SHOW ME THE VALUE: BENEFITS OF CERTIFICATION TO ISO/IEC 20000-1:2005 WITHIN AN AUSTRALIAN GOVERNMENT ORGANIZATION

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ABSTRACT

Organizations making large investments in implementing and adopting standards and frameworks desire information showing how these investments benefit their organization. This research aims to answer the question 'How does the attainment of certification against the ISO/IEC 20000 Service Management standard provide benefit to an Australian government organization?'

A systematic review of available literature shows that there is very little academic research about ISO/IEC 20000. The review conducted in this dissertation seems to be the first in depth review of the ISO/IEC 20000 literature. It found that there is no consolidated list of benefits for certification to the international standard for service management. The benefits that are listed in the standard and in the available relevant professional literature are logical but have not been tested in context.

This dissertation presents a list of six benefits of ISO/IEC 20000 certification consolidated from previous studies and research: (1) increased service levels, (2) better credibility and trust, (3) enriched staff commitment, (4) reduced costs, (5) developed processes and (6) improved compliance. This list of six benefits can be used as a starting point by all researchers exploring the benefits of ISO/IEC 20000 certification.

The case study research method is used to present the first academic study of the IT Service Management (ITSM) implementation of ISO/IEC 20000 in a single Australian government organization. The organization was analysed to determine whether such an exploratory protocol could be used by later researchers investigating a similar organization.

The research looks in detail at the quantifiable effects of ISO/IEC 20000 upon service levels. Whilst service levels in the organization were not affected, there was some apparent value from independent assessment against the requirements in ISO/IEC 20000-1 for the areas of compliance, staff motivation and processes. This significant finding suggests a replicable system of measurement and analysis that can be used in further studies.

RESUMO (PORTUGUÊS)

Organizações que estão a fazer grandes investimentos na implementação e adoção de padrões e estruturas desejam informações mostrando como estes investimentos beneficiam a sua organização. Esta pesquisa visa responder à pergunta "Como é que a obtenção da certificação de acordo com a norma de gestão de serviços, ISO / IEC 20000, oferece benefícios para um organismo governamental na Austrália?

Uma revisão sistemática da literatura disponível mostra que há muito pouca pesquisa académica sobre a norma ISO/IEC 20000. A revisão levada a cabo nesta dissertação parece ser a primeira revisão profunda sobre a literatura da norma ISO/IEC 20000. A pesquisa feita mostra que não há uma lista precisa dos benefícios para a certificação para os padrões internacionais de gestão de serviços. Os benefícios que estão listados na norma e na literatura da área profissional são lógicos, mas não têm sido testados em contexto.

Esta dissertação apresenta uma lista de seis benefícios da certificação para a norma ISO/IEC 20000 recolhida a partir de estudos e pesquisas anteriores: (1) aumento dos níveis de serviço, (2) melhor credibilidade e confiança, (3) fomentar o compromisso dos funcionários, (4) redução de custos, (5) desenvolvimento dos processos e (6) melhorar o cumprimento das regras. Esta lista de seis benefícios pode ser usada como um ponto da partida para todos os investigadores que exploram os benefícios da certificação da norma ISO/IEC 20000.

O método de investigação do estudo de caso (Case Study Research) é utilizado para apresentar o primeiro estudo académico do gerenciamento de serviços de Tecnologia da Informação (ITSM) implementação de ISO/IEC 20000 num organismo governamental da Austrália. A organização foi analisada para determinar se este protocolo exploratório poderá ser usado por futuros investigadores que pretendam estudar organizações similares.

A pesquisa foca em detalhe os efeitos quantificáveis da norma ISO/IEC 20000 nos níveis de serviço. Enquanto que os níveis do serviço na organização não foram afetados, houve alguns valores observáveis da avaliação independente contra os requisitos na norma ISO/IEC 20000-1 para as áreas de cumprimento das regras, motivação de pessoal e processos. Este importante resultado sugere um sistema de medida e análise replicável que pode ser usado em estudos futuros.

KEYWORDS

ISO 20000, ISO/IEC 20000, ISO/IEC 20000-1, Service Management, ITSM, Information Technology Service Management, International Standards, Service Levels, Benefit, Value, Return on Investment, IT, Australia, Government

PALAVRAS-CHAVE (PORTUGUÊS)

ISO 20000, ISO/IEC 20000, ISO/IEC 20000-1, gestão de serviços, ITSM, gerenciamento de serviços de Tecnologia da Informação, Normas Internacionais, níveis de serviço, benefício, valor, retorno dos investimentos, rendibilidade dos investimentos, TI, Austrália, governo, governamental

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PREFACE

I had the rare pleasure of working in one of the seven Australian organizations[1] certified against the ISO/IEC 20000 standard. As a certified IT Infrastructure Library (ITIL) expert, I worked as the incident and problem manager for the organization and was responsible for representing these two processes at the yearly ISO/IEC 20000 recertification audits. Many employees did not see value in ISO/IEC 20000 certification and many asked 'why bother?'. A new Chief Information Officer (CIO) took control of the organization and he wisely asked the question, 'What benefit does this certification provide the organization?'

Of the seven Australian certified organizations, three are government agencies. Considering that most consider the main benefit of independent assessment is increasing customer trust in the organization and so providing a degree of competitive advantage, this led me to consider why have these agencies found value in ISO/IEC 20000 certification? Does it help change culture? Does it focus the organization? As an internal supplier does it satisfactorily demonstrate the Chief Information Officer's focus on service management to the business? Does it improve the quality of service the IT shop provides? Does a government agency realize value through its internal IT supplier being certified to ISO/IEC 20000? These are all valid questions, but no questions to which I could find answers.

In many instances ISO/IEC 20000 certification is a requirement placed on service organizations that wish to submit tenders for contracts. Van Bon and van Selm (2008) studied a company who had used ISO/IEC 20000. This company did not qualify the benefits and costs of the certification. It did however allow the organization to win two tenders, one from a government agency. Furthermore, both companies had stipulated that bidding tenderers must demonstrate compliance to the service management standard. However, government service organizations are internal providers who are not required to tender for contracts. By removing the requirement to establish credibility in an open market, the question remains, are there other benefits for an internal service provider in seeking ISO/IEC 20000 certification?

Theoretically, ISO/IEC 20000 presents a valid system of improving service management. Practically, organizations can be distracted by doing the processes rather than appreciating the outcome the process provides. Employees can easily feel the burden of an audit schedule. It is less common for the same employees to sense the practical benefits of controlled processes.

Chapters 2 and 3 have been reviewed and input freely given by Erin Casteel, Chair of the ISO/IEC working group responsible for the ISO/ IEC 20000 series.

[1] This figure, correct at January 2014 does not include companies that operate in Australia, however hold the certification through a global parent company. Of the seven certified organizations, three are government agencies.

STRUCTURE OF THE DISSERTATION

After defining the need in Chapter 1, this dissertation continues in Chapter 2 with a literature review in demonstrating the paucity of research in ISO/IEC 20000. Chapter 3 leverages this systematic literature review and presents a succinct list of six benefits derived from current literature.

Chapters 4 and 5 introduce case study research and how it will be applied to investigate the ISO/IEC 20000 certification of one Australian government organization. These chapters discuss how the research is conducted to provide internal and external validity. Two key documents in maintaining the chain of evidence and preventing invalidity influences include the research protocol and the evidence collection database. These are discussed in detail in these chapters and presented in Annexes C and D.

The six benefits described in Chapter 3 are analysed in detail against the organization in Chapters 6 and 7. The journey to certification is described in detail in Chapter 6. The organization saw a relationship between the IT Infrastructure Library (ITIL) and ISO/IEC 20000. The organization had already adopted ITIL, however they saw ISO/IEC 20000 as a method of improving their service management. The organization expected ISO/IEC 20000 to provide evidence that they were following the best practice guidance detailed in the ITIL books.

Chapter 7 measures and discusses the effects of ISO/IEC 20000 on service levels, demonstrating the effects of ISO/IEC 20000 certification on service levels and financial performance.

Chapter 8 presents a scorecard of how each of the six benefits discovered in Chapter 3 provided value to the organization. ISO/IEC 20000 certification is shown to be a cost effective way to achieve the service management aims of the organization, delivering significant benefits across the areas of processes, staff and compliance.

ETHICALLY SHARING DATA

Protecting and respecting anonymity is as important as sharing data with other researchers. This dissertation involves an organization that may be identifiable from the information included in this dissertation. Identification of this organization has the potential to damage the organization's reputation (Deakin University, 2010). This potential damage has been discussed and steps have been taken to maintain confidentiality. The organization understands the ramifications from being involved in this research and has agreed to be involved. A letter of organizational approval was given to the researcher, but is not included in this dissertation in order to maintain confidentiality. This research was conducted in accordance with the University of New South Wales (UNSW) policies for intellectual property, workplace health and safety and ethics. Research approval for this study has been given by a National Health and Medical Research Council registered Australian Human Research Ethics Committee.

