communities, and to address issues of confidentiality, privacy and consent

(Department of Health and Ageing, 2004, 2005; Health Insurance Commission, 2002; Richards et al., 1999).

#### **Patient Needs**

As recognised in Chapter Three, medical paternalism and passive patienthood have been challenged by new changing social expectations of health care, scientific cures and technological advances (Richards et al., 1999); as well as ageing populations and less community cohesion and social support (Kearley K. et al., 2001; Sturnberg et al., 2003). Even the Internet has become a challenging medium often used by patients to question GPs on possible diagnosis and treatments. However, this is not always the case. In an Australian study, GPs believed that some patients want them to take overall control of their condition, listen to and help them deal with their problems (not just treat their symptoms), educate them, and, for older patients, provide social contact. Patients also want their GP to ensure they have an adequate quality of life. GPs felt that this placed great pressure on them (Gross et al., 2003; Jack et al., 2004; Sturnberg et al., 2003). As explained in Chapter Four, the IT/IM Officer did not have access to the patients at the time of the implementation so no "practical" comment could be made. However, the sheer weight of the literature about this element makes its inclusion in the framework a necessity.

#### **The Health Care Problem**

The premise at this early emerging stage represented in the diagram suggests that the entry point to the systems is through driving forces; however, it is not quite clear yet whether the features within each of the three factors are comprehensive and value laden. That is, it is not known if it covers all the possible motivational factors referred to in the literature or observed. Nevertheless and at the user level, the framework requires that every aspect of practice influence be understood to maximise awareness (i.e. is there a problem? can I make a difference?), timing (i.e. is this a priority at this point in time?; have we got everything in place to do this?); business sense (i.e. does it affect accreditation?, is there a profit to be made?); resource allocations (i.e. do we need to employ extra staff?; can we afford this?); and many more issues as noted above and expanded in Chapter Four. On contemplation of all these factors, we should arrive a the 'problem identification construct'; the realisation or concern that a particular healthcare (chronic disease) issue (clinical, financial, legal risk) might not be as well managed as previously thought and an

'in principle' agreement that something needs to be done is reached by the key decision makers.

Upon becoming aware of a chronic disease problem, then the framework turns to resolving capacity issues.

#### **Practice Capacity Construct**

The Practice Capacity Construct is concerned with the practice's potential for dealing with the problem or gap in care in a practical manner. This construct deals with neutralising the initial inertia to find de-motivators as found in Chapters Three and Four. There was often the misconception that change invokes a '*radical shift in the way we do things*' or that '*we would have to spend lots of cash on staff and resources to tackle this*' (Oldroyd et al., 2003) this self de-motivation is well understood not just by the already documented literature but by the IT/IM Officer's own experiences. The reasoning here is that all the necessary resources already exist at most practices, the function of this construct is to overcome this inertia. Three main elements that constitute this construct are as follows:

#### **General Practice Capacity**

In this section of the framework, the health care problem (chronic condition) has already been identified, now it is time to broadly look at the practice potential for a viable and workable system. The literature (see Chapter Three and Four for more details), suggests that any potential system must, as much as possible, draw on existing data flows or integrate easily into existing workflows (Liaw & Schattner, 2003; Nancy Lorenzi & Riley, 2000; Oldroyd et al., 2003; Richards et al., 1999; M. H. Ward, 2003). It must be 'tuneable' to fit different conditions, initiatives and approaches to chronic care (Chew & Van Der Weyden, 2003). Unlike the previous construct, where the contemplation of issues was at a strategic level, this construct is concerned with the practical level. In short, it looks at existing practice capacity by asking basic questions on: IT capacity (can the existing software address the needs of the IS needed? is the hardware fast enough?); Workforce capacity (is there a nurse to...? are GPs clinically trained to?); Infrastructure capacity (is there a room available for the nurse to ...?); Support/Training capacity (does the local Division provide IT support and IM training for....?); Financial capacity (is it financially viable in our situation to...?); Improvement capacity (will the outcomes improve on existing....?); etc. These questions will confirm or deny the potential for the practice to

introduce a workable information system to affect the healthcare problem identified in the previous strategic construct.

#### **Change Agent**

The framework places emphasis on the need of an expert 'agent of change' together with a practice champion (usually any member of the practice with an interest in 'the problem' at hand) to make sense of the organization and its readiness and potential for change. An Agent of Change, as suggested in the literature review (Chapter Three), unlike a Consultant or a Support Expert, is the most comprehensive and responsible role a system analyst can take on. Whether internal or external to the business, it requires the presence in the business for a prolonged amount of time (Mittman, 2004). The mere presence of the analyst changes the business; interacting with workers and management to understand the organization and serving as a catalyst for change. Above all, the analyst must be a problem solver; an effective applicator of tools, techniques and experience; a communicator; an applied computer expert; self-disciplined; self-motivated; a project and people manager (Kendall & Kendall, c1995). This was certainly the case as experienced by the IT/IM Officer (Chapter Four).

This construct has the role of ensuring that practical capacity exists at the practice to tackle the health care problem. Now the attention turns to putting it to work into an 'applied level' to suit the health care problem using existing practice capacity.

#### **Practice Champion:**

As identified in the business literature (Chapter Three) and corroborated by practical experience (Chapter Four), these individuals played a major role in not just providing access to the divisional change agent, but were a constant source of drive in all aspects of the system implementation process. This is in line with Ash (1997) who described local champions as individuals who must actively and enthusiastically promote the system, build support, overcome resistance, and ensure that the system is actually installed and used (Kendall & Kendall, c1995). Although the information system literature does recognise key players in systems implementations (Ash, 1997), there has only recently been a more concerted effort to recognise the contribution of these champions (Practice managers, Nurses, etc) in health implementations (Schuster et al., 2003). Most of the existing literature on 'champions' refer to GPs and not practice managers or nurses (Sellitto & Carbone, 2007). If any thing, these practice champions were seen to have a limited role in

chronic-disease management, mainly associated with implementing government initiatives and doing the associated paperwork (Wenck & Lutton, 2005).

These individuals or individual, be they practice managers, nurses or staff members, are crucial in the implementation of chronic diseases information systems as the link to all other players in general practice and the focus of all activities by the change agent in this framework. This was further observed and noted by the IT/IM Officer in Chapter Four. This contrasted markedly with the view that the GP is 'the' champion in general practice (Oldroyd et al., 2003).

#### **Development and Implementation Cycle Construct**

The Development and Implementation Cycle Construct is concerned with the actual design, implementation and evaluation of the system designed to deal with the chronic disease care problem. This construct now moves to the hands-on application process of a CDIS. This system will be dictated by the real world situation of the practice as reviewed by the previous construct in the framework, rather than a pre-determined generic model. The assumption here is that practices are unique and the framework must be flexible enough to deal with the all the idiosyncrasies of any practice. Ultimately, the system applied must be practice-specific and owned (Australian General Practice Network, 2007; Better Connections Better Care-Workshop, 2007; Wenck & Lutton, 2005). Fortunately, there is ample literature (Chapter Three) on many similar application models and frameworks that have been developed for the IS business sector and by many authors; for example, a typical development cycle, has clear cyclical processes, from problem identification to detailed analysis (in the Analysis section), followed by a design, implementation and maintenance construct (Mann & Williams, 2003; Mittman, 2004; Oldroyd et al., 2003). These frameworks have also been used in the literature relating to health management (Skidmore & Eva, 2004; Tatnall et al., 2003); However, the literature review appears to be nonexistent when it comes to research or implementation of these models in general practice as a business entity. Least of all applied to supporting chronic disease management. The development and implementation cycle draws heavily from the IS literature; however some features had to be added to suit what was indentified in the literature and observed by the IT/IM Officer about general practice and chronic diseases specifically. For example: the need for Outcomes measurement in chronic disease care (Clinton & Scheiwe, 1995).

The diagram (Table 19) above shows the development and implementation cycle to be to be cyclical, matching the classic implementation approaches in IS literature (Chapter Three – Table 10). The implementation issues can, for example, inform problem definition or analysis at any time in the cycle leading to further changes to previously agreed goals (changes needed). This checking and evaluating must be a feature of this construct. Minute changes in any of the first construct (drivers of change), will re-define the problem and hence the structure of the system. There is not enough space in this paper to describe each of these sections in further detail without testing; but it aims to describe a roadmap to the practical implementation path as perceived by the IT/IM Officer in past implementations.

#### The Feedback Channel

The feedback channel represents the return of successful practices at a re-entry point in the framework as a result of the successful implementation and adoption of the initial setup. They were clearly observed during the field work process. The construct represents the willingness of practices to break 'inertia' and make surprisingly rapid changes when the conditions are right (Mittman, 2004).

#### Summary

This chapter drew from the literature review (Chapter 3) and practical experience (Chapter 4) to develop an emerging information systems framework that appears to support the prevention and management of chronic conditions general practice. A graphical interpretation of the constructs and flow process was put forward, following a concise explanation of what these are and how they could possibly interact to produce a viable framework.

As suggested earlier in the chapter, not all the many and specific elements could be addressed in this study, being a socio-technical study overarching on a number of systems and sub-systems and fields of study, it would be too time consuming and the lack of multiple skills required would make it impossible to achieve within the confines of this PhD thesis. Hence this chapter only sought to narrow down the construct to capture the 'main features'. This situation contributes to other more subtle ramifications, as Mason and Waywood (1996) pointed out there are some cautions to be aware of when utilising a conceptual framework:

Firstly, the framework is a construction of knowledge bounded by the life-world experiences of the person developing it, and should not be attributed a power that it does

not have (F. Nickols, 2006). Secondly, the nature of a conceptual framework means that it consciously or unconsciously informs thought and practice by increasing personal sensitivity to notice particular occurrences so this must be accounted for (Mason & Waywood, 1996). Thirdly, no researcher can expect that all data will be analysed using the framework without the risk of limiting the results from the investigation. It is hoped however, that by considering these cautions, that the exploration of these constructs will remain open to new or unexpected occurrences in the data and the whole investigation more generally as it occurs (Mason & Waywood, 1996).

Although the main features of a workable conceptual framework appear to have been developed, it remains untested. Testing and expanding the inner workings of this emerging framework is the aim of the two data collection chapters that follow.

## **CHAPTER SIX** — First Data Collection

"Thinking is more interesting than knowing, but less interesting than looking"

(Johann Wolfgang von Goethe 1749-1832)



Figure 20 - STAGE THREE: Chapter 6 - First Data Collection

## Introduction

Stage One of this thesis provided an overview of the study (Chapter One), the methodology (Chapter Two), literature review (Chapter Three) and then framed the context of the study and provided practical implementation knowledge (Chapter Four). Stage Two began by drawing the learnings from Stage One and putting together a emerging information systems framework for the prevention and management of chronic conditions (Chapter 5).

The purpose of this chapter is to pre-test the emerging framework before the main data collection phase. For this purpose, this chapter aims at testing the initial framework developed in Chapter Five by testing it with ten key informants or champions that were identified by the IT/IM Officer as having been heavily involved in past implementation process in their own practices.

This chapter will first provide a brief background of those interviewed and their context to improve the potential of the findings for wider applicability. Secondly, the data collection will be presented, analysed and summarised for each section tested and the findings will inform alterations to the emerging framework inferred from the data.

A new revised framework is then developed to be tested in the main data collection section of this study in the next chapter (Chapter 7).

## Key Informants (Champions) Characteristics and Background

As explained in the methodology chapter (Chapter Two), key informants are selected for the fact that they were heavily involved in supporting multiple chronic diseases information systems implementations at their practices since 2003 when the implementations started. These multi-system practices are labelled Type A practices, and are defined in this study as those practices that had achieved success (S) in the introduction of at least two chronic disease information systems (CDIS) (S+S), or at least one successful implementation and were actively working towards (T) success in a second one (S+T) at the time of the research design. Further explanation of practice types and characteristics is found in the main data collection phase (Chapter 7) where the distinctions between levels of success among practices will become more relevant. A brief reference to the systems that were already implemented in these Type A practices 1 and 2, has implemented (and adopted) four or more chronic diseases information systems (CDISs) and were used to pilot the interview protocol.

	<u>Practices Type A</u>												
	(Prac	tices wit	h Multij	ple System I	mplementa	tions)							
Practices	Туре	Pilot Study	Phase One	Cervical Screening	Diabetes	Asthma	Other						
Practice 1	A	1	1	S	S	S	S						
Practice 2	A	1	1	S	S	S	S						
Practice 3	А		1	S	Ν		S						
Practice 4	A		1	S	Т		S						
Practice 5	А		1	S	S	S	S						
Practice 6	А		1	S	Т	Т							
Practice 7	Α		1	S	Ν		S						
Practice 8	А		1	S	Т		S						
Practice 9	A		1	S	S		S						
Practice 10	A		1	S	S		S						

Figure 21- Practices Type A - (Multiple Systems Implementations)

(S = Successful IS adoption, T = working towards successand N = Not working towards success)

The following table (Table 22) provides an overview of the practices participating in the study by rurality, size (number of GPs), chronic condition systems implemented, interviewee type and the medical software used. This is not a population sample, but a selection based on their heavy involvement leading to known adoptions (as explained in the research design section of the methodology (Chapter Two).

Furthermore, and although the aim of the study is not to generalise, but to make the framework widely applicable, it is well worth considering these features as they might reflect on the strength and weaknesses of the study in further applications.

	Particination		P	racti	ce	<b>Dreatico</b> sizo			C	hror	nic	Intonviouso				Medical			
	Partic	ipation	R	urali	ity	Pr	acti	ce si	lze	Co	ndit	ion	In	iterv	iew	ee	So	ftwa	ire
Practices	Pilot Study	Main Data collection study	Rural	Semi-Rural	Suburban	Solo	2 to 3 GPs	4 to 7GPs	8 to 15 GPs	Diabetes	Cervical Cancer	Other	Practice Manager	Nurse	Staff	GP	Medical Director	Spectrum-Plexus	Other
#1	~	✓		~					✓		~		~				✓		
#2	✓	✓		✓				✓			✓		✓					✓	
#3		✓			✓			✓			✓		✓				✓		
#4		✓			✓		✓				✓				✓		✓		
# 5		✓		✓					✓		✓		✓					✓	
#6		✓		✓				✓			✓		✓					✓	
#7		✓		✓		✓					✓			✓			✓		
#8		✓		✓				✓			✓		✓				✓		
#9		✓	✓						✓		✓		✓				✓		
#10		✓		✓					✓		✓			✓			✓		
L	2	10	1	7	2	1	1	4	4		10		7	2	1	0	7	3	

Figure 22 - Key Informant Characteristics

As Table 22 suggests, there is a spread of practices according to the selected characteristics. For example: by geographical location it reveals that the majority were from semi-rural locations but some were of rural and suburban backgrounds. Size suggests

that the majority were middle to large practices but even single GP practices were successful. The condition for which the system being tested was introduced was strictly Cervical Screening. The types of interviewees were in the majority practice managers with two nurses and one staff. Finally, both major clinical softwares used at the Division to run the computerised chronic diseases information systems were also represented.

## **Testing the Emerging Conceptual Framework**

To test the emergent conceptual framework developed in Chapter Five (see Table 23 below), it was important to pre-test the individual elements, constructs and process flows outlined in the previous chapter (Chapter 5) in preparation for the main data collection in Chapter Seven..

However, there are limitations to what can be tested in this data collection phase. For example, Patient Needs is seen as a being the realm of just GPs and perhaps Nurses only; as they are the ones in purposeful contact with the patient. And since the main champions were identified as non-clinical individuals (in most cases); testing this element would have to wait until the next data collection phase.



Figure 23- The Emerging Conceptual Framework to be tested

As explained in the methodology chapter (Chapter 2) and understanding that the role of the researcher (also the IT/IM Officer) can be subjective and could possibly influence data

collection and analysis (Miles & Huberman, 1994), a strategy was developed to minimise this. To build on the preliminary findings of the emerging framework and to avoid errors of omission, a two-stage plan was devised to minimise this exposure. Firstly an exploratory pilot study was conducted on two key participants from two key practices using semistructured interviews to test the finding in the literature review, with the view to fine tune and narrow down the interview protocol before applying it to the ten informants. This served the purpose of minimising the interviewees' time recollection response by having a much more focused interview protocol. These pilot studies helped to narrow down the elements, constructs and process in the framework to be tested using another eight key participants from the selected practices. The two pilot interviewees, from Practice 1 and 2 in Table 22 were also re-interviewed with the 'new' and improved interview protocol. The interview protocol questions are shown in table formats below in the same order they were presented to individuals during the interview. The questions used and the responses given are also included to better understand the purpose of the inquiry.

#### **Data Collection and Results**

The primary purpose of this initial data collection, as extensively explained in the methodology chapter (Chapter 2) is to validate from the interviewees factors that were identified in the framework as developed in Chapter Five and pre-checked in the exploratory pilot interviews. Thus the interview results presented here are more 'structured' to focus the interviewees on the issues at hand; and the reporting of results reflects this.

#### Pilots: exploratory study

The use of exploratory pilot semi-structured interviews in the research design proved to be very relevant in the overall testing of the emerging framework developed from the literature. The pilot interview protocol can be found in Appendix A (Pilot interviews – 2 key informants). The two key interviewees, better known as practice champions in this study, were very experienced practice managers that were very instrumental in the development of many systems at their practices. They provided a wealth of information that had not only the desired effect of narrowing down the interview protocols —by providing exhausting potential responses for each element tested; but even at this early stage, the interviewee responses began to provide new directions to re-shape some assumptions in the framework. These new directions and assumptions can be seen in some

subtle inclusions in the upgraded and more 'structured' interview protocols. These can be found in Appendix A (Interview protocol – First data collection - Ten practice champions).

## Background information

The initial part of the interview made sure to set the scene on specific chronic condition (cervical cancer) information systems set up at the ten practices targeted in this phase. Then it set about clarifying the role of the interviewees in the implementation process at the time, as well as confirming and ranking their perception of their participation in the implementation of their system. Seven practice managers; two nurses and one 'other' (Health Public Officer) were targeted to be interviewed. Nine interviewees were 'very' involved in the implementation process and one suggested that she was 'somewhat' involved. Two acknowledged a dual role (Practice Manager and Nurse, and the other Nurse and Administrative staff).

However, at the time of interviewing, one of the targeted participants in Table 22 above could not be interviewed. A senior administrator at the practice proposed instead to take the place of this interviewee in the interview process.

Unfortunately, although a senior member of staff, this 'replacement' interviewee had not been a direct participant during the hands-on implementations and was also unaware of the issues investigated in this study; making this interviewee's inclusion in the study inappropriate. Nonetheless, the other nine were directly involved in the implementation process as required. The data collection is then limited to the nine interviewees deemed to be appropriate in the study. The following table (Table 7) provides a clearer overview and shows the multiple roles interviewees had at the practice.

The Information System Champions in General Practice Q1 what was you role in the practice at the time of implementation?														
Interviewees from Practice number														
Role	1 2 3 4 5 6 7 8 9													
РМ	1	1	1	1			1	1	1					
Nurse					1	1								
Staff														
GP														
Other			1		1									
Number of roles at the practice:	1	1	2	1	2	1	1	1	1					

Figure 24 - The Information Systems Champions in General Practice

To make sure that interviewees were selected according to the criteria outlined earlier (heavily involved in the implementation process) the pertinent question was asked and the results are in Table 25 below.

Champion level of involvement in implementations													
Q2 How involved were you in setting it up?													
Involvement	Interviewees from Practice number												
	1	2	3	4	5	6	7	8	9	Total			
a. None										0			
b. Little										0			
c. Somewhat	1									1			
d. Very		1	1	1	1	1	1	1	1	8			

Figure 25 - Champion Involvement in implementations

## Factors Driving Change Construct

This section of the interview was intended to gauge the interviewee's perception of how the practice discovered that there was a chronic condition issue that needed action (Health Care Problem), what influences (Internal, External and Patients) motivated them and who were the individuals supporting this change at the practice. Essentially, this is about testing the first section of the conceptual framework, as replicated in *Table 26* below.



## Figure 26 - Factors Driving Change Construct

Interviewees were asked to rank a set of pre-identified potential response options as identified in the pilots for driving motivation. The identified options were used as a prompt not as a definite or limited list; it was expected that they could still add their own perceptions to the list.

The ranking requested of interviewees to rank the most important motivational factor as 1; the second as 2, and so on and so forth; the lower the average the higher the motivational importance.

The ranking of average responses found in Table 27 helped identify that for this selection of interviewees: '*risk management*' was the highest motivator, by showing the lowest average (1.89); with four participants out of the nine ranking it at number one, two others at number two and the rest at third (an average of 1.89). The second highest motivator was '*data from their own patient population fed back by the Division IM/IT officer*' with the second lowest average (2.22). Third in order of motivation was '*special GP interests*' and fourth '*PIP incentives*'.

While interviewees had four previously identified choices and an 'other' fifth opportunity to comment, only two interviewees out of the ten used it. One of them, a practice manager and the other a nurse, both used it to highlight their own training as Cervical Screening trained nurses. The first ranking it second and the second fifth (this is also reflected in the previous table).

<u> Motivational Factors – First Attempt</u>											
Q1. How did you/your practice arrive at the conclusion that something needed to be done about this? Explain and rank by perceived importance.											
Mativational Factor limited list Interviewees from Practice number											
Mouvational Factor – limited list	1	2	3	4	5	6	7	8	9	Avg.	
a. Though PIP Payments – Not achieving the											
outcome payments	3	4	4	4	4	4	2	3	2	3.25	
b. Risk management issues	2	3	3	2	1	3	1	1	1	1.89	
c. Division data feedback - highlighting											
problem	1	1	3	1	3	1	3	4	3	2.22	
d. GP's special interest in this issue	4	2	1	3	5	2		2		2.71	
e. Other:	5	5	5	5	2	5	5	5	5	4.67	

Figure 27 - Motivational Factors – The Limited List

The interview continued eliciting from the interviewees a ranked response to basically the same options as before asked in a slightly different manner, but this time adding what was identified in the pilots to be an emerging and peculiar issue for this framework; the addition was '*patient care*' (See Table 28).

The pilot interviews had alerted the researcher to gauge this element for a potential direction shift in the framework.

This time the five choices were presented to interviewees to rank as shown in Table 28. The lowest average (1.67) and therefore, the most important motivator this time was '*patient care*' with six out of nine respondents ranking it as first, one as second one at third and one fourth; '*Risk management*' was now second; third '*Division influence/support*'. Fourth and fifth were '*Accreditation issues/bodies*' and '*Wanted to involve/include other staff*' respectively.

Figure 28 - Motivational Factors – The full list

<b>Motivationa</b>	<u>  Factors –</u>	The	<u>full list</u>	

Q 2. Please expand on what you consider to be the practice's reasons (financial, patient care, -clinical, et), as well as the pressures you were under by external bodies (like insurers and government agencies), etc both pro and con) influences to introduce this system, at that time. Explain or rank each.

Mativational Factors Complete List		Inte	ervie	ewee	es fr	om	Pra	ctice	e nu	mber
Mouvational Factors – Complete List	1	2	3	4	5	6	7	8	9	Avg.
a. Patient Care	1	4	1	1	3	1	1	2	1	1.67
b. Financial (PIPs)	6	5	6	5	6	5	3	5	6	5.22
c. Wanted to involve/include other staff	3	6	4	6	2	6	4	6	6	4.78
d. Risk Management issues	5	1	2	2	1	2	2	1	2	2.00
e. Insurance incentives (for minimizing										
risk)	6	6	6	6	6	6	6	4	6	5.78
f. Government influence	4	6	6	6	6	6	6	6	5	5.67
g. Accreditation issues/bodies	6	3	5	3	4	4	5	6	3	4.33
h. Division Influence/Support	2	2	3	4	5	3	6	3	4	3.56
i. Other	6	6	6	6	6	6	6	6	6	6.00

The interviews continued focusing on the practice champion/s as an element in the framework identified in the literature and observed by the IT/IM Officer. The interviewees were asked to identify if there was a clear *practice champion* (as explained in the literature review: those individuals that *motivate* and *drive* change at a practice) and also to identify and rank other supporters or other champions of the systems at the time of implementation. The feedback revealed that *'practice champions'* were present in all practices. Those taking on the role of practice champion leaders were: Practice managers, rated as most influential in four out of ten responses and the second most influential in three out of ten, only with two interviewees not rating them. Nurses were seen as practice champion leaders

in two practices, third most influential in four cases, with no other ranking in three instances. GP principals were seen as practice champions in two cases and second most influential in only one case, with no other ranking in six cases. Division IT/IM support, got a mention as practice champion leader in one practice, as second most influential in two others, third in three, fourth and fifth in one each, and did not rate in one case. Practice staff were not identified as practice champion leaders by the interviewees. Nevertheless, they were identified as the second most influential individuals in three cases, fourth in two cases, and had no mentions in the other four instances. GPs with special interests did not rate at all except for one practice ranking them fifth. The following table (Table 29) explains their numbers and ranking in practices.

Influential individuals in general practice											
Q3a. Practice Champions: Who, individuals in supporting this sys	Q3a. Practice Champions: Who, in your opinion, were the most influential individuals in supporting this system change? Can you suggest a ranking order?										
Influential Individuals Interviewees from Practice number											
Influential Individuals	1	2	3	4	5	6	7	8	9		
a. GP – Principal			1	1		2					
b. GP – Special interest								5			
c. Nurses	3		3		1	1	3	3			
d. PM		1	2	2	2		1	1	1		
e. Staff	2			4			2	4	2		
f. Division IM Support	1	2		5	3	3	4	2	3		

Figure 29 - Influential individuals in general practice

The interview now examined the influence of Division program in motivating these practices in the implementation of information systems associated with the prevention and management of chronic conditions.

The feedback, as seen in Table 30 tells us that the 'IT/IM support program' was ranked first in all nine cases, Second was 'Risk management workshops' ranked second in three cases, and third in one; with 'Practice manager network' getting a second in one occasion and third in another.

Figure 30 - Divisional Influence

# Division IM/IT Influence in systems development and implementation in general practice

## **3b. Did the Division play a role in motivating your practice/your self to look into implementing an Information System further? For example:**

	Interviewees from Practice number												
	1 2 3 4 5 6 7 8 9 Avg.												
a. IT/IM support	1	1	1	1	1	1	1	1	1	1.00			
b. Risk Management Workshops	4	2	4	2	4	4	4	3	2	3.22			
c. PM network	1	4	4	4	4	4	4	2	3	3.33			
d. other	4	4	4	4	4	4	4	4	4	4.00			

On eliciting further comments or any other thoughts on driving forces at the time, there was only one comment reflecting the lack of understanding they had of these issues. This is found in Table 31.

## Figure 31 - Other Issues - Comments

Other issues question
4. Were there any other issues at the time driving this health problem?
1. 'Uncertainty was the very issue'

## Discussion and Summary for factors Driving Change

The first section dealing with driving forces and motivation provided clues that pointed to two distinct types of motivation. One more general and seemingly overt: as in the case of the external 'risk management issues' and 'Division data feedback – highlighting problem'; the more internal 'GPs special interests' and 'PIP payments being missed'. The other type of motivational influences emerging in this study was the predominance in responses to the issues of 'Patient Care'. It seems to relate to something more akin to a feeling of responsibility for the health of patients. This finding in itself is nothing new to the daily care provision of GPs, but it is extremely important when considering that in these successful implementations of information systems, GPs have had little, if any participation or influence at all as detailed in Chapter Four by the IT/IM officer and confirmed in this examination. It appears that the responsibility for 'patient care' was also felt as part of other individuals' roles (Practice Managers, Staff and Nurses) not just exclusively by the GPs.

All results in this section point at a specific 'awareness' of a chronic condition problem on the part of key individuals at the practice; in most cases identified as Champions, supporters or individuals of influence. And at least in these ten successful practices, it was mostly in the hands of practice managers, nurses and influences from the Division IT/IM support program (Officer).

We have seen that motivation could vary from practice to practice: risk management, data feedback, and financial incentives, to mention a few, all playing a role in motivating practices. However, patient care is a common denominator in all these successful implementations.

This distinction between motivators and a much more influential awareness is not present in the emerging framework devised in the previous chapter (Chapter Five). The prominence of champions connected to this awareness is not in the original diagram either. Another more obvious omission in the emerging framework that can be drawn from this study was the major influence that Division IT/IM (Officer) support had in directly creating the aforementioned awareness of the chronic condition issue at the practice. In the emerging framework, the Division support person (IT/IM Officer) was only seen as providing external motivation only.

## **Practice Capacity Construct**

The aim of this section is to examine the capacity construct that was identified in earlier chapters and formed part of the emerging framework. This is the second construct of the emerging framework and shown in Table 32 below.



Figure 32 - Practice Capacity Construct

The interviews now concentrated on the practice capacity section of the framework (*Table 32*), in the first instance, it was about testing the assumption that practices already had all the hardware/software/human resources needed to setup a system as suggested in Chapter four by the IT/IM Officer. Of interest in this study, was to find out if they actually had all the requirements, as well as how they knew (Question 1, in Table 33). The interview format continued to be similar with pre-determined responses for them to choose and rank from, as well as eliciting open comments to add new perspectives.

On the issue of whether additional hardware/software needed to be purchased to implement information systems, all nine interviewees responded 'no'; on whether additional staff needed to be employed again the outcome was there 'was no need' in all cases (Question 2, Table 33).

When asked if the interviewees were aware they already possessed all the capacity at the time to implement systems, six had not known and that three said that they had already known (Question 3, Table 33).

Eliciting how they found out they had these requirements resulted in eight out of nine pointing out that it was the IT/IM Officer from the Division that alerted them to the fact; in the 'one' other case the interviewee simply commented: '*I just knew*' (Question 4, Table 33).

Asking about other practice capacity issues, only three practices out of the nine had some kind of complaint. One respondent commented that 'the lack of a spare PC made it difficult to carryout the administrative/recall and reminder work needed'. Another commented that 'lack of time' considering their 'large practice size'' was a considerable issue. The third one commented on the need for 'staff training in the use of the system' and sometimes the lack willingness of other staff to 'take on the system'. This can be found in Table 33, Question 5.