Being an employee of the organization studied gave the researcher access, at will, to organizational records that other researchers do not and will not have access to in the future. Sharing the data and information gained though this research is a key aim of this dissertation, allowing fellow researchers access to organizational data that can be used for other research. Vogt et al. (2012) described that sharing data and the methods used to collect the data 'as one of a professional researchers highest responsibilities'. It is quite common for researchers to agree that it is a good idea to describe their methods and the rationale for them, but it is less often believed that the data themselves should be easily accessible to other researchers.

Similarly, Freese (2007) makes a strong case for making the data accessible, arguing that publishing the data makes research a social activity and not something that is at the discretion of individual researchers. This research has chosen to use organizational data, the alternative of a survey or interview would lead to potentially biased responses and aged recollections of the information due to the longitude of this study.

This dissertation will not make organizational records available, as that would likely violate confidentiality and the trust the organization has placed in the researcher. On approval from the organization, the databases constructed from those records will be made available. This is not only a socially responsible move, but also a move to demonstrate trustworthiness in the research. As Freese points out, the less the data is made available, the less persuasive the findings will be to readers sceptical of the conclusions.

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DEFINITIONS

Across literature and disciplines often the same words can have very different meanings. The purpose of this section is to provide the reader with clarity on the meaning of a term within this dissertation. Additionally, this section establishes a common framework for helping readers to understand the purpose of all the parts of this dissertation.

In most part this definitions used in this document and the same as the definitions used in ISO/IEC TR 20000-10:2015 (International Organization for Standardization, 2015c). A working understanding of the definitions included in ISO/IEC TR 20000-10:2015 is assumed. Terms and definitions used in this dissertation but not included in this section can be found in standard English dictionaries.

The following are definitions not included in ISO/IEC TR 20000-10:2015 that require further clarification.

Availability (Avail%). The monthly percentage of time that systems were available for.

Case. A case may be understood as a temporally and spatially bounded instance of a specified phenomenon. Although process tracing focuses on events within a case, it can play a role in comparisons of cases. For example, an analyst can use process tracing to assess whether a variable whose value differs in two most similar cases is related to the difference in their outcomes (Bennett, 2010).

Case study. This term can cover a wide range of research situations. Generally it implies that a particular research situation is important in its own right, and cannot be abstracted from its context (Yin, 1989). It is thus not simply a representative data point. It may be a particular organization, project or procedure, and there may be multiple cases within a research project. Although this description makes it sound like an interpretive method, Yin (1993) distinguishes a case study from other intensive methods, such as ethnography and grounded theory, and argues that it is really just a specific data collection method within positivism. Waltham (1995b) disagrees, arguing the case for interpretive case studies. In this research, 'case study' refers to Yin's type of positivist research, and interpretive examples are classified under the specific approaches discussed in chapter 4. Case study research often includes other methods such as interviews and questionnaires (Mingers, 2003).

Certification. See independent assessment

The Customer. (as related to the Organization). The agency responsible for providing funding and ensuring that the service is received

The Department. The entire organization, including the group, the organization and the customer, and, for all intensive purposes, all the end users.

Doctorate of Information Technology. A doctoral level degree that comprises of two-thirds course work and one-third research. Time allocated to the research component represents 1.5 semesters full time research.

The End User. People and organizations within the wider agency who use the applications provided by the organization.

Financial Management Performance (Fin%). Percentage of deviation from budget forecasts

The Group. The higher level organization to which the organization belongs to.

Independent assessment. An assessment of conformity conducted by an independent external body. This external body must be a Registered Certification Body for the assessment to achieve compliance to ISO/IEC 20000-1.

Incident Management (IM EOM). The number of incidents that remain open at the end of the month.

Incident Management Performance (IM%). The monthly percentage of incidents resolved with the agreed time frame, as stipulated by the Service Level Agreement (SLA).

Incident Management Resolution (IM Res). The number of incidents that were resolved in the month.

The IT Group. The group responsible for the provision of IT services to the Department.

The Organization. The group of people and facilities, with the arrangement of responsibilities, authorities and relationships, to provide the service to the customer.

Problem Management Performance (PM%). The monthly percentage of problems resolved with the agreed time frame, as stipulated by the SLA.

The Service. The service provided by the Organization to the Customer and the end users.

Service Science. Katzan (2008: pg: vii) defines Service Science as "*the application of scientific, engineering, and management competencies that a service-provider organization performs that creates value for the benefit of the client or customer"*. Spohrer and Maglio (2008) provide this definition: *"Service science is the study of service systems, which are dynamic value co-creation configurations of resources (people, technology, organizations, and shared information)"*. This dissertation uses this definition, as it aligns with information systems components of people, process, partners and technology. Additionally, the Spohrer and Maglio (2008) definition is consistent with the wider definition provided in the United States Act, which is the basis of many other service science definitions.

User Satisfaction (SU%). The percentage of positive (Good, V. Good, Excellent) user responses to service received.

ABBREVIATIONS

AS - Australian Standard

APMG - The Association for Project Management Group Limited

B1 - Benefit 1 - Service

B2 - Benefit 2 - Credibility and Trust

B3 - Benefit 3 - Staff commitment to service management

B4 - Benefit 4 - Financial

B5 - Benefit 5 - Process

B6 - Benefit 6 - Compliance

BS - British Standard

BIP - Business Information Publications

CEO - Chief Executive Officer

CIO - Chief Information Officer

COBIT - Control Objectives for Information and Related Technology

CSI - Continual Service Improvement

EC - Exclusion Criteria

ECIS - European Conference on Information Systems

EOM - End of Month

HPITSM - Hewlett Packard Information Technology Service Management

IBM - International Business Machines Corporation

IC - Inclusion Criteria

ICT - Information and Communication Technologies

IEC - International Electrotechnical Commission

IM - Incident Management

IMS - Integrated Management System

IS - Information Systems

ISO - International Organization for Standardization

IT - Information Technology

ITIL - Information Technology Infrastructure Library

ITSM - Information Technology Service Management

JAS-ANZ - Joint Accreditation System of Australia and New Zealand

KPI - Key Performance Indicator

MoR - Management of Risk

MSc - Master of Science

NZS - New Zealand Standard

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PGF - Portfolio Governance Framework

PM - Problem Management

RATER - Reliability, Assurance, Tangibles, Empathy and Responsiveness Service Quality Model

RMS - Record Management System

SAI - Standards Australia International

SAT - Self Assessment Tool

SERVQUAL - Service Quality Model

SLA - Service Level Agreement

SM7 - HP Service Manager Service Desk Software, Version 7

SMIP - Service Management Improvement Project

SMS - Service Management System

STD - Standardized

SU - Satisfied Users/User Satisfaction

TR - Technical Report

UK – United Kingdom

UNSW - University of New South Wales

USD - United States Dollar

Research Objective:

How does ISO/IEC 20000 certification provide benefit to an Australian government organization?

CHAPTER 1. WHY RESEARCH THE BENEFITS OF ISO/IEC 20000?

1.1. Why is Service Management Standards Research Important?

1.1.1. The importance of governance

The Gershon review on ICT Governance discussed Australian government agencies and their ability to achieve efficient, effective and acceptable use of IT (Gershon, 2008). He concluded that at the heart of his findings is that *"... the current model of weak governance of ICT at a whole-of-government level and very high levels of agency autonomy ... leads to sub-optimal outcomes in the context of prevailing external trends, financial returns, and the aims and objectives of this Government"*. It was also found that benefits realization and the measurement of benefits arising from investments in ICT, are areas where there is substantial scope for improvement, together with measuring and improving the efficiency of current ICT operations (Toomey, 2008). This research fulfils a need identified by Gershon and provides an analysis of benefits arising from investment in ICT.

Gershon noted that four government agencies had already identified that they could increase the efficiency and effectiveness of ICT spend, by implementing recognized frameworks such as service management and other ITIL based approaches. Many of the organizations surveyed identified the need for standardization across government as a method of decreasing investment costs. They also increased the speed and benefit realization for the end user, and standardization and reduced costs for agencies, as well as reduced tendering costs for suppliers. Six submissions to the report committee mentioned that the government would benefit from adopting a standard service management system. ISO/IEC 20000 provides a standard service management system. This dissertation shows that there are six potential benefits available to government agencies from adopting ISO/IEC 20000 as the standard service management system.

One industry submission commented that the *"Victorian State Revenue Office has reduced its ICT budget by 16.5% since achieving ITIL® compliance in 2005"*. This research could not ascertain how an organization could achieve ITIL compliance. It is possible that the reports author was in fact referring to ISO/IEC 20000 certification. Gershon recommended six key methods to improve ICT governance, recommendation two was centered around strengthening agency governance "by implementing a common methodology for assessing agency capability based on self-assessment and periodic independent audit". This research could not find evidence indicating a common methodology was being adopted by government agencies. Assessments against the ISO/IEC 20000 standard could provide a common methodology for assessing agency capability and meet the recommendation in the Gershon report, whilst providing benefits to end users and government agencies.

1.1.2. The importance of standards

Organizations have been quick to embrace frameworks, but have not embraced standards with the same enthusiasm. The extensive adoption of service management frameworks by organizations may point to the acceptance by IT managers that frameworks can deliver operational efficiencies and customer satisfaction. The limited implementation of service management standards poses a question as to why value of certification is not perceived highly within the same organizations.