Figure 33 - Practice Capacity Issues

Practice Capacity Issues										
	Int	ervi	ewe	es fi	rom	Pra	octic	e ni	ımb	er
1. Did you have to purchase new Hardware/Software resources to implement the system? What?	1	2	3	4	5	6	7	8	9	
Yes										
No	1	1	1	1	1	1	1	1	1	9
Over time had to be updated										
2. Did you have to employ new staff to use it? If yes explain why.										
Yes										
No	1	1	1	1	1	1	1	1	1	9
3. Were you aware at the time the sys existing resources? Yes	tem	cou	ld b	e im	plei	men	ted	usir	ng th	e 3
No	1	1	1	1	1	1	•	•		6
<b>4. How did you find out that you had</b> Called the software company Talked to other practices using the same system (networking)	all r	equi	iren	nent	s to	setu	ıp tl	ne sy	ystei	<u>n?</u> 0 1
IT/IM help from the Division	1	1	1	1		1	1	1	1	8
Other					1					1
5. Was there any other capacity (hardware, software, infrastructure, etc)   issue you'd like to comment on about this?   a. Lack of extra PC to carry out   D										
h Look of room										1
c. Other	1				1			1		1

#### Summary and Conclusion for Practice Capacity

What has become clear in this examination is that capacity 'limitations or barriers' (spare computers, infrastructure, extra workforce) were only 'perceived' to be there. It validated the observation by the IT/IM Officer in Chapter Four, that its all 'a lack of awareness' rather than a reality. That existing capacity is enough to implement chronic disease information systems (at least in computerised practices, which across Australia number
more than 90%). This can be said to be the result of lack of software capacity training of practice champions and others in general.

It also provided clues as to the major contributions practice champions had in partnership with the Division IM/IT support/change agent in creating awareness regarding false expectations of capacity needs to introduce information systems to deal with chronic conditions as contended in the literature review.

## **Development and Implementation Cycle Construct**

This section of the interview centred on the practical application (Development and implementation cycle) of the system highlighted in the emerging conceptual framework (Table 34). It covers the initial problem definition, system analysis and decision making process to the physical running of the system. For example, the initial problem definition included typically searching through the practice database for patients coded with the chronic condition being sought to ascertain their screening rate (in the case of Cervical Screening); sometimes searching for pertinent clinical tests performed, practice records of recalls and reminders, lab lists of results and paper records, among others. This information allowing the working out of 'real' (evidence) coverage rates in accordance to existing populations to clarify further development and shape of the system according to the outcomes of these analysis.

The systems analysis would then centre on fitting work process according to human capacity, goals, etc. Implementation in general meant the training, physical setup of software applications (i.e. recall and reminders), and continuous support over time. *Adoption*, in the context of this study means the long term use of the system; and *outcomes* the measurement of success in achieving practice set goals.



Figure 34 - Development and Implementation Cycle

Interviewees, although they were well aware of the IT/IM Officer's contribution at their practice were nonetheless explained the role of the 'systems analyst/change agent' within the context of the framework prior to being questioned. Their feedback on this stage of the framework revealed that the Division IT/IM Officer was involved as the system analyst in conjunction with other staff in all cases but one, where he was acknowledged as the sole analyst (Question 1, in Table 35). Of those eight cases, Practice managers were co-analysts in six cases. Nurses were co-analysts in four cases. The PM, IT/IM person and Nurse were co-analysts in two of those cases.

When asked if there were any other individuals at their practices capable of doing this analysis, six responded that there were not, and three that there were Question 2a, Table 35).

The interviews now turned to the issue of goals set for the system once the analysis was complete. In eight cases the system was expected to maximise screening rates, two of those also wanted to reach a percentage of females screened by a determined date (fox example, 80% of females tested within the year); and one that did not really set a goal for the system (Question 2b, Table 35).

At this point, they were asked how and who made the decision about these goals. Interviewees were solely responsible for these decisions in five cases, with the practice manager's own decision in four and one by a GP Principal. In four occasions, there were at least two decision makers; practice managers and GP Principals in three cases and practice manager and the nurse in another. One interviewee suggested there was a *'whole team approach'* (Question 2c, Table 35).

Involvement in designing the system was the next issue tested. The Division IT/IM person was involved in eight out of nine cases, in partnership with the practice manager in most cases (n=5), the nurse in two other cases and one with a staff member (one on these included all three mentioned). One practice manager was shown as being the sole person responsible for designing the system at one practice. Significantly, no GPs were involved in the design process (Question 2d, Table 35).

The involvement of the practice champion was elicited at this stage; where results showed that they were involved in all cases, ranking 'very much' in seven cases and 'somewhat' in another two (Question 2e, Table 35).

Now the interview turned its attention to the role the Division (through its IT/IM support person) played in the design of the system. Interviewees' responses suggested that the Division support person suggested a variety of models for consideration (n=5); as well as the encouragement of the nurse's role (n=6) and lastly the encouragement of a 'whole practice approach' in four cases. Four interviewees recalled multiple scenarios being suggested (Question 2f, Table 35).

System Analysis Design and	invo	olve	me	<u>nt</u>						
1. Who did the system analysis at that time? For example: Searching the database at the	Interviewees from Practice number									;
practice, looking at practice specific population health data. etc.	1	2	3	4	5	6	7	8	9	
a. PM	1	1	1			-	1	1	1	6
b. GP										
c. Staff										
d. Division IT/IM support	1	1	1	1	1	1	1	1	1	9
e. Nurse					1	1	1	1		4
f. Other third party										

Figure 35 - System Analysis, Design and Involvement

2a. Were any other individuals capable of doing the analysis at the practice at the time?

Yes		1					1		1	3
No	1		1	1	1	1		1		6

# **2b.** If you were involved in designing it, were there goals set to be achieved? For example:

Maximize screening rates	1	1	1	1		1	1	1	1	8
Set % of females screened by X		1					1			2
Not really.					1					1

## 2c. How did the practice arrive at these decisions? (Who made the decisions?)

GP-Principal/s,	1		1	1		1				4
PM	1	1	1	1	1		1	1	1	8
PM & GP-Principals										
Whole practice team (inc. Staff & Nurses)										
Nurse					1					1

## 2d. Who was involved in designing the system?

PM		1	1		1		1	1	1	6
GP										
Nurse					1	1				2
Staff										
Division IT/IM support	1	1		1	1	1	1	1	1	8
2e. Was the champion involved?										
A Little										
Somewhat	1			1						2
Very much		1	1		1	1	1	1	1	7

## 2f. What role did the Division play?

Encouraged the practice to look into various										
models?			1	1	1			1	1	5
Were 'nurse roles' encouraged?	1		1	1	1	1		1		6
Encouraged a whole practice approach (involving										
everyone)?		1			1		1	1		4

When the question was asked if the champion had driven the system implementation, the result was all nine responding in the affirmative. Champions were identified to be the practice manager in six occasions, the nurse in three (Question 3, Table 36).

The results on questions that dealt with the task of running the specific recall and reminder system revealed that administration staffs were entrusted with the job in six cases. Nurses

were actively administering it in another five practices, where two of those shared the workload with the staff. Only in one practice was the running of the recall and reminder entrusted to the GP, supported by a staff member (Question 3a, Table 36).

When asked if these hands-on systems administrators were involved in the design of the system, they admitted that six of those did not participate in the process of designing the system; with the other three responding that they had (Question 3b, Table 36).

Drivers Process and Par	ticin	onte	in Ir	nnla	mor	ntati	ione					
Interviewees from Practice number:												
3. Who drove the Implementation	1		2	4	5	6	7	0	0			
process: The champion: 1/N	I	4	3	4	Э	0	/	0	9			
Yes	1	1	1	1	1	1	1	1	1	9		
No												
		1	1	1	1		1	1	1			
PM		1	1	1			1	Ι	1	6		
Nurse	1				1	1				3		
GP-Principal												
Staff												
3a. Who would run the Recall & Ren	ninde	ers?										
Staff		1		1	1		1	1	1	6		
Nurse	1		1		1	1	1			5		
PM										0		
GP		1								1		
3b. Were they involved in designing a	nd i	nple	men	ting	it?							
Yes	1				1	1				3		
No		1	1	1			1	1	1	6		

Figure 36 - Drivers, Process and Participants in Implementations-

The interviews now focussed on the important issue of workflow effects by the system implementation on human resources at the practice (Table 37). As explained in the literature review, system implementations were seen as a disrupting influence due to a belief that it dramatically changes GP workflows, wastes time due to prolonged learning curves and creates havoc with human resources (Chapter Three).

Results show that in the case of GPs, only one interviewee recognised that '*Doctors could have done with some more IT/IM-clinical training*' (suggesting that training in the use of the clinical software to run the system is seen as beneficial to those GPs using the system). Staff, on the other hand were more affected by the introduction of the system. They were

subject to roster changes in two occasions, increased workflows in two and needing more training in one case. Practice managers, as well were affected by some workflow increases on two occasions. Nurses needed roster changes on two occasions, had increased workflows in three instances and needed training on four occasions (Table 37).

Disrupti	ions	to V	ork	flov	VS					
4. Were there major or minor chan	ges t	0 W(	orkf	lows	s? fo	r ex	amp	ole:		
Interviewees from Practice number:										
Individuals in general practice	1	2	3	4	5	6	7	8	9	
GPs,						-		-		Total
Roster changes										
Increased workflows										
Training needed – IT/IM - Clinical									1	1
Other										
Staff,						-				
Roster changes			1					1		2
Increased workflows			1						1	2
Training needed – IT/IM - Clinical					1					1
Other										
PM,						-				
Roster changes										
Increased workflows							1		1	2
Training needed – IT/IM - Clinical										
Other										
Nurses										
Roster changes			1				1			2
Increased workflows	1		1			1				3
Training needed – IT/IM - Clinical			1		1	1	1			4
Other										
Total	1		5		2	2	3	1	3	17

Figure 37- Disruptions to Workflows

On the overall request to find out how complex the system was to run, all ten concluded that it was '*easy*', with one also commenting that: '*in the beginning it was somewhat difficult*' (Question 5, Table 38).

While adoption was a foregone conclusion for these nine practices, as it was a precondition of participation, it was of interest to find out how complex and how gradual the acceptance (and eventual adoption) was. However, the results showed that six indicated that the system was adopted straight away and three not so readily (Question 6, Table 38). However, they conceded that the system had lasted for at least three years in most cases

(=7), with two over four years and a total average of 3.22 year overall (Question 7, Table 20).

Complexity to Use and	Ad	opti	ion	of S	yste	ms				
										-
		nte	rvie	wee	s fro	om I	<b>Prac</b>	tice	nur	nber:
5. How complex was it for them to use										
it?	1	2	3	4	5	6	7	8	9	
Easy	1	1	1	1	1	1	1	1	1	9
Somewhat difficult							1			1
Very hard										
6. Did everyone adopt the system straight	awa	ay?	Ex	plai	n	T	1	T	I	
Yes		1		1	1	1		1	1	6
No	1		1				1			3
7. Did it last? How long now? Please expla	in.									
Yes	1	1	1	1	1	1	1	1	1	9
No										

Figure 38 - Complexity to Use and Adoption of Systems

## Summary and Outcomes for Development and Implementation Cycle

This third section looked at the practical implementation of the information systems in these successful practices. One outcome was the realisation that the development and implementation cycle model did not fit the standard patterns in the way that may have been expected in the emerging framework.

The more obvious difference in these practices to the 'actual' approach was that the Problem Definition stage had actually happened very early on in the process. In fact, this was the process used by the Division IT/IM support program to create the 'awareness' for chronic disease action mentioned above, although it was the interviewees that confirmed it. What is interesting from the interview results was the influence of practice managers (mostly in their dual role as practice champions) in the decision making process, conversely, the somewhat low participation of Principal GPs (n=4) in this process. This 'practice managers' influence requires special consideration in the framework as it shows that in these successful implementations there is a prominent place for people that champion the systems and make decisions. This is not just the practice owners/Principals as it would logically be expected from the literature.

## Feedback Channel Construct (Outcomes)

The literature review provided the background for the inclusion of an 'outcome' element in the emerging framework, supported by the observations of the IT/IM Officer. More specifically, if an information system for the prevention and management of chronic diseases was to be successful in general practice it had to 'ultimately' produce a number of outcomes. For example, patient clinical outcomes, improvements in the screening and (therefore) early detection and management of chronic disease problems; risk minimisation; financial gains; and others.

However, results in Table 39 (Question 8) indicated that only four practices had formally discussed outcomes after a period of use; with one interviewee conceding the importance of a formal process: '*We should have formalised it*' (Table 41).

Results also indicated that data used to discuss outcomes usually came from multiple sources. For example: using government quarterly reports on Practice Incentive Program (PIP) payments to the practice (n=3); Practice own database searches; checking how many recall and reminder were in the system (n=2); anecdotal evidence, such as, recognising the increased number of females that were being tested (n=2); division data feedback, such as, providing a detailed report on activities in the system (n=2) and other sources like the state government centralised (Victorian Cytology) register of pap smears (Question 9, Table 39).

Figure 39- Systems Outcomes

Systems Outcom	nes												
8. Did your practice ever discuss outcomes	Interviewees from Practice number:												
after a period of use?	1	2	3	4	5	6	7	8	9				
Yes			1				1	1	1	4			
No	1	1		1	1	1				5			
9. What kind of data was used?	T	[	r	[		r	r	r	r				
Division data feedback							1	1		2			
Practice own database search							1	1		2			
PIP payment receipts			1					1	1	3			
Anecdotal evidence							1	1		2			
Other: Vic Cytology			1							1			
10. What was the conclusion? 10a. Did it work?	1												
Yes	1	1	1	1	1	1	1	1	1	9			
No										0			

Of interest in this section of the study is the fact that only half the practices had ever discussed 'outcomes' after a period of use (Question 8, Table 39). This contrasts with their perception that outcomes were achieved in all cases (Questions 10/10a, Table 39). Perhaps, their perception of increased numbers of females coming through the doors for cervical smears created this perception of success without actually formally measuring it.

In all cases, there were multiple outcomes. With Interviewees citing 'patient care', 'accreditation issues' and 'risk management' in relation to in a further nine; four mentioned financial outcomes, four as a vehicle to involve staff (team building); three benefited from insurance incentives (for minimising risks); and one cited Government influence an outcome crucial to the system (Question 10B, Table 40).

The Outcomes of information syst	tem	s in	gei	iera	al p	rac	tice			
10b. What were they?										
Outcomos				Pra	acti	ce N	Jun	nbe	r	
Outcomes	1 2 3 4 5 6 7			7	8	9	Total			
1. Patient Care	1	1	1	1	1	1	1	1	1	9
2. Financial (PIPs)	1				1			1	1	4
3. Wanted to involve/include other staff	1						1	1	1	4
4. Risk Management	1	1	1	1	1	1	1	1	1	9
5. Insurance incentives (for minimizing risk)			1				1	1		3
6. Government influence		1								1
7. Accreditation issues/bodies	1	1	1	1	1	1	1	1	1	9
8. Other										
Total	5	4	4	3	4	3	5	6	5	39

Figure 40 - The Outcomes of information systems in general practice

Table 41 summarises the very few comments regarding the adoption of the system with the benefit of hindsight (Question 11). Most of the comments reflect their regret at not having accessed the freely available support from the Division (education, purging process and timing) rather than a failure in the framework. However, and very relevant, a failure of the emerging framework was the lack of formalisation of outcomes; this is further reflected in Table 39, question 8, where more than half had not formally discussed outcomes.

Figure 41 - Hindsight Open Comments

Hindsight Open Comments
11. In hindsight, what would you have done differently?
Comments:
We should have formalised it (outcomes)
Should have purged (cleaned) it before starting
maybe better education
Should have done it sooner!
More publicity!

## Summary and Outcomes of systems Outcomes

This fourth section of results revealed the importance and the justification for adding an outcomes element in the implementation cycle. As well as the need to formalise data feedback back to the practice in their multiple forms.

Of encouragement was the minimal disruption to practice life after the introduction of an information system to support the prevention and management of chronic conditions. Perhaps as was later mentioned, this was due to the 'easiness' of the system implemented and the on-demand training and support that they had from the Division IM/IT program. The lack of emerging new issues throughout the interviews and in the final comments section lends itself to suggest that the structured interviews covered most of the key issues of interest in this framework, mostly due to the success of the exploratory pilot interviews to explore the emerging framework in comprehensive detail before the actual data collection.

#### **Overall Summary**

The analysis of the first data collection suggested that some changes are needed to the emerging framework. The benefit of having been involved in the practical implementations in these settings before the study, will help provide an insider's interpretation of the data collected to modify the framework in light of the findings. The three main sections and their modifications will be now summarised.

#### Alteration to the framework

This section discusses how the emerging framework can be altered to become a more robust framework in light of the findings of this first data collection section. In the first instance and from the previous results, it can be inferred that there is a distinct divide between the standard motivators for change (financial, accreditation, special interest, government influence, patient needs, among others); and the more prominent 'awareness' that defines the chronic condition problem in their own practices. The central and distinct element here was "*patient care*". This awareness was shown to be the product of a purposeful 'Problem Definition' stage within the processes through which these practices travelled. The major influences in this process are well documented in the data collected; mainly the Division IT/IM support program (external influence); and the practice champion (internal influence) searching through the practice database to find this evidence.

These differences are amended in the upgraded framework, as originally the problem definition stage was assumed to take place later in the framework process. In essence, this finding places the problem definition element as the main influence on highlighting the evidence (such as: the low rate of females being screened at the practice) for creating

awareness of the gaps in care. This situation suggests a separate stage from the 'other' common motivational forces associated with driving change in practices.

Important to this framework and emerging from the data is 'the process of decisionmaking'. While it was never defined in the emerging framework, it can be inferred that the decision to implement an information system for chronic conditions in these successful approaches, does not happen as a result of a sudden awareness of a chronic condition problem at the practice. That is, it did not happen at the starting (Problem Definition) point of the process as was assumed in the emerging framework. Data collected and the way the interview protocol sequence was developed, began to indicate that decision-making happened at a particular later stage. Moreover as a result of the amount of ground work put into the analysis and development stages by the champions and the Division IT/IM person before presenting the evidence to the decision makers, the decision makers had before them all the relevant information to make an informed decision. This information included: 1) a complete chronic condition gap analysis (evidence), 2) practice capacity sorted out (Human resources, schedules, roles, etc), financial details and forecasts, risk and liabilities and a variety of implementation models to decide on. There was a clear picture of driving/motivational forces and potential projected health outcomes.

This section in the study shows the link between practice capacities (already discerned in the previous framework) and the importance of pre-analysing and designing a variety of models before decision making and implementation can occur. These findings suggest that this element deserves a section in its own right within the new and revised framework.

The implementation and successful adoption of the systems in turn, produced desired outcomes that went on to introduce other information systems for chronic disease care. This is the practical section of this framework relating to the feedback channel and its valid place in it.

Among the identified influences in the emerging framework, the practice champion and the change agent (IT/IM Officer) were seen as having much greater influence in a number of sections of the framework that were not acknowledged in the emerging framework derived from the literature and the IT/IM Officer's own experience.

For example, their influential role in the problem definition section leading to awareness of a chronic condition, their role in capacity awareness, analysis and development of models

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to provide evidence to allow the making of informed decision and in all aspects of the implementation process. Their contribution appears to be closely related to a kind of partnership, although and according to this preliminary data it was not always so. This finding will also need to be reflected in the revised framework.

The initial section of the framework corroborated the potential motivators driving change in general practices at the time of implementation in these successful practices. The data collected accounted for another emerging, and separate, section in the framework that provided the means for identifying and creating awareness of a chronic disease problem at their own practice. Another section, identified in the study, recognised the presence of a certain amount of capacity awareness, pre-analysis and development in the process leading to the last section where decision-making occurs and system were implemented and (eventually) evaluated for outcomes.

These findings led the researcher to propose the following graphic representation (Table 42) of the revised chronic diseases information systems framework. This newly proposed framework builds on the original emerging framework, and reflects the observations noted from this first data analysis section.



Figure 42 - The Revised Framework

## The Functionality of the Revised Framework

The Factors Driving Change represents the accumulation of knowledge that begins to motivate general practice about a particular chronic disease issue. 'Knowledge' for the purpose of this framework is defined as *'the simple awareness of bits of information'* and

motivation is defined as 'having the desire and willingness to do something' (Sutton, 1993). The concept here is that awareness creates motivation. This awareness is represented by non-practice patient-related information; for example, among the external motivators there are media campaigns (TV, radio, etc), division seminars, flyers, and in this cases, even the IT/IM Division facilitator played a role. Then there are the internal motivators; for example, GPs might have a professional interest in cervical cancer; accreditation obligations to introduce systems; financial advantages; risk management requirements, etc. Lastly, it is assumed, as documented in the literature, the Patient Needs also provides another source of influence on the practice (not examined in this section of study). The point to make here is that these are not fixed variables but are time, value and need specific; that is, some will have more influence than others at a particular place and time. The implementation practitioner, or those trying to introduce change in general practice must learn to 'read' these undercurrents to take advantage of these influences.

*The Chronic Disease Problem Definition* segment of the framework is not just the desire to do something (motivation), but something more powerful. If, as explained earlier: knowledge is the simple awareness of bits of information, what is being represented here is something akin to 'understanding', that is 'the awareness of the connectedness of this information' (Wikipedia, 2007). Wikipedia (2007c) also suggests that 'it is understanding which allows knowledge to be put to use'; and further goes on to clarify that 'Understanding represents a higher level than simple knowledge'. This is precisely what problem definition, in the context of what has been found in these cases can be interpreted to be all about. For the practitioner, it means looking into the practice databases and extracting 'patient-related evidence' to feedback to the champion/s. Almost inevitably, implementers will be asked to return to start looking at solutions for the problems that have been defined in the searches.

*The Practice Capacity, Analysis and Design* is where most of the misconceptions and barriers are overcome and potential solutions under a number of possible designs to suit the practice's uniqueness are looked into and devised. In most cases a full analysis and design is conducted with the champion and other potential supporters as the data showed. This paves the way for the champion to approach the decision makers with a full account of the chronic disease problem at the practice, and strategies and feasible solutions for them to

decide on. If the decision makers approve, the facilitator or external agent is invited back to start the practical implementation process in tandem with the champions.

*The Chronic Disease Information System Implementation* section deals with the practical set up of the system according to 'the design' that the decision makers have agreed on. For the external agent, it would normally involve a number of visits to train a number of staff in their different roles, to clean up databases and create registers, to setup recall and reminders and learn how to use them to their best potential.

The external agent keeps monitoring the working system over time until all gaps and cracks are ironed out and adoption takes place. Finally, outcome assessment timeframes need to be formalised to measure and feedback success. Success breeds success, which is the feedback channel's purpose. Even in these practices, even with a lack of formal acknowledgment of success, it has allowed practices to move on to other systems.

#### Conclusion

This section of the study, while corroborating most of the assumptions drawn from the literature and the observations from the IT/IM Officer, also provided a new interpretation from the revised framework to highlight the peculiarities of successful chronic disease information systems as revealed in this data collection phase.

Results from the data collection gave a glimpse of the importance of chronic disease evidence-based understanding built though practice champions in partnership with Division IT/IM program officers. As well as the purposeful place for the making of informed decisions based on sound analysis (practice capacity, practice population health, financial, risk liability, etc) and the design and choice of potential information system models. Furthermore, it was also noted the encouragement and motivation that successful outcome of information systems will have on the further development of new systems to care for chronic disease patients.

This section of the study shows that the framework now resembles more closely the journey travelled by these successful practices. However, it must be acknowledged that the picture is not complete. The framework has not been tested in implementations that cater for other chronic conditions like Asthma, Diabetes or Mental Health that are deemed to be more complex for practices to manage. Perhaps in doing so, some other inferences

emerging in this study could be investigated. For example, if the same framework applies to the application of other chronic conditions information systems after the first implementation? Or if, for example: governance/distribution of power or even ownership plays a mayor role? Moreover, maybe a broader validation is needed with other practice individuals than those studied here (champions) or practices where success was not formally achieved to further validate the finding in this stage.

# CHAPTER SEVEN — Main Data Collection

'Research is formalised curiosity. It is poking and prying with a purpose."





Figure 43 - STAGE THREE: Chapter 7 - Main Data Collection

## Introduction

The introduction to this thesis (Chapter One) provided an overview of the study. Stage One (The Research Strategy) provided the methodology used in the study (Chapter Two), the literature review (Chapter Three) and then framed the context of the study and provided the practical implementation knowledge component (Chapter Four).

Stage Two (The Exploration), began by drawing the learnings from Stage One; and putting together a proposed information systems emerging framework for the prevention and management of chronic conditions in general practice (Chapter Five). It then continued by testing the emerging framework and suggesting further revisions resulting in a revised framework (Chapter Six).

The purpose of this chapter is to test the revised framework developed in Chapter Six by interviewing a much wider and diverse number of representatives from a larger number of practices and with diverse levels of chronic disease information system implementation and adoption outcomes (success).

More specifically, to test and validate existing elements and constructs already identified in the emerging and revised frameworks, as well as any emergent theme that may develop in the course of this main data collection stage. To place the findings in context, a brief background and aims to the chapter is provided, together with the rationale for practice and participant selection.

Interview transcripts and observation have been analysed to corroborate existing concepts and constructs and to identify emergent ones in this main data collection stage.

The findings (constructs and concepts) in this main data collection stage are presented as a summary of selective classifications and characteristics sought in this data collection stage. These selective summaries of interview results are inter-dispersed with observations and interpretivist discussion.

Where appropriate, data are also aggregated from the previous data collection stage and briefly summarised and discussed to argue for the development of a final framework. Then the final framework is described and graphically represented at the end of the chapter. The final discussions and conclusions drawn from the overall study are provided in the next stage of the study, Stage Three (Chapters 8 and 9).

#### **Background and aims**

The first phase of data collection allowed key features of the emerging conceptual framework to be examined, leading to refinements. However, some concepts and constructs were not specifically targeted, and more importantly, it was limited to practice champions only, most of these being practice managers, and to one specific chronic condition (Cervical Cancer). The views were sought only from practices where chronic disease information systems had been successfully implemented. What the initial data collection and analysis provided was a solid grounding from where to build a very relevant interview protocol to better consolidate and validate the previous study findings. With a good solid grounding, the strategy now was to examine the new framework by better targeting diverse participants and diverse success characteristics.

#### Practice type selection

The previous data collection allowed the framework to be enhanced by using the ten most successful practices. The aim was to examine the framework from the point of view of highly successful and very involved practices and participants.

The aim is now to include the largest number of practices from the Division to gauge a much broader level of understanding from a wider perspective to validate the revised framework. However there were some limitations to the potential breadth of this section of

the study; bearing in mind that four practices were not easily accessible and the fact that nine were not known to have a chronic disease information system (CDIS) that were fully functional. Further more, not all practices had achieved successful outcomes as defined in the first lot of data collection.

To facilitate the breakdown of the varying levels of success, practices were divided into five types: Type A's, were those practices that had achieved success (S) in two Chronic Disease Information Systems (CDIS) (S+S), or at least one successful implementations and were actively working towards (T) success in a second one (S+T). Type B's, those that had not achieved success yet, but were working actively to achieve success in two CDIS (T-T); Type C's, were those that were believed to be working towards just one CDIS adoption and no (N) other at that stage (T+N); Type D's: those that were believed to be not (N) working to towards success in CDIS (N-N) And Type E's, those not easily accessible in this study. Table 44 Further summarises the types by CDIS success.

Figure 44 - Practice Types by CDIS Success

Practice Types by CDIS Success						
Туре А	S + S or S + T	Success/Adoption in at least two CDIS				
Туре В	T+T	Success/Adoption in one and working towards one other CDIS				
Туре С	T + N	Working towards one CDIS and no other				
Type D	N + N	No CDIS at all				
Туре Е	Not Known	Not accesible to the study				

One limitation to the study is that it would be impossible and impractical to test all accredited practices (38 in total) in the available time, so a minimum of five practices from each type (a total of 20 practices, approximately 58%) was seen as an achievable minimum target. Practices were going to be targeted where possible on diverse characteristics (rurality, number of GPs, etc); including some of those already used (but from another participant's point of view).

As it turned out, instead of 20 practices, 26 (or 68%) were finally used in this main data collection stage of the study. Among them, 7 of Type A, 8 type B, 6 Type C and 5 type D, taking the total number of practices in both data collection stages to 28 (74% of all practices at the division). Those that were not easily accessible (Type E) were not contacted.

A breakdown of practice participation by CDIS success type is presented below in Table 45.

*Figure 45 – Summary of participating Practices by CDIS implementation success types in both collection phases.* 

ΤΥΡΕ Α	First Data Collection	Main Data Collection	ΤΥΡΕ Β	Main Data Collection	ТҮРЕ С	Main Data Collection	TYPE D	Main Data Collection
Practice 1	1	1	Practice 11	1	Practice 20	1	Practice 27	
Practice 2	1	1	Practice 12	1	Practice 21	1	Practice 28	
Practice 3	1	1	Practice 13	1	Practice 22	1	Practice 29	1
Practice 4			Practice 14		Practice 23	1	Practice 30	1
Practice 5	1	1	Practice 15	1	Practice 24	1	Practice 31	
Practice 6	1	1	Practice 16	1	Practice 25	1	Practice 32	1
Practice 7	1		Practice 17	1	Practice 26		Practice 33	1
Practice 8	1	1	Practice 18	1	Total 6	6	Practice 34	1
Practice 9	1	1	Practice 19	1	Percentage	100	Practice 35	
Practice 10	1	_	Total 9	8			Total 9	5
Total 10	9	7	%	89			%	56
%	90	70						
SUMMARYTotal number of practices at CHDPN38Total number of practices accessible to this study34Total number of practices in Fist Data Collection9Total number of practices in Main Data Collection26Total number of Practices used in the Study28Percentage of total Division practices used in this study74 %								
Percentage of	acces	ssible	practices used i	n this	study	82	%	

## **Participant selection**

The strategy in this data collection stage was to interview a broad range GPs, Nurses, Administrative Staff (mainly Receptionists) and other Practice Managers that had not participated in the previous collection phase. For this purpose, it was important to have close to equal representation from all four participant types to better examine the revised framework. The minimum target set was to have at least seven representatives from each type. That is, this second lot of data collection was going to improve any limitations posed by the selection of interviewees in the first data collection focusing only on key champions. However, there was little point in interviewing individuals that did not participate in the implementations just because they belonged to a certain practice or type. For example, to find out about 'decision making' there was little point in asking just any employed GP at a practice, the only ones capable of answering these questions were GP Principals (business/practice owners) directly involved in the decision making process. Notwithstanding the aim, some participants were selected because of their participation and knowledge rather than their type, sometimes being the only individuals that were know to have participated in these implementations at their practices. This was more relevant in practices where the implementation process was never quite completed.

In total, ten GP Principals (practice owners), thirteen practice managers, six nurses and seven administrative staff were interviewed. When taking into account those that had multiple roles, the number of GPs remained the same at ten, practice managers increased to fifteen, nurses to eight and staff to eleven; well exceeding the target sought.

By the time the second phase of data collection ended, a total of 36 individuals had been interviewed. However, and more importantly, when we considered that eight of those had double roles, either discreet or by default, the total interviewees (by role) totalled 42 (if each half role is counted to represent a different individual with their unique perspective within their role).

#### **Other characteristics**

Practices were selected to match the profile of the Division where possible, based on the following characteristics: Rurality, Practice size (number of GPs) and clinical software used.

To add strength to the study, it was important to match the proportion of certain characteristics in the population (Division). These will be dealt with in more detail later on. Nonetheless, the following table highlights the proportions (percentages) of the whole Division and their correspondence to the participants selected for this data collection stage. See Table 24 below.

Figure 46 - Division - Study Representativeness

Population Characteristics	Practices	Rural	Semi-Rural	Suburban	Solo	2 to 3 GPs	4 to 7GPs	8 to 15 GPs	<b>Medical Director</b>	Spectrum-Plexus	Other
Division Profile	34	13	12	9	2	8	15	9	26	6	2
Percentage	100	34	32	26	5.3	21	39	24	71	16	11
-		-									
Total Data collection	28	10	10	8	2	6	12	8	22	6	
Percentage	100	77	83	89	100	75	80	89	85	100	0

The 'sample' used in this section of the study matches the overall Division profile very closely in all aspects and characteristics.

## Conducting the study

As briefly explained earlier, the interviews were intended to test aspects of the revised framework (Table 47) from at least four types of participants from four practice types. This situation allowed the opportunity to develop more specific interview protocols to match the participant and practice type. That is, to ask the appropriate question to the appropriate participant; although many questions were relevant to all. For example, all type A practice champions (mostly practice managers) were already interviewed in the first data collection stage. More importantly, this provided the grounding to narrow down the main aspects study and focus on validating previous findings from other participant types and testing aspects not previously examined or emerging from the revision.



## Figure 47 - The Revised Framework

This situation opened the way to target GP Principals specifically to test if, for example motivating factors were the same as for champions or were somewhat different. As well, for example, to also seek responses that would be of unique knowledge to a GP; for example. Did patients influence the setting up of CDISs? These protocols can be found in Appendix A (Interview Protocol – Type A – Main Data Collection)

In the case of type D practices, for example, it would be better, for example, to focus specifically on why the implementation did not succeed and to find out if any of the concepts identified in the framework were missing. These protocols can be found in Appendix A (Interview Protocol – Type D – Main Data Collection)

To this effect, five slightly different semi-structured interview protocols were devised. All contained the core protocols contained in the first data collection stage, but specific questions were added to match each practice type and individually to GPs. A copy of the specific protocols can be found in Appendix A. Furthermore, the new framework developed out of the last data collection was shown to all participants to seek their views on the process flow as shown in the framework diagram (sequences of constructs represented by lines and arrows). This can be found in Appendix A at the end of the thesis.

Access to these practices and participants was never going to be a problem as the researcher is still, after more than five years, actively in contact, implementing CDISs and supporting these practices and participants as explained in Chapter Four. Furthermore, two aspects were of note; one was the willingness of all ten GP Principals in particular to participate without reservation. Perhaps, this was due to the researcher's previous and concurrent IM/IT role where he would have developed rapport and trust over a long period of time whilst working with them. The second was the candid nature of the responses, having known most of them for at least five years, some more than others; it was a pleasant surprise to hear responses that were open and frank. Again, the result of perhaps having gained their respect and trust in the previous (and concurrent) working relationship.

#### Murphy's Law: Expectations vs. Reality

In hindsight, a four year long study (interrupted somewhat by the ill health of the researcher at a critical stage) was bound to throw up some unexpected and inevitable changes that would throw well intended strategies into chaos.

During this period, a few changes took place; some practices ceased to exist, others merged and new ones sprouted in their places and while many new personnel came and went most of the targeted participants were still there; some in the same function, others with new roles. As far as participant types targeted was concerned there were no major differences in impact between the planned and the executed. However, the biggest impact on the study design was going to be the changes that occurred in practice types; with great disparities between the planned strategy and the actual practice types found when these strategies were executed.

In general, many more practices achieved higher levels of success than originally known, with more than seventy CDIS either already successful or on their way towards success documented during the interviews. These need a specific explanation before the analysis can begin and conclusions drawn later on.

Of the twenty eight practices studied in both data collection phases, twenty of them (72% out of 28) had achieved Type A success, instead of the eight expected. Of the eight Type B expected practices, only four remained (14%). Of the five Type C expected practices only four remained (14%). More interesting, was the fact that there were no Type D practices to be found in our selected population.

The following table (Table 48) further clarifies the issue.

## Figure 48 - Expected vs. Actual Practice Types



While this situation denied the study potential results from the less successful type D practices, there was more than enough information coming from the interviews to justify their inclusion in the study —as the previous known profile of the Division would not have matched this unexpected 'greater success' achieved. Nonetheless, it seems to be further proof that the practical implementation framework really works.

Furthermore, at the end of both data collection phases there was a total of 36 (100%) participants interviewed. There were 10 GP Principals (28%); There were 13 Practice Managers (36%); 6 Nurses (17%) and 7 Staff (20%). See Table 49 below. More will be discussed about the participants in Chapter 8.

Type A	ractices	Doctor	Jurse	We	Staff	Sub totals	oles	<b>Fotal Roles</b>		Type B	ractices	Doctor	<b>N</b> urse	Wo	Staff	Sub totals	oles	rotal Roles
Practice 1		1	1	1	0,	3	1	4		Practice 15	1				1	1	1	2
Practice 2	1	1		1		2		2		Practice 16	1	1				1		1
Practice 3	1	1		1		2		2		Practice 19	1		1			1		1
Practice 4	1			1		1		1		Practice 24	1			1		1		1
Practice 5	1	1		1		2		2		Totals	4	1	1	1	1	4	1	5
Practice 6	1	1		1		2		2										
Practice 7	1		1			1		1										
Practice 8	1	1		1		2		2										
Practice 9	1	1	1			2	1	3										
Practice 10	1		1			1		1								s	oles	es
Practice 11	1	1				1		1			ces	-				otal	erc	Rol
Practice 12	1				1	1		1			acti	g	rse	_	ff	btc	ldu	tal
Practice 13	1	1				1		1		Туре С	Pr	å	n	PZ	Ste	Su	å	Ê
Practice 17	1		1			1		1		Practice 21	1				1	1	1	2
Practice 18	1			1		1		1		Practice 22	1				1	1	1	2
Practice 20	1			1		1		1		Practice 23	1				1	1		1
Practice 29	1				1	1	1	2		Practice 31	1				1	1		1
Practice 33	1			1		1		1		Totals	4	0	0	0	4	4	2	6
Practice 34	1			1		1		1										
Practice 35	1			1		1		1										
Totals	20	9	5	12	2	28	3	31										
т	otals	<pre>Practices</pre>	Doctor	o, Nurse	Md 13	Staff	ତ୍ୟ Interviewees total	Double roles	Total Roles	]								

Figure 49- Actual totals by participant and practice type

Due to the unexpected success of many more practices than anticipated, the great majority of individuals, included multiple individuals and double roles, now belonged to the 20 more successful type A practices; The 4 Type B practices are only represented by 1 GP, 1 Practice Manager, 1 Nurse and 1 Staff (that although not in title, was a de facto PM); worse still the 4 types C practices are only represented by 4 administrative Staff (Not full fledged PMs).

As in the case of Practice types, stratification would just be impossible on these small numbers. This situation is perhaps not so relevant to the way the study was designed. Particularly as some constructs, and questions to investigate those constructs, are only valid for specific individuals (from those practice levels) that participated in or were affected by the particular constructs. This situation was dealt with in the main data collection phase (as explained in the research design section – Chapter Two); whereby only asking relevant questions to individuals that were for the most part either heavily involved or their involvement was directly relevant to the needs of the question. For example, no question about Patient Needs was asked of Practice Managers and Staff as their contact with patients is not as comprehensive as it would be with Doctors and perhaps Nurses. Furthermore, asking a GP about implementation issues when they were not involved in an aspect of the implementation process. Another example, or at least validly, by GPs who did not take part in such process. And finally, to give a further example, testing the feedback channel only applied to practices that had multiple implementations (Type A's).

Then again, this unexpected level of success is perhaps the best kind of validation for the 'potential' of this chronic disease information system implementation framework to be widely applicable across many general practice contexts.

#### **Main Data Collection Findings**

This section of the chapter will outline the findings from the main data collection phase. The findings are presented as a summary not of individual practices, but grouped according to the constructs and characteristics relevant to the framework sought in this main data collection stage through the appropriate protocols.

These summaries of results are supported by selected direct quotes from interviewees, as they seem to provide the depth and meaning of the interviewee's response to the questions asked during the interview.

Every grouping is complemented with observations and a discussion summary before the summary. However, direct observations by the researcher have been kept to an absolute minimum to avoid any potential bias as suggested in the methodology chapter (Chapter two).

Furthermore, to facilitate to the reader the understanding of the relationship between interviewees and the characteristics targeted (i.e. job role, success type and practice setting) the direct quotes from each response clusters will be labelled in the following manner: i.e. GP - 9 - type A. This means the interviewee is a GP, then the practice number

(from where the participant was interviewed): in this pace practice number 9, and the type of success level achieved by the practice: in this case A.

This labelling should allow the readers to make their own correlations and conclusions without the subjective interpretation of the researcher. Nonetheless, the summary and discussion section for each construct will still interpret the findings as the researcher perceives them.

## **Construct one: Factors Driving Change**

This particular construct was built around a number of the pre-identified concepts (Internal and External motivators, and Patient Needs) in the literature, and from existing experience and was pre-tested in the previous chapter. In the revised framework The Factors Driving Change represented the accumulation of knowledge that began to motivate general practice about a particular chronic disease issue. The concept here was that awareness created motivation. This awareness is represented by non-practice patient-related information; for example, among the External Motivators there were media campaigns (TV, radio, etc), Division seminars, flyers, and even the IT/IM Division facilitator played a role in previous findings. Then there were the Internal Motivators; for example, GPs might have a professional interest in cervical cancer; accreditation obligations to introduce systems; financial advantages; risk management requirements, etc. Lastly, it was assumed, as documented in the literature, that Patient Needs also provided another source of influence on the practice (not examined up to this point). This construct (Table 50) was tested as follows:



Figure 50 - Construct One: Factors Driving Change

## The Ranking of Factors Driving Change

Twenty three interviewees were specifically asked to rank the motivators previously identified by practice champions in the previous data collection phase in Chapter 6. The typical protocols used introduced a brief context to the question and asked as follows:

#### In a previous data collection phase a number of motivational factors were identified and ranked according to their perceived importance at the time of implementation.

**Q1a** - Can you please rank the following (un-ranked) motivational forces according to your views at the time of implementation, and please add or expand on any comments or thoughts on the matter?

Accreditation issues/bodies Financial (PIPs) Risk Management issues Government influence Wanted to involve/include other staff Patient Care Division Influence/Support Insurance incentives (for minimizing risk) Other – can you please explain?

The results from the twenty three interviewees were somewhat similar to the first data collection stage when heavily involved practice champions were interviewed.

#### **Patient Care**

In first place and far ahead of the rest, the majority (total n=15, 65%) agreed that Patient Care was the leading motivator. For individual participant types, the rates were fairly similar, with all three nurses (100%), with six GPs out of eight (75%); with four out of five PMs (80%), and with three out of six staff (50%) saying so. The percentages shown, although from a small number of participants, appear to show that those more clinicallyoriented and closer to the patient have greater motivation from this perspective. This measure alone (supported by the previous data collection phase as well) justifies the elevation of 'patient care' well above any other motivator to introduce a chronic disease information system in general practice.

Here is a selection of direct quotes to highlight the depth and meaning of interviewee responses to the interview question:

*My first ranking would be patient care because it was fragmented and buried within the practice... so that's number one.* 

GP – Practice 9 - type A

...what you're trying to do is do the best for your patient with chronic condition... GP - 16 - A

#### **Risk Management**

The second most prominent answer was Risk Management; four out of 23 (17%) ranking it first (two GPs, one PM and one staff). This is neatly summarised in this quote:

I don't really recall that our practice took a different view on more assertive Cervical Screening than it took to more assertive Chronic Diseases management in general. Maybe conversely if there was a driver it was owning our own recall systems, the driver was the Medical defence industry and MDAV in particular and their risk management programs highlighting cervical screening systems as being one of the more evident causes of medical litigation.

GP – 13 - A

GP – 2 - A

#### **Financial Incentives**

The third was financial incentives with three (13%) one GP, one PM and one staff.

Financial then patient care

Money of course... I would say money comes first then patient care then risk management.

Financial of course, they are Doctors aren't they?

Staff-15 - B

PM – 29 - A

#### Accreditation (and others)

The other single responses ranked number one were: Accreditation, and a practice manager perception that the GP Principal wanted to create a paperless practice:

(To make the practice) .... Paperless, its something he aims long term

PM-32 - A

#### The Interdependence of Motivational factors

The following direct quotes make it very clear that most of these concepts are interrelated: This is in line with the socio-technical literature's reference to the interdependence of subsystems. Number one is patient care, I mean...it has to be a good idea and it has to be plainly and demonstratively good for the patient, there is no point in doing anything if it is not good for the patient, in conjunction to that it has to be of benefit to me...taking on a new initiative costs me a bucket of money and if I am not going to be rewarded I am not going to do it

GP – 13 - A

I guess back then it was driven by risk management issues and financial incentives, which gets back to accreditation but then all integrates into patient care; but I think you have got to be convinced that something is worth doing and basic things like these are worth doing

GP – 11- A

....certainly the financial was an influence of course. In my point of view I was being paid more for I was I was already doing; and I was finding that a lot of our Doctors were not managing them (patients) properly so they were the two key factors for me.

GP - 9 - A

I think it's a bit of each (on the list of motivators) For me... from my point ... of the clinic, I think we need consistency, so that if the patient sees one doctor and then see, another doctor we can be more consistent... sure for accreditation purposes we want to keep our information up-to-date, but I think we really need to make sure we're screening... I think we need to get them all so we can treat them to the best of our ability and make sure they're getting the best of care... and if we do it across the board so everyone... (Gets the care)

Nurse-8 - A

Well, I think first of all with chronic condition it is patient care...that's why we're here. ....I look it as a personal challenge for myself, so that's what motivated me. We certainly had the Division influence and certainly from the Doctors point of view... accreditation and financial.

Staff – 12 - A

#### **The Patient Factor**

The presence of this element in the conceptual framework was due the abundant literature that refers to the patient as an influence on GPs. This was not supported by the practical experience in implementations reviewed in Chapter Four, but since the Division IM/IT Officer did not have direct access to patients it was best thought that it should be included and tested in the study.

The Patient Need concept was tested in this stage for the first time. And, as it was thought would be the case —and confirmed in this section, only GPs and nurses would have the level of access to patients required to shed light on this issue. Seven GPs and two nurses were specifically asked:

One issue that was not tested, but well understood in the literature is the influence that 'Patients' themselves put on decision makers.

**Q1b** – *Did patients influence you to uptake systematic approaches? Please explain if so.* (*What were your views, thoughts, experiences, beliefs at the time?*)

The responses were that it did not directly influence the motivation of the practice to set up CDISs. Although some suggested that an influence or expectation was being created as a bypass of the actual setup of the CDIS, when it is up and running, as the following quotes below will make clearer:

No, cause we've had a paper system for many years.

GP - 1 - A

*NO*, *NO*, *Maybe they didn't say we want you to do it maybe because they didn't know what they wanted or what was needed.* 

GP – 9 - A

I think sometimes they do, I'm seeing more and more now in relation to pap smears. Now they expect us to recall them, there is an expectation there now, probably because we've recalled in the previous years.

GP - 6 - A

No, I think that patients have been more of a driver once they've been in the system about saying... I would like this or if could also do this, but I do not imagine them being a primary guide.

GP – 5 - A

with systems management: no... its normally not much different from what I'm doing anyway, but it does happen with other problems but from a systems point of view... no, in Melbourne maybe it might happen but not here.

#### GP – 16 - A

Not to set up systems directly... Ho, a couple ... some do, but we find that most of the patients that are like that are ones that have been (to) allied health services and have said to them your doctor should be providing this service and that service; but that's more the care plan thing not the actual care of the Diabetes... (There being a self interest by Allied Health services driving this).

Nurse - 8 - A

The findings regarding this construct seem to corroborate that although there are many driving factors and most of these are interconnected and interdependent, the key driving force in this construct is finding the evidence that 'Patient Care' is at risk. Since the beginning of this four year study (starting at the time the proposal for this study was being put together) further observations have further strengthened the initial observation that not only does it affect chronic conditions but, appears to have also have an effect on the setup of other care paradigms (i.e. prevention strategies, therapeutic guidelines, evidence-based practice, etc).

Conversely, there are still strong de-motivational forces that cannot be easily escaped in the current context; for example the red-tape (term used in health to describe bureaucratic paperwork) involved in claiming government incentives, as the following quote suggests:

Yes, but Doctors are not always motivated by incentives .....But it's all the crap that goes with it (paper work-red tape) ....It's the time ...

PM-34-A

In contrast to this position, or perception of the problem rather, the majority of practices have set themselves up in such ways that the burden of the paperwork does not fall on the laps of those most affected by it; namely GPs. Hence, even this real de-motivator can be overcome or minimised with a better system setup (improved role/task definitions; whereby for example, the paperwork task is passed on to a nurse). Yet, it can also be argued that without the motivation of incentives (including the burden they can pose on

users) success could be hard to achieve, as this type C practice quote might seem to suggest:

Incentives really haven't influenced any thing here because I guess they really don't know ...the Doctors don't know about them...

The point of the argument here is that, unlike the quote seems to indicate, they are perhaps less successful (Type C) *because* their Doctors did not access the PIP incentives.

One practice in particular perceived the extra flow of patients as a limitation to set up more CDIS:

...the other limitation that I already mentioned to you is just our own appointment plot. Now, I know that this is all regular, routine fill up the slot when its convenient. It's not going to fill up the book but if you get too many things you'll have hardly any free appointments...so that's the only other limitation

GP – 2 - A

Staff - 30 - C

As in the example before last, the issue is more 'perceived' than real; as other practices have set themselves up in such a way that it improves rather than burdens the appointment schedule. A simple indicator to this, without going into much detail, is that patients over the age of 50 visit their Doctors more than fifteen times a year; this age group for example would include the majority of Diabetics. The reason they visit so many times is that they have multiple interventions over many visits instead of having less planned visits with multiple interventions that could be in their majority handled by a nurse freeing up many GP-hours to allow that GP to see more patients than he or she is now.

If anything, the biggest threat to the implementation of CDIS comes from the government itself. One branch of the Department of Health and Ageing is encouraging GPs to uptake these systematic approaches and pays incentives to them to do so, and another (Medicare), is more concerned with regulating and controlling costs which appear at odds with each other. The following comment from one of the participants will further explain this point:

Every doctor would like to do more with their patients, the barrier is time.....nurses help a lot, the problem is that we can put on extra three or four nurses....have three or four nurses per doctor...how many patients is that Doctor going to see a day? I can run three or four nurses and see 120 patients in a day...do you think that this is a problem? (with Medicare), nurses are a very helpful thing because they streamline our work so much...particularly when the system doesn't need you, but the problem is that I can't benefit from them because at the end of the day there are constraints (with Medicare).

GP – 3 - A

When a practice becomes more efficient through the support of nurses, the GP is able to see more patients per day. This poses a problem for the health authority (Medicare) that might not comprehend how a GP can see so many patients per day. This is an untested issue that might act as a serious de-motivator at one end or a complete barrier at another. Nevertheless, some of these practices with high efficiency gains and high turnover of patients have already been audited by Medicare and with some evidence based arguments (provided with the support of the external agent or IM/IT Officer); it appears to have satisfied the queries of this branch of the government; at least so far.

## Motivational factors a final ranking:

The aggregated data allowed for a final ranking of motivational factors in the table below (Table 51) confirmed what each data collection phase individually seemed to agree on; that *patient care* was a much stronger concept that the 'other' motivational factors. The aggregation comes from 27 interviewees responses.

Figure 51 - Motivational	Factors -	Final Ranki	ng
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Overal Ranaking	Motivational Factors	Aggregated Rankings					
. analang		1st	2nd	3rd	4th		
1st	Patient Care	19	3	3	2		
2nd	Risk Management issues	6	11	0	1		
3rd	Finanacial (PIPs)	3	2	7	1		
4th	Accreditation Issues/Bodies	1	2	4	3		
5th	DivisionInfluence/Support	0	2	5	3		
6th	Wanted to involve/include staff	0	0	1	2		
7th	Insurance incentives (Minimising risk)	0	0	1	4		
8th	Government influence	0	0	0	1		
9th	Other	0	0	1	0		
# Summary of Construct One: Factors Driving Change

The key findings from this construct appears to be confirming —specifically from the clinical staff (GPs and Nurses) having the closest contact with patients, that the key motivator is *Patient Care*, well above any other motivators, although many of these still play a role as they appear to be all interconnected. Nevertheless, the notion of Patient Care is central in this framework for the existence of the next construct.

In essence, it could be said that there were real and perceived motivators and de-motivators adversely competing in driving practices to change; no one more powerful than feeding back to the practice the evidence of gaps and deficiencies in their own *patient care*. Furthermore, field observations during the four year study period suggest that most barriers and de-motivators can be resolved with the careful design of CDIS, that would match the sub-systems and that address the practice's unique concerns. And even the more complex ones like infrastructure costs can be offset by increased efficiency and better financial returns in the way of incentives income. The most prominent issues here for the less successful practices can be represented perhaps by the old saying 'you do not know what you don't know'; and according to the findings so far, the role of the change agent (IM/IT Officer) needs to bring this unawareness of issues into the light to then be resolved through appropriate systems design and engagement processes.

# **Construct two: Chronic Diseases Problem Definition**

In the original emerging conceptual framework (Table 19) —derived from the literature and practical experiences, the factors driving change (motivational construct) included the Internal, External and Patient Need concepts and the Health Care Problem. The Health Care Problem was a concept that emerged by suggesting that at the user level, the framework requires that every aspect of practice influence be understood to maximise understanding of the issues (Chronic Disease Problem Definition) at hand. These included common questions relevant to CDIS implementations:

- •Is there really a problem?
- •Can I make a difference?
- •Is this a priority at this point in time?
- •Have we got everything in place to do this?
- •Does it affect accreditation?
- •Is there a profit to be made?
- •Do we need to employ extra staff?
- •Can we afford this?

Many more potential issues were noted in Chapters Three and Four. On consideration of all these factors we should arrive a the 'problem identification phase' (Problem Definition, Table 52); the realisation or concern that a particular healthcare (Chronic Condition – Awareness, Table 52) issue might not be as well managed as previously thought and an 'in principle' agreement that something needs to be done is reached by the key decision makers.



Figure 52 – Construct Two: Chronic Disease Problem Definition

The First Data collection stage (Chapter Six) made it clear, in the view of successful practice champions tested, that that there was something much stronger influencing practices to take on CDISs. Specifically, becoming aware of deficiencies in *Patient Care*; this appeared to have been achieved though specific approaches and process though the key players (champions) and influenced by the Division's external agent. This prompted the elevation of this issue to its own construct and the place of *patient care* as a motivator has been validated by the findings in the previous construct above. This section of the examination sought to validate use of data feedback from own practices as a key tool to raise awareness of an existing problem (gaps in chronic condition care) in practices through a number key individuals (especially Practice Principals – practice owners) as follows:

# One of the outcomes of the first data collection was the importance placed on 'the practice's own data feedback' to fully understand why systematic approaches needed to be taken up at your practice.

Q2a – Do you recall being presented with data feedback on the Chronic Disease issue? Q2b – By whom? PM, Nurse, Div IT/IM officer, other?

**Q2c** – *How important would you rank this feedback in terms of motivation to change to more systematic care of that Chronic Disease.* 

Surprisingly, the most striking finding was that most Practice Principals recognised that they were not always aware of their own shortcomings or gaps in patient care. The following direct quotes from eight Principal GPs paint a very descriptive picture:

I think that's right, I think that a reasonable perception because you always think you're doing well with the patients that you are seeing and what you're doing with them, but unfortunately, you deny the opportunity to talk about people you're not helping and you also deny the opportunity to see what you're not doing with the ones you are seeing!

GP – 11`- A

True, yeah, I don't think anyone expects the patient to come in every six months asking to get their hablc done...its all about patient care, usually triggered by cycle of care. Knowing of the gap yeah... would be a motivator, again you want to improve your performance and making sure that you are covering them, because you don like them coming in to find out that they haven't had it done ...I think is identifying, if its shown to you that you are not doing as well as you might think you are on top of it but you're only getting a certain percentage of your diabetics, you need to do something about it.

GP - 6 - A

I think that's true, you are less minded of the people you don't see...there is no doubt about that. But I also think about the results you get from NPS (National Prescribing Service) audits and things like that that just remind you that there are people who are left imperfectly managed.

GP-5 - A

....Yes for sure ...you don't know, you don't know it gives you a perspective on what's going on....Well I think that ...you imagine that there is an issue that you can deal with and then when you're actually given the statistics and numbers ...well you think how many Diabetics there are in the practice you don even realise they are there. ...it allows you to stand back and say gee - wheeze I've got a few hundred diabetics within the practice ...that's a significant issue but number one they need to be cared for but also financially there are 500 health checks. .....I think I was comfortable and enthusiastic about doing it but seeing the numbers it supported what I thought.

GP – 9 - A

I think that's probably right ... I think anecdotal memory is a very poor tool although we'd like to think that it was better than this.

GP - 8 - A

Yes, it tells you how you are doing

GP - 1 - A

...part of that, I guess we're getting more and more from insurance companies sort of saying the risk management is whatever...the risk is...there are a lot of external pushes. ..ho yes, you look at the data and you say am I doing the right thing...am I minimising risk ...do I put myself at risk for managing this the right or wrong way....the only way to find out is by that data extraction ...to see if you're running it correctly or whatever. Yes it is a big thing I think ...what you're trying to do is do the best for your patient with chronic condition by finding out what you're not doing correctly.

GP-16-A

Yes, I think that sort of statistical feedback its always useful...to measure things GP-13 - A

This sentiment was corroborated by practice managers (PMs), nurses and staff that were more directly involved in the implementation process; for example:

Yes, I think the data on the computer shows them where the gaps are...it supports it with the evidence based research

Nurse - 19 - B

....When we looked at the data: for sure! ...Definitely.

Nurse – 8 - A

You would have done that and at the time we would have had a gap, I think we would have a larger percentage of seasonal patients...it's a nightmare Well it is, I was talking to the girls the other day how do you know if every female had a pap smear...well we don't because that there might be women who might have never ever had a pap smear and will never show up on the recall system because they never had one...and they looked at me quite shocked and said ...no! ...there will always be people who fall though.

It's the ones that put forward their foot ...the 'furtherest' are the ones that are treated the best. ....And that's a serious issue for every Doctor... and they are all aware that ...oh I am only coming for a particular item. ...And sometimes you forget that...(there is much more than that).....Absolutely!

PM – 34 - A

Extremely important

PM-20-A

*Yes, because it's actually looking at other patient management other than the immediate problem that they're coming for.* 

PM – 29 - A

*Very important... it influences you to know (of the gaps in care)* 

PM – 33 - A

How important? Yes, it's probably the driving force really. We probably just took it for granted that the Doctors were beating to the necessary beat without us.

Staff-12 - A

It's paramount, because I know, for my own, If it wasn't for someone reminding me ...I could go four years without remembering, easy...so its paramount.

Staff-30 - C

It was good to know

Staff - 21 - C

If any remark is necessary from this construct it is the frank and honest answers given by the interviewed GPs. The fact that they have owned up to their shortcomings in being aware of these gaps in patient care is a truly remarkable admission coming from such accomplished professionals, as well as commendable that they all decided to act on it. This shows their commitment to their patients' health. Furthermore, when shown the place of this section of the framework and how it fitted within it, none of the interviewees disagreed with the place awareness has in the framework —even those not directly involved in past implementation.

#### Summary of Construct two: Chronic Disease Problem Definition

The interviewees make it very clear that their own practice feedback data provided the key evidence for the shortcomings or gaps in patient care. In particular, from the GP Principals' point of views, that being shown the evidence of gaps in care is of extreme importance for those in decision making positions when it comes to implement a CDIS in general practice. These findings also confirm the researcher's observations noted over the past few years during and before the study as previously explained in Chapter Four and in the first data collection stage.

Furthermore, it confirms the essential role of the external agent in accessing, analysing and feeding back their own data to affect change.

# Construct three: Practice capacity

The place of practice capacity in the emerging framework (Chapter 5) was concerned with the hardware, software, infrastructure, workforce and other elements that were necessary for the implementation of CDIS. The literature had pointed out the many 'capacity' barriers to the introduction of systems, but observations of successful implementations revealed that in most practices the capacity already existed or needed to be created at the point of introduction of CDISs.

This was initially tested on the ten most successful practices at the Division (Chapter 6); revealing that these successful practices already possessed the capacity; although most key individuals (champions = mostly PMs) involved in the implementation were not aware of it. The Practice Capacity, Analysis and Design construct within the revised framework (Table 53) was seen as the place where most of the misconceptions and barriers (held by individuals as explained in Chapter Four) are overcome and potential solutions under a number of possible designs to suit the practice's uniqueness are devised. In most practices

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an analysis and design was conducted with the champion and other potential supporters as the data had shown (Chapter 6). This construct was important because it would have paved the way for the champion to approach the decision makers with a full account of the chronic disease problem at the practice, with strategies and feasible solutions for them to decide on. If the decision makers approved, the facilitator or external agent was invited back to start the practical implementation process of the CDIS.



Figure 53 – Construct Three: Practice Capacity, Analysis and Design

In this section of the study, and although already examined with the ten key champions in the previous chapter; another fourteen individuals from a wider population background (GP=10, PM =1; Nurse=1 and Staff=2) were also asked about practice capacity issues at the time of implementation; taking the total of interviewees to 24 (67% of all interviewees and half the practices covered). The inquiry was mostly around the use of their electronic clinical record system, to crosscheck the validity of some of the champion's answers. Furthermore, expanding the interview topic to other issues (hardware, workforce, infrastructure, training, etc) would have been time prohibiting and unproductive as most of these issues would have been observed by the IT/IM Officer/researcher anyway during the implementation process. Nevertheless a few unsolicited comments do provide for a wider insight into practice capacity.

At this point in the examination, interviewees were provided with the context in which the following question regarding capacity issues would be asked. The context and questions can be seen in the following box.

The literature clearly concedes that the lack of capability of computers and software, and resources like staff, infrastructure (rooms), among others; are all perceived as barriers to adopting Information Systems.

One of the common themes of the previous interviews was that, at the time of the first implementation, most of those heavily involved were not aware of the capacity or resources needed to set up such systems.

**Q3a** – at the time of the first adoption, were 'you' aware of the resources needed to adopt chronic disease Information Systems? Can you recall and explain?

Q3b – that capacity and resources already existed at the practice was a common theme among interviewees. Was this how you saw it? Can you explain? Q3c - Was the IT/IM Division officer prominent in making the practice aware of it?

# General Practice Capacity

**Clinical Software:** 

The reader would be reminded from Chapter Three, that Clinical Software immaturity and lack of capacity (such as: recall and reminders), in particular was cited as a major barrier to CDIS implementation and use.