Companies who implement service management improvement initiatives reported benefits in cost savings and standardization in delivery of IT service and support (Gacenga et al., 2011). Despite the appeal and potential to see benefits, certification to ISO/IEC 20000 is influenced by both the financial investment required and the difficultly in demonstrating and quantifying the benefits and linking them to value as perceived by the customer. A survey conducted by the IT Service Management Forum (itSMF) of member organizations concluded that of the 440 organizations that have adopted ITIL, 84% are aware of ISO/IEC 20000, but only 28% are certified to ISO/IEC 20000-1 (Dugmore, 2012b). If most organizations know about ISO/IEC 20000, why are only a few seeking certification? Solisma (2016) conducted a survey of Australian IT professionals which echoed the global findings of Dugmore. The results showed twice as many respondents are not aware of the standard than are certified to the standard and that more than half of the respondents were using ISO/IEC 20000 for guidance, but did not intend to seek certification. Many organizations adopted some processes or guidance from frameworks like ITIL and COBIT, but far fewer organizations implemented the direction provided by the service management standard.

The organization studied in this dissertation has not followed the trend of low global uptake and has adopted guidance from ITIL and been certified to ISO/IEC 20000. This researcher observed the organization studied in this dissertation and evidence supporting the following information is presented in Chapters 5, 6 and 7. The organization is an Australian government organization who displayed their ISO/IEC 20000 certificate proudly on the entrance hall leading to the Managing Director's office. All their external correspondence prominently displayed the ISO/IEC 20000 certification mark. Company induction training involved a slide on ISO/IEC 20000 and the importance for the company stating *"This certification places our organization in an elite group of organizations".*

Ironically, this researcher observed that in the weeks leading up to an external certification team visiting the organization, there was a commonly held belief amongst employees that customer service levels would drop and managers would become focused on catching up on eleven and a half months of 'ISO 20000 crap' they had been ignoring. The managers had ignored the C in

Continual Service Improvement (CSI). The managers did not see any value in certification to ISO/IEC 20000.

On the other customer-facing side of the business, this research could not find any records of the customer ever asking for the agency to be certified. Top management often asked why they had ISO/IEC 20000 certification. They saw some value in the certification, but were not sure it was worth all the effort and distraction from the organization providing service to the customer. The researcher observed that transition of this government IT department was absorbed into a larger IT organization and the new CIO asked a key question, a question that the rest of the organization had been asking for years, 'how does certification provide benefit to the organization?'.

1.1.3. Understanding the value of standards in context and contributing to the body of knowledge

The value of management standards is realized not by the processes they examine, but by the outcomes from the process. Dugmore (2006) described that the requirements of ISO/IEC 20000 are about efficiency, 'doing, not documenting', and not about building a bureaucratic overhead. This statement is confirmed by the Chair of the ISO/IEC working group responsible for the ISO/IEC 20000 series who said:

A Successful Service Management system (SMS) is one that satisfies the customers needs. The whole purpose of the Service Management System is to make sure that you're doing, at least the very minimum, of what needs to be in place for it to work effectively, efficiently, to make sure you're managing your cost, reducing your risk, and delivering effectively against the business objectives, so that your customers are satisfied, and you're delivering what both your internal and external customer need in terms of services. That is success, its not about doing it for itself, its about doing it for the outcomes (Casteel, 2013).

Certification is not about doing it for certification, it is about doing it for the outcomes. So what are the outcomes? That is the question this dissertation will cover. Albrecht (1985) discussed how service management actually works and lists factors that leaders must consider when attempting to align employees to the business goal of providing value to customers. One of these factors is 'how people in the organization can define and carry out the critical practices that actually deliver that value'. ISO/IEC 20000 is all about defining critical practices. However, to find benefits these practices must be reduced to the critical practices that actually achieve value.

This dissertation is based on an organizational question posed within one government agency that has adopted ISO/IEC 20000 as a means of demonstrating value to the customer. This research focuses on demonstrating the value ISO/IEC 20000 can have to an Australian

government agency. This dissertation will describe the adoption and path, from an inward-facing technology organization, through to a service focused customer-facing organization with ISO/IEC 20000 certification. The case study will measure the performance of the organization before, during and after this transformation, through the eyes of the organization's customer, arguably the only metric that matters. Performance of this organization will be analysed and discussed to confirm the hypothesis of this dissertation. The results of the literature review, case study and analysis will be available for future researchers who can utilize the framework to analyse further organizations and determine if benefit exists for their organization to gain certification.

This dissertation will provide the following contributions to the body of knowledge:

a. Provide a comprehensive review of current research on ISO/IEC 20000;

b. Examine the benefits of ISO/IEC 20000 certification from current literature;

c. Explore the benefits realized by an Australian government organization through certification to ISO/IEC 20000;

d. Examine the costs of ISO/IEC 20000 certification for an Australian government organization; and

e. Present a case study on one Australian government agency to demonstrate the business benefit of ISO/IEC 20000 certification.

1.1.4. The importance of measuring investments

A number of studies documented the need for measuring and reporting the performance of information systems (Chang and King (2005); DeLone and McLean (1992), Seddon et al. (2002)). Dehning and Richardson (2002) reported that 'never before has IT played such an important role in the existence of companies, yet the overall impact of IT on performance remains largely an unexplained puzzle' (2002, p 27). More and more the business value of service management is being demonstrated, however the business value of ISO/IEC 20000 certification has remained an academic research area with little exploration. Lewis and Millar (2009) stated that *"Until quite recently interest in IT governance was mainly confined to a few academic researchers exploring the functions and structures of the IT department".* ISO/IEC 20000 is almost the opposite phenomenon, as Chapter 2 will demonstrate. Most of the interest on the topic generated from professional circles with very little academic research conducted on the topic.

Organizational budgets are becoming increasingly dominated by IT expenditure. The size of global IT spending reached USD$3.8 trillion in 2015, with IT services spending at USD$981 billion (Gartner, 2015). It is noted by Son et al. (2005) that the control and governance of the IT

function is becoming a critical issue for organizations, due to the significant amounts of investment in IT (Brynjolfsson and Hitt, 1998); Dedrick et al. (2003); Gacenga (2013); Luftman and Ben-Zvi (2011). One of the reasons that Luftman and Ben-Zvi (2011) believed that business alignment for IT remains elusive, is a tendency to pursue a silver bullet instead of addressing multiple strategic alignment maturity components such as IT metrics, communications, partnership, governance, human resources and technology scope. For this reason, business and IT continue to be misaligned. It is worthwhile to further research ISO/IEC 20000 certification as one method that can be utilized to solve this alignment conundrum.

Studying the value of ISO/IEC 20000 certification is significant. Although several Australian organizations have been certified to ISO/IEC 20000, no studies have been conducted to analyse the benefits and value gained from the certification. The size of the investment an organization requires in order to achieve ISO/IEC 20000 certification is significant. It is beneficial for organizations to be able to see value in their investment and measure the value of ISO/IEC 20000 certification. Research conducted by Dehning and Richardson (2002) found that investments in IT management have an impact on organizational market value.

Organizations are spending more and more on IT every year. Service focus and ITIL have grown over the last decade and academic research on the impacts of ITIL and ITSM on organizations and value have been scarce. Ideally, there would be academic research demonstrating if there is value in certification to ISO/IEC 20000. The government agency examined in this dissertation had already adopted a service management framework and studies have shown the value of these frameworks. This dissertation aims to investigate the additional benefits and costs of certification, which is over and above the benefits and costs of adopting a service management framework.

1.2. Background

1.2.1. What is certification?

The term certification has a specific meaning in relation to international standards and is defined in ISO/IEC 17000. The term infers third-party attestation related to products, processes, systems, or persons (International Organization for Standardization, 2004). However, there is a critical difference between ITIL certification and ISO/IEC 20000 certification. ITIL certification is awarded to individual people after successfully completing assessment from an examination institute, whereas ISO/IEC 20000 certification results from an audit of an organization (Cater-Steel and Toleman, 2007a).

A successful compliance audit for ISO/IEC 20000-1 (International Organization for Standardization, 2011; International Organization for Standardization, 2005) certification is the result of months of planning, training, documentation and review. The qualified auditor seeks

objective evidence such as records and documents, to externally assess that the activities of the business are in accordance with the documentation and the requirements of the relevant standard. The process to attain ISO/IEC 20000 certification varies depending on the size of the organization, the breadth of its operation and the prior and existing level of standardization and documentation (Cater-Steel and Toleman, 2007a). Organizations that seek certification do so in order to make an impact on their organization and find a clear benefit from the end goal of certification.

The certification process has several internal and external impacts. Senior management can use certification as an objective of a complex transformation process. The success of the project can be directly and precisely observed at the end of the process by means of the attained certificate. As a result, the transformation process will more likely gain sufficient attention, priority and resources from the organization. For the individuals involved, the objective of certification serves as a motivation and reinforcement, by highlighting the achievement of the certificate at the end of the transformation process.

Additionally, pursuing certification also intensifies the anchoring of continuous improvement processes for IT services within the organization. From an external perspective, the certificate serves as a seal by an independent body, providing customers with evidence that all the conditions and requirements of a recognized standard are met. This evidence can be used as a quality signal to increase an IT service provider's competitiveness, if customers choose IT providers based on their compliance with the standard. This is often the case in public tenders and increasingly the case in private businesses. The certificate can be used for marketing the IT services, since a proof of conformity with approved standards signals trustworthiness and reliability (Disterer, 2009; Cabinet Office, 2011a). The ITIL Continual Service Improvement book is clear on the value of certification, 'Certification to ISO/IEC 20000-1 by an accredited certification body shows that a service provider is committed to delivering value to its customers and continual service improvement' (Cabinet Office, 2011a). Chapter 3 of this dissertation explores the impacts and benefits of ISO/IEC 20000 certification.

1.2.2. History and Development of ISO/IEC 20000

In the 1990s, ITIL gained the support of the British Standards Institution and was extended and adopted as British Standard (BS) 15000 (Code of Practice for IT Service Management) in 1995. The second edition of BS 15000, incorporating certification, was launched in June 2003. Based on the BS, in 2004 the Australian Standard (AS) 8018 Information and Communication Technologies (ICT) service management was released in Australia (Standards Australia, 2004). The development of an international standard based on BS 15000 was fast tracked by the ISO/IEC Joint Technical Committee 1 (JTC1) Sub-Committee 7 (SC7). In December 2005 all ISO member countries, including Australia, agreed to adopt ISO/IEC 20000 based on BS 15000

and AS 8018 was superseded. ISO/IEC 20000 integrated the process-based approach of ISO's quality management system (ISO 9001:2000) by including the 'plan, do, check, act' cycle and requirements for continual improvement (Cater-Steel and Toleman, 2007b). The scope of ISO/IEC 20000 is wide and its application is generic and applicable to all service providers, regardless of type, size and nature of the services delivered. Subsequent editions of ISO/IEC 20000 were released in 2007 and the current edition in 2011. The history of ISO/IEC 20000 is broadly covered in current literature. For further information please read Disterer (2012); Dugmore (2012a); APMG-International (2012), who have all provided a detailed history of ISO/IEC 20000.

As of the 1st of January 2016, there are seven published parts of ISO/IEC 20000, Information Technology -- Service Management. A full list of the current parts of the standard is available from the ISO webpage (International Organization for Standardization, 2016b). Part 1 of the standard deals with the requirements of a service management system and is the portion of the standard that organizations pay external assessors to certify them against. The remaining parts of the standard provide guidance and examples on how to implement a good service management system. Within the scope of this dissertation, when referring to the benefits of ISO/IEC 20000 certification, this dissertation refers to Part 1 of the standard.

1.2.3. ITIL is not a Standard

Behind the scenes, standards make everyday life function well as they establish sizes, shapes, processes and systems. For example, standards help ensure that baby cot sizes are safe, that a light bulb fits a socket and planes stay in the sky (International Organization for Standardization, 2016a). On a global scale, the main standardization body is the International Organization for Standardization, known by its acronym ISO (coming from the Greek word 'isos', meaning equal). Founded in 1947, ISO currently has a portfolio of over 20,500 standards and is comprised of 162 countries (International Organization for Standardization, 2016a). International Electrotechnical Commission (IEC) is an organization started in 1908, that administers and coordinates the standardization system in the fields of electricity and electronics. Between the two organizations, standardization is implemented across many areas, one such area is management.

Certification gives recognition for compliance to a standard. A common similarity amongst management standards is that they are auditable. Therefore audit or independent assessment gives these standards a value in itself, since it allows organizations to verify the implementation and use of the management standard across different agencies. When an independent assessment is carried out, the registered certifying body usually issues a 'certificate' that recognizes the organizations compliance to the standard (Cots and Casadesús, 2014).

ITIL is a framework and not a standard. In the service management field there is a wide range of standards, tools and frameworks, including ITIL, Control Objectives for Information and Related Technology (COBIT), ISO/IEC 20000, ISO/IEC 27001, Six Sigma and PRINCE2. One of the most commonly discussed and implemented is ITIL which defines itself as a group of best practices for the management of IT services (Cabinet Office, 2011d). As it is not a standard, no organization can claim ITIL compliance[2] or be 'certified to ITIL'. It is important to understand this clear distinction, as ITIL is good practice, but it is not a standard.

ISO/IEC 20000 is a standard. The numerous similarities between ITIL and ISO/IEC 20000 have caused authors to study them as a whole (Dugmore and Taylor, 2008) or to consider ISO/IEC 20000 a derivative of ITIL, or as a means to 'certify the company to ITIL'. There are similarities in the two documents, however the documents serve differing purposes. ISO/IEC 20000 is a standard that presents the minimum requirement for a businesses service management system. They can be independently assessed to ISO/IEC 20000 and certified for compliance to ISO/IEC 20000.

ISO/IEC 20000 is not only for information technology providers. IT businesses are increasingly managing complex portfolios of resources, capabilities and offerings. This must no longer be based on inward-facing system/hardware/infrastructure solutions, but outward facing customer service provision. Service oriented thinking has been a result of organizations attempting to increase the value delivered to their customers. Katzan (2008) described service oriented thinking across all business disciplines and states that it is not limited to IT. Similarly, Galup et al. (2007) discussed that for computers, communications and information systems, the service focus is provided through service management. This is evidenced through the relabeling of traditional information 'technologies' to that of 'service', for example Infrastructure as a service (IaaS), Software as a service (SaaS) and Service-Oriented Architecture (SOA).

IT businesses need service oriented thinking, luckily, IT businesses have IT Service Management (ITSM). Other than the title, ISO/IEC 20000-1 does not discuss IT, only service management. This study is centered on an IT service provider organization, for this reason, a reader will see references made to ITSM. In most instances this research, like the standard it is focused on, will discuss service management in general terms and not specifically to an IT organization.

An organization cannot use ITIL as proof that they are providing a reliable service. A number of service management frameworks, standards and models have been developed to provide reliability. Some of the more popular and common frameworks are IT Infrastructure Library (ITIL), IBM Service Management Reference Model or Systems Management Solution

2 An individual can be certified as an ITIL professional.

Lifecycle, Microsoft Operations Framework (MOF) and HP IT Service Management Reference Model (HPITSM) (Cater-Steel and Tan, 2005). Both MOF and HPITSM are based on ITIL as this is the most widely recognized framework for ITSM in the world (Cabinet Office, 2011d). Additionally, ITIL is the framework championed by the IT Service Management Forum (Hochstein, Tamm & Brenner 2005). ITIL has been widely adopted and recognized for providing best practice guidance on effective management and control of IT service delivery and support (Barafort et al., 2002). And yet, ITIL is not a standard that has to be followed, it is a guide that should be read and understood, then used to create value for the service provider and its customers (Cabinet Office, 2011d). Organizations that have adopted a service culture and adopted one of the service management frameworks listed above, will face the challenge of deciding on the need for certification to provide 'proof' of their ability to comply to the service management standard.

ISO/IEC 20000 certification gives recognition for compliance to a service management standard. Marcos et al. (2012) described that different standards, methods, regulations and best practices *"are the result of the many years of work done by experts in the IT field".* Amongst three other standards, they recommended ISO/IEC 20000 as the premier standard to guide planning. ISO/IEC 20000 provides a formal and universal standard for organizations seeking to have their service management capabilities audited and certified (Cabinet Office, 2011d). It is important to be clear on the difference between the standard and the framework. ISO/IEC 20000 is a standard to be achieved and maintained and ITIL offers a body of knowledge useful for achieving the standard (IT Governance Institute and PricewaterhouseCoopers LLP, 2008).

1.2.4. Importance is not Correlated by Global Adoption

History has demonstrated that the expected global uptake of ISO/IEC 20000 did not transpire. A decade ago when ISO/IEC 20000 was only starting to be known, authors hypothesized that growth in the standards adoption was 'guaranteed to accelerate' (Cater-Steel and Toleman, 2007b). Mingay and France (2006) stated that Gartner described, *"...by the end of 2008 at least 80% of the relevant employment projects in the public sector and at least 30% in the private sector in developed economies will require an ISO 20000 certification."* These predictions were challenged by the most comprehensive and expansive review of the uptake of ISO/IEC 20000 (Cots and Casadesús, 2014). The authors discussed that quantitative worldwide studies on other ISO standards were based on data obtained from certificates issued, which ISO collects from the different certification bodies and publishes annually in The ISO Survey of Management System Standard Certifications (International Organization for Standardization, 2014). This survey unfortunately contains no data for ISO/IEC 20000, which prevents using the same source as alternative studies on management systems.

The study conducted by Cots and Casadesús (2014) has a limitation in that the data is collected from only one accreditor. This makes their work suitably accurate at a global level, however at a national level, more fidelity is required than their analysis shows. Cots and Casadesús (2014) note that there is also a strong correlation between countries with the most ISO/IEC 20000 and ISO/IEC 27001 certifications, from which, the authors say it can be deduced that countries' promotion and regulatory activities have a major impact on the diffusion of standards.