Of interest, was the revelation that most GPs, unlike previous practice champions interviewed (mostly practice managers) knew they *had* the capacity to implement electronic systems of care as the following comments to the relevant questions suggest:

I think that I knew that MD (Medical Director) purported to have the ability to do these recalls and so forth, however the issue is at least threefold; you got to have the software program to do it, you've got to have staff who have the time to do it and you got to have staff that have the skills to do it; then you have to have an education program for your practice and for the community to make it work....so yes, four years ago I think I knew that MD had the ability but we didn't implement it four years ago...we had to wait until we had the motivation and the skills and that wouldn't have been impossible without the PIP nurse funding and the like

GP-13 - A

I do not know when but, we did know that MD (medical Director Software) could do that

GP-1-A

I was aware that we could but I needed someone to be doing it

GP – 9 - A

I knew we had the tools to do it but we didn't have enough knowledge to implement it in an organised and systematic fashion ... GP - 8 - AYes, have been using MD for quite a while GP - 16 - A

GP-11-A

The only PM interviewed also conceded being aware of the software capabilities:

Yes, since we go MD, I've been doing it.

PM-34-A

However, this not always the case; there were a few GPs even from very successful practices that recognised their limited knowledge:

No, we hadn't use MD until then, we were only doing prescriptions but all notes were on paper

GP-3-A

Are you aware of all your functions in your mobile phone?

GP-5-A

Some even pointed out deficiencies in their software design.

...Diabetes for example is had to crack, it's a bit of a hodge podge and its hard to track... the recording of information (in our software) is in different spots. so that's a bit of a problem for us. ...sometimes for example podiatry needs to be done, so where is that...that is in letters out, not in pathology area, there is another letter that comes from the eye specialist... this is going to be somewhere else again...to do one patient might take 50 min...the letter might six months or two years old... Medical Software as a product is in its infancy, hardware .....Our systems are no where near as robust as a motor vehicle evolved over time...

GP - 13 - A

Staff on the other hand, confirmed that they did not appear to know how to use their software at that point in the implementation process

Not aware at that point, no

Staff - 22 - C

Not aware of what MD could do then, I do now

Staff – 29 - A

Both Medical Director and Spectrum/Praxis softwares used in this study had enough capacity —both in their unique ways, to facilitate the introduction of CDIS; both requiring adjustment of features to match individual practices' unique approaches to CDIS. That is not to say that they are perceived to perfectly suited to general practice:

Medical software (referring to Medical Director) as a product is in its infancy. GP - 13 - A

This has also been the practice in the use of other clinical softwares (Best Practice, Locum, Genie, etc) that have been observed by the researcher but were outside the scope study (mainly due to their small number at the Division). However, some of these clinical programs were perceived as not being easy to use:

In reference to a previous program that was used at this practice:

(Medical Director)... much better program, much easier to run recalls. In (previous software) we were but it was much harder, from my point of view to get the latest data was quite an ordeal. In MD you just push a couple of buttons and (its there)

*PM* – *32* - *A* 

Nevertheless, those that moved to other software (outside the two used in this study) eventually made them work for themselves:

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There were a lot of things we couldn't use in the beginning like the templates but the practice manager and I work together on our templates and we create now our own and now all our information get recorded into them.

*Nurse* – 18 - A

# Infrastructure:

As in the case of Clinical Software, infrastructure barriers such as the lack of spare rooms in which to conduct CDIS specific activities was also identified in the literature review (Chapter Three). However, the IT/IM Officer made it very clear that no observations were made where infrastructure was a barrier; therefore it was not sought as part of the examination. Nonetheless, a nurse's answer comment on a related question summarises what the IT/IM Officer had observed (Chapter Four).

No, it wasn't an issue, one of our doctors had left so we had the room and computer, this is my room more or less, there is sometimes a staff that does some paperwork but....(not having the room) ... it would make it very hard 'cause I have things setup in my computer ... so that I can switch backwards and forwards on the programs that are on the computer ...I can do it from another room if ...like ...I need to do a diabetes assessment but ideally it's nice to have the patient so I can access data or...

Nurse - 8 - A

Infrastructure can potentially be a barrier to CDIS implementations, but the experience in this study suggests that practices have been able to adapt very quickly to infrastructure needs. For example, some have slotted specific administrative duties on days/times when there is GP room available or less staff at the practice. Soon enough, most practices with definite shortcomings inevitably extend the infrastructure at their practices, merge or moved to bigger premises to accommodate their new needs. A considerable number have done so over the duration of the study.

No, we've got two new consulting rooms to go up and then the nursing station will be here... it's in the council at the moment but until they pass it (its holding us back)...it might be two years before we get it up.

PM – 9 - A

# **Analysis and Design:**

The specific model that practices might seek to implement is highly dependant on their practice capacity; making every practice unique. Hence this study has not sought to find out about individual implementation as it would have meant one system/model for every practice and sometimes two or three systems per practice. The responses here, although mostly citing processes reflect the analysis and design that has gone before the application of the implementation.

The following response to how this practice does Diabetes recall reveals, for example the individual complexities and intricacies at this practice.

#### Question: Are patients recalled specifically for Diabetes?

Depends, like... I do a six month review, the twelve month... so we can do all the other stuff, the (the GPs) just have alerts on their computer, when the patient comes in we put an alert ...we've got little cards that we put on the vouchers then the doctor just does the height and weight, etc. Twelve month diabetes, I was ringing them particularly to come in for that ...at the moment I haven't been able to ring them to come in because we had a few changes (normally I don't ring them, I delegate to someone else to get them back in) but because I've been away and everything...so I just put alerts on the computer to make it a longer appointments so that the doctor has more time to do that. (pointed out that maybe that's the reason –not being quite systematic-it take Dr more time than desired) yes, you're probably right ,And its hard because their diabetes review might be a certain time but then we might try and ring them and they might say oh no Dr X is looking after my Diabetes I do not need to come in ...(acknowledge that they should have made it known to patient and DR that every patient should be seen by the nurse for diabetes) ...or they get sick of coming back!!

Lots of patients: well I've got 300 Diabetics on recall, and I though I was doing really well until I saw my Diabetes one yearly review list of 32 pages (laughing) since I've been away (with so many patients there really not enough of you) yes that's right! yea, we used to have an asthma nurse but I'm taking over that as well – not realistic

Nurse - 8 - A

In another occasion, a practice manager admitted that they didn't mind using identifiable clinical/ recall labels that were accessible to staff (directly against accreditation and privacy regulations) to contact patients as they felt strongly that their patients:

...would like to be told what they are reminded for

PM – 34 - A

Other practices, for example, have preferred initially to leave the recall and reminder administration to GPs, and then in time realised that there are better models:

You've got to keep at it...It's not easy, but you've just got to do it...initially you just got to accept the fall out. We reached the outcomes, that's true, but we're now moving to a more nurse driven approach, you cannot relay on one or two people to do it, and also I think you can't actually do it in a practice with registrars coming all the time, you can't even rely on doctors doing it. You must have a non-doctor doing that.

GP-11-A

The same Doctor later in the conversation revealed that:

Look, I mean ... in my wildest dreams ... I didn't think it would be such ... that it would work so well... to have that sort of... nurse led model of prevention and surveillance ... still works and so well

GP-11-A

These little comments revealed that every implementation has limitations depending on the practice capacity and according to the number of patients; and how they decide to tackle their system is entirely their own preference or rather what works for them (as explained by the IM/IT Officer in Chapter 4). Conversely, there are certain key roles in the system that produce better outcomes than others, as will be shown further in the findings.

#### **Computer Hardware:**

This has not been such an issue for most practices; however, computer speed did make a difference for those doing the administration processes. Most slow systems were overcome

by clever utilisation of time frames when the computers were not in full use (lunchtimes, after hours, days of small numbers of Doctors at the practice, etc). However, when computer (hardware) was upgraded, it really made a difference for all involved; allowing for faster searches, letter printing, and all time intensive processes.

It's harsh for her (Nurse) at the moment, because when the computers are working fine it's so easy. I know she's a little frustrated at the moment.

Staff - 30 - C

The doctors understand the usefulness of it, but because they have never worked at a practice where they've seen how great the computers can be and because they have worked at practices were the computers have been quite terrible, they don't understand how much better it could be. They are understanding by the little changes that they've seen, and how it makes everybody's life easier..

Staff-30 - C

#### Workforce:

The issues around workforce barriers were overcome in most practices by assigning the clinical administration roles to nurses in the CDIS (where they were previously used for limited clinical purposes only, and not chronic conditions care) and purely administrative roles to key staff where they were given the responsibility of managing the non-clinical part of the system (i.e. organising recall letters, checking for risk management, etc). As a consequence, there was less administrative work performed by the Doctors and nurses. This of course was slightly different for most successful practices. Others, where there were no nurses, resorted to employing new nurses to fill the need for the clinical and administrational needs of the system. More specifically for cervical screening, having female GPs is perceived as an advantage.

Some of the next comments will shed some further light:

The Lady doctor made a big difference, the male doctors would do them, but some people aren't so worried its just a fact of life and it's go to be done...but I know...the general population of females would rather have a lady doctor ...just because they know what you have to go through kind of thing. I guess it would be the same for males for prostate checks. I'm an office manger, but I do also look after all the recall and reminders.... job that I would gladly pass on to a nurse if we had one.

 $PM-29-\!A$ 

She would have come from a Hospital background and not used to the requirement of general practice and chronic conditions.

PM – 34 - A

#### **Intellectual capacity:**

This issue will be further explored when the study looks at champions and the external agent later on. Suffice to say at this point in time that practices do not have the intellectual capacity readily available to set up CDIS. And while some individuals (usually principal GPs) possess good technical knowledge of the software and even the hardware, it will become evident that much more is needed for such an endeavour.

#### Summary of construct three

The responses from these interviewees suggests that GPs in particular, at least some, had prior knowledge of what their electronic clinical software could do for them; others did not or did not know just how to organise it properly. It also suggests that other capacity issues like infrastructure, workforce, and hardware can be overcome with a bit of clever design and role planning. And although not explored in this section, the apparent lack of intellectual capacity will be dealt with in another construct later in the chapter. Analysis and design is closely related to practice capacity in relation to the number of patients to be treated, that is, it is unique to every practice.

It is worth keeping in mind that the Practice Capacity issue just tested is intrinsically tied to the system implementation (below) where it 'actually happens'; however, it is at the Practice Capacity stage where the 'thinking process about them and their solutions, start to be considered'.

# **Construct four: Information Systems implementation**

The emerging framework in Chapter Five suggested that the practical implementation of the CDIS is to be a process matching the standard development and implementation cycles

found in the literature (Chapter Three). The framework however, also included an 'outcomes' process as it was seen to be relevant to general practice. However, by the time that emerging framework was tested in the first data collection stage (Chapter 6) with ten multiple-implementation practices, it was necessary to modify this section to match the new findings.

As a result, the revised framework clearly saw the problem definition as a process happening much earlier in the sequence (already investigated in construct two). The systems analysis and design process was seen to be very closely allied to the practice capacity issues at the practice (workforce, hardware, software etc) (already tested in construct three). This can be seen represented in Table 54 below.



Figure 54 - Construct Four: Information System Implementation

This construct in the framework investigates the decision making, implementation, adoption and outcomes processes of the CDIS studied here. This particular set of questions in the box below, aims at finding out from interviewees if the process of decision making inferred in the revised framework was valid. For example, the context was first set by asking the interviewees (specially GP Principals seen as decision makers) if they remembered being presented with a number of CDIS options to decide upon by the practice manager or champion (as the IT/IM Officer trained the champion to have a variety of models to present to the GP Principals).

Practice champions were shown a variety of systematic implementation models to bring to you for decision making. For example: nurse centred models, GP only models, with staff involved in variety of ways in the system. Q3d - Were you presented with a few options to decide on?

# About the design of the model that was eventually adopted

**Q3e** – How was the model developed, was it your idea, did you take the practice champion or Division IT/IM person's advice, or a team effort? Who were involved in designing it? Please comment.

**Q3f** - One of the outcomes of the first lot of interviews was the notion that once the shape of the system was developed, that the decision was made there and then to adopt it. Was this the case with your practice? Explain.

**Q3g** – Who made the decision to adopt it: GP Principals, PM, Whole team, can you explain?

# **Decision Making**

In Chapter Six, four PMs interviewed believed that they were solely responsible for implementation decisions and one interviewee suggesting that the GP Principal was solely responsible for decision making. In four occasions, there were at least two decision makers; practice managers and GP principals in three practices and practice manager and the nurse in another. Finally, only one interviewee suggested there was a whole team approach. There appears to be a great deal of empowerment towards PMs, Nurses and staff in such successful practices.

This section of the study sought to find out from a wider population point of view how decision making is carried out in successful practices and if 'empowerment' was a feature of it. According to the following interviewees this was done in a number of ways:

....well, the practice manager provides us with the information we don't have ...then she gives us her opinion and we make the decisions...

GP - 3 - A

The main decision was made by the principals and the practice manager and then we made sure we had engagd the Doctors as to what will be happening but also the nurses who'll be doing the work.

GP-9-A

If it is critical and affects everyone it's the whole practice....initially the principals and the PM may say yes we can do this then everyone gets involved... I think that's the way you get people working together

GP-1-A

GP - 5 - A

GP - 8 - A

GPs and all Clinical Staff - team approach

The nurse/pm suggested different models then whoever is the GP principal in charge according to (yearly) roster makes the decision.

Usually the team, I might come up with an idea that might be motivated from a government initiative or something like that or our computer database where we recognise there is a gap, I'll come up with the idea, present it to the clinical team, once the clinical team feels that it is worthwhile, you know pursuing it, then we run with it.

PM-1-A

Principals, but we certainly had an influence yes, but at the end of the day the decision lies with the principals

Staff-20-A

...Always the Doctor....Influence... yes!

Staff - 29 - A

Usually (well.. we get to discuss it..) It is me that makes a decision on whether we implement it, whether we have the workforce resources, etc.

PM - 34 - A

GP Principal, I was involved too... but I think he sort of knew what he wanted with recalls ...to make it work at its full capacity.

PM – 32 - A

Conversely, not all people associated with successful practices necessarily had an empowering and team approach decision making process:

Principals	GP – 2 – A
The principal only.	Staff – 12 – A
Principal only.	Staff - 24 – A

Principal, no influence in decision making at all.

Staff - 22 - C

# Empowerment

It appears that although most GP Principals had the last word, the majority have been very willing to include and get advice from their practice managers, employee doctors and nurses and even trusting some of them with the final decision. The next interview excerpts are classic examples:

I think that the principals decided that the practice nurses were in charge of developing the Pap smear recall system and they are fine quality professionals and they did it

GP-13-A

It's a combination, we would have ... the first Tuesday of the month we'd have an administrative meeting and there you present the case... and sometimes you tell the Doctor!

PM - 33 - A

Yes (empowered them), very much involved in it, they monitored it, they are the ones talking to the patients saying you're due for a review...tests, whatever is relevant, they contact the patients ...they are the champions

Left in your hands?.... Yes More or less, I've gone through it then I've gone into a meeting with them and I just told them what to do... Ha... HA!!

Nurse -18 - A

... yes, I think the staff more than the Doctors because we get to see both sides of it, how we're going to record this and how we're going to call them back, how are we going to take this patient's continuity of care. Yes (doctors rely on you) yes because if the patient just walks in and the Doctor asks the question, but then if we have to be relied-on to make a reminder system... how are we going to do that? ... And that drives it back that we have a computer system we know can do this for them. Its just getting the time from them to explain what we need and making ourselves understood.

Staff - 30 - C

Some interviewees thought that more important than a team approach was the empowerment of a champion with the responsibility to act. That is, while giving tasks to many individuals is of value, someone still needs to oversee that all the individual tasks are done within the greater CDIS system. The following comments shed some light on this issue:

I don't think a team (approach) works; you need someone responsible for it. Staff - 12 - A

.... Definitely, there are four practice nurses here, but when we take on a project we have to individually do it even though you'd like the other person to know so that if you're away they can answer questions, but try it around one person for show then they know exactly what's going on ... and if you get different people involved in different bits and pieces it just doesn't work.

Nurse - 8 - A

Empowerment appears to also be not just a self-selecting process but a purposeful one:

...so we're trying to create champions with the nurses...yes we're empowering nurse dedicated to Diabetes and so forth...

GP - 11 - A

I think that if people can take a little bit of ownership over something it brings more satisfaction to them and the relevance to what they're doing

Nurse – 19 - B

However, assigning responsibility for a job does not seem to necessarily equate to empowerment, in the words of one staff member:

I feel like I was given this job therefore I have that commitment..... ...between the Doctors and the staff there's little communication here about management or that sort of things...it's very much... they control it...

Staff - 22 - C

In essence, empowerment appears to be a key feature in many of these implementations. In fact negative comments on empowerment seemed to be linked to less successful practices. This needs to be taken into account in the final version of a framework for the prevention and management of chronic conditions in these settings.

# Implementation process and adoption

As explained earlier, every system implementation is quite unique to the characteristics of each practice; therefore this section did not seek to find out the details of each implementation but to gauge an insight into individuals' perception of the implementation process and if their system was easy to use.

The responses clearly evoke individual issues for each individual practice as unique entities.

In practice the pap smear was the easiest to use first, it was a very small defined target...not I don't think it was complex at all.

GP-13-A

No not really no, I mean ... what it really did probably was organise what we were already doing...I think that's been the great benefit...formalise the gathering and collection of the things that we've been doing in a much more effective way. GP - 8 - A

I think that sometimes people forget to put reminders in but I think we have it sorted out ...we have the nurses making sure that it runs well.

GP - 1 - A

Yes, the implementation of that was really the Practice Manager's job ... and then the receptionists would help with that... and that's the mechanics of it.

GP-11-A

Ah ...mm..., I think probably time is the biggest factor, as in ..they are happy to do it but you get your patients that come in for something then they want something else and something else, its hard to get them to adhere to what they need to do for that visit without getting sidetracked ...they are pretty good with change and everything

Nurse – 18 - A

No... I think if you do the regular function on a regular basis it's easy, it's very easy... but if you do it spasmodically you won't get that specific time allocation on a regular basis then you'd forget.

Staff - 12 - A

...Its harsh for her at the moment, because when the computers are working fine it's so easy. I know she's little frustrated at the moment The doctors understand the usefulness of it, but because they have never worked at a practice where they've seen how great the computer can be and because that have worked at practices were the computers have been quite terrible they don't understand how much better it could be. They are understanding by the little changes that they've seen, and how it makes everybody's life easier. So its starting to get there, but the driving force has been us just saying to them oh this will be great. *No, it's just simple for them and makes their life easier ...they're quite happy to do it.* 

Staff - 30 - A

No... I think if you do the regular function on a regular basis its easy, its very easy... but if you do it spasmodically you won't get that specific time allocation on a regular basis then you'd forget. (This comment is reproduced again in this section as it is relevant to the theme)

Staff - 12 - A

I think they really want to use it,.. They all wan to use it, and that's partly because of the liability issue...and the recall system...its too much to try and remember in your mind... who needs to come in who doesn't need to come in. So they want to do the right thing for their patients as well. The training is another issue they've had so much training over the years and this is another training thing...in their initial training when they were in medical school they did not have to do computer training..(so that's changed I think a speech program so that they hold their line of thought will help a lot.). It goes back to time management skills and efficiency Nurse – 19 - B

The Doctor doesn't mind new Ideas...the other Doctors then starts pushing him to do it... once he starts to do it he's fine ...its just getting past that first (hurdle).... PM - 29 - A

No, it's just simple for them and makes their life easier ... they're quite happy to do it. (This comment is reproduced again in this section as it is relevant to the theme) PM - 34 - A

Generally yes, there is a couple that are sluggish, but I think overall they're getting there.

Staff-22 - C

Some are very good at It, some are not, the lady Doctors are very good at it

More importantly —the next comment will validate the notion that systems are not static but very much iterative to suit how practices perceive their shortcomings and change their characteristics (including software) to change to achieve better results.

You've got to keep at it...It's not easy, but you've just got to do it. Initially you just got to accept the fallout (consequences). We reached the outcomes that's true but we're now moving to a more nurse driven approach, you cannot rely on one or two people to do it, and also I think you can't actually do it in a practice with registrars (junior GPs in training) coming all the time, you can't even rely on doctors doing it. You must have a non-doctor doing that.

GP-11-A

In LOCUM (Clinical Software) we were but it was much harder, from my point of view, To get the latest data was quite an ordeal. In MD (medical Director) you just push a couple of buttons and (its there)

PM-32-A

It is important to highlight that the workflow processes needs to be seamless for users for systems to be successful.

The only time I think about the process is when I'm looking for the little reminder box.

GP – 3 - A

Conversely, even users in successful practices still struggle with some personal workflow issues.

...from that point of view you understand our limitations...and you understand why we don't click on that box because... you know, we want to limit the amount of time we spend on these things... its all about software design I suppose...

GP - 2 - A

# Outcomes

This particular section examined three key issues. One was the perception of success of the system. Two, what were the perceived achievements and three, how they had measured these achievements. This construct was identified as a weakness in the original implementation process, hence the need to find out how important it is to formalise this process in the framework. The following questions were asked:

# One key feature of the framework as it relates to a health setting is the need to measure health outcomes.

Q4e - Do you consider the CDIS to have been successful? Some of the perceived outcomes identified by the practice champions were: Financial (PIPs) Risk Management Insurance incentives (for minimizing risk) Patient Care Government influence Accreditation issues/bodies Wanted to involve/include other staff Other Do you agree with them? What we the most important to you?

# **Success and Achievements**

The surprising finding was that in absolutely all practices and all interviewee types all agreed that the system had been successful —regardless of what the outcomes benchmark for success indicated. Here are some of their comments:

The system was certainly successful in many ways...again primarily from the MDAV (Medical Defence Association of Victoria) aspect of minimising the risk of abnormalities going by untreated ...and being screened more regularly

GP – 11 - A

Yes...I think it definitely improved patient care, we certainly got much more of a team management structure. The fact that nurses mange their own, the medical staff gets involved in the framework, it been quite a good vehicle for us, the fact that it's given an new role for (our Nurse). It actually gave her a good clinical role to go with , we certainly improved the bottom line, accreditation is due next year so we think were going to get the tick (of approval), risk management.... well I suppose it its part of it, we haven't got anyone suing us!!

GP – 8 - A

Yes, definitely (how?) For Diabetes it would be attendance to clinics, they're booking them up nicely (Meaning the orderly and systematic booking of patients) and it's happening and the feedback from nurse and Doctors is very positive. GP - 9 - A

Patient care has improved dramatically from it, broadening the number of staff involved has also been a big issue with it.....I do not know how it has worked financially, not at the moment

GP - 8 - A

Yes, yes, Because people (the patients) tell you, people a very happy with the results....happy with the cycle of care, happy that they're being looked at by the same person... they see our diabetes nurse on a regular basis if they've got any problems in-between they've got their personal GP...the GP knows what the diabetes nurse is doing ... the patient is comfortable with the whole system, All-Accreditation, involvement of other staff, etc

Staff-12-A

Yes, we're improving!

PM-34 - A

Even those not achieving the set benchmark for success noted that:

It was successful because we have got a lot of people to come back.

Staff - 24 - B

Yes... I think so.... most of them...accreditation, risk management and improved patient care more importantly!

Staff -21 - C

The Doctors are probably more aware than I am, because I know one of our directors wants the PIP statement to take to regular meetings, so I'm assuming that they are, yes.

Staff - 22 - C

...by the number of people coming in for Paps...and the patients really appreciate it...the level of concern

Staff - 30 - C

In general, participants agreed that the systems were very successful, even when they were not achieving the benchmarks set up for the study. This was also perceived by the IT/IM Officer over the course of the study and during implementation to be the case in most practices: where every *improvement* was perceived as a measure of success; and as long as they felt that they were improving, they always seemed to feel successful no matter the degree.

# Measurements

The issue of lack of measurement (evidence for success and achievement) was really highlighted in the first data collection and has been examined here as well. By using the following questions:

Q4f - How did you determined the success? For example, practice champions said that they used: Division data feedback Practice own database search PIP payment receipts Anecdotal evidence

Do you agree?

The majority of interviewees recognised that although they felt that the systems were successful; little formal measurement had been done to prove it. Some of the interviewees were able to locate the Practice Incentives Quarterly report on the spot and they were able to know how they were doing for the first time during the interview.

(Any hard data?) No, haven't seen any, no

GP – 9 - A

No Idea ...well we haven't been sued!

GP – 13 - A

*I can't remember in Cervical Screening, but I remember in Diabetes reaching outcomes* 

*..it used to be higher but it is in the high fifties now* (in relation to Cervical Screening outcomes)

GP-11 - A

*The practice manager will come up to me and let me know how we're doing* (from the PIP report)

Nurse-18-A

PIP is higher, patients are happy that they're being looked after...there is a little bit more concern from the Doctors...

Yes we put all those recalls in for every patient but we still haven't monitored the outcomes.

PM-1 - A

PM – 29 - A

The following quote also highlights the two major measurements that are required:

With outcomes you really have your patient outcomes but you also have to have your practice outcomes

PM - 1 - A

This is of significant importance for the clinical staff, particularly Doctors:

I would want to know ... be demonstrated that I actually done things that are of benefit ... my arm is twisted by mainly financial incentives to set up these systems but ... I do not know if it is clinically helping to have a chronic disease management plan and the outcomes affected.

GP – 16 - B

There have to be proven outcomes

PM – 33 - A

# Formalisation of measurements

The examination of this shortcoming in the process highlights its importance in the

framework:

**Q4g** - Most of the Practice Champions agreed that we should have formalised the outcomes measurement. *Do you agree with their statement, if so how?* 

The following comments suggests that the outcomes components in the framework is well justified. Furthermore, there is a consensus that outcomes should be formalised to monitor the adoption of the CDIS.

What the useful think that 'you' (The Division IM/IT Officer) can do is that we could gather all of those PIP reports if the Division can find a way to measure the performance of individual practices against those ends and tabulate them in such a way so that they compare and have a means of informing those practices who might not be running optimally. And can do it in a way that it stands out ....

GP-13 - A

That certainly would be good feedback, that's a motivating factor showing that things are working and it also motivates people to do other things

GP-1-A

if we could set that up (monitoring systems) for each of the major chronic condition we need to be watching. If we had a good reliable way of looking at the outcomes seeking to improve systems the whole time and give us a bit of feedback on are we doing as good as we think we are? Most people would and should be motivated by patient outcome ...and there is a sense of accomplishment as well....I'd love to have a system that yearly feeds back how we are doing and what we are accomplishing in the year, ......well its nice to have a target.

GP-6-A

Not me personally but I employ people to look at that...part of the strategy that I don't even have to look at it. if you identify something that is doing well there is no need to be fixing it ...that is that if it is not broken.

Ho...it is! very important (in the system) you want to measure it and we want to have the outcome.

PM-1-A

Very!, I think it's the power of those sort of tools that allow us to look at where we're going and demographic coverage you're likely to get outcomes for

GP-8-A

Conversely, at least one interviewee felt that perhaps auditing outcomes was too cumbersome to carry out without help:

In our organisation I'm not going to have a brain storm and say let's do an audit on our pap smear because there are 150 things we should be doing audits on and I don't think that pap smears is on that list. I guess that for pap smears I'm not sure that an audit is so useful; I agree with the broad principal that we instituted change, it is good to see and review what we've done ...who's going to do it and who's going to pay for it I am not sure... there are lots of ideas that are worthy but you cant do all of them

GP – 13 - A

# Summary of Construct four: Information Systems Implementation

The findings from this data collection stage corroborated the changes and observations reflected in the revised framework after the first data collection. However, while decision making, implementation and adoption concepts were observed as very much unique to every practice, the outcomes element appears to be a distinct and common feature to all of them, prompting a re-think of the framework configuration, suggesting that the outcomes element be separate into its own construct. This will be dealt with in the discussion chapter (Chapter Eight).

Further confirmation is provided by the clear recognition that this was perhaps the worst handled concept by the external agent (Division IT/IM Officer). The evaluation of outcomes, must be remembered was part of the implementation methodology as suggested in Chapter Four and Five.

Nevertheless, the chance to interview these key individuals resulted in numerous requests to return to the practice to conduct full CDIS outcome audits, further building a case for a separate outcomes construct within the framework.

The examination of this construct revealed that the decision making process was mainly carried out as a team approach, an empowering process but it was not a pre-requisite in all successful practices.

All practices regardless of the level of achievement believed they had been successful and adopted their CDI system, yet very few had sought solid evidence for their claim. The examination of the formalisation of feedback revealed as with the first lot of data collection that this process needs to be further highlighted within the framework in the final revision.

# Construct five: The Feedback Channel

The rationale for this construct revolved around the observation that practices seemed to be encouraged —upon achieving success in one CDIS, to move on to another CDIS (Table 55). This was examined by directly asking participants if having succeeded in one CDIS had further encouraged practices to implement other CDIS's; and if the development of the next CDIS had followed similar paths to the original CDIS and had become easier to use then.

The question were asked as per the following box:

# In your particular practice you have succeeded in PIP outcomes in a number of Chronic Disease Systems

**Q5** - This framework assumes that the success in this implementation encouraged the practice to take on a new chronic disease (system), is that assumption correct? Did success with the first one encourage the practice to implement subsequent ones? Please explain your answer.

**Q5a** - Did the take up of the next chronic conditions follow a similar path as that shown in the framework? Explain please.

**Q5b** - 2 - What were the differences (if any)?

**Q5c** - *If you had subsequent CDIS installed, was it easier to become familiar with those? Please explain.* 

**Q5d** – *Do you think your practice will keep implementing new CDIS in the future?* 



Figure 55 - Construct Five: The Feedback Channel

There were in essence no negative answers to these questions from those that were directly asked, and their comments were quite supportive of the function of this construct. This is quite important within the framework as it is seen as the key to not just the sustainability of the original CDIS implemented, but to the further development of other CDISs.

The results showed that of the 13 individuals from 13 practices (68%) from 19 type A practices (as it was only relevant with practices with multiple implementations = type A's) that answered this question, all agreed that it was conducive to further CDISs.

#### **Promoting further CDIS implementations**

The following responses highlight the support for the assumptions made in the framework:

It sort of drives itself to do other things as well ...however, bottom-line is that you don't have to wait until outcomes to do that...we believed that it would bring an outcome and started to add other systems anyway...

GP – 1 - A

So you just transpose the model, modify it somewhat (into another condition) and off you go, yeah. ..it may be transferable or it might not be because cervical screening is more about screening and assisting people with bad management of a chronic condition there are two different things ...the model should still work but you'd modify ..(to suit the condition ) and so on.

GP - 9 - A

....but having seen the nurse-led model of a dedicated clinic the improvement has been out of this world. So you think well...Why can't we do it with everything else? GP - 11 - A

Yes I think it does, it that ... system that allows you to analyse something and identify what you can do to improve it.