It should be noted, that according to the data used in Cots and Casadesús' research, Australia is not in the top 15 countries for any standard in the year 2011 and that Oceania, as a geographic region, has consistently had the lowest number of valid certificates between the years 2006 to 2011. Figure 1-1 shows the number of certifications across standards in the IT sector in Australia.

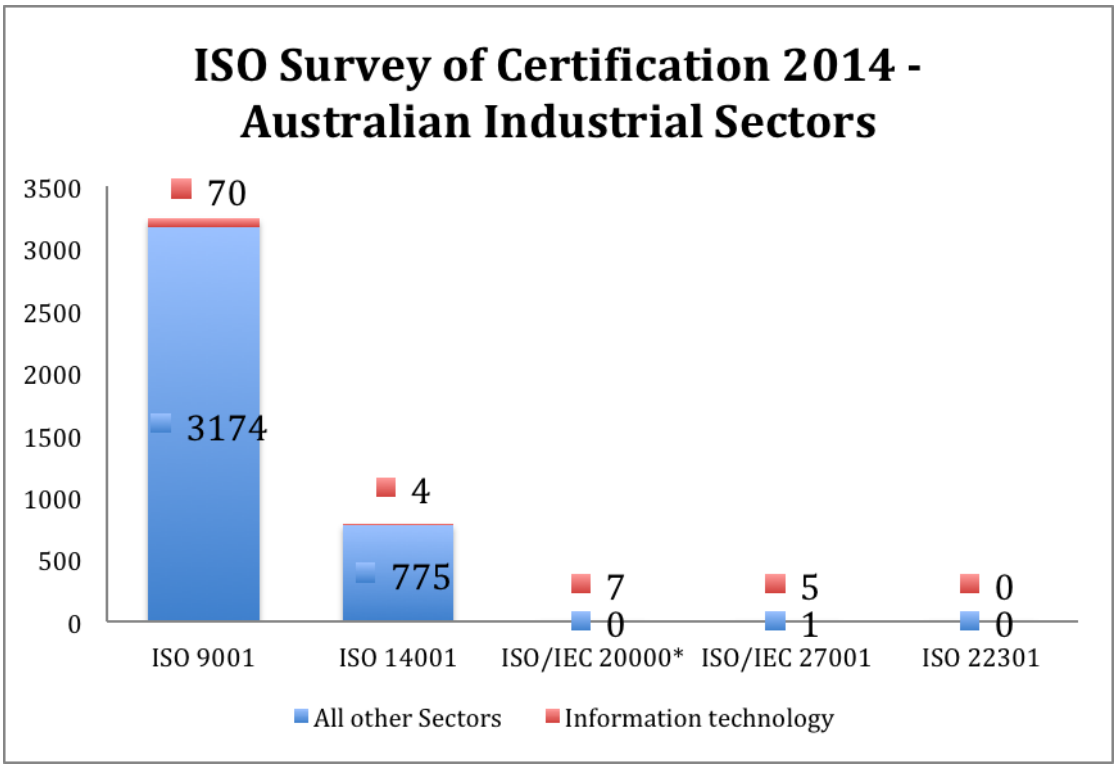

Figure 1-1. ISO Certifications across Australian Industrial Sectors[3]

Like the rest of the world, Australia has a very low uptake in organizations certified to ISO/IEC 20000. Dugmore (2012b) showed that the uptake of ISO/IEC 20000 in developed countries was less then the uptake of the standard in developing economies. The uptake and number of Australian certifications has not yet been researched. Current certification data is held by JAS-ANZ (2015) and is available from their website, however, historic data on certifications in

[3] The ISO survey data only uses data supplied by JAS-ANZ. As shown in Annex A, this data includes most, but not all certified Australian organizations.

Australia is held by individual accreditation bodies who were not willing to provide figures for this study.

SAI Global was the one exception to this statement and their historic data is provided in Annex A. To aid with follow on researchers who are seeking to discover the trends and uptake of ISO/IEC 20000 within an Australian context, a list of certified organizations, correct as at 16 Oct 2015, is included in Annex A. The list contained in the Annex shows that there are currently nine Australian organizations certified to ISO/IEC 20000.

It is possible that the low uptake of ISO/IEC 20000 in Australia is because there is little research into the benefits of the standard. It is also possible that there is little research in to the standard because there is a low uptake in ISO/IEC 20000 in developed countries. The research contained in this dissertation commences the discussion surrounding how an organization receives benefit from ISO/IEC 20000.

1.3. Conclusion: The Need for Action

The benefits of service management across organizations are increasingly being recognized (Marrone and Kolbe, 2011; Gacenga, 2010). Whilst the actual number of organizations adopting ITIL is not known, Australia is a leader in ITIL adoption (Cater-Steel et al., 2009; Marrone et al., 2014). The Australian Pacific region, including Australia, China, India, Japan, has the highest rate of adoption of ITIL in organizations and the highest levels of ITIL certified people (Axelos, 2014). The chair of the working group responsible for ISO/IEC 20000 is also Australian, yet Australia remains a country with a very low rate of organizations certified to ISO/IEC 20000 (APM Group, 2015; Casteel, 2013).

Why does Australia have such a low uptake of ISO/IEC 20000? Top level managers need to know what benefits are available to businesses from ISO/IEC 20000 certification and how these benefits relate to government agencies in the Australian context. A key perceived benefit to an organization is that the certification displays a level of effectiveness in service provision, which demonstrates superiority over competitors (APMG-International, 2012; RemedyOne, 2014). Government internal IT suppliers do not compete in an open market and, in most instances, are not required to demonstrate superiority for their parent organization. Therefore, it is important to know why money is invested in ISO/IEC 20000 certification and if that investment provides a return. What does current research tell a reader about how the standard for service management provides benefit to organizations that pass an external assessment and achieve certification to the international requirement? Chapter 2 will present a systematic literature review of what current research imparts about ISO/IEC 20000.

CHAPTER 2. WHAT RESEARCHERS KNOW ABOUT ISO/IEC 20000: A SYSTEMATIC LITERATURE REVIEW

There is a paucity of literature discussing ISO/IEC 20000. When describing the importance of using a systematic approach to reviewing literature, Pickering and Byrne (2014a) stated *"in a world of increasing information availability, finding ways to make sense of the literature on a topic is important"*. Service Management is no different, following an initial scoping review, a systematic literature review was conducted to ascertain the breadth and depth of the current literature and to identify the gaps that would benefit from having further research conducted.

2.1. Background: Why was the Method of a Systematic Literature Review Chosen?

Systematic literature reviews summarize and critique the current literature available on a chosen topic. There are however, other methods in which to conduct a literature review, including traditional or narrative reviews. To support this research, the literature review will collect all relevant information about the topic, using a system that avoids bias and can be repeated by another researcher at a later date. Following collection, the information is then filtered and analysed, again in a repeatable way, to ensure that only high quality and relevant literature is considered for detailed analysis (Randolph, 2009).

A traditional or narrative review is commonly used in dissertations. This was not chosen in this instance, as this type of review can result in researcher bias clouding the results of the review. The paper written by Boote and Beile (2005) discussed the sorry state of reviews of research literature in dissertations based on education and suggested that 'biased impressionistic summaries' should never be used in dissertations. Just because a method has been traditionally used, does not make the method the appropriate choice. Brocke et al (2009) explored the methodological rigor of literature review articles published in ten major Information Systems (IS) journals. The results of their research showed that many of these reviews did not thoroughly document the process of the literature search.

A systematic literature review has a more rigorous and well-defined approach, comprehensively presenting a catalogued synopsis of all available literature. By following carefully recorded steps, this review of ISO/IEC 20000 literature can be repeated by subsequent researchers and checked for correctness and completeness. Using this method of review, it is much easier for a novice researcher to produce a successful review that achieves the stated goals of the research. A systematic review is described by Manning Fiegen (2010):

> *Systematic review offers a model for summarizing and critiquing the literature to improve future practice and possibly encourage higher levels of research methods.*

> *The key aim of the systematic literature review is to avoid bias, which the researcher may unintentionally introduce through his or her own personal interest or preferences, or simply a lack of awareness of the breadth of literature on that topic. (pg. 386)*

Pickering and Byrne (2014b) produced an easy to follow methodology aimed at doctoral level researchers. This is the method followed, in most part, for the remainder of this chapter. Deviation from the method described, and justification for the deviation, is documented and explained in the relevant sections. Further details on the actual method and conduct of the systematic literature review, as described by the authors, is presented throughout the remainder of this chapter.

2.2. Aim: What will this Review Teach the Reader?

A scoping review, as described by Landa et al. (2011), was conducted in 2014 and identified that no systematic reviews of the available literature on ISO/IEC 20000 have been conducted. The scoping review also noted that there was insufficient information available in order to facilitate a meta-analysis or meta-synthesis of previous research studies.

To ensure external validity of this review, it was carefully documented in such a way as to be transparent, comprehensive and reproducible, so that other researchers were able to follow the same procedures and produce the same results (Adolphus, 2015; Pickering and Byrne, 2014b). This systematic literature review incorporates a more systematic and quantitative approach, thus addressing concerns regarding bias (Petticrew, 2001; Collins and Fauser, 2005).