GP - 5 - A

Certainly will, if it makes life easier.

GP - 2 - A

Yes, success generates an enthusiasm then you're quite compelled to go on.  $\label{eq:GP-8-A} GP-8-A$ 

Yes, I think once you get the system that works and everything, I think it is rewarding that I know that that patient is under control that they are in this program and yeah we can look at other things

Nurse - 18 - A

Yes...probably asthma, but I'll be much happier when we get a nurse so I can pass it all to her.

PM-29 - A

Yes, speaking on behalf of the practice champion, if I know her as well as I do, yes ...once she feels she's on top of something she'll move on to something else.

PM-20 - A

Yes on to Asthma after our nurse is comfortable with Diabetes.

PM – 33 - A

...and then you get an outcome, of course it puts you on to the next thing...well if I got a great outcome for this of course I'm going to get a great outcome for Diabetes, for Asthma for anything that's on going ...a recall and reminder system is the way to go... But one rock at a time!

PM-34 - A

*Yes, certainly (keep implementing)* 

PM – 32 - A

Conversely, although all interviewees saw the benefit of further CDIS implementations, a few still saw a few perceived barriers along the way (even though they had archived great success – type A)

Yes, the problem is...I'll tell you what we are here for...we here to treat patients on an episodic and need/supply.... basis and reactive basis and also to do some preventative population health stuff, if we suddenly create a system you create a job for an administrator you increase our practice throughput and if you look at the number of Doctors and the number of staff; it is the number of support staff which has grown the most in fact, so if you say to me now I want you to move to my bowel cancer program.. Well I'm going to say who's going to pay for the .5 EFT (Equivalent Full Time) Nurse/manager that's going to make it work?...So if you look at the cost of general practice and the income of general practice I don't see any discernable cream ...that general practice is becoming more financially viable and that there is fat in the system aimed at financial PIPs and that there is going to be more of the same.

GP – 13 - A

Thus, the only barrier perceived here is that the participant had not yet become aware of how a nurse can self-fund her position by systematically tapping into the financial incentives —from introducing other systems.

There are, however, actual barriers out there that prevent practices from adopting a CDIS. This is more notable in the next three responses from practices that never made it past Type C level.

For example, in the case of a practice that did not have an electronic clinical software program. Even though they had, very creatively, run an electronic CDIS from their electronic appointment book for cervical screening, this could not help them for Diabetes:

We don't have a (further CD) system, because I think (The principal) considered it at one stage but because we do not have an electronic clinical record system its very difficult and you need to rely on your memory and if the patient comes in you have to do something physical to their paper file so you know that this person is being treated for diabetes...

Staff - 21 - C

Others have struggles with 'human' barriers; for example, a practice that struggled commented:

No...I wouldn't have done that ... between the Doctors and the staff there's little communication here about management or that sort of thing...it's very much... they control it...

Staff-22 - C

It appears also that drug companies in particular, pose a significant threat to the development of 'appropriate' CDIS; as their 'narrow systems setups' appear to target certain patients that are more suited to their particular agenda, and do not set up appropriate comprehensive follow-up systems (recalls and reminders) within them.

Well they are into diabetes though some drug companies and we have a diabetes educator but there is not a lot of follow up. (Why?) because its time consuming and they don't see it as important....We've had companies come in and explain to them how to do these things (GPMPs and TCAs) but I would have though they would have put in recall for all of those plans (we'll go and check that – and we did and found that I have to comeback and sort them out 'cause they're not doing too much)

Staff-22 - C

#### CDIS development paths compatibility

The aim of this section was to test the observation by the IM/IT Officer in Chapter Four, that all the subsequent implementations followed the same prescribed path as described in the emerging framework, but this was untested until now. To test this observation, the ollowing question was asked:

**Q5a** - Did the take-up of the next chronic conditions follow a similar path as that shown in the framework? Explain please.

Yes! This is the process that we follow at the practice... ongoingly!

GP – 5 - A

Yes, the process is pretty much the same, yea... and it can be utilised on anything -we are actually now starting up a chronic wound clinic and it's really the same principle. We've got the patients, we don't have the continuity; we don't think they been screened properly. It might be that different doctors might have different ideas of wound management, I've got one nurse who's got the passion to (take this on) which has now gone to the Division hoping that the nurse gets the education in that area.

PM-1-A

Yes, I think is a fair assumption, now we realise what we can do here, asthma is certainly our next thing to look at. To see how the program is set up, follow it through and while we've got good outcomes and see if we can achieve the same with the other (condition)...

PM – 33 - A
...the PIPs and stuff because that sort of stuff encouraged you to do extra stuff ...enabled you to employ someone to be more efficient ...you needed the money to be able to employ someone to actually set it up properly at the time.

GP - 1 - A

... and some of it it's just the same focus, it's just a different button that's all! PM-33-A

#### Summary of construct five: The Feedback Channel

This key observation included in the original framework appears to be confirmed by all respondents. Furthermore, during the time of the four year study, most practices had approached the IT/IM Division Officer to help them set up multiple CDIS, beyond the inclusion in this thesis and some that were not necessarily chronic conditions but rather risk factors, like weight management clinics, and important blood pressure systematic checks, as well as general health screening or specific diagnoses.

The findings clearly point to a feedback effect into new CDISs, due the positive factual and even perceived outcomes. Some barriers are still perceived to the development of more CDISs; however, as explained earlier, these are more than likely a lack of awareness of what 'it could be' —to borrow a soft systems methodology phrase.

## **Construct six: Practice Champions**

This section of the interviews examines the prominent place of the practice champion within the framework. The reach of the practice champion's influence permeates throughout the framework and is the key link between the external agent and the rest of the practice. This can be graphically observed in the complete revised framework below (Table 56).



Figure 56 - Practice Champions: Highlighted at the centre of the framework

Initially interviewees were asked to reveal if there was a CDIS champion (or champions) at the practice and to identify them. Then, they were asked to comment on the importance to the success of the CDIS of the champion. The question was: **Q** - *Can you name the champion or champions (if any) in your practice that you consider were the driving forces behind the implantation of these systems?* 

To this purpose, eight GPs, six practice managers, five staff and two nurses, twenty one in total, that directly answered the question in this study (21 out of 26 interviewees = 80%, from 25 Practices = 90% of all practices) made it very clear (as was in the case of the ten key informants in the previous data collection phase) that the presence of a champion or multiple champions was definitely there and that the role was essential within the framework, not just to implement it but to keep it going as well; as the next direct quotes seem to suggest:

I think that...like in all matters to do with IT you need someone pushing forward at the practice otherwise it doesn't happen...the practice manager certainly was but the nurse also was the original person doing the chronic disease management, so she was very comfortable taking it on. We had a nurse working with us at the time, who's since left. She started Diabetes... the process but pretty much she liaised with the nurse who did and continues to do recalls, so the person in charge of recalls is probably the driving force (champion) if they are good.

PM – 9 - A

*PM and Nurses helping together with yourself* (IT/IM Officer), we made an effort to get involved too

GP-2-A

Initially it was myself and the practice manager, we put in all the hard work initially but now to avoid my burning out situation...so we're trying to create champions with the nurses...yes we're empowering nurse dedicated to Diabetes and so forth.

GP-11-A

You need the practice manager, nurses, staff and principals - I think it was the nurse that drove it more than the PM

GP-1-A

The nurses with pap smears as they are the ones mostly doing the smears so they look after the recalls; with diabetes it's a combination. Both the GPs and nurses are working together dealing with it...that's more a cooperative approach

GP-6-A

Yes, the practice manager

GP - 3 - A

The nurse, the practice manager, myself and a staff member

GP-8-A

Initially it was myself, and the practice manager... we put all the hard work initially but now to avoid my burning out situation...so we're trying to create champions with the nurses...yes we're empowering nurse dedicated to Diabetes and so forth... (This comment is reproduced again in this section as it is relevant to the theme)

GP-11-A

One of our female GPs + practice nurses

GP-13 - A

The nurses with pap smears as they are the ones mostly doing the smears so they look after the recalls; with diabetes it's a combination both the GPs and nurses are working together dealing with it...that's more a cooperative approach. (This comment is reproduced again in this section as it is relevant to the theme)

GP - 6 - A

Absolutely, absolutely ... I would say three clear champions (myself, nurse and a staff member) that really flied with the initiative and have achieved the outcomes... Without a doubt the biggest benefit was having an admin girl that had the drive and the passion and the ability and that was the key change point in many areas... she was amazing. And having a great team... if you've got the team that's the key thing, if you got the team and they are motivated and you've got the champions you can achieve anything

Yes, I am for Diabetes... The practice manger is running the Cervical screen system and she's going to get the other practice nurse to be involved in that as well Nurse -18 - A

Me, every thing stops with me and a nurse if the practice had one ...we don't have a nurse at the moment but we do have a program at the shire at the moment and we will have a nurse then.

PM – 29 - A

...It would have to be Me, I'm it! ... (the nurse) was a brilliant champion as well 'and she really looked after that part extremely well.

PM – 34 - A

An ex-staff member initially... now I'm doing the recalls and reminders

Staff - 12 - A

Me ... I'm the only one!

Staff-21 - A

Yes, myself – the (champion) nurse and other nurses as well for cervical screening  ${\rm PM-20}$  - A

We now have a practice nurse that made a big difference....We work in conjunction with each other, but she needs to learn how to use the system, how to identify the problem and how to get the data so we can look at it...combined we make a whole person...she's got the medical awareness that I don't have

PM-33 - A

Me, oh yes!

PM-32-A

Me, if I'm the one that makes sure that those ...they don't even ask me if I have sent them...so if I don't do it ...it wouldn't happen...they've got the recalls in...and they never question, they never ask whether I do it on a weekly basis or monthly...or what.

Staff - 22 - C

(By name) is now (the champion) being the practice nurse

Staff - 30 - C

Conversely and even though these following practices achieved partial success, it highlights the limitations of not having a dedicated champion.

NO...and that's the problem, there isn't one (practice champion) and we do need someone to be able to take on that...I'm the practice principal of course and it all falls back to me then...everything else ...I just find it too difficult to sort of keep it up. The practice manager and a staff member were doing the work but not really driving it.

GP - 16 - B

*No....and you need someone in the practice that can coordinate what's happening.* Nurse - 19 - B

Before we had a manual system, the problem with the electronic system is that you need a dedicated staff to pick it up, the problem is that we are doing so many other things we need to recall now that it is just beyond our capacity, unfortunately in this practice the PM is also our nurse and we cant give her the whole lot...the system is fine but you need someone to drive it...we are thinking of appointing extra people.

GP - 2 - A

The importance of a practice champion is further suggested in those cases when the CDIS champion left the practice:

259

NO! Definitely not

Happen? No

(No)...you need someone there to organise and to make sure that it's all flowing through ...

Absolutely (not)!!! Couldn't agree more.

stopped doing it... so we'll get lower again....

*Yes, yea... (In response to being asked if only with a champion)* 

To validate the answers, some interviewees were purposively asked if the system could be run without the practice champion.

... for a long time we didn't have a nurse... I think, you know... to have someone who knows what their doing and to keep on top of it Staff - 24 - B

I kept doing the recall ....when she left....The recalls kept going out but no one to

information is not put in place then the information is not looked at and managed

off course it all falls away. She motivated the Doctors to get information into the

system... (Achieved outcomes)....All this was between April and July then we

her position really because all the systems that were put in place ... if the

Yes, it was good at the start (when there was nurse/champion running it) but then

Staff - 12 - A

well I think its like anything, if its continual and updated then it does the job...its

Staff - 23 - C

PM – 1 - A

PM – 32 - A

drive it

GP - 6 - A

PM – 20 - A

Nurse -18 - A

NO, NO, Definitely not! If I walked out of here tomorrow it wouldn't happen Staff – 22 - C

No probably not, because we do not have enough time to do that

Staff - 30 - C

If no champion? Oh! No.

Staff-21-C

The contribution of champions cannot be underestimated as some responses indicate:

I think there was strong influences there (from the Champion)...where as I would say send a letter, the PM would say no, the patients would prefer us to ring them and that's a fairer way to do it...so it was more informal

GP – 11 - A

And the effect of not having 'a champion' is well expressed in the following quote:

I think that (apart from not having a champion) I haven't been involved enough with the whole issue of it ...because I was reasonably comfortable that we were doing alright ... There is that side of it which is not being pushed along, continued to be implemented and make sure it is implemented. And then a lack of feedback to say... well if you're not implementing it why not and if it had made any improvements ...I don't know whether we were better off or worse off. So it made no difference... so there's been no pressure to sort of go and smarten up.

GP - 16 - B

#### **Construct six: Practice Champions**

This key concept of 'champion' in the CDIS framework was observed not just prior to the study but during the study as well. However, it has become evident in the data collected that many individuals call themselves champions and rightly so a lot of the time; yet there probably should be a distinction between them in this framework. For example, GPs call themselves champions because they have seen the potential benefit to their patients and decided to support or accept the implementation CDIS in their business.

Yet, from the perspective of the implementation process sought in this study; the initial contact and drive at the practice in most of these practices was done with non-GP individuals (Nurses, PMs and Staff). As explained in the literature review, the practice champion is a common concept, and more often than not only referring to GPs; yet in this framework it relates to people that are champions because of their natural position and empowerment, and those that take on the role for a number of reasons but eventually make it their own; as well as those that are given the role and carry it out regardless of empowerment.

The examination strongly suggests that a practice champion and more specifically in these implementations a 'CDIS champion' is an essential component to a successful CDIS implementation. Those that do not have one appear to struggle and seek to find one, and those that have lost their champion seem to know quite well the negative implications. While other individuals do take on the role and can still make it somewhat successful, it does not appear to be sustainable in the long run.

#### Construct seven: The External Agent

As with the practice champion, the external agent was seen as essential in the successful implementation of CDIS frameworks as recognised in the first data collection stage. This section of the study sought to further confirm this assumption, and also intended to find out if the implementation strategy used by the change agent in these successful practices was appropriate from the GP Principal's point of view. The overall change management strategy of keeping the process away from GPs was seen as key and an unusual feature and needed testing. The central role of external agent within the framework is highlighted in Table 57 below.



Figure 57 - The External Agent Highlighted

# IT/IM change agent contribution (External Agent)

It is perhaps worth reminding the reader that that the following examination revolves around asking questions about the interviewer/researcher's past (and current) role as the IT/IM Officer implementing their systems. This is always potentially open to some unintended bias in their answers. Having clarified that, the potential for bias would be expected to affect the heavily-involved champions (with whom the IT/IM Officer spent most of his time) rather than other interviewees like GPs who would have had very little contact with the IT/IM Officer during that time.

First, to see if interviewees were aware of the external agent at the time of the CDIS implementations, all interviewees were asked if they knew of the involvement of the IT/IM Division Officer in the implementation of CDIS at their practices by using the following question:

### Q - Are you aware of the Division's IT/IM role (mine), in the implementation process?

All interviewees, (including all ten GP Principals, five practice managers and two nurses) except one, acknowledged positively the contribution of the external change agent. Some of their comments follow:

Well we've got to remember that were working in small business, and I think we have certainly passed the cottage industry and maybe in dollar terms we are not typical of a small business angle, but we are still working out of renovated houses and so forth so we don't have within the organisation the intellectual capacity to audit our systems neither have the resources for people to use the computers that can happen.

#### GP – 13 - A

no, no we wouldn't have been able to set up the recall system it hadn't been for your (the change agent) assistance, we might have wanted to do it but we didn't have the technical know-how ... we could have employed someone to come in to do it for us but the cost would have made it impossible

GP – 6 - A

Yes its important (having an external agent) for a lot of people like me who are concerned about the time involved in actually doing all that ... and the time vs. benefit for the practice yes. And then doing it within the practice and having someone to support that is not the ideal thing and probably not really knowing what they're doing. *Yes ...there could be other practices or someone further down the line (the external agent would be able to keep them up-to-date)* 

GP-11 - A

I knew we had the tools to do it but we didn't have enough knowledge to implement it in an organised and systematic fashion and that's where you were helpful for us...You've been the person that has been able to give us the tools, yes, yes

GP-8-A

...having an external agent to push it and drive it and so forth is enormously helpful...

Yes, I have to say yes for the recording... ha! ha! (Laughing!!)

GP-9-A

Ho no! ... 'cause you always find thing you don't know so you need someone to point you in the right direction so that you know this is the right way of doing things

Nurse-18 - A

There is too much knowledge (needed)..I think you need a specialist in that area... Nurse – 19 - A

Yes, you need that external help

#### PM-34-A

... I would say that all the systems and risk management protocols we have utilised ... have been invaluable, so yes I would say that it has been a big factor.

PM-1-A

Yes, I think I already had a system (paper), but I think you (the external agent) ordered it to match our software that we had. NO...without your support no (we wouldn't be able to do it)

PM-20 - A

Oh yes, most definitely – (Without External Agent?) No

PM-32 - A

All of it happened through you (Division IT/IM support) coming up and showing me how to set it up and how the system worked...and how to make it better. PM - 29 - A

I thought these things would be already in place!! - not aware of the work involved GP - 3 - A

As mentioned earlier on, only one Principal GP did not know of the IT/IM Division's work at his practice. His actual answer to the question might yield further explanation for this:

I guess... I see it as your background is not clinical so when you are dealing with the Doctors and nurses in the practice they are dealing with the clinical issues. But if you are coming from a background that it is more about the system than the content ... you're more worried about the management of information I suppose to the clinical information but that clearly would influence the way ... it would be difficult for you to try to interact clinically at the practice level with that not being your background.

GP – 5 - A

The interpretation assigned to this answer appears to suggest that to introduce a CDIS only someone with clinical expertise would be able to do so. This interpretation contradicts the literature that suggests that the problem with chronic conditions is not so much 'the content of clinical management' but the lack of 'systematic' approaches to deliver the clinical content (and this is a purely information management issue). This assumption perhaps highlights the antithesis to what has actually happened in the implementation framework as

examined in this study; where the salient feature is that 'GPs' were left out the equation, against the recommendations of mainstream literature, as reviewed in Chapter Three. This perception or assumption (not aware of the dozens of hours the external agent had spent at this GP's practice to initiate and support their multiple implementations) will be further discussed in the conclusion chapter as it goes to the roots of the success of these CDIS.

#### Construct seven: The External Agent

In light of the evidence from the participants, there would be very little to add in regards to the major functional concept of the external agent. There are however, a number of finer points that would relate to the 'individual' (IT/IM Officer) rather than the change agent as a concept by itself. However, these personal characteristics, specific engagement approaches and empathy-building methods amongst many other features are beyond the scope of this study. Nonetheless, some might be discerned in Chapter Four. What is relevant perhaps are the change management strategies utilised in these implementations by the change agent; these will be briefly discussed in the Discussion section of this thesis (Chapter Eight).

Interviewees seemed to suggest that the change agent was an instrumental part of successful implementations. Some of the responses even suggested that it would have been impossible without the external agent. While this was expected from practice managers and nurses, as they were the only point of contact, the responses from GP principals were somewhat more 'informed' than expected:

From the point of view of a researcher who was heavily involved in the implementation process with these practices in the past; the GPs' answers tended to reflect two points of view. The first is the GP was well aware (or informed) of the work of the IM/IT Divisional Officer at their practice (even though the actual contact between the Officer and the GPs was minimal or non-existent,) and the second, represented by the response from the single GP that did not know of the IM/IT Officer's work behind the scene in his own practice. This second response type is perhaps what the researcher would have expected to be the most common among GPs. This perhaps signifies that the majority of practice champions, as the focal point of contact with practices, made their GP Principals well aware of the IM/IT labour behind the scenes. Conversely, the extensive work of the IT/IM Officer at

that particular practice appears not to have been communicated to GPs. Finding or speculating the reason for that is beyond the scope of this study.

## Construct eight: The implementation process

This construct relates specifically to the methodology used across all these practices as well as the flow of the whole framework from beginning to end across all constructs. More specifically it set out to examine three key aspects:

The particular method used by the external agent (approaching practice champions instead of focussing of GP principals as commonly suggested in the literature) and;
If the flow process suggested in the framework matched the perception of all those interviewed.

3- To check the strength of the links between constructs.

### Implementation strategy

As explained in Chapter 4, the strategy utilised by the IM/IT Officer to introduce CDIS was always to bypass GPs and focus his efforts on practice champions. This is a key feature throughout all implementations supported at the Division to date. So it was important to gauge the GPs' viewpoint of this strategy to confirm the utility of this method. This perception was elicited in the following manner:

In most practices the intention, of the Division IT/IM person was that most of the 'hands-on' CDIS implementation would be carried out in the background with minimum disruption to your work.

Q4a – Was that the case here? Do you think that it is a good approach? Why/why not?

Definitely, uncommonly you'll meet doctors that will drive these processes but most of them will say I'm just really pleased if it happened. Conversely, if they are uncomfortable with what's going on it may be because it's either clinically not good medicine or not very good business.

GP - 9 - A

Yes, it must have been because I know nothing about it. It's been an invisible process...it gives me time do my job and she (PM/Champion) does her job

GP - 3 - A

I think it works when you work with someone in the practice that knows how the practice works ...in our practice we work it through the PM, then meet together and discuss it

GP - 1 - A

I think.... again...from a personal point of view it would probably have been better for me to be out in front a little bit more to sort of get me more motivated more involved but ...there are other work pressures and things happening...

GP – 16 - B

Yes, that's fine,.... if you speak to management first, to explain things then say how about we speak to the doctors, well I've gone through this with your PM, its not a problem to them, this, this, that, etc then you can show it to the doctors.

PM-29 - A

#### Framework process flow

The purpose of this section of the study was to gauge from interviewees their perception of the way the whole process was implemented. To achieve this, all interviewees were shown the graphic description of the framework and asked at least twice during the interview (usually after construct three questions and later at the end of the interview) if the flow of events at their practice matched the framework suggestions.

If you look at the framework (graphical representation) up to this stage: This framework assumes that once you were aware of the problem, the capacity issues were already sorted and you have a few choices that suited the practice, that then you were able to make an informed decision on the best model to use.

**Q3h** - Was that the case here? Does it reflect so far how things have developed at your practice?

While none of the interviewees disagreed with the process as described in the framework graphic, their answers, unlike most of the other questions, were fairly short and non-descriptive, ranging form a simple aha, to yes, to agree. The longest response to this question was:

#### The link between constructs

This particular concept within the framework has been well supported by the direct quotes from all interviewees in this data collection stage and the previous one. There is very little that can be added to accentuate how the constructs connect to each other in a macro sense. The detailed aspects of their connection is perhaps a study in itself and beyond the scope of this thesis. Nevertheless, the discussion chapter will shed some more light on this concept.

#### Summary of construct eight

The overwhelmingly positive reply from interviewees to this question seemed to suggest that the framework process flow was quite indicative of how the flow of events occurred in these CDIS implementations. Perhaps more importantly in relation to the assumptions made originally, GP Principals seemed to be comfortable with the notion of allowing someone else (champions) at the practice to take the lead and just feedback the digested information and suggestions back for their later attention and decision making. The connections and influences between constructs shown in the framework appear well confirmed throughout the interview responses.

#### **Data Collection summary**

The main data collection provided further validation to the tested framework as well as new information that influences how the final framework will materialize at the end of this chapter. In general, all eight constructs were supported in the examination. Although the practices studied were much more successful than first thought; this is seen as corroboration that the framework being studied appeared to have worked very successfully in the majority of cases (n=20) and at varying levels for the rest out of the 28 practices analysed.

In summary, the evidence of gaps in patient care is paramount in a CDIS and other internal and external motivators still play an interconnected role; although patients did not appear to have influenced the implementation. The role of the external agent working in close proximity to the practice champion in bringing this evidence into their awareness was well represented. Practice capacity and its perceived barriers to implementation were examined and the responses confirmed that that most practices already had all the capacity requirements to introduce CDIS, albeit the key individuals that could drive them, did not; hence the need for the role of the external agent to resolve this shortcoming in awareness.

Decision making in these successful practices were in the main the product of a team effort but not entirely a pre-requisite; however, empowerment of individuals was consistent with successful results.

The implementation success appears to be not solely dictated by improvements in clinical evidence; Participants also viewed improvements in process, guidelines and patient satisfaction all acting as valid measurements. Yet, GPs have clearly stated their preference for solid clinical outcomes to further validate existing and developing new CDISs. The responses on outcomes are a major finding that will be discussed in later chapters, perhaps creating a separate construct within the framework.

The feedback channel construct results supported its inclusion in the framework, although some barriers, mostly perceived, are still apparent in some cases.

The examination strongly suggests that a practice champion and more specifically a CDIS champion is an essential component to a successful CDIS. Not having one has led to less successful implementations. Practices that do not have a strong governance model (dedicated practice managers) are less likely to succeed in CDIS implementation. The responses from interviewees seemed to suggest that the framework process flow was quite indicative of how the flow of events occurred in these CDIS implementations and how it was represented in the diagram.

The connections and influences between constructs shown in the framework appear well confirmed throughout the whole study.

The next chapter will attempt to discuss all the findings from this main collection and first data collection stages to suggest improvement and to finalise the framework.

#### CDIS Outcomes data from primary and secondary records

This section will compare the documentation of pre and post outcomes that are relevant to the support of the findings in this study. Medicare documentation was collected across the length of the study and kept for analysis. This documentation is now presented to corroborate and support some of the findings in this thesis. In Chapter Four, the following table (table 28) was presented to indicate baseline data when the CDIS implementations tested in this study began. These Medicare (ex-HIC) indicators are not the most accurate measurement to explain the level of success in implementations for the reasons already cited in Chapter Four (for example: the sharing of practices between divisions across many boundaries). Nonetheless, it is an independent and indicative source to strengthen the findings already discussed in the study. Having stated the negative aspects of these data, Medicare does however provide data on approximately 30 practices assigned to CHGPN of the practices' impact on their (SIP) outcomes. More importantly, 28 of these 30 were included in the study, hence their relative value.

The table below shows a comparison between incentive uptake and use rates across divisions in the State of Victoria, from those with highest to lowest uptake and use of cervical screening incentives (first column). CHGPN (shaded) was lagging well behind in the percentage of practices using SIPs during 2003 before the implementations had started. Columns 2 and 3 show the number of practices participating in the Diabetes incentives program, and the number of practices actually using the SIPs items; in these CHGPN lags behind again. The fourth and fifth columns represent the same but for Asthma; where the Division is not so far behind in comparison to the others.

This data will be used to compare how the division as a whole improved its chronic disease Medicare indicators in relationship to other Divisions using this particular IT/IM Program starting in 2003.

	Jervi	ce incenave j	rograms (a	oirs) Zu	60	
% signed			% signed		% signed	% eligible
on		% practice	on		on	providers#
practices		participation	practices		practices	receiving
with SIPs			with SIPs		with SIPs	SIPs
*		*	*			
*		27%	*		*	*
81%		25%	*		*	*
80%		24%	88%		*	*
75%		21%	81%		*	28%
75%		20%	71%		*	26%
73%		20%	71%		*	22%
71%		20%	70%		*	20%
70%		20%	68%		*	19%
70%		20%	67%		*	17%
67%		19%	67%		*	17%
67%		19%	67%		80%	14%
63%		19%	67%		54%	14%
63%		19%	67%		52%	14%
62%		18%	67%		50%	12%
62%		18%	66%		49%	12%
62%		17%	64%		49%	12%
60%		17%	63%		46%	11%
58%		16%	63%		43%	11%
57%		16%	63%		42%	10%
55%		16%	63%		41%	10%
55%		16%	61%		40%	10%
55%		16%	59%		38%	10%
54%		15%	59%		37%	10%
53%		15%	58%		35%	10%
53%		15%	56%		35%	9%
52%		14%	55%		33%	8%
52%		14%	54%		33%	7%
51%		14%	49%		32%	7%
50%		14%	47%		31%	6%
		,			31%	6%

## Figure 58 - CHGPN Service Incentive Programs (SIPs) Outcomes for 2003

## **Cervical Screening Information Systems**

The following table (Table 59) provides chronological (Quarterly) data from 2003 to 2007; and clearly outlines (shaded) the improvements in indicators due to the CDISs (cervical Screening) set up at Central Highlands General Practice Network from 2003 to 2007. These data highlight how effective the implementation process and adoption was in coopting so many practices from a very low base. What it does not clearly show is the actual success rates of screening in each individual practice, as it is deemed private 'practice' data.

2003	2005	2006	2007
% signed on practices with SIPs	% signed on practices with SIPs	% signed on practices with SIPs	% signed on practices with SIPs
*	*	*	*
*	*	*	*
81%	*	83%	*
80%	84%	80%	86%
75%	80%	76%	86%
75%	77%	76%	84%
73%	73%	75%	78%
71%	72%	75%	77%
70%	71%	71%	77%
70%	67%	71%	77%
67%	66%	70%	75%
67%	65%	68%	74%
63%	65%	67%	74%
63%	64%	67%	74%
62%	64%	65%	73%
62%	63%	65%	73%
62%	60%	65%	73%
60%	60%	65%	72%
58%	59%	64%	70%
57%	59%	63%	70%
55%	58%	62%	69%
55%	58%	61%	69%
55%	57%	58%	64%
54%	57%	57%	64%
53%	57%	53%	63%
53%	53%	53%	63%
52%	52%	51%	62%
52%	50%	50%	57%
51%	48%	50%	50%
50%	42%	42%	48%

Figure 59 – CHGPN Cervical Screening Outcomes (SIPs) 2003-2007

A better measure would be to showcase the improvement rate per practice; however, and although the researcher was able to collect this data, this poses some privacy risks and will not be included. Nevertheless, and just to give an example, one of the better performing practices was achieving screening rates of 26% in 2003 (Chapter Four); and by the end of 2007, their screening rate had climbed to 72%. This is not an isolated case as was confirmed during the interviews, where at least 24 practices (80% of the 30 accredited for PIP) had achieved at least the 55% benchmark set by the PIP program at some point during the study period.

Can it all be attributed to CDIS? The response is that no other activity was provided by CHGPN during the time of the study for Cervical Screening. There were however, the standard media campaigns on radio and TV; but the improvement due to these sources would have been across the board not just for CHGPN.

### **Diabetes Information Systems**

In chapter four, as with cervical screening, the baseline data pointed to very low indicators (Table 60). It must be repeated that Division HIC (Medicare) data are not the best to measure CDIS adoption. Nevertheless, the following table (Table 60) shows the two indicators that suggest a dramatic improvement from 2003 to 2007 in the practice percentage participation at the Division (from 17% to the highest in the state at 59% in 2005) and the number of practices with SIPs (from 59% to peaking at 86% in 2006).

2003	2005	2006	2007	2003	2004	2005	2006	2007
0	)utcomes	s Paymer	nt			SIPs		
% practice	% practice	% practice	% practice	% signed on				
participation	participation	participa	participa	practices	practices	practices	practices	practices
		tion	tion	with SIPs				
*	*	*	*	*	89%	*	*	*
27%	*	*	*	*	86%	95%	88%	*
25%	*	*	*	*	81%	88%	88%	*
24%	*	75%	*	88%	81%	86%	85%	88%
21%	*	70%	81%	81%	81%	86%	84%	85%
20%	*	69%	70%	71%	78%	86%	81%	84%
20%	*	67%	63%	71%	78%	77%	78%	82%
20%	59%	63%	62%	70%	77%	76%	76%	81%
20%	57%	61%	60%	68%	76%	74%	75%	80%
20%	54%	60%	59%	67%	74%	73%	74%	76%
19%	54%	57%	57%	67%	73%	73%	74%	76%
19%	54%	57%	57%	67%	73%	72%	73%	76%
19%	53%	56%	56%	67%	71%	71%	73%	76%
19%	53%	56%	56%	67%	71%	70%	72%	74%
18%	52%	55%	55%	67%	67%	69%	72%	74%
18%	52%	54%	53%	66%	67%	68%	69%	73%
17%	50%	53%	52%	64%	66%	68%	68%	73%
17%	47%	53%	52%	63%	65%	67%	66%	72%
16%	44%	51%	51%	63%	65%	67%	65%	71%
16%	43%	50%	50%	63%	64%	67%	65%	68%
16%	42%	48%	50%	63%	63%	65%	64%	68%
16%	41%	48%	48%	61%	62%	64%	63%	66%
16%	40%	47%	48%	59%	60%	64%	62%	65%
15%	39%	43%	47%	59%	60%	64%	61%	65%
15%	39%	42%	44%	58%	60%	63%	60%	65%
15%	38%	42%	43%	56%	58%	63%	60%	63%
14%	36%	42%	41%	55%	57%	63%	58%	62%
14%	36%	37%	40%	54%	56%	60%	57%	62%
14%	33%	34%	36%	49%	49%	56%	50%	57%
14%	31%	32%	35%	47%	41%	49%	50%	50%

Figure 60 - CHGPN Diabetes Outcomes (SIPs) 2003-2007

The table suggests marked improvements, but also that these were not quite sustained after 2005/6. The drop in comparison to other Divisions seem to coincide with the introduction at the Division of the National Primary Care Collaborative (NPCC) program (a program incidentally design to improve Diabetes outcomes) that took precedence over the IM/IT Diabetes implementation program studied here; as well as coinciding with a period in which the researcher halved his working hours due to illness.

The other problem that added to this reduction in PIP/SIPs outcomes was the confusion caused by the PIP programme when a newly devised General Practice Management Plans (GPMPs) incentive item was introduced. These new Medicare item numbers were taken up by practices to the detriment of PIPs (hence misrepresenting the measurements). The IM/IT officer, by this stage (2006) was not the only source of information of PIP/SIP to CHGPN practices causing practices to sometimes deviate from the original setup with the unfortunate resulting drop in indicators.

Strangely enough however, from 2005, it would have been expected that the NPCC program would have produced an improvement (and a confounding factor in this study) rather than a mild decrease, yet this situation from 2005 onwards sadly tends to support the original CDIS implementation program's strength under study here.

## Asthma Information Systems

This is perhaps the most compelling example of the significance of what systematic approaches can achieve with very few implementations.

The data provided in table (Table 61), although impressive for the Division, do not quite reflect the reality of what is actually going on. Truth be told, there are only perhaps five practices that have set up systematic asthma approaches (that the researcher knows of and helped set up); and these are the practices really producing the strong outcomes; although for privacy reasons data are not provided individually by practice by Medicare Australia to the Division network.

2003		2005			2006			2007		
						رn		%	%	
					Wainnad	70 aliaibla		signed	eliaible	
% signed	% eligible	% signed	% eligible		% signea	eligible			nrauida	
on	providers#	on	providers#		on 4!	providers		VII 	provide "	
with SIDe	CIDa	with SIDe	receiving SiDa		practices	# 		practice	rs#	
WILL SIFS	3173	WILLI SIFS	31-3		with SIPs	receiving		s with	receivin	
						SIPS		SIPs	g SIPs	
*	*	*	*		*	*		*	*	
*	*	*	*		*	*		*	*	
*	*	*	*		*	*		*	*	
*	28%	*	*		*	*		*	*	
*	26%	*	*		*	*		*	*	
*	22%	*	*		*	*		*	*	
*	20%	*	*		*	*		*	*	
*	19%	*	*		*	*		*	*	
*	17%	*	17%		*	*		*	*	
*	17%	*	17%		*	*		*	30%	
80%	14%	*	16%		*	*		*	29%	
54%	14%	*	15%		*	*		*	28%	
52%	14%	*	15%		*	37%		*	27%	
50%	12%	*	15%		*	31%		*	26%	
49%	12%	59%	14%		*	31%		49%	26%	
49%	12%	48%	13%		*	29%		48%	25%	
46%	11%	38%	11%		*	28%		42%	25%	
43%	11%	35%	10%		*	26%		41%	23%	
42%	10%	35%	9%		45%	26%		38%	21%	
41%	10%	35%	9%		33%	26%		37%	20%	
40%	10%	33%	9%		31%	25%		36%	20%	
38%	10%	30%	8%		31%	25%		34%	20%	
37%	10%	28%	8%		27%	24%		33%	20%	
35%	10%	27%	7%		24%	23%		32%	20%	
35%	9%	25%	7%		23%	20%		30%	19%	
33%	8%	25%	6%		22%	20%		29%	19%	
33%	7%	24%	6%		22%	20%		29%	19%	
32%	7%	22%	6%		21%	19%		24%	18%	
31%	6%	21%	5%		21%	18%		22%	18%	
31%	6%	21%	4%		21%	17%		20%	17%	

Figure 61 - CHGPN Asthma Outcomes (SIPs) 2003-2007

## Conclusion to Framework's impact on outcomes

In summary, the chronological data from Medicare Australia (HIC), although not a perfect measure (for reasons already explained in Chapter Four) presented in the above tables coincides with the implementation of successful CDISs and adds credibility to the findings in the study by supporting and corroborating the high rate of success at CHGPN from a non-PhD study source; namely Medicare Australia PIP indicators.

# **STAGE THREE: The Outcome**

# **CHAPTER EIGHT – Discussion**

'Knowledge is of no value unless you put it into practice'

(Anton Chekhov 1866 -1904)



Figure 62 - STAGE THREE: Chapter 8 - Discussion

#### Introduction

The introductory chapter (Chapter One) provided an overview of the whole thesis; highlighting that the purpose of this thesis was to develop an information systems framework for the prevention and management of chronic conditions in general practices. Stage One of this thesis then proceeded to outline the methodology, the literature review and the context from where to draw the emerging framework to be examined in the study. Stage Two of this thesis first tested the emerging framework with ten key informants. Data collected and analysed helped to fine-tune the emerging framework resulting in a revised framework which was then tested in the main data collection phase with a larger portion of the population targeted. Data collected were analysed and aggregated to the previous data collection findings and Medicare documentation was also presented to support outcomes. Stage Three is now concerned with the outcomes of this thesis, and this chapter in particular aims to discuss the make-up of the final framework according to the aggregated findings in the previous section of the thesis. Finally, a summary conclusion is presented for every construct found in the final framework, to systematically answer the following questions:

- •What do these findings mean?
- •How do they fit into the existing body of knowledge?
- •Are they consistent with current theories?
- •Do they give new insights?
- •Do they suggest new theories or mechanisms?

## Overall discussions and conclusions leading to the final framework

This section will first remind the reader of the revised framework and then will showcase the final graphical representation of the final framework as inferred by the analysis from the previous data collection findings. This is expected to allow the reader to see the main "big-picture" changes upfront, and then further details are provided for each individual change.

The previous chapter set out to test the revised framework shown here below (Table 63) and to aggregate and summarise all relevant findings to review the constructs in the final framework.



Figure 63 - The Revised Framework

The final framework (Table 64) is graphically represented to also include the '*Purpose*' of each construct, the '*Action*' or what needs to be done to achieve the purpose. Further discussion and conclusion about the study and this final framework will follow next.



Figure 64 - The Final Framework

The reader might be able to discern at first glace that the changes are subtle but better reflect, in the view of the researcher, the overall constructs within the framework according to the data collected. Particularly the simplification of the three motivational factors into a single *Factors Driving Change* construct representing the same concepts. As well as the new *Adoption* construct (previously labelled Decision Making) that now occupies a key process on its own. Further detailed explanations for each construct rationale are now presented below.

# Factors Driving Change

Both data collection sections appear to confirm that motivational forces are multi-factorial but it strongly underlined that a much stronger influence is asserted by the 'patient care' factor (or element). This was well supported across all practice types and role types; however, clinical staff (nurses and Doctors) and practice managers appear to be more represented by this factor than 'Staff' types. This is probably due to clinicians' specific role in clinical care and perhaps the greater understanding of Practice Managers of the significance of this factor for the practice as a whole. Nevertheless, interviewees were very clear to point out that patient care must conform to financially sustainable models and facilitated by workforce and infrastructure factors.

Of great importance from a CDIS point of view, is that the framework used was capable of satisfying the driving factors as perceived by those involved in these implementations. The point to make here is that an approach to implementing a chronic disease information system in general practice must be able to tap into these motivational forces, however, not in isolation but as a complete solution, catering to the perceived needs of those key individuals driving change in practices. In essence this construct remains unchanged and is represented in this final framework as follows (Table 65).



Purpose: To tap into existing driving forces

Action: Highlight Sub-Systems Deficiencies (Financial, Legal, Administrative, Organisational, The patient, Government, etc.)

Figure 65 - CDIS - Factors Driving Change Construct

# Chronic Disease Problem Definition

This construct supplements the motivational factor but it occupies a very different space. This construct suggests that awareness is created via a realisation of patient chronic disease care gaps in the practice's own population rather than just, for example, being aware that there is a national chronic disease (CD) problem "out there". By the GPs' own admission, gaps in care from a whole population point of view are not always at the clinician's foremost thought or understanding (awareness). This was also true, more understandably, of clinical staff.

This construct could potentially be the single most powerful change agent; it must also be seen as an extension of a multi-faceted approach to CDIS implementation. The key to defining the CD problem or clinical gap is perhaps, as suggested by the finding, the central role the external change agent plays in this paradigm. However, having access to a practice database and to be permitted any kind of analysis is not an automatic right, but a privilege that must be earned. This is perhaps the key construct in the whole system, and is where the relationship with, and engagement of, the practice champion becomes crucial. In all practices, the champion —regardless of title, and the external agent were always working in unison to advance practices' understanding of chronic condition gaps in their own settings.

To better represent the function of this construct in light of the health literature, and potential users, the label *Evidence Based Analysis* is now used (instead of Problem Definition and Chronic Condition awareness) to describe it more purposefully. It is represented in Table 66

# **Evidence Based Analysis**

Purpose: To create evidence-based awareness

Action: **Practice record analysis** (to identify patient care deficiencies)

Figure 66 – CDIS - Evidence Based Analysis Construct

# **Practice Capacity**

The findings seem to suggest that practices already had all the necessary capacity (hardware, software, infrastructure, workforce, etc.) to implement CDISs. However, at least in these practices, the issues were not so much having these items, but more a limitation in knowledge and understanding of systems implementation in general. And while some knowledge was evident with a few GPs and PMs, very few GPs had the time to set up CDIS, and PMs, who mainly had the task of implementing CDISs, lacked the understanding of how to set them up.

This well represented finding supports the presence of the external agent as a means of dispelling the lack of resources as a capacity barrier, and providing the knowhow and training to achieve implementation. The practice champion also played a central role in every instance, by being the catalyst between all the components of the systems (social, technical, financial, etc) to develop an in-house understanding of their own capacity to tackle the gaps in chronic diseases and to take that understanding to decision makers for approval to implement CDISs.



The label is now the same Capacity and is represented in Table 67 as follows

Figure 67 - CDIS – Capacity Construct

# **Decision Making and Adoption**

A distinction was made in the previous chapter to highlight an issue that perhaps was overlooked until the final aggregated analysis. That is, the fact that the involvement of GP Principals, and their motivation for the introduction to CDIS, was in no way related to the motivational forces at the engagement stage —and most of the implementation process, with the CDIS champions in practices (Mostly PMs. Nurses and Staff); Although, the motivational factors were more *aligned* between GPs, Nurses and Practice Managers in more successful practices.

Their role and motivation is certainly important and definitive as owners of the business have the power of veto or support any intended implementation. This is the case, as perceived in the revised framework and tested during the second data collection phase. This point in the Final framework seems to be (as with all of practices in this study, and more so with highly successful ones) where the decision to adopt took place. Furthermore, the adoption, regardless of achievement levels over time, seemed to have been maintained.

In summary, this construct is new to the framework, in recognition of its importance, and labelled *Adoption* and represented in Table 68.



Figure 68 - CDIS – Adoption Construct

## Information Systems Implementation

The findings in this construct revealed that the implementation cycle varied greatly from the ones drawn from the literature. Specifically, the findings strongly suggested that systems implementation does not technically start until a decision to adopt was previously reached, and well after the problem definition and data analysis had been carried out earlier in the process. Both problem definition and data analysis are somewhat of a pre-cursor to decision making, that is, they only become a part of the implementation process if the decision makers decide to go ahead implementing CDIS. What the findings also point out is that in most practices, decision making was a function of team work and empowerment, particularly in the most successful ones; however, it also indicates that a team approach is not necessary for the introduction of CDIS; Hence adding to its applicability in other practice settings.

Nonetheless, those that did not assign relevant responsibilities to key individuals to manage the systems eventually slowed down their progress to success. In short, empowerment appears to have a greater bearing on the success and sustainability of CDISs.

One other key learning from this construct was the validation of the concept that every practice is 'unique'; where every CDIS system implementation was exclusive to each practice as observed by the researcher and IM/IT Division Officer.

However, there were some commonalities in every implementation; for example, the system needs to be easy to use and more importantly, users must have ownership of their system. Hence the model chosen might not be 'the best' in the eyes of the external agent but it was perceived as being so by the decision makers. To this effect,

the findings appear to suggest that when a decision is made to implement CDIS, it does not mean 'getting it right the first time', but it must be tweaked accordingly and constantly customised to the user's new needs and perceptions. Sometimes this is achieved with the full guidance of the external agent and sometimes on their own ability once they had been trained by the external agent to do so. The aim is always to re-evaluate and re-design constantly for optimum efficiency and efficacy; this is another key to the adoption and sustainability of successful CDIS.

The construct branded "Implementation process" is represented in Table 69 below with the label *Systems Implementation*.



Figure 69 - CDIS - Systems Implementation Construct

## Outcomes

If anything became very evident from the data collected, it was the key concept of outcomes. The second data collection in particular, highlighted the need to view outcomes as a more prominent and unique construct in its own right. It appears that in general practice, and specifically in the case of clinical staff, knowing if the identified gaps in patient care have been resolved is a crucial issue. Therefore evidence for these outcomes is

crucial in a successful CDIS framework. Particularly, as suggested in the findings, if clinical staff and GP principals in particular are going to maintain the system in place over time.

The Outcomes construct is represented in Table 70 below.



Figure 70 - CDIS - Outcomes Construct

# The Feedback Channel

The findings strongly support the presence of this feedback channel in the final framework. It provided ample support (100% and 68% in the first and second data collection respectively) that success in one CDIS —even when not fully evaluated, provides enough self-momentum to drive other CDISs. Although this was not automatic, as there were perceived and real barriers that could not (or were perceived not) be overcome. This is where the external agent and the practice champion also play a fundamental role as in the practice with the original CDIS. Although by now, with the second CDIS implementation it is expected that some champions might be able to grasp the concepts and technical requirement to also drive the next CDIS framework themselves.

The other notable outcome of this construct is that most interviewees agreed that the next CDIS did follow the same path of development; further validating the legitimacy of the framework.

The Feedback Channel is represented in Figure 34 below. The linkages to other constructs will be apparent in the final complete representation (Table 71)

FEEDBACK CHANNEL Positive outcomes encourages practices to keep developing new CDIS systems

Figure 71 - CDIS - Feedback Channel Construct

#### Practice Champions

The findings appear to be very conclusive in this respect: a practice champion is a key element in this framework. By design or by role, successful implementation depends on them and their drive to improve their own outcomes, even in clinical matters. Their role in CDIS implementations expands from the initial act of defining the gaps in care to the evaluation and further introduction of new CDISs. This will be represented holistically in the final framework (*Table 72*)

#### The External Agent

There appears to be very little doubt that a successful CDIS needs an external expert driver. However, the external agent cannot work in isolation, they need to engage and extensively cooperate with a practice champion to develop customised CDIS systems. This role is 'key' in analysing gaps and developing potential suitable systems with the practice champion to present to decision makers to understand the clinical gaps in care based on their practice's own valid evidence. Then the agent must be active in monitoring the implementation and helping to review the clinical health outcomes as well as all other intended outcomes to secure further implementations and validate their efforts and successes. The place of the external agent in the final framework can be seen in *Table 72*.

#### The Implementation Process

The findings support the strategies used by the external agent (Division IM/IT officer) to engage practices through practice champions instead of GP principals. None of the interviewees shown the graphic framework disputed the flow of the framework; suggesting that it is truly representative of the developmental flow process that they all had gone through. The validation seems to be extended to the links between constructs providing further evidence for the strength of the graphical representation of the final framework below (*Table 72*).

#### The final framework

The thesis appears to validate most to the existing constructs in the revised framework; however, some minor modifications need to proceed, according to the above interpretation of the findings to fine-tune the final framework.



Figure 72 - The Final CDIS Framework
# **Summary Discussion of Major Findings**

This section discusses the overall findings from all data collection phases and observations to systematically discuss and justify all constructs, process flows and other identified outcomes in the final framework above (*Table 72*).

# Factors Driving Change: Motivational factors and sub-systems in CDIS

The successful implementation of CDISs in general practice, in the current Australian context, depends on multi-factorial driving forces; but most importantly on the awareness of deficiencies or gaps in practices' own patient care. This is crucial in understanding the underlying need to support certain sub-systems in general practice. Every motivational factor represents in one way or another a CDIS sub-system. And every sub-system of interest to users (Patient Care, Financial, Risk Management, etc) needs to be identified and carefully included in any CDIS implementation to be successful; at least as the findings in this study seen to suggest.

More specifically, and perhaps where it is particularly relevant in this study, it was recognised that motivational factors were the driving forces for change, see table below (Table 73). When these motivational forces are broken down, we end up with very distinct but interrelated and interdependent sub-systems. For example: the findings (see aggregated Analysis by Practice Type and Participant Type in Chapter 7) suggested that when an individual in general practice states that risk management (Ranked 2<sup>nd</sup>) is the uppermost concern in their mind, they are unknowingly referring to a number of interrelated subsystems. That is, there is a potential 'risk' for a client or patient to sue the practice. For example, the failure to perform a cervical screening test that could lead to the patient's death. This is clearly part of two distinct but interrelated sub-systems; 1<sup>st</sup> a Legal subsystem (ranked 2<sup>nd</sup>) and 2nd a Patient Care (ranked 1<sup>st</sup>) sub-system. They are interrelated because, if the patient care system was optimised to avoid omitting any patients from screening, by default it optimises the Legal (risk management) sub-system. Furthermore, in practical terms, this Patient Care subsystem can only be optimised by having a complete and functional patient register and recall and reminder system; that is optimising the 'technical' sub-system. It can be concluded that having an optimised CDIS, requires having an optimised technical sub-system, which also optimises the Patient Care subsystem and by default optimises the Legal sub-system.

The same can be said for Accreditation Issues (ranked 4<sup>th</sup>) and Financial Incentives (ranked 3<sup>rd</sup>). By running an optimised CDIS means that by default they are complying with accreditation requirements (i.e. having recalls and reminders in place and Risk Management systems). At the same time, the optimum number of patients are treated and therefore the maximum amount of financial incentives are accessed, optimising both subsystems (notice how they interact with patient care and risk management sub-systems). Interestingly, the Practice Incentives Program (PIP) did not figure particularly prominently as a motivating factor, which as part of the financial sub-system needed solid outcomes in this framework to achieve sustainability (and profitability). This can be seen as going 'against the grain' of any private enterprise where the *financial bottom line* would be the ultimate outcome (data in this study suggesting that this is not the case here). This point alone suggests the uniqueness of general practice as a small business.

The same reasoning process can be applied to every element and construct in this study. For example it applies to 'workforce' subsystems; when the CDIS is achieving patient care outcomes (evidence-based subsystem) it is a direct measure of how GPs, Nurses and Staff sub-systems are performing.

The fact that the Division Influence (IT/IM officer/external agent) was ranked third also gives an indication that, at least in these successful implementations, a CDIS system or its subsystems (External Agent sub-system) are not necessarily internal to a bounded system, but can be seen as part of a larger interdependent external (Division) systems network.

Overal Ranaking	Motivational Factors	Aggregated Rankings			
i tu i u i u i g		1st	2nd	3rd	4th
1st	Patient Care	19	3	3	2
2nd	Risk Management issues	6	11	0	1
3rd	Finanacial (PIPs)	3	2	7	1
4th	Accreditation Issues/Bodies	1	2	4	3
5th	DivisionInfluence/Support	0	2	5	3
6th	Wanted to involve/include staff	0	0	1	2
7th	Insurance incentives (Minimising risk)	0	0	1	4
8th	Government influence	0	0	0	1
9th	Other	0	0	1	0

Figure 73 - Overall	Ranking of	f Motivational	Factors
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For example, the second strongest factor was Risk Management, strongly motivating practices at the time (the first by far was Patient Care already discussed). This finding

identifies the risk management sub-system (although it could be argued that it could form part of other larger 'legal' sub-system). Accreditation also comprised as a very strong motivator, again identifying another sub-system, again perhaps within a larger one. Division influence, as the third most influential factor also signals the presence of a subsystem.

# What does it mean?

This finding means that any framework to implement CDIS in general practice must take into account all the motivational forces present at the time, and integrate them into subsystems in the design and implementation process, as well as making them measurable as outcomes.

# How does it fit into the existing body of knowledge?

There seems to be no literature that links sub-systems and health implementations in general practice at the moment. In the business sector, it is a different story; as this is the cornerstone of the socio-technical approach, where the aim is the fit achieved by a design process aiming at the joint optimisation of the subsystems. For example, the experts tell us that any organisational systems will maximise performance only if the interdependency of these subsystems is explicitly recognised. Hence any design or redesign must seek out the impact each subsystem has on the other, and the design must aim to achieve superior results by ensuring that all the subsystems are working in harmony (J. E. Ward, J. Gordon, et al., 1991).

This was not specifically examined in this study, but the importance given to motivational factors and outcomes measures and their interrelatedness in achieving success was clear evidence that sub-systems, and their maximisation, played an important role in CDIS implementations and adoptions.

# Is this consistent with current theories?

This is consistent with the Socio-Technical approach found in the Business Information Systems literature (Mayers, 1999; Mumford, 2003, 2006; Pasmore, 1988; Schneberger & Wade, 2006; Williamson, 2002).

#### Does it give new insights?

It does provide a new insight, particularly in health settings, by looking at implementation approaches from a *Socio-Technical* approach; rather than from the more '*technologically*' driven approaches used in health settings to this date; where only the technology seems to be the focal point of study (it might also be said with very little success rates).

#### Does it suggest new theories or mechanisms?

It does not suggest new mechanisms but it does provide for the use of existing mechanisms in other fields within the health arena, and specifically in general practice. More specifically, and of perhaps greater importance than given in this study, was the concurrence of these motivational factors between champions and GP Principals. These findings speak of an *'alignment of perception'*; an unwritten understanding of what is important in general practice (motivational factors as sub-systems to be improved or maximised)

The conclusion that can be drawn from this aspect is that a successful information system to support the prevention management of chronic diseases must be able to optimise every sub-system; it must be a multi-system approach.

This is perhaps old news in the field of Information Systems, but potentially a solution to what was noted in the literature review (Chapter Three), that: the compelling reasons for computerisation in industries such as banking and finance fail spectacularly in health (Mumford, 2003, 2006; Schneberger & Wade, 2006).

Furthermore, as seen in the literature review, few thinkers in the health sector see motivation as a key to 'provide the impetus to disturb the normal equilibrium of existing often habitual practice' (Donaldson & Gerard, 2004).

# Evidence-Based Analysis: Patient care as the key evidence-based motivator to affect change

As the most powerful motivator and driver for change in this study, it should come as no surprise the significance that this element has on the successful implementation of CDIS. The evidence only exists in the electronic records in practices' own databases; and many times it exists unrecognised without the help of an external agent. As with the previous sub-systems, the evidence subsystem, can be concluded as the key finding underpinning this framework. This sub-system will be become more evident as it forms part of many of the constructs in this framework.

# What does it mean?

Patient care for all intents and purposes is what would be termed in business: 'the bottom line' of practices and GPs. It's what they 'do'; it's the 'ultimate outcome'. In the health sector, it could be seen as the key to 'the systematic evidence-based-practice' being sought to deal with this growing western health problem (Lovatt, 1999; McGovern & Rodgers, 1986). On the basis of the data collected in this thesis, it is the most powerful motivational force that any CDIS could ever use to affect change, implementation and adoption in these health settings.

# How does it fit into the existing body of knowledge?

Patient care was perhaps 'the key' factor in these implementations; a well known concept in the health knowledge sector (WHO, 2008b); but its use in an implementation framework is not well reflected in the Health Informatics or Business Information Systems literature found in this study.

# Is this consistent with current theories?

There are currently no theories that purposely link '*patient care*' to the implementation of chronic diseases information systems in general practice.

# Does it give new insights?

It does provide new insights from a diverse number of perspectives. 1) It is a powerful motivator for both clinical and non-clinical members of general practice. 2) The positive outcomes of patient care are powerful arguments for the continued application of CDIS in other chronic conditions and 3) It also fosters sustained adoption as the findings seemed to suggest.

# Does it suggest new theories or mechanisms?

The discovery of this new construct and some of its implications are presented throughout this body of work; which has prompted the researcher to further analyse and publish a treatise on this new knowledge in a chapter in the upcoming book: Handbook of Research on Contemporary Theoretical Models in Information Systems, due in 2009 (D. Carbone, 2009).

# Capacity: Breaking down pre-conceived barriers and pre-developing systems

A set of barriers long held to be responsible for the lack of uptake of any systematic approaches in general practice (see literature review - Chapter Three) was proven to be a myth. The perceived barriers are found to be more the result of lack of knowledge and understanding of what 'systems' are (chronic conditions in this case, but applicable to any other system). This issue proved to be simply resolved by the application of an external agent's expertise within the implementation framework process. This paved the way to pre-develop (define, analyse and design) systems for consideration by decision makers (GP Principals).

# What does it mean?

This means that in practices that are already computerised, there are no significant barriers to the introduction of CDIS. Barriers are mostly perceived rather than real and this due to the lack of understanding and training in hardware and software capacity that already exists in Australian general practices. More specifically, this lack of knowledge is mainly reflected in those that will contribute the greatest to the implementation process of CDIS: The CDIS implementation 'champion' already existing in every practice.

# How does it fit into the existing body of knowledge?

The dismissal of 'capacity barriers' as de-motivators goes against every study that has been reviewed in the literature (Chapter Three). Perhaps this is due to the literature's focus on implementation failures. There seems to be no other study that corroborates the findings of this study in the literature reviewed so far. Particularly in reference to the fact that 'capacity' already exists in Australian general practices. This was also reflected not just o\in the technical construct examined here but also in the human and organisational constructs as well, as seen in Chapter Seven.

Nonetheless, the demystifying of barriers is much more common in the *change management* literature than in the implementation literature (T. Bodenheimer, 1999a; Grol et al, 1998; Schuster et al., 2003). As is the generic (not general practice specific) literature's calls for the need to include users.

# Is this consistent with current theories?

There are no theories that deal specifically with this issue in regards to CDIS implementation in general practice.

# Does it give new insights?

It certainly gives an insight into the mindset of those implementing 'technologicallydriven' systems in health settings. There is a need to focus more on the 'Socio' aspects of systems particularly the engagement and training of key individuals (champions), that will have the inner knowledge to be creative enough to find solutions to any barriers perceived in most implementations.

# Does it suggest new theories or mechanisms?

It suggests that the understanding in the literature, wherein the focus on GPs as the 'central user' to be engaged in the implementation process, is misguided. This has been proven incorrect in this study. GPs are busy individuals that just want to get on with the care of their patients, and who for the most part seem to be happy to allow the 'organisational and implementation' aspects if CDIS to left in the hands of their own capable champions and employees, who would provide appropriately worked out CDIS models for them to make decisions on.

# Adoption: The Decision Making Process

In this particular part of the process the practice champion armed with all the evidence for change and potential pre-developed models (systems and sub-systems) and the benefit of their inner knowledge of the context, and with the support of the change agent, will approach decision makers. Decision making was found to be normally done by GP Principals, sometimes it was a 'team' approach and sometimes Practice Managers were empowered to make the decision themselves.

# What does it mean?

It means that an implementation can only go forward from this point if all the sub-systems and evidence to be presented to decision makers is compelling enough to convince them to adopt it.

# How does fit into the existing body of knowledge?

There is no concept in the literature that deals specifically with this issue.

# Is this consistent with current theories?

There no theories to support or deny this finding.

# Does it give new insights?

It does provide clear warnings that the adoption of CDIS is dependent on building a valid case (evidence) for decision makers to approve; at least within the confines of the implementation framework

# Does it suggest new theories or mechanisms?

Yes, the mechanism is as simple as following the processes outlined throughout the whole thesis and particularly in Chapter Seven.

# Systems Implementation: The hands-on approach

The implementation of CDIS does not appear to follow the standard development and implementation cycle model used for testing at the start of this study and drawn from the literature in Chapter Three. At the time, it was believed to have been a continuous process typically from problem definition to adoption and outcomes as seen in the Table 74 below. Instead the development cycle was tied to a fairly linear flow of events well separated from the hands-on or 'technical' implementation.



Figure 74- The Conceptual Development and Implementation Cycle

# What does it mean?

It means that unlike the continuous development and implementation cycle outlined in the conceptual framework for testing in this study; the development, or more precisely the *pre-development* of problem definitions, analysis (and design) all occurred well before the '*practical*' implementation took place. The key difference was that 'adoption' appeared to have happened inevitably at the point where the decision making process took place. In essence the implementation process is now seen in this construct as a 'stand alone' phenomenon exclusively dedicated to the implementation of the pre-developed systems and sub-systems in the previous phase (by champion supported by change agent) of the framework. Furthermore, and by default, each system developed by this method is unique to each practice.

# How does it fit into the existing body of knowledge?

It perhaps does not fit a all, The clear separation of these two seemingly intertwined constructs appears to be somewhat different from what is recorded in the literature (Chapter 3, section four).