While it is clear that service management and ITIL adoption can have benefits for service provider organizations, there is very little academic research on ISO/IEC 20000 and no comprehensive literature reviews on the subject of ISO/IEC 20000. It is not known how large the body of academic literature on ISO/IEC 20000 is or when, who and where is the research has been conducted. To answer these questions, this chapter systematically searched the academic literature to identify original studies reporting on ISO/IEC 20000 and to ascertain the value or benefit that can be gained from adoption of the standard by an Australian government organization.

2.3. Review Protocol: How Will this Review be Conducted?

The following systematic review conforms to the guidelines outlined by the Preferred Reporting Items for Systematic Reviews (PRISMA) recommendations (Moher et al., 2009) and follows the systematic quantitative literature review approach outlined by Pickering and Byrne (2014b). This research has used the PRISMA statement to demonstrate how the review was conducted. To obtain a comprehensive list of research papers with information pertaining to ISO/IEC 20000 implementation in Australian government organizations, a systematic search of original

research studies using Elsevier, Web of Science, ProQuest, Technology Research Database, Taylor & Francis, Web of Science, Directory of Open Access Journals, SpringerLink, Wiley Online Library and Oxford Journals was conducted through the UNSW Search Gateway. The studies excluded and retained were recorded for each of the screening stages, according to the PRISMA statement (Moher et al., 2009).

The initial keywords were identified through ITIL literature and more keywords were added as more literature was reviewed. A search string using a combination of the following keywords was used; ISO/IEC 20000, BS 15000 and AS 8018. Initially additional filters were included, compromised of; Australia, Government, Value, Benefit, Return on investment, Cost Benefit Analysis or Measurement. Unfortunately, too few results were received on this very narrow research field and the keywords were removed.

Different combinations of search terms and variants of the key words were used, based on the requirements or limitations of each database. For example, the search strategy for the ProQuest Database was "ISO 20000" OR "IEC 20000" OR "ISO/IEC 20000" OR "ISO20000" OR "IEC 20000" OR "ISO/IEC 20000:2005" OR "ISO/IEC 20000:2007" OR "ISO/IEC 20000:2011" OR "ISO/IEC 20000-1" OR "ISO 20k" OR "BS 15000" OR "AS 8018". The references cited by each potentially relevant study were reviewed to locate additional potential studies.

Explicit inclusion criteria (IC) and exclusion criteria (EC) were used to enable this review to be reproducible. The criteria utilized were:

1. IC1 – Include papers whose title, keyword or abstract contains ISO 20000, BS 15000 or AS 8018.
2. IC 2 – Include relevant papers that were referenced in discovered papers.
3. IC 3 – Include relevant literature gained from other sources such as Google Scholar.
4. EC 1 - The publication must be an original research paper. However, due to the scarcity of academic research on ISO/IEC 20000, this criterion was relaxed to allow some conference papers and industry reports to be included.
5. EC 2 – The obtained studies must be written in English.
6. EC 3 – Exclude duplicated papers.
7. EC 4 – Exclude papers that do not discuss Service Management.
8. EC 5 – Exclude papers that are not principally about the specific topic, for example, the paper must discuss ISO/IEC 20000 in detail, not service management in general.

9. EC 6 - Exclude papers that do not discuss ISO/IEC 20000 in the context of organizations.
10. EC 7 – Exclude papers that do not discuss Australian organizations or government agencies.

2.4. Search Results: Using the above Protocol, what was Produced?

The initial search of all search fields within the UNSW Gateway, after 'expanding beyond library collections', included the following keywords: "ISO 20000" OR "IEC 20000" OR "ISO/IEC 20000" OR "ISO20000" OR "IEC 20000" OR "ISO/IEC 20000:2005" OR "ISO/IEC 20000:2007" OR "ISO/IEC 20000:2011" OR "ISO/IEC 20000-1" OR "ISO 20k" OR "BS 15000" OR "AS 8018". This search returned 574 results and 144 of these results had ISO 20000 in the title. Of the 574 results, there were 164 articles (41 peer reviewed), seven books, 51 conference papers/proceedings, two dissertations and 351 Newspaper Articles. These results included some duplication.

English was the prevalent language, with 507 studies. The second most dominant language was Spanish with 11 titles and third German with 10 titles. Other languages included Portuguese, Chinese and French. A review of the authors that had the most articles, showed that these authors were split into two main groups discussing differing aspects of ISO/IEC 20000 within their publications. The first group of authors, Cater-Steel and Toleman, focused their work on ITSM/ITIL adoption and ITSM in education. The second group, Tanovic, Sehovac, Ribic and Orucevic, focused their publications on improving ISO/IEC 20000 and ITIL based on the new model they proposed. By far, most results were industry releases or consulting firms advertising the standard and how they can be implemented for 'your' company.

Tanovic et al. (2013) discussed ISO/IEC 20000, but modifies and improves the standard using two complimentary frameworks. The result of the research was a new improved process model for ISO/IEC 20000 standard which could be implemented in any business environment. The authors implemented their improved process model in a telecommunications operator in Bosnia and Herzegovina. The literature produced by Tanovic et al. (2013) did not have benefit or impact to the research in this paper.

The 574 results were then filtered according to the exclusion criteria and only 41 were peer reviewed articles (EC1). Of these articles, 28 were in English and 13 in other languages such as Czech, German, Spanish, Portuguese (EC2). Of the 28 English peer reviewed articles that were displayed, eight were duplicates (EC3), leaving 20 articles to be examined in detail.

The search was then expanded to include dissertations, conference proceedings and books, giving 27 additional results. After reviewing the title, source and abstract only two (Lepmets et al., 2011; Heikkinen and Jäntti, 2012) were included in the literature review. The reference lists

of the articles discovered (IC2) and Google scholar (IC3) were then utilized for additional sources of information. Five additional articles, Disterer (2012), Mingay and France (2006), Dugmore (2012b), Dugmore and Lacy (2011) and APMG-International (2012) were added to list to be examined in detail.

The complete reference list of the twenty-seven ISO/IEC 20000 articles that meet IC1, IC2, IC3, EC 1, EC2 and EC3 are as follows:

1. ANONYMOUS 1996. ISO shock. The Journal of Business Strategy, 17, 5.
2. DUGMORE, J. 2006. BS 15000 to ISO/IEC 20000 What difference does it make. ITNOW, 48, 30-30.
3. MINGAY, S. & FRANCE, N. 2006. ISO/IEC 20000 Has an Important Role in Sourcing Management. In: GARTNER (ed.) Research. Gartner.
4. BABCOCK, C. 2007. Data Centers Managed Right. InformationWeek, 57-58.
5. CATER-STEEL, A. & TOLEMAN, M. 2007. Education for IT Service Management Standards. International Journal of IT Standards & Standardization Research, 5, 27-41.
6. TE-KING, C. & CHUN-HSIEN, C. 2007. A Planning Map of Advanced EIP System. International Journal of Electronic Business Management, 5, 266.
7. COOPER, L. 2008. ISO20000 qual complements ITIL. ITNow. Oxford.
8. HIGGINS, L. N. & SINCLAIR, D. T. 2008. A new look at IT governance. Journal of Corporate Accounting & Finance, 19, 31-36.
9. HASEGAWA, M. & HONDA, K. 2008. Providing Support Infrastructure in Consideration of IT Management. FUJITSU Sci. Tech. J, 44, 167-175.
10. RUZEVICIUS, J. 2008. The Study of Quality Certification System of Lithuania. Inzinerine Ekonomika-Engineering Economics, 78-84.
11. CATER-STEEL, A. 2009. IT Service Departments Struggle to Adopt a Service-Oriented Philosophy. International Journal of Information Systems in the Service Sector, 1, 69-77.
12. DISTERER, G. 2009. ISO 20000 for IT. Bus. Inf. Syst. Eng., 1, 463-467.
13. WILLSON, P. & POLLARD, C. 2009. Exploring IT governance in theory and practice in a large multi-national organisation in Australia. Information Systems Management, 26, 98-109.
14. WINNIFORD, M., CONGER, S. & ERICKSON-HARRIS, L. 2009. Confusion in the Ranks: IT Service Management Practice and Terminology. Information Systems Management, 26, 153-163.

15. CATER-STEEL, A., HINE, M. & GRANT, G. 2010. Embedding IT Service Management in the Academic Curriculum: A Cross-national Comparison. J. Glob. Inf. Technol. Manag., 13, 64-92.

16. DUGMORE, J. & LACY, S. 2011. Introduction to ISO/IEC 20000 Series: IT Service Management, London, British Standards Institution.

17. LEPMETS, M., RAS, E. & RENAULT, A. 2011. A quality measurement framework for IT services.

18. APMG-INTERNATIONAL 2012. ISO/IEC 20000 White Paper. itSMF International APMG-International.

19. DISTERER, G. Why Firms Seek ISO 20000 Certification-a Study of ISO 20000 Adoption. ECIS, 2012. 31.

20. DUGMORE, J. 2012. Using ITIL® and ISO/IEC 20000 together: a global view.

21. HEIKKINEN, S. & JÄNTTI, M. 2012. Identifying IT service management challenges: A case study in two IT service provider companies.