#### Is this consistent with current theories?

It does not appear to be mentioned in any other theoretical framework.

#### Does it give new insights?

It does, as it separates the problem definition, analysis and design from the actual implementation phase. This is quite a departure from existing theoretical implementation frameworks. The construct also includes an 'internal' knowledgeable individual (Practice Champion) with the support of the change agent as part of its inner workings.

# Does it suggest new theories or mechanisms?

It does point to the processes that are outlined in the framework as a way to reaching the implementation phase; as well as making it clear that every implementation is driven by internal contextual knowledge led by the champion and not the expert (change agent)

# Outcomes: The evidence for further improvement

Initially in the emergent conceptual framework, the 'outcomes' element was added to the framework as an add-on, based on the observation by the IM/IT Officer during CHGPN implementations before the study begun.

It became quite evident after the first lot of data collection of its impact on the acceptance and, more importantly, on the positive effect it had on encouraging a second CDIS implementation. This was despite the fact that only half the initial interviewees had formally 'measured' outcomes at all. It appears that the perception of increased activities (such as: more women showing up for cervical screening) was enough to give an impression of successful outcomes.

This element provided clear evidence that all the motivating factors or sub-systems were being affected (positively); including the improvement of patient care, financial sustainability, minimising risk, and so on. The second data collection specifically re-tested for this element elevating it to its own construct as explained in Chapter Seven.

# What does it mean?

It means that successful CDIS implementations in general practices need to be systematically evaluated, and the information fed back to the practice to make sure all subsystems are working at their optimum to maintain motivation and adoption. Practices appeared to have had very little problem in taking-up multiple CDIS if the outcomes were perceived to positive.

#### How does it fit into the existing body of knowledge?

There is no exclusive implementation knowledge on this issue specifically for chronic conditions in general practices. It is usually mentioned in passing when referring to patient outcomes, but mainly when referring to the gaps between the evidence and actual medical practice (Grimshaw et al., 2004; Grol & Grimshaw, 2003 ; F. Nickols, 2006). Perhaps this construct can provide the 'evidence' for patient improvement requested by GPs. Perhaps in later Post Doctoral studies as clinical outcomes were not part of the scope of this study.

#### Is this consistent with current theories?

There appear to be no theories to date that deals with this specific construct, particularly in CDIS.

# Does it give new insights?

It certainly appears to be a key motivational force to achieve further multiple implementations.

# Does it suggest new theories or mechanisms?

The mechanism is a simple evaluation of every subsystem to measure the maximisation of the overall CDIS; and could be concluded that it is a new mechanism, or rather one that does not seem to have previous use in information systems implementations.

# Feedback Channel:

Success feeds on success. When outcomes are evident (and even when they are only perceived) practices can transform into self driving agents of change, improving and introducing more CDIS as new CD gaps in care are discovered.

# What does it mean?

It means that within this framework the potential for multiple self-driven implementations are certainly possible for the majority of practices with similar characteristics and profiles tested in this study.

# How does fit into the existing body of knowledge?

The potential for failure is well known. A handful of successful implementations are known; but multiple successful implementations in general practices are unheard of at this point in time.

#### Is this consistent with current theories?

There are no theories that specifically deal with this construct in this context.

#### Does it give new insights?

It only confirms that practices are capable of multiple CDIS implementation

#### Does it suggest new theories or mechanisms?

The data suggests that effect of this feedback channel is self-driven by those implementing (successfully) the first one.

# Practice champions:

These are not a new discovery in the realm of health generally or general practice specifically, but they add a new dimension to the understanding of their place in the implementation of information systems in health settings (and general practice specifically).

They are the key and knowledgeable informant part within the social sub-system that will open doors and access to the change agent, and provide their expertise and knowledge for the development of CDIS that will work in their practices. They are a powerful influence on the practice decision making process and a key relationship in the implementation process.

# What does it mean?

It means that without one, it would probably be impossible to achieve strong engagement with practices and, as the data collected suggests, very unlikely to succeed in implementing CDIS without having one present.

# How does fit into the existing body of knowledge?

According to the literature in Chapter Three, practice managers, where present, were seen to have a limited role in chronic-disease management, mainly associated with implementing government initiatives and doing the associated paperwork. Some GPs envisaged a possible role for the practice manager in setting up systems to facilitate chronic-disease care; however, running the system for patient recall, auditing and monitoring was not being recognised by GPs (T. Bodenheimer, 1999b). This view is perhaps the antitheses of what was found in this study. Practice managers being identified in this study as the champion were usually present in successful implementations. There appear to be no precedents to the use of non-GP practice champions to drive implementation process successfully in general practices.

#### Is this consistent with current theories?

To the researcher's knowledge there are no chronic diseases specific implementation theories that deal with this specific construct and least of all in general practice specifically.

Does it give new insights?

If it is taken into account that a great majority of practices would have a Practice Manager or a nurse in their staff, it stands to reason that perhaps all of those could potentially introduce CDIS successfully. These findings suggest that this is a new insight.

# Does it suggest new theories or mechanisms?

It does suggest that perhaps the approach to be utilised to support change in general practices needs to focus more on these individuals than on GPs specifically, or on just throwing money at practices in the form of incentives (PIPs), as the government seems to do in Australia.

# The external agent:

In all twenty eight practices, the external agent played a major role at every stage of the implementation framework, and particularly in cooperation with the practice champion. The specific roles the external agent played were not sought in this study due to the scope of the research. However, the role description in Chapter Four seems to suggest that the IM/IT Division Officer (external agent) was not the typical 'technologically driven' information systems specialist, but a multi-skilled individual in all interrelated sub-systems affecting the framework.

# What does it mean?

If the responses given by interviewees in Chapter Seven are an indication, the change agent (as was the case with the practice champion) is an essential part of the framework just examined. This was also observed by the IM/IT Officer in Chapter Four.

# How does it fit into the existing body of knowledge?

No knowledge was found during the literature review regarding the use of change agents for the implementation of chronic diseases information systems in general practices.

# Is this consistent with current theories?

No theories or frameworks were found for this specific purpose.

Does it give new insights?

It does suggest that without a change agent the implementations of CDIS might not be possible; or at least not as successful —or worse still, result in poor quality outcomes for all involved leading perhaps to failures.

# Does it suggest new theories or mechanisms?

It suggests that the Australian Government had it right in 2002 when they funded an IM/IT position in every Division in the country; however, there were no blueprints for action (e.i. this framework) at that particular time. This perhaps needs to be revisited by Australian health authorities. It suggests perhaps that a new (improved) mechanism or emerging theory can be inferred from these findings.

# Summary

The purpose of this chapter was to further discuss the analysis of the aggregated findings from both data collection phases in this study to justify the final framework. A summary conclusion was presented for every construct found in the final framework, to systematically discuss what each construct and process meant, how they fitted into the existing body of knowledge, their consistency with existing theory, if they provided new insights and if new theories or mechanisms could be suggested from them.

# **CHAPTER NINE - Conclusions**



'Knowing is not enough, we must apply; willing is not enough, we must do.' (Johann Wolfgang Von Goethe)

Figure 75 - STAGE THREE: Chapter 9 - Conclusion

# Conclusion

The purpose of this thesis was to develop an information system framework to support the prevention and management of chronic disease in general practice. The need to develop such a framework was driven by a rise of quasi-epidemic proportions in chronic disease affecting our health system both financially and in terms ofhealth outcomes. All indications appeared to suggest that the advent of computers would have a much needed supporting role in overcoming preventative and management shortcomings in current chronic conditions care paradigms in general practice. The purpose of this chapter is to provide concluding remarks regarding the study and its findings, as well as indicating the scope for future research parameters, and the implications for theory, policy and practice of the discoveries in this thesis, and concluding with the limitations and what was not included in the study.

# **Recapping the Study**

An initial literature review revealed a lack of information systems implementation understanding and research in the specific setting of general practice. Both Health

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Informatics and Business Information Systems knowledge areas mostly highlighted implementation failures occurring in large health organisations, and none were chronic disease or general practice specific. This was further highlighted by the mainly 'technically driven' approaches to implementations. This state of affairs contrasted sharply with high levels of implementation and successful adoptions beginning to occur at Central Highlands General Practice Network (CHGPN), yet these field implementations were not theoretical in nature as the aim was practical application, not research. This opened the way for a collaborative industry-university partnership to study these successful implementations as an environment for the development of a theoretically and practically informed information systems framework to support the prevention and management of chronic conditions in general practice.

A literature review in conjunction with the practical knowledge of the Division's IM/IT Officer in charge of past and ongoing practical implementations sought to identify elements, constructs and processes that could be developed into an emerging (conceptual) framework for the study. The emerging framework revealed three distinct (untested) constructs (Table 76): Factors driving change, identifying patient needs, internal and external motivators as well as the identification of the health care problem (chronic disease); Practice capacity, where limitations to systems implementations appeared to be resolved; and the development and implementation cycle itself, modified from the information systems literature to include the outcomes element, where the practical application seemed to happen. It also included a feedback channel (as a way of representing multiple implementations due to an initial success in outcomes); also including a change agent and a practice champion as key individuals perceived to participate in every implementation.



Figure 76 - The Initial Conceptual framework

These constructs would be refined over the course of two major testing phases, however the first testing process began with a couple of pilot unstructured exploratory studies with two of key practice informants heavily involved in their own implementations, where a number of unidentified elements were revealed and included in the interview protocol in the first data collection phase.

The first data collection phase interviewed ten key practice champions directly involved in their CDIS implementation. These champions were drawn from the known ten most successful practices (all had multiple CDIS implementations). The results provided by these implementation experts were important to further fine tune the emerging framework before testing it in the main data collection phase. The analysis provided strong evidence that the factors driving change (patient need was not tested) were somewhat different to the motivation provided by the awareness of defining the local chronic disease problem 'in their own setting', prompting the creation of a separate construct for this elements.

The analysis also revealed that, at the time of reviewing the practice capacity, a concurrent system design and analysis was performed. This was included in the Practice Capacity – Analysis and Design construct. A further discovery was the timing of the decision making process; occurring after a thorough analysis of all subsystems capacity and solutions was presented (mainly by the practice champion) to the GP Principal as business owners. This was seen as an important element, and was included as the initial process in the Chronic Disease Information System Implementation construct. The findings also provided some new directions to be added and tested in the main data collection interview protocol. The resulting revised framework is presented below (Table 77).



# Figure 77 - The Revised Framework

The main data collection phase then proceeded to test the revised framework (above) across twenty-six practices, purposely selected to represent the division's population distribution types (Rural, Semi-rural, Suburban) across the two main clinical software used (Medical Director and Spectrum/Practix). This included a further twenty-six new individuals (not interviewed before) from the four participant types identified in practices (GPs, Nurses, PMs and Staff). All constructs were tested and analysed to reveal new information to upgrade the framework even further.

The conclusion of the main data collection and analysis phase reveals a final total of seven constructs that appears to constitute the basis for the final CDIS implementation framework. By the end of the examination process, the first construct had now dropped the Patient Need element drawn from the literature, concentrating on highlighting the motivational forces that constitute their own sub-systems within the framework as validated by the participant's own views. The second construct, was confirmed strongly as being the local evidence-based/medical proof that practices need to introduce change. The third construct, Practice Capacity remained unchanged but revealed some further details of its internal workings. A fourth construct: Adoption corroborates the decision making process as being the key point in the process; where the uptake (and by apparent default adoption) of the CDIS occurs. The fifth construct is the practical Systems Implementation point where the actual hands-on implementation happens. The sixth construct is where Outcomes are measured. This key point in the process provides the necessary evidence for practices to realise gains in health and sub-systems outcomes. The seventh construct, the Feedback Channel is a reaction to the previous successful outcomes, where practices are so encouraged by results that they very quickly decide to uptake new CDISs. This Feedback Channel also represents the return to the same implementation (framework) process, as ratified by the study. The practice champion and the external agent to facilitate the process are also included in the framework as follows (Table 78):



Figure 78 - the Final Framework

# The contribution of Chronic Diseases Information Systems

While the focus of this thesis was to identify and develop an information system *framework* to support the prevention and management of chronic diseases in general practice —and hopefully this was achieved in this study; there is a more practical (implementation) aspect of this framework that lies beyond the academic aspect of the study. The introduction of each and every CDIS itself has, it will be argued contributed to general practice and ultimately to affect patient outcomes in one way or another. A number of data sources already reported throughout the thesis are summarised and presented next to highlight the practical contribution of CDIS for the benefit of the reader.

#### Number of CDISs implemented

At the end of the study (early 2008), more that seventy chronic diseases information systems were documented from the participant practices (Chapter Seven). These did no include other systems known to be set up in non-participating practices. It is perhaps worth reminding the reader that there were "no" computer assisted information systems prior to the implementation of this framework, before the study began (Chapter Four). This can be verified through government (Medicare) figures, where as reported in Chapter Seven, 84 percent of Division practices were participating in the PIP scheme for Cervical Screening by 2007 (Table 59 – CHGPN Cervical Screening Outcomes (SIPs) 2003-2007); Furthermore, 84 percent of practices were by 2007 participating in the PIP scheme for Diabetes (Table 60 - CHGPN Diabetes Outcomes (SIPs) 2003-2007); with a further 48 percent of practices in 2007 accessing the Asthma PIP (Table 61 - CHGPN Asthma Outcomes (SIPs) 2003-2007). It is worth reminding the reader that Medicare data are not particularly precise, nonetheless, it does largely support the findings in this study.

#### The success of CDIS implementation

It is worth reminding the reader that of the 28 participating practices studied, 20 or 72 percent of practices achieved multiple CDIS implementations successfully. A further 4 practices or 14 percent achieved at least one successful CDIS and had other CDIS working towards success; with the remaining 4 or 14 percent working towards success in at least one CDIS. More importantly, there were no practices left without a CDIS implementation.

Perhaps the best proof on the overall functionality of the framework, leading to sustainable adoptions can be found in Chapter Six (Table 39) where all key informants, heavily

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involved in the implementation process, agreed that the implementation had worked. Furthermore and already extensively explained in their own words by participants in Chapter Seven (under the heading Success and Achievements), the framework was perceived to be successful regardless of the benchmarks for success indicated.

#### The success of sub-systems in CDIS implementations

More important perhaps, was not just the overall success of the CDIS implemented, but also the clear satisfaction from respondents of having addressed all the sub-systems issues the framework set out to resolve. Although Chapter Seven provides multiple responses to support this point, it is perhaps better summarised by reiterating the following quote from one interviewed GP Principal:

Yes...I think definitely improved patient care, we certainly got much more of a team management structure, the fact that nurses manage their own, the medical staff gets involved in the framework, it's been quite a good vehicle for us, the fact that its given a new role for (our Nurse), actually gave her a good clinical role to go with , we certainly improved the bottom line, accreditation is due next year so we think were going to get the tick (of approval), risk management.... well I suppose it its part of it, we haven't got anyone suing us!!

GP-8-A

#### Health outcomes of CDIS

The ultimate measure of the value of this framework and of individual CDIS implementations is arguably outside the academic dimension to Information Systems (and therefore the scope of this thesis). It can be argued that ultimately, a CDIS is about preventing or improving the health of chronic disease sufferers. Direct health measures (improvements) would be almost impossible to achieve, as the implementation of information systems are not a set of single and/or definable interventions; and least of all in a controllable (laboratory type) environment where direct health outcomes are more likely to be measured. Nonetheless, some inferences can be made based on the known correlation between the degree of change (in a particular condition or risk factor) and its corresponding health outcome. For example, when it comes to CDIS for cervical Cancer, it was reported in Chapter One, that 101 females from 20 to 69 years of age (equivalent approx 40 percent of the whole population in Australia) were at risk of developing cervical cancer if not screened every two years. Therefore, any increment of about 101 females being screened for cervical cancer, would be catching the patient at an early stage of the disease's development leading to an almost certain and early cure without complications. It follows, bearing in mind that these are rough estimates from imperfect data, that if at the beginning of the implementation process the Division's rate of cervical screening cover was around 31% (approx 20.000 out of 64.000 20-69 females in the Division = 40% of the total population) in 2003 (

Table 16, Chapter Four), over a population of approximately 160,000 inhabitants (Chapter 4), and by the end of the study (2008) most practices had achieved the PIP benchmark or 50% (approx 32000) or greater (defined by their Medicare statements and confirmed during the study, Chapters Six and Seven), it can be inferred that at least an extra 12.000 (50%) more females were now being screened. It can then be inferred (12.000 divided by 101) that at least 118 females were prevented every two year from developing cancer complications and potential death.

The case for Diabetes CDIS without going into details, is somewhat similar. Internal division audits only recently completed, show that the use of Hba1c monitoring (blood test required to check Diabetes control) before the implementation of Diabetes CDISs was averaging around at a rate 43 percent across the Division (Daniel Carbone & Hoggan, 2008); that is, less than half of Diabetics were being monitored for control. By the end of the study, at least 20 out of the participating 28 practices (72%) had at some point reached the minimum Practice Incentives Programme (PIP) benchmark of 80% selected for the study. This is an increase in monitoring of at least 50 percent for the successful practices. Further corroboration can be seen through Medicare data as reported in Chapter Seven, Table 60.

#### **Other impacts of CDIS implementation**

Although, the outcomes presented above could be used to further infer a probable number of improvements in a number of economic and social burden indicators (like disability costs and early mortality), this is well outside the scope of this study and beyond the skills of the researcher. However, it provides fertile ground for a Post-Doctoral study.

# Future research: where to from here?

The final implementation framework, based on the literature, field experience and a number of testing iterations appears to be well supported by the overall analysis in this thesis. Moreover, the implementations themselves from where the framework was inferred were extremely and unusually successful, adding to the overall validity and reliability of the framework itself.

The post-thesis opportunities to improve the study are many. First, is to increase its external validity by further applying the theoretical framework in many other diverse health settings. Namely other general practices across many Divisions and states and ultimately in other health settings where cyclical care management paradigms might be used (Community Health Centres, Hospitals, private Allied Health Services and Specialist services, etc). This is of course not limited to the Australian context but can apply internationally as well.

Secondly, the need to study in much more depth the specific details of each construct in the framework. For example, there are the benefits of further understanding the specific personal characteristics of individuals in successful implementations (champions, GPs, Nurses, PMs, the external agent, etc). This should help build a much more detailed understanding of each element.

Thirdly, and in lieu on the practical, current and very useful nature of the framework, is to further document each step of the journey in a much more detailed way to capture the myriad of small practical details that were not possible to fit into this thesis. This will not only improve reliability, but also provide much more direction and guidance to individuals responsible for practical implementations in health settings.

This area of endeavour is very much at the forefront of information systems health research. The need to improve negative trends in health outcomes and budget expenditure —known to increase exponentially in the future, should strongly encourage the further examination of this framework in other health settings. The framework might need further advances to better explain its own context, and to further fine tune every construct in the framework and its applicability to any other comparable health issue. Overseas researchers could well adapt the learning from the framework to suit their own specific contexts.

#### The contribution of the present work

In 1976, Cherns (1976) recognised that socio-technical theory could only provide guiding questions that practitioners could use to orient themselves, but could not provide a blueprint for action (Cherns, 1976). The aim of this study was to test the concepts of newer system theory so as to achieve a better understanding of the conditions under which general practice's untested social-technical system could be integrated to develop an information system framework to support the prevention and management of chronic conditions as a blue print for action. The author believes that the contribution is self evident.

This blue print for action was developed by testing a number of constructs developed from the literature, field experience and new discoveries during the testing process. Along the way, new constructs were discovered; others were validated, strengthened or re-shaped to reflect the new understanding. Not only does the study contribute to the general Information System body of knowledge, but it also provides a 'usable' platform for other IS practitioners to introduce CDIS, successfully in their own health settings.

#### The Applicability of the Framework

The applicability of the framework by practice characteristic can perhaps be best inferred from the findings; where every practice characteristic in the CHGPN population was proportionally represented in the study. This included by rurality, the number of GPs (size of the practice) and the clinical software used to run the technical sub-system. Every one of those characteristics had successful (multiple adoptions) in this study. However, the small numbers involved from each category would make it difficult to claim wide and indisputable applicability.

The applicability of the framework by 'human characteristics' is perhaps a lot clearer; suggesting that only practices with administrative staff as 'implementation champions' are more likely to struggle with implementation. All other practices where there was a dedicated Practice Manager or Nurse were able to implement at least one and the majority has multiple implementations. In summary, the applicability of the framework appears to be only limited by the characteristics of the governance model existing in practices. However, this is yet to be tested in more strict hierarchical organisations where organisational structures might prevent potential and lower-hierarchy champions from contributing as they appear to have done in these organisations.

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# Limitations of the Study

The major limitations to this study are as follows:

#### External validity:

As explained in the methodology chapter, the findings were not meant to be generalisable to populations (the wider Australian general practice landscape) but generalisable to theoretical propositions (the final framework). The key rationale was the identification of the 'uniqueness' of every general practice precluding generalisations; hence the need for an implementation framework flexible enough to suit every uniqueness. Nevertheless, the inclusion of twenty eight practices; purposely selected to represent a wide variety of circumstances and achievement levels, and thirty six interviewees, representing forty one roles from all four major participant types might strengthen the case for generalisability to other general practices. However, it must be reinforced that the framework is meant to be *explanatory*, not *predictive*.

# Construct validity:

To establish correct operational measures for the concepts being studied, the researcher chose to use multiple sources of information to establish a chain of evidence. First and foremost, the evidence came from participants, not from just key informants but through the views of Champions, General Practitioners, Practice Managers, Nurses, and Staff from a variety of practices with varying success levels. The researcher, aware of his previous implementation role and the potential for bias, kept his own observations to a minimum, preferring to allow the participants' own voices to validate the findings. Australian Medicare documentation confirmed practices' success levels (outcomes achievements) and were further confirmed by the researcher during the interview process. Yet, some of this data could not be reproduced here as the practice Medicare data is private and it is not ethically responsible to divulge it. The reader is left to 'accept' or 'believe' the researcher's measures and observations. Ultimately, it is up to the reader to accept a researcher's credibility. It is hoped that enough information is presented to follow the study from development to how the conclusions were drawn.

#### Reliability:

The study is very broad and covers a vast array of field areas and concepts. It is probably not detailed enough to provide exhaustive information on the very specific or practical

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elements of this framework, especially as every implementation was completely different to the next. Hence the development of a *framework* rather than a much more limited *model* was sought in this study. Furthermore, this exploratory study has not made a strong distinction between a *preventative* framework versus a *management* framework. This is due to the exploratory nature of the study; however, this distinction would need to be further explored in the future to better analyse the potential differences between such frameworks.

# Confounders:

The only potential confounder identified in this study by the researcher (and it only affected Diabetes) was the introduction in 2006 of the National Primary Care Collaborative program within some of the practices in the population studied (CHGPN). A program that, borrowed the methodology developed by the IM/IT officer in this study to introduce much of the hands-on implementation. However, this program was not fully supported from an information systems perspective; instead it used other non defined approaches. The point to make here is that rather than a confounder that would improve the outcomes, and skew the results of the study; data from Medicare provided in Chapter Eight, Table 60, suggested exactly the opposite: In 2005, *before* the NPCC program started the CHGPN performance in comparison with other Victorian Divisions had peaked at 1<sup>st</sup> in outcomes with 59% and 3rd in SIPs at 86% in 2005. After the NPCC program was introduced these indicators dropped as can be see again in the following table (Table 79) already presented in Chapter Seven.

2003	2005	2006	2007	2003	2004	2005	2006	2007
Outcomes Payment			SIPs					
		%	%	% signed				
% practice	% practice	practice	practice	on	on	on	on	on
participation	participation	participa	participa	practices	practices	practices	practices	practices
		tion	tion	with SIPs				
*	*	*	*	*	90%	*	*	*
27%	*	*	*	*	86%	95%	88%	*
25%	*	*	*	*	81%	88%	88%	*
24%	*	75%	*	88%	81%	86%	85%	88%
21%	*	70%	81%	81%	81%	86%	84%	85%
20%	*	69%	70%	71%	78%	86%	81%	84%
20%	*	67%	63%	71%	78%	77%	78%	82%
20%	59%	63%	62%	70%	77%	76%	76%	81%
20%	57%	61%	60%	68%	76%	74%	75%	80%
20%	54%	60%	59%	67%	74%	73%	74%	76%
19%	54%	57%	57%	67%	73%	73%	74%	76%
19%	54%	57%	57%	67%	73%	72%	73%	76%
19%	53%	56%	56%	67%	71%	71%	73%	76%
19%	53%	56%	56%	67%	71%	70%	72%	74%
18%	52%	55%	55%	67%	67%	69%	72%	74%
18%	52%	54%	53%	66%	67%	68%	69%	73%
17%	50%	53%	52%	64%	66%	68%	68%	73%
17%	47%	53%	52%	63%	65%	67%	66%	72%
16%	44%	51%	51%	63%	65%	67%	65%	71%
16%	43%	50%	50%	63%	64%	67%	65%	68%
16%	42%	48%	50%	63%	63%	65%	64%	68%
16%	41%	48%	48%	61%	62%	64%	63%	66%
16%	40%	47%	48%	59%	60%	64%	62%	65%
15%	39%	43%	47%	59%	60%	64%	61%	65%
15%	39%	42%	44%	58%	60%	63%	60%	65%
15%	38%	42%	43%	56%	58%	63%	60%	63%
14%	36%	42%	41%	55%	57%	63%	58%	62%
14%	36%	37%	40%	54%	56%	60%	57%	62%
14%	33%	34%	36%	49%	49%	56%	50%	57%
14%	31%	32%	35%	47%	41%	49%	50%	50%

Figure 79 - CHGPN Diabetes Outcomes (SIPs) 2003-2007

# Potential Bias: The researcher's role as a participant/observer

As explained in the methodology chapter (Chapter 2), due to the pre-existing and continuing relationship of the IT/IM Division implementer, practices were observed for a number of years before, during and even after the study. The amount and type of observations from practice to practice varied considerably during this time. Observation could be counted in days per year in some practices or just a few hours in others, the role of the observer varied from a 'complete observer' to 'full participant' (Cherns, 1976). In this situation, and on a positive note, the observer/participant had the opportunity to perceive reality from the point of view of an insider; however, the researcher must be aware of the potential for bias. The investigator may become too closely involved and lose detachment, or assume advocacy roles detrimental to unprejudiced reporting (Glesne & Peshkin, 1992).

This situation had the potential to provide an unbalanced view of certain practice types. Therefore, and in order to avoid this potential bias, by the researcher/implementer as an observer, the documentation of observations was kept to a *very minimum* in the thesis, in preference for the interviewee's own direct point of view/answers to the relevant questions; and only used when there was a very explicit need to clarify interviewee responses or shed light on parts of the framework that needed specific clarification that could only be provided by these observations.

It was also hoped to dilute this potential for bias by using a larger number of general practices instead of a smaller number, where the potential for bias due to smaller number of observation could be accentuated. As Burns (1990) suggested, the use of a collection of many instances can be used to represent a *whole* case study (Burns, 1990). And, as was the case here, that the case study researcher can combine data collection sources such as archives, interviews, questionnaires and observations allowing them to accomplish descriptive studies, test theory or generate theory (Yin, 1994).

# What was not included in the Study

The following and very valid socio-technical tenets were well outside the scope of this study so they were not included: According to Land (2000) there are two sometimes conflicting set of values underlying much socio-technical thinking that this study was not able to investigate (Land, 2000): First, are the *Humanistic Values*: a belief in the importance of humanistic principles. The main task of the designer is to enhance the quality of working life and the job satisfaction of the employee. In turn, the achievement of these objectives will enhance productivity and yield added value to the organization. Although not specifically targeted, much in this regard has come through in the study as can be seen in Chapter Seven.

And likewise *Managerial Values*, in these respects socio-technical principles are merely instruments for achieving primarily economic objectives. Humanistic objectives have no value in themselves, but if their achievement produces a better performance from employees leading to the fulfilment of the economic objectives well and good. These economic objectives were not specifically targeted in this study, but their place in the framework as part of systems and sub-systems can be clearly inferred.

The other key emerging feature in chromic disease and general practice specifically is the organisational development and use of 'teams' and 'multi-disciplinary teams'. While relevant to some extent in the application of CDIS systems their operation in the study was not tested, but again they permeate much of the findings.

#### Implications for theory

The outcome of this study was the development of an information system framework to support the prevention and management of chronic conditions as a blueprint for action. The implication for theory is contained tacitly within the final framework, and overtly in the discussion chapter (Chapter 8). Nevertheless, the emerging interpretation from the findings is that the framework itself cannot be explained by existing socio-technical theory; nor by other common theories used in health. For example, and among the most commonly used theories in health, Rogers' (1995) generalisation that early users (adopters) of a new innovation set an example for peers (Hurley, Magarey, Kalucy, McIntyre, & Thomas, 2003; Stahl, 2007; Zeiss & Thompson, 2003) finds itself in trouble from the start on two accounts; one is that the quick rate and magnitude of adoption does not 'fit' Roger's much slower dissemination assertion; secondly, it fails to recognise that these adoptions were not a matter of choice or authoritative commands by external bodies, but of informed evidence-based decisions affected by active change management strategies (Chapter 8). The same can be said of the Tipping Point Theory used in the NPCC program (Gladwell, 2000); where a large cash carrot, including lavish wining and dining in expensive restaurants and five star hotel accommodation are perceived —at least in the author's view, to do much more for engagement and adoption (at least initially) to affect change than any environmental or power broker influence as suggested by Gladwell (2000). At the risk of stating the obvious, the key ingredient in this framework is the discovery of a new paradigm: the evidence-based (Patient Care) sub-systems as the centre piece of the framework, both as a motivational force to affect change management and as an outcome instrument to encourage further CDIS implementations. And although clinical evidence per se is commonly being used to affect change in clinicians, it has never been used in connection with CDIS implementation frameworks. These findings cannot be dismissed, as they alone point to the birth of a new emerging theory to supplement the myriad of information systems theoretical foundations already existing that do not fit the health context. This theory is by default health context-related and at the moment more specific to Australian general practices contexts.

#### Implications for policy and practice

Western health systems are aiming to shift the emphasis from acute care of chronic patients in hospitals to the prevention and management of chronic conditions in general practice

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(Gladwell, 2000). Now, more than ever, changing acute models of care used currently in general practice to more systematic and evidence-based clinical guidelines driven approaches is a major priority. These findings might help to achieve these priorities.

There are many lessons learnt from this study, but perhaps general practice will benefit the most from its findings. Already, a demonstrably large proportion of general practices have shown a pre-disposition, willingness and positive results to adapt to new information systems-driven chronic disease management and prevention approaches, or at least the majority of the population at CHGPN. However, it is policy makers that can make chronic disease improvements happen at a much faster and greater scale at the ground level. Specifically this included the Department of Health and Aging at the Federal Government level in charge of the Primary Care system (General Practice). Although they tried in the past, through the introduction of the Chronic Diseases Management (CDM) IT/IM officers program to improve chronic disease management through IT/IM solutions, the results were less than satisfactory. Unfortunately, they themselves had no 'blueprint' to guide the role and implementation processes for these officers in Divisions, resulting in many Divisions discontinuing the role as funding run out; and many not using the officers in CDM IT/IM functions.