22. COTS, S. & CASADESÚS, M. 2014. Exploring the service management standard ISO 20000. Total Quality Management & Business Excellence, 26, 515-533.

23. KAYNAK, O. & KARAGÖZ, N. A. 2014. Experience report: implementation of a multi-standard compliant process improvement program. Journal of Software: Evolution and Process, 26, 488-495.

24. MESQUIDA, A.-L., MAS, A., FELIU, T. S. & ARCILLA, M. 2014. MIN-ITs: A Framework for Integration of IT Management Standards in Mature Environments. International Journal of Software Engineering and Knowledge Engineering, 24, 887-908.

25. MESQUIDA, A. L. & MAS, A. 2014. Integrating IT service management requirements into the organizational management system. Comput. Stand. Interfaces, 37, 80-91.

26. WALKER, A., COLETTA, A. & SIVARAMAN, R. 2014. An evaluation of the process capability implications of the requirements of ISO/IEC 20000- 1. Journal of Software: Evolution and Process, 26, 1316-1326.

27. FÉLIZ-SÁNCHEZ, A. & CALVO-MANZANO, J. A. 2015. Comparison of models and standards for implementing IT service capacity management. Revista Facultad de Ingenieria, 1, 86-95.

2.5. Initial Screening: Removing Irrelevant Articles

To ensure that only studies related to the topic were included, all results were initially screened by assessing the titles and abstracts, then excluding those that did not discuss ISO/IEC 20000 the international standard for IT service management (EC4). Initial screening removed one

article, Anonymous (1996). Full text copies of all 26 original research studies that had passed the initial screening were obtained and these were reviewed in detail.

2.6. Second Screening: Removing Generic Service Management Articles

The second screening (EC5) excluded studies if they did not discuss ISO/IEC 20000 in detail or only referenced ISO/IEC 20000 in the context of ITIL, ITSM or IT Governance. Interestingly, the term ISO/IEC 20000 was often used as a keyword for these articles, but then the standard was only mentioned once or twice in the text of article.

The 11 articles removed at the second stage of screening were: Féliz-Sánchez and Calvo-Manzano (2014), Heikkinen and Jäntti (2012), Higgins and Sinclair (2008), Hasegawa & Honda (2008), Lepmets et al. (2011), Mesquida et al. (2014), Ruzevicius (2008), Willson and Pollard (2009), Disterer (2009), Cater-Steel (2009) and Winniford et al. (2009).

Mesquida et al. (2014) described a new framework that integrated the different ISO standards that related to IT management. The framework was composed of a process reference model that extends the ISO/IEC 15504-5 software lifecycle process with the ISO/IEC 20000-4[4] outcomes and the ISO/IEC 27002 security controls. Additionally, the authors' framework has integrated management systems that bring together the requirements of the management systems defined by the ISO 9001, ISO/IEC 20000-1 and ISO/IEC 27001. The second part of the paper presented the results obtained from the application of the framework in six Spanish IT companies. The main benefits to the companies from the use of the proposed framework were significant cost savings, increase of flexibility, efficiency and coherence.

Willson and Pollard (2009) published a case study about the governance of IT in a large multinational organization in Australia. Their work focused on IT governance as a whole and only made a short reference to ISO/IEC 20000 as a control framework for IT governance. They noted the paucity of research on the reality of IT governance in organizations and the exploration of the factors that influence IT governance as it was actually practiced. The study focused on the factors that made implementation successful and not value or benefit gained from the implementation. The author did not mention specifically which frameworks the organization implemented.

[4] ISO/IEC 20000-4 is a process reference model that was developed to produce the process assessment model that is ISO/IEC TS 15504-8. However, ISO/IEC 20000-4 was published before ISO/IEC 20000-1:2011, so it is not fully aligned with ISO/IEC 20000-1. Regardless, it is an intermediate product not intended to be used by itself. ISO will be revising ISO/IEC 20000-4 once parts 1, 2 and 3 have been republished.

2.7. Third Screening: Removing Non Highly Relevant Articles

Utilizing the remaining 15 articles, the third stage of screening removed all articles that discussed ISO/IEC 20000, but not in the context of organizations (EC6), let alone the context of an Australian government organization. This eliminated 10 more articles; Cater-Steel et al. (2010), Cater-Steel and Toleman (2007a), IT Governance Institute and PricewaterhouseCoopers LLP (2008), Disterer (2009), Dugmore (2006) Dugmore and Lacy (2011), Te-King and Chun-Hsien (2007), APMG-International (2012), Mingay and France (2006) and Walker et al. (2014).

The final stage was to exclude papers that do not discuss Australian organizations or foreign government agencies (EC7). This excluded all articles, as there was no peer-reviewed literature discussing ISO/IEC 20000 in government or Australian organizations.

2.8. Information Extraction: Gaining and Categorizing Data from the Review

Once through the initial screening stage, the extraction of relevant information commenced. The criteria by which the information obtained from the studies were:

- IC 1_{INF} – Identify existing literature reviews.
- IC 2_{INF} – Identify existing case studies of organizations
- IC 3_{INF} – Identify methodologies, techniques, methods and procedures measuring benefit/value of ISO/IEC 20000
- IC 4_{INF} – Collect Information relating to ISO/IEC 20000 in Australian government agencies.

To analyse the data obtained from the selected studies and to standardize the way in which information was collected, an information extraction form was used. This form recorded comments, impressions and the most important ideas from each relevant study. The following section presents the relevant conclusions drawn from IC 1_{INF} - IC 4_{INF} based on the five papers that made it through EC6.

2.9. Results: Presentation of the Results of the Systematic Literature Review

Disterer (2012) presented a paper discussing the adoption and certification of firms to ISO/IEC 20000. He utilized APMG certification[5] data to conduct a whole world analysis of the uptake of ISO/IEC 20000 and discussed in detail the benefits (those perceived after certification) and expected benefits (motivations) of internal and external companies based on his survey of certified organizations in German speaking countries such as Germany, Austria, Switzerland and Liechtenstein. He noted that 'formulating and testing hypotheses regarding ISO/IEC 20000

[5] APMG is only one of many certification schemes.

is not very sophisticated yet'. The literature review noted that 'So far, there are no sound studies on the certification of firms according to ISO/IEC 20000'. Consequently Disterer relied heavily on ISO 9000 studies to guide his research and commented that it is well established from studies about ISO 9000, that a differentiation between internal and external motives can be quite revealing. The survey he conducted noted a range of motivations (expected benefits) for ISO/IEC 20000 certification. This showed the most important motives for the decision to seek certifications to be customer orientation, customer/user satisfaction, competitive advantage and marketing (trust and reputation).

In discussing the benefits of certification it was noted in Disterer (2012) that the lesser perception of external benefits could lie in the fact that the relatively new ISO/IEC 20000 standard is not yet known to many stakeholders in the market, or only attracts little attention, which means that the standard cannot (yet) cause large external benefits. To this end, he stated that 'a change can be expected when large companies or public authorities declare a certification to be a prerequisite in tendering procedures'. The two key external motivations (pre-certification) of 'customer orientation' and 'customer/user satisfaction' had moved down on the scale of perceived benefits (post-certification) to near the bottom of the scale. Disterer's survey recorded that participating companies overall were highly satisfied after the implementation of ISO/IEC 20000: with only six per cent of companies reporting that they were less than satisfied and eight per cent of the companies reporting that the cost-benefit ratio was negative (i.e. they did not regard their investment in ISO/IEC 20000 as efficient).

Acknowledging Disterer's study, Cots and Casadesús (2014) conducted a quantitative study on a global scale of the current and future impact of ISO/IEC 20000. Their study utilized techniques previously used to analyse the diffusion of ISO 9001, ISO 14001 and ISO/IEC 27001. The main point that is applicable from Cots and Casadesús' diffusion analysis to this research is, the assertion that if there are no major changes in the environment, then the number of certificates issued (correct as at May 2012) was already very close to the anticipated saturation levels, at just over 600[6] certifications worldwide.

According to the APMG certification website (APMG-International), as of 25 Aug 2015, there are 805 organizations certified to ISO/IEC20000-1:2011. Despite reality defying the predictions of Cots and Casadesús' (2014) study, there is one important conclusion that can be drawn, leading countries in ISO/IEC 20000 certifications are also leaders in the other three analysed standards and that there is an even stronger correlation between countries with most ISO/IEC 20000 and ISO/IEC 27001 certifications. It is therefore surmised that a country's promotion and

[6] Cots and Casadesús rely on APMG data, and acknowledge that there are additional certifications through alternative schemes.

regulatory activities have a major impact on the diffusion of standards. Furthermore, it is noted that according to the data used in this research, Australia is not in the top 15 countries for any standard in the year 2011 and that Oceania as a geographic region has consistently had the lowest number of valid certificates between the years 2006 to 2011. However most Australian organizations certified to ISO/IEC 20000-1 are not listed on the APMG Certification site but are instead noted on the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) certified organizations directory website. Their study does note the limitations of solely using APMG data and suggests that it would be desirable for future research that the International Standards Organization collect and publish certification data for ISO/IEC 20000, thus facilitating comparisons of more complete data sets.