Policy makers now have a blueprint in this thesis that appears to work successfully, and some Divisions already posses IT/IM specialists not found, or trained anywhere else in any other industry to support general practices introducing CDISs. This is achievable perhaps despite Divisions' demonstrated differences in the understanding of the value of information systems approaches to organisational development and program implementation (Sibbald, 2002.). This clear blueprint for action with substantial results to back it up might just help.

The author further believes that with little supplementary development, the same theoretical foundations could just as well be used in other health settings like Hospitals and Community Health Centres under the influence of State policy makers to support the same or similar outcomes. Information systems practitioners, familiar with general practice will easily be able to apply the framework with very little additional guidance.

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## APPENDICES

## Appendix A: Interview protocol samples

## Interview protocol – Pilot interviews (2 key informants)

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## Developing a Framework from past implementations

The purpose of this interview is to capture the views of those involved in past implementations of Information Systems in their own practices; reflecting and commenting on their own experiences to support, modify or deny the pre-emerging model based in the literature review.

## First round of interviews

## Setting the Scene and Open ended and semi-structured questions

A while ago this practice decided to implement an information system to deal with a perceived problem with: Cervical Screening

- 1. Was it clear what the health problem was?
- 2. What was your role in the Practice at the time of implementation?
- 3. How involved were you in setting it up?

#### **Testing the Factors Driving Change**

- 1. At the time of considering implementing this system, what were the broad motivating forces behind the implementation of the system?
- 2. Please expand on what you consider to be the practice's reasons (financial, patient care, -clinical, et), as well as the pressures you were under by external bodies (like insurers and government agencies), etc both pro and con) influences to introduce this system, at that time. Explain each.
- 3. How did you/your practice arrive at the conclusion that something needed to be done about this? Explain.
- 4. What, in your opinion, were the most influential individuals in supporting this system change? (GPs, Nurses, PM, Staff) Explain why? Would you consider them champions for the cause?
- 5. Did the Division play a role in motivating your practice/your self to look into implementing an Information System further?

6. Were there any other issues at the time driving this health problem?

## **Testing Practice capacity**

- 1. Did you have to purchase new Hardware/Software resources to implement the system? What? Why?
- 2. Did you have to employ new staff to use it? If yes explain why.
- 3. Were you aware at the time the system could be implemented using the existing resources? Explain.
- 4. How did you find out that you had all requirements to setup the system?
  - Did anyone help?
  - How?
- 5. Was the existing capacity (hardware and software) of the system enough to run it? Or did the capacity had to be increases? Who supported this? How much say did they have in resolving this issue?
- 6. Was there any other capacity (hardware, software, infrastructure, etc) issue you'd like to comment on about this?

## **Testing the Development and Implementation Cycle**

1. Who did the system analysis at that time? Were any other individuals capable of doing the analysis at the practice at the time? Could they have done it? If not, why not?

For example:

- Searching the database at the practice,
- Looking at practice specific population health data,
- Other?
- 2. If you were involved in designing it, how was the system designed to function:
  - Briefly explain
    - i. Were there goals set to be achieved?
  - Who would run it? Were they involved in designing and implementing it?
  - How did the practice arrive at these decisions? (Who made the decisions?)
  - Who was involved in designing it?
  - Was the champion involved?
  - What role did the Division play?
    - i. Were you encouraged to look into various models?
    - ii. Were nurse roles encouraged?
    - iii. Were GPs involved in the process at some stage?

- 3. Who run/drove the Implementation process? The champion?
- 4. Were there major or minor changes to workflows?
  - i. GPs
  - ii. Nurses
  - iii. Staff
  - iv. Others?
- 5. How they did they react to them?
- 6. How complex was it for them to use it? Was it different for everyone (for example: easy some and very difficult for others?
- 7. Did everyone adopt the system straight away? did it last? Please explain.
- 8. Did your practice ever discuss outcomes after a period of use?
  - What kind of data was used? Any anecdotal evidence?
  - What was the conclusion? Or, as an alternative, is it too early to tell?
    - i. Did it work?
    - ii. Were the outcomes worth it?
    - iii. What were they?
    - iv. What did others think of it?
  - Did outcomes encourage the further development of other systems? Explain.

#### **Overall Summary**

- 9. Overall, would you say that the system:
  - Produced improvements to the health problem?
  - Improved financial outcomes?
  - Risk management outcomes?
  - Other, explain
- 10. In hindsight, what would you have done differently?
- 11. Comments

## Interview protocol – First data collection (Ten practice champions)

\_\_\_\_\_

### **Developing a Framework from past implementations**

The purpose of this interview is to capture the views of those involved in past implementations of Information Systems in their own practices; reflecting and commenting on their own experiences to support, modify or deny the pre-emerging model based in the literature review.

A while ago this practice decided to implement an information system to deal with a perceived Chronic Condition problem:

Cervical Screening Diabetes Asthma Other

- 4. What was your role in the Practice at the time of implementation?
  - a. PM
  - b. Nurse
  - c. Staff
  - d. GP
  - e. other
- 5. How involved were you in setting it up?
  - a. None
  - b. Little
  - c. Somewhat
  - d. Very

## **Testing the Factors Driving Change**

- 7. How did you/your practice arrive at the conclusion that something needed to be done about this? Explain and rank by perceived importance.
  - a. Though PIP Payments Not achieving the outcome payments
  - b. Risk management issues
  - c. Division data feedback highlighting problem
  - d. GP's special interest in this issue
  - e. Other:
- 8. Please expand on what you consider to be the practice's reasons (financial, patient care, -clinical, et), as well as the pressures you were under by external bodies (like insurers and government agencies), etc both pro and con) influences to introduce this system, at that time. Explain or rank each.
  - a. Patient Care
  - b. Financial (PIPs)

- c. Wanted to involve/include other staff
- d. Risk Management issues
- e. Insurance incentives (for minimizing risk)
- f. Government influence
- g. Accreditation issues/bodies
- h. Division Influence/Support
- i. Other
- 9. Practice Champions: What, in your opinion, were the most influential individuals in supporting this system change? Can you suggest a ranking order?
  - a. GP Principal
  - b. GP Special interest
  - c. Nurses
  - d. PM
  - e. Staff
  - f. Division IM Support
- 10. Did the Division play a role in motivating your practice/your self to look into implementing an Information System further? For example:
  - a. IT/IM support
  - b. Risk Management Workshops
  - c. PM network
  - d. other
- 11. Were there any other issues at the time driving this health problem?

#### **Testing Practice capacity**

- 7. Did you have to purchase new Hardware/Software resources to implement the system? What? Why?
  - Yes
  - No
  - Over time had to be updated
- 8. Did you have to employ new staff to use it? If yes explain why.
  - Yes
  - No
- 9. Were you aware at the time the system could be implemented using the existing resources?
  - Yes
  - No
- 10. How did you find out that you had all requirements to setup the system?
  - Called the software company
  - Talked to other practices using the same system (networking)

- IT/IM help from the Division
- Other
- 11. Was there any other capacity (hardware, software, infrastructure, etc) issue you'd like to comment on about this?
  - Lack of extra PC to carry out R&R
  - Lack of room
  - other

## **Testing the Development and Implementation Cycle**

- 12. Who did the system analysis at that time? For example: Searching the database at the practice, looking at practice specific population health data, etc.
  - PM
  - GP
  - Staff
  - Division IT/IM support
  - Other third party
- 13. Were any other individuals capable of doing the analysis at the practice at the time?
  - Yes / No
  - If you were involved in designing it, were there goals set to be achieved? For example:
    - Maximize screening rates
    - Set % of females screened by X
    - Not really.
  - How did the practice arrive at these decisions? (Who made the decisions?)
    - GP-Principal/s,
    - PM
    - PM & GP-Principals
    - Whole practice team (inc. Staff & Nurses)
  - Who was involved in designing the system?
    - PM
    - GP
    - Nurse
    - Staff
    - Division IT/IM support
  - Was the champion involved?
    - Little
    - Somewhat

- Very much
- What role did the Division play?
  - Encouraged the practice to look into various models?
  - Nurse roles were encouraged?
  - Encouraged a whole practice approach (involving everyone)?
- 14. Who drove the Implementation process? The champion? Y/N
  - PM Nurse GP-Principal Staff
  - Who would run the Recall & Reminders?
    - Staff
    - Nurse
    - PM
    - GP

Were they involved in designing and implementing it?

- Yes / No
- 15. Were there major or minor changes to workflows? for example:
  - GPs,
  - Staff,
  - PM,
  - Nurses
- Roster changes
- Increased workflows Training needed – IT/IM - Clinical
- Other

- 16. How complex was it for them to use it?
  - Easy
  - Somewhat difficult
  - Very hard
- 17. Did everyone adopt the system straight away? Explaine Yes/No
- 18. Did it last? How long now? Please explain. Yes/No -----Years/Months

#### Outcomes

- 19. Did your practice ever discuss outcomes after a period of use?
  - Yes / Not
- 20. What kind of data was used?
  - Division data feedback
  - Practice own database search
  - PIP payment receipts
  - Anecdotal evidence
- 21. What was the conclusion?
  - i. Did it work?
    - Yes /No
  - ii. What were they?
    - 1. Patient Care
      - 2. Financial (PIPs)
      - 3. Wanted to involve/include other staff
      - 4. Risk Management
      - 5. Insurance incentives (for minimizing risk)
      - 6. Government influence
      - 7. Accreditation issues/bodies
      - 8. Other
  - Did outcomes encourage the further development of other systems? Explain.
    - Yes / No
- 22. In hindsight, what would you have done differently?
- 23. Any Comments?

## Interview protocol – Type A - GP Principals (main data collection phase)

## Target: type A, 7 GP principals

#### Setting the scene

I would like to thank you for providing me the opportunity to access you time for my study. Please read and sign the VU consent form.

I will be taping interview to avoid lengthening the interview more than desired. Can you state your name and role at the practice?

As you are well aware, number of Information Systems for dealing with the prevention and management of chronic conditions were adopted at your practice over the last few years. *Can we please confirm which ones?* 

Have you reach PIP outcomes for any of them?

Cervical Screening, Diabetes, Asthma, Others: Heamochromatosis, arthritis, CVD, etc.

#### Introduction to PhD study

My study is about developing theory on why Information Systems for Chronic Disease Management and Prevention were adopted is such a large scale at CHGPN over the past few years. Successful adoptions of Information System in health are a rare occurrence. Out of a literature review and my own observations a graphical emerging generic framework was devised and tested in very successful implementations. Those interviewed were perceived Practice Champions heavily involved in the implementation process. This second lot of data collection I am looking for validation, to be able to compare results, of those findings through Practice Principals. *Can you name the champion or champions (if any) in your practice that you consider were the driving forces behind the implantation of these systems? Are you aware of the Division's IT/IM role (mine), in the implementation process?* 

Four sections or stages within the framework were identified that appears to mimic the implementation process, which I will proceed to test with you.

#### Stage one: Factors driving change

**In previous data collection phase a number of motivational factors were identified and ranked according to their perceived importance at the time of implementation. Q1a -** *Can you please rank the following (un-ranked) motivational forces according to* 

your views at the time of implementation, and please add or expand on any comments or thoughts on the matter?

Accreditation issues/bodies Financial (PIPs) Risk Management issues Government influence Wanted to involve/include other staff Patient Care Division Influence/Support Insurance incentives (for minimizing risk) Other – can you please explain?

One issue that was not tested, but well understood in the literature is the influence that "Patients" themselves put on decision makers.

**Q1b** – *Did patients influence you to uptake systematic approaches? Please explain if so.* (What were your views, thoughts, experiences, beliefs at the time?)

Stage two: Chronic Disease Problem Definition:

# One of the outcomes of the first data collection was the importance placed on "the practice's own data feedback" to fully understand why systematic approaches need to be taken up at your practice.

Q2a – Do you recalled being presented with data feedback on the Chronic Disease issue? Q2b – By whom? PM, Nurse, Div IT/IM officer, other?

Q2c – How important would you rank this feedback in terms of motivation to change to more systematic care of that Chronic Disease.

Extremely, Very important, somewhat important, not so important, not at all. Please explain your answer.

## I would like now to show you the framework in graphic format for you to comment on the notion that is was your own data feedback that produced the most important kind of motivation for introducing a systematic approach.

Q2d - What are your thoughts of the diagram to this point?

Q2e - Do you agree with the prominent place that your practice champion and the IT/IM officer have in it so far?

Stage three: Practice Capacity, Analysis and Design

The literature clearly concedes that the lack of capability of computers and software, and resources like staff, infrastructure (rooms), among others; are all perceived as barriers to adopting Information Systems.

One of the common themes of the previous interviews was that, at the time of the first implementation, most of those heavily involved were not aware of the capacity or resources needed to setup such systems.

Q3a – at the time of the first adoption, were "you" aware of the resources needed to adopt chronic disease Information Systems? Can you recall and explain?

Q3b – that capacity and resources already existed at the practice was a common theme among interviewees. Was this how you saw it? Can you explain?

Q3c - Was the IT/IM Division officer prominent in making the practice aware of it?

### Practice champions were shown a variety of systematic implementation models to bring to you for decision making. For example: nurse centred models, GP only models, with staff involved in variety of ways in the system.

Q3d - Were you presented with a few options to decide on?

## About the design of the model that was eventually adopted

Q3e – How was the model developed, was it your idea, did you take the practice champion or Division IT/IM person's advise, or a team effort? who were involved in designing it? Please comment.

Q3f - One of the outcomes of the first lot of interviews was the notion that once the shape of the system was developed, that the decision was made there and then to adopt it. Was this the case with your practice? Explain.

Q3g – Who made the decision to adopt it: GP Principals, PM, Whole team, can you explain?

## If you look at the framework up to this stage

This framework assumes that once you were aware of the problem, the capacity issues were already sorted and you have a few choices that suited the practice, that then you were able to make an informed decision on the best model to use.

Q3h - Was that the case here? Does it reflect so far how things developed at your practice?

Stage four: Chronic Disease Information System Implementation

In most practices the intention, of the Division IT/IM person was that most of the 'hands on' CDIS implementation would be carried out in the background with minimum disruption to your work.

Q4a – Was that the case here?, do you think that it is a good approach? Why/why not? Q4b - once the CDIS system was implemented, how easy was it to use? Q4c - Did it become easier to use over time?

Q4d - How long did it take to become comfortable with the system (if at all)? Please explain.

## Show this section of the framework

## One key feature of the framework as it relates to a health setting is the need to measure health outcomes.

Q4e - Do you consider the CDIS to have been successful? Some of the perceived outcomes identified by the practice champions were: do you agree with them? What we the most important to you? Financial (PIPs) Risk Management Insurance incentives (for minimizing risk) Patient Care Government influence Accreditation issues/bodies Wanted to involve/include other staff Other

Q4f - How did you determine the success? For example, practice champions said that they used: Do you agree? Division data feedback Practice own database search PIP payment receipts Anecdotal evidence

Q4g - Most of the Practice Champions agreed that we should have formalised the outcomes measurement? Do you agree with their statement, if so how?

Other Chronic Conditions

## In your particular practice you have succeeded in PIP outcomes in a number of Chronic Disease Systems

Q5 - This framework assumes that the success in this implementation encouraged the practice to take on a new chronic disease, is that assumption correct? Did success with the

first one encourage the practice to implement subsequent ones? Please explain your answer.

Q5a - Did the take up of the next chronic conditions follow a similar path as that shown in the framework? Explain please.

Q5b - 2 - What were the differences (if any)?

Q5c - If you had subsequent CDIS installed, was it easier to become familiar with those? Please explain.

Q5d – do you think your practice will keep implementing new CDIS in the future?

## Interview Protocol – Type B (Main data collection phase)

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**Target: Type B, 3 GP principals & 3 Champs/Contact person, total 6 interviews** Setting the scene

I would like to thank you for providing me the opportunity to access you time for my study. Please read and sign the VU consent form.

I will be taping interview to avoid lengthening the interview more than desired. Can you state your name and role at the practice?

Introduction to PhD study

My study is about developing theory on why Information Systems for Chronic Disease Management and Prevention were adopted is such a large scale at CHGPN over the past few years. Successful adoptions of Information System in health are a rare occurrence. Out of a literature review and my own observations a graphical emerging generic framework was devised and tested in very successful implementations. Those interviewed were perceived Practice Champions heavily involved in the implementation process. This second lot of data collection I am looking for validation, to be able to compare results, of those findings through Practice Principals and Champions in other practices.

As you are aware, number of Information Systems for dealing with the prevention and management of chronic conditions were adopted at your practice over the last few years. Your practice in particular, set up Cervical Screening systems a while ago. The reason for this interview is that it been noticed that even though your practice never achieved PIP outcomes in Cervical Cancer Screening, the practice still went on to set up other Chronic Disease Information Systems.

*Can we please confirm which ones?* Diabetes, Asthma, Others: Heamochromatosis, arthritis, CVD, etc.

Did you achieve PIP outcomes for any of them?

Can you name the champion or champions (if any) in your practice that you consider were the driving forces behind the implantation of these systems?

Are you aware of the Division's IT/IM role (mine), in the implementation process?

What I would like to do today is to run past you the already emerging framework and confirm some of the factors and assumptions in it.

Stage one: Factors driving change

## In previous data collection phase a number of motivational factors were identified and ranked according to their perceived importance at the time of implementation.

**Q1a** - Can you please rank the following (un-ranked) motivational forces according to your views at the time of implementation, and please add or expand on any comments or thoughts on the matter?

Accreditation issues/bodies Financial (PIPs) Risk Management issues Government influence Wanted to involve/include other staff Patient Care Division Influence/Support Insurance incentives (for minimizing risk) Other – can you please explain?

## One issue that was not tested, but well understood in the literature is the influence that "Patients" themselves put on decision makers.

**Q1b** – *Did patients influence you to uptake systematic approaches? Please explain if so.* (*What were your views, thoughts, experiences, beliefs at the time?*)

Stage two: Chronic Disease Problem Definition:

One of the outcomes of the first data collection was the importance placed on "the practice's own data feedback" to fully understand why systematic approaches need to be taken up at your practice.

Q2a – Do you recalled being presented with data feedback on the Chronic Disease issue? Q2b – By whom? PM, Nurse, Div IT/IM officer, other?

Q2c – How important would you rank this feedback in terms of motivation to change to more systematic care of that Chronic Disease.

Extremely, Very important, somewhat important, not so important, not at all. Please explain your answer.

## I would like now to show you the framework in graphic format for you to comment on the notion that is was your own data feedback that produced the most important kind of motivation for introducing a systematic approach.

Q2d - What are your thoughts of the diagram to this point? Q2e - Do you agree with the prominent place that your practice champion and the IT/IM officer have in it so far?

Stage three: Practice Capacity, Analysis and Design

The literature clearly concedes that the lack of capability of computers and software, and resources like staff, infrastructure (rooms), among others; are all perceived as barriers to adopting Information Systems.

One of the common themes of the previous interviews was that, at the time of the first implementation, most of those heavily involved were not aware of the capacity or resources needed to setup such systems.

Q3a – at the time of the first adoption, were "you" aware of the resources needed to adopt chronic disease Information Systems? Can you recall and explain?

Q3b – That capacity and resources already existed at the practice was a common theme among interviewees. Was this how you saw it? Can you explain?

Q3c - Was the IT/IM Division officer prominent in making the practice aware of it?

## Practice champions were shown a variety of systematic implementation models to bring to you for decision making. For example: nurse centred models, GP only models, with staff involved in variety of ways in the system.

Q3d - Were you presented with a few options to decide on?

## About the design of the model that was eventually adopted

Q3e – How was the model developed, was it your idea, did you take the practice champion or Division IT/IM person's advise, or a team effort? who were involved in designing it? Please comment.

Q3f - One of the outcomes of the first lot of interviews was the notion that once the shape of the system was developed, that the decision was made there and then to adopt it. Was this the case with your practice? Explain.

Q3g – Who made the decision to adopt it: GP Principals, PM, Whole team, can you explain?

If you look at the framework up to this stage

This framework assumes that once you were aware of the problem, the capacity issues were already sorted and you have a few choices that suited the practice, that then you were able to make an informed decision on the best model to use.

Q3h - Was that the case here? Does it reflect so far how things developed at your practice?

Stage four: Chronic Disease Information System Implementation

In most practices the intention, of the Division IT/IM person was that most of the 'hands on' CDIS implementation would be carried out in the background with minimum disruption to your work.

Q4a – Was that the case here?, do you think that it is a good approach? Why/why not? Q4b - once the CDIS system was implemented, how easy was it to use?

Q4c - Did it become easier to use over time?

Q4d - How long did it take to become comfortable with the system (if at all)? Please explain.

## Show this section of the framework

## One key feature of the framework as it relates to a health setting is the need to measure health outcomes.

Q4e - Do you consider the CDIS to have been successful? Some of the perceived outcomes identified by the practice champions were: do you agree with them? What we the most important to you? Financial (PIPs) Risk Management Insurance incentives (for minimizing risk) Patient Care Government influence Accreditation issues/bodies Wanted to involve/include other staff Other

Q4f - How did you determine the success? For example, practice champions said that they used: Do you agree? Division data feedback Practice own database search PIP payment receipts Anecdotal evidence

Q4g - Most of the Practice Champions agreed that we should have formalised the outcomes measurement? Do you agree with their statement, if so how?

## **Specific for type B practices**

In your particular practice you have succeeded in some PIP outcomes in a number of Chronic Disease Systems but not on others.

*Qb1* - *Why do you think you did not reach the PIP outcome for cervical screening as others did? Please explain* 

*Qb2- Do you think your reasons fit the framework developed? Qb3 -*

Other Chronic Conditions

Q5 - This framework assumes that the success in this implementation encouraged the practice to take on a new chronic disease, is that assumption correct? Did success with the first one encourage the practice to implement subsequent ones? Please explain your answer.

Q5a - Did the take up of the next chronic conditions follow a similar path as that shown in the framework? Explain please.

Q5b - 2 - What were the differences (if any)?

Q5c - If you had subsequent CDIS installed, was it easier to become familiar with those? Please explain.

Q5d – do you think your practice will keep implementing new CDIS in the future?

## Interview Protocol – Type C (Main Data Collection)

#### Target: type C, 5 champion or contacts

#### Setting the scene

I would like to thank you for providing me the opportunity to access you time for my study. Please read and sign the VU consent form.

I will be taping interview to avoid lengthening the interview more than desired. Can you state your name and role at the practice, please?

As you are aware, your practice adopted a Cervical Screening Information Systems over the last few years.

The reason for this interview is that it been noticed that your practice never achieved PIP outcomes in Cervical Cancer Screening. *Is that correct?* 

Is it still functioning?

*Have you set up any others? Which ones?* Diabetes, Asthma, Others: Heamochromatosis, arthritis, CVD, etc.

#### Introduction to PhD study

My study is about developing theory on why Information Systems for Chronic Disease Management and Prevention were adopted is such a large scale at CHGPN over the past few years. Successful adoptions of Information System in health are a rare occurrence. Out of a literature review and my own observations a graphical emerging generic framework was devised and tested in very successful implementations. Those interviewed were perceived Practice Champions heavily involved in the implementation process. This second lot of data collection I am looking for validation, to be able to compare results, of those findings through Practice Principals and Champions in other practices.

Can you name the champion or champions (if any) in your practice that you consider were the driving forces behind the implantation of these systems?

Are you aware of the Division's IT/IM role (mine), in the implementation process? What I would like to do today is to run past you the already emerging framework and confirm some of the factors and assumptions in it.

#### Stage one: Factors driving change

In previous data collection phase a number of motivational factors were identified and ranked according to their perceived importance at the time of implementation. Q1a - Can you please rank the following (un-ranked) motivational forces according to your views at the time of implementation, and please add or expand on any comments or

thoughts on the matter?

Accreditation issues/bodies Financial (PIPs) Risk Management issues Government influence Wanted to involve/include other staff Patient Care Division Influence/Support Insurance incentives (for minimizing risk) Other – can you please explain?

## One issue that was not tested, but well understood in the literature is the influence that "Patients" themselves put on decision makers.

**Q1b** – *Did patients influence you to uptake systematic approaches? Please explain if so.* (*What were your views, thoughts, experiences, beliefs at the time?*)

## Stage two: Chronic Disease Problem Definition:

One of the outcomes of the first data collection was the importance placed on "the practice's own data feedback" to fully understand why systematic approaches need to be taken up at your practice.

Q2a – Do you recalled being presented with data feedback on the Chronic Disease issue? Q2b – By whom? PM, Nurse, Div IT/IM officer, other?

Q2c – How important would you rank this feedback in terms of motivation to change to more systematic care of that Chronic Disease.

Extremely, Very important, somewhat important, not so important, not at all. Please explain your answer.

## I would like now to show you the framework in graphic format for you to comment on the notion that is was your own data feedback that produced the most important kind of motivation for introducing a systematic approach.

Q2d - What are your thoughts of the diagram to this point?

Q2e - Do you agree with the prominent place that your practice champion and the IT/IM officer have in it so far?

## Stage three: Practice Capacity, Analysis and Design

The literature clearly concedes that the lack of capability of computers and software, and resources like staff, infrastructure (rooms), among others; are all perceived as barriers to adopting Information Systems.

One of the common themes of the previous interviews was that, at the time of the first implementation, most of those heavily involved were not aware of the capacity or resources needed to setup such systems.

Q3a – at the time of the first adoption, were "you" aware of the resources needed to adopt chronic disease Information Systems? Can you recall and explain?

Q3b – That capacity and resources already existed at the practice was a common theme among interviewees. Was this how you saw it? Can you explain?

Q3c - Was the IT/IM Division officer prominent in making the practice aware of it?

#### Practice champions were shown a variety of systematic implementation models to bring to you for decision making. For example: nurse centred models, GP only models, with staff involved in variety of ways in the system.

Q3d - Were you presented with a few options to decide on?

## About the design of the model that was eventually adopted

Q3e – How was the model developed, was it your idea, did you take the practice champion or Division IT/IM person's advise, or a team effort? Who were involved in designing it? Please comment.

Q3f - One of the outcomes of the first lot of interviews was the notion that once the shape of the system was developed, that the decision was made there and then to adopt it. Was this the case with your practice? Explain.

Q3g – Who made the decision to adopt it: GP Principals, PM, Whole team, can you explain?

## If you look at the framework up to this stage

This framework assumes that once you were aware of the problem, the capacity issues were already sorted and you have a few choices that suited the practice, that then you were able to make an informed decision on the best model to use.

Q3h - Was that the case here? Does it reflect so far how things developed at your practice?

## **Stage four: Chronic Disease Information System Implementation**

In most practices the intention, of the Division IT/IM person was that most of the 'hands on' CDIS implementation would be carried out in the background with minimum disruption to your work.

Q4a – Was that the case here? do you think that it is a good approach? Why/why not? Q4b - once the CDIS system was implemented, how easy was it to use? Q4c - Did it become easier to use over time?

 $\widetilde{Q4d}$  - How long did it take to become comfortable with the system (if at all)? Please explain.

## Show this section of the framework

## One key feature of the framework as it relates to a health setting is the need to measure health outcomes.

Q4e – Even though you never reached the PIP outcomes, do you consider the CDIS to have been successful?

Some of the perceived outcomes identified by the practice champions were: do you agree with them? What we the most important to you? Financial (PIPs) Risk Management

Insurance incentives (for minimizing risk) Patient Care Government influence

Accreditation issues/bodies

Wanted to involve/include other staff

Other

Q4f - How did you determine the success? For example, practice champions said that they used: Do you agree? Division data feedback Practice own database search PIP payment receipts Anecdotal evidence

Q4g - Most of the Practice Champions agreed that we should have formalised the outcomes measurement? Do you agree with their statement, if so how?

## Specific for type C practices

## In your particular practice you have succeeded in some PIP outcomes in a number of Chronic Disease Systems but not on others.

*Qb1* - Why do you think you did not reach the PIP outcome for cervical screening as others did? Please explain

*Qb2- Do you think your reasons fit the framework developed? Can you explain? Qb3 – Why did you not set up any other system (if haven't?) if yes next questions....* 

## **Other Chronic Conditions (ONLY IF DEVELOPED ANOTHER CDIS)**

Q5 - This framework assumes that the success in this implementation encouraged the practice to take on a new chronic disease, is that assumption correct? Did success with the first one encourage the practice to implement subsequent ones? Please explain your answer.

Q5a - Did the take up of the next chronic conditions follow a similar path as that shown in the framework? Explain please.

Q5b - 2 - What were the differences (if any)?

Q5c - If you had subsequent CDIS installed, was it easier to become familiar with those? Please explain.

Q5d – do you think your practice will keep implementing new CDIS in the future?

## Interview protocol – Type D (Main Data Collection)

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Target: type D, 5 champs or contacts

#### Setting the scene

I would like to thank you for providing me the opportunity to access you time for my study. Please read and sign the VU consent form.

I will be taping interview to avoid lengthening the interview more than desired.

Can you state your name and role at the practice, please?

My understanding is that your practice has not adopt any Chronic Disease Information System.

Is that correct?

If yes keep going, if no go tot type C interview.

## Introduction to PhD study

My study is about developing theory on why Information Systems for Chronic Disease Management and Prevention were adopted is such a large scale at CHGPN over the past few years. Successful adoptions of Information System in health are a rare occurrence. Out of a literature review and my own observations a graphical emerging generic framework was devised and tested in very successful implementations. Those interviewed were perceived Practice Champions heavily involved in the implementation process. This second lot of data collection I am looking for validation, to be able to compare results, of those findings through Practice Principals and

Champions in other practices.

Can you name a champion or champions (if any) in your practice that could drive the implementation of Chronic Disease Information Systems?

Are you aware of the Division's IT/IM role (mine), in supporting the implementation process?

What I would like to do today is to show you the already emerging framework in schematic/graphic format and confirm some of the factors and assumptions in it.

I'll be explaining the factors and process for you to comment on what is different of your practice.

- •Champions & IT/IM Support
- •Stage one: Factors driving change
- •Stage two: Chronic Disease Problem Definition:
- •Stage three: Practice Capacity, Analysis and Design
- •Stage four: Chronic Disease Information System Implementation
- •Outcomes:
- •Feedback Channel

#### Specific for type C practices

## In you particular practice you have succeeded in some PIP outcomes in a number of Chronic Disease Systems but not on others.

*Qb1* - *Why do you think you did not ever implemented and Chronic Disease Information System?. Please explain* 

*Qb2- Do you think your reasons fit the framework developed? Can you explain?* Q5d – *do you think your practice will keep implementing new CDIS in the future?*