Dugmore (2012b) presented the results of an APMG survey conducted of 544 individuals on the combined use of ITIL and ISO/IEC 20000. Her survey examined the benefits that organizations obtain (or do not obtain) from the using both ITIL and ISO/IEC 20000. The survey results showed that there is broad-based support for the view that using ITIL and ISO/IEC 20000 together adds value. Within the study, three countries were presented in detail, Japan, Peru and Switzerland. Across these three countries Dugmore's survey showed that the greatest perceived benefits of certification were: 'credibility improved', 'management commitment' and 'better service'. Across all survey responses the most commonly selected benefit among those that had used ISO/IEC 20000-1 for certification was 'credibility improved' 37%. This choice was similar in nature to 'market advantage', 16%. 'better service' which came in with 20% and 'senior management commitment' at 15%. The survey results also showed that actual and planned use of both ITIL and ISO/IEC 20000 indicated there was a very large latent demand for either or both. Latent demand was described as *"a larger market for adoption and use of both ITIL and ISO/IEC 20000 than the actual established base".* Dugmore commented, "*The survey results show that a second phase of collecting additional information and case studies will be worthwhile".* Further to this, *"There is broad-based support for the view that using ITIL and ISO/IEC 20000 together adds value. The main benefits for use of both are 'Improvements in processes' and 'Improvements in services', irrespective of if the organization is certified under ISO/IEC 20000-1 or not".* The second phase of Dugmore/AMPG's research was to develop case studies illustrating the quantified benefits from the combined use of ITIL and ISO/IEC 20000. Following on from this survey, APMG contacted a range of survey respondents and asked them to produce a two-page case study, based on a template indicating what type of information was required and where the information would appear in the case study. The case study organizers had difficulty in getting quantification included in the case studies. Either people didn't have a reliable method of quantifying the outcomes or their management considered the data commercially sensitive (Dugmore, 2015). Only two case studies from the

second phase of this process were finalized and published, namely Stockport Council and APMG-International (2013) and Airwave Network and APMG-International (2013).

Kaynak and Karagöz (2014) provided an article discussing the experience their company Innova had when integrating ISO 15504 with other IT related standards (ISO/IEC 27001, ISO/IEC 20000, and ISO 9001:2008). ISO/IEC 20000 was implemented in Innova to leverage a competitive advantage. The authors discussed the lessons that were learned from the implementation, including practices and major challenges.

Mesquida and Mas (2014) developed a guide for integrating the management systems of ISO 9001 and ISO/IEC 20000, allowing organizations to reuse previous experiences, knowledge, processes and practices. Within Australia and New Zealand the standard AS/NZS 4581:1999 provides guidance to identify the components that are common to all management systems. After implementing the developed 'integrated management system' in five diverse organizations, each company reported positively on the experience. Surveys conducted on the organizations produced this consolidated list of perceived impacts of the integrated management system on service quality; (1) Customer satisfaction, (2) IT service quality/stability, (3) Certification of the organization, (4) Better alignment of people and information, (5) Facilitation of growth of the organization, (6) Reduction in the number of incidents.

One study (Gacenga, 2013) that was excluded by EC1 (and would have been excluded again at EC5) provided some data - albeit not discussion - that has some relevance to this literature review. Chapter 4 of Gacenga's dissertation included a survey of ITSM adoption amongst itSMF Australia members. This research was solely based on Australian organizations and included responses from employees of government agencies. The survey data potentially holds some relevant pieces of information applicable to this study and are summarized as follows:

1. There may be a link between the low uptake rate of ITSM in Australia and the number of years ITSM has been used in an organization. The results of Gacenga's survey indicated that 66 per cent of respondents were using ITSM for three years or less. Dugmore (2012b) noted that organizational maturity is a factor in whether or not individuals perceive a benefit from ISO/IEC 20000 certification. Consequently, the low take up rate of ISO/IEC 20000 in Australia may be attributed to the small duration of time that most itSMF Australia members have been using service management.
2. The survey showed that the majority (80 per cent) of respondents were implementing different frameworks and standards alongside ITSM framework processes as part of the IT service management improvement initiatives. Out of 353 responses on the question of specific frameworks implemented alongside ITSM, the frameworks most cited were PRINCE2 (46 per cent), and equal second, ISO 9000 and ISO/IEC 20000 at 29 per cent

apiece. Interestingly, the fact that the amount of uptake of the two standards is similar, correlates with the information presented by Cots and Casadesús (2014) in their analysis of qualification data that showed leading countries in ISO/IEC 20000 certifications are also leaders in ISO 9001, ISO 14001 and ISO/IEC 27001 certifications.

3. Of the 209 respondents, 42 per cent were employed by a government organization. Such a high response rate from government employees may show a strong adoption rate by Australian government organizations within Australia.

4. There appears to be a trend in the data where a greater number of implemented ITSM processes are associated with a greater number of ITSM benefit responses. Mesquida and Mas (2014) reported that most ITIL processes are required in order to meet all clauses and requirements of ISO/IEC 20000-1. If Gacenga's hypothesis is correct, then an organization that is required, through the course of obtaining ISO/IEC 20000 certification, to implement more processes could be more likely to have a variety of benefits. However, the Spearman Rank Order correlation between the number of implemented ITSM processes and the number of ITSM benefit responses is not statistically significant (rest (209) = 0.039, p= 0.575). For example only nine of 209 respondents (4 per cent) utilize service validation and testing process (or equivalent) a process that is, in most circumstances, required to meet clause 6.3.3 in ISO/IEC 20000-1.

This section has presented a brief synopsis of the five papers that were deemed relevant to this literature review through the application of the previously stated exclusion and inclusion criteria. This synopsis is not intended to be exhaustive, but is intended to present information relevant to the subsequent chapters of this dissertation.

2.10. Current Literature Production

As of November 2015, Solisma was conducting a survey on the utilization of ISO/IEC 20000 in Australian and New Zealand (Russell, 2015; Solisma, 2016). This survey may produce important information that refines and updates the information in this review.

2.11. Conclusion: Literature Review

This literature review covered one segment of service management literature and has justified the inclusion and exclusion of literature, based on the objectives of the review. The state of the field has been critically examined and the topic of the benefits of certification to ISO/IEC 20000-1 is situated within the broader scholarly literature available.

While ITIL® and ISO/IEC 20000 are, by their very nature, different, the numerous similarities as stated by Dugmore (2012b) have caused many authors to study them as a whole, or to consider ISO/IEC 20000 a derivative of ITIL® or a means for companies to *"certify themselves in ITIL®"* (Cots and Casadesús, 2014). In the main, academics and universities have not embraced these standards and frameworks in either research or education about them, however, demand for IT staff qualified to various levels in these standards is growing (Jakobs, 2010).

Of the 574 potentially relevant results initially obtained through the search of relevant literature databases, no studies passed all exclusion criteria. Only 15 studies were related to ISO/IEC 20000. Of these, only five examined the standard within an organization. The majority of the discovered studies mainly related to ITIL and ITSM, or the integration of ISO/IEC 20000 with other standards. No articles discussed ISO/IEC 20000 within the context of an Australian organization or a government organization, demonstrating an aperture in the body of academic knowledge relating to service management. None of the studies resulting from the systematic review explored the goal set by this research project.

2.12. Research Objective

The aim of this research is to present an academic level study that investigates the benefit of ISO/IEC 20000-1 certification to an Australian government organization. This narrow topic will be one step towards bridging the gap in academic research regarding the benefits of ISO/IEC 20000 certification in public and private enterprise throughout the world.

Taking the organizational question posed by a CIO in Chapter 1, how does ISO/IEC 20000 provide benefit to an organization? And then subtracting what is known from the literature presented in Chapter 2, a researcher is left with an information requirement that has not yet been fulfilled. The research objective of this dissertation answers the question:

How does the attainment of ISO/IEC 20000 certification provide benefit to an Australian government organization?

Sub-objective one:	How can a researcher determine the extent of the benefits of ISO/IEC 20000 certification?
Sub-objective two:	Given the method determined in sub-objective one, what is the extent of the benefits from ISO/IEC 20000 certification in an organization?
Sub-objective three:	Do the benefits of ISO/IEC 20000 certification justify the costs of the investment?

CHAPTER 3. WHAT ARE THE BENEFITS OF CERTIFICATION?

The literature review presented in Chapter 2 of this dissertation exposed many benefits of ISO/IEC 20000. These were wide and varied, but showed consistent themes across multiple sources. Those benefits discussed in the literature fall into three categories; expected, perceived and anecdotal. Firstly, the expected benefits were written prior to, or during, the implementation of ISO/IEC 20000 in an organization. Expected benefits were sensible and drawn from the authors experience in the industry. Secondly, perceived benefits were collected through surveys and interviews of employees of service management organizations. These were practical and drew from the perceptions of those within the industry. Finally, anecdotal benefits were generated by the service management organizations that had implemented ISO/IEC 20000. The papers that provided anecdotal benefits did not provide sufficient data or methodology for an external researcher to support their claims. Advantages discussed by the various sources were generated by individuals with experience in service organizations. The claimed benefits of ISO/IEC 20000 were all very functional and logical, but lacked sufficient academic rigor to utilize them as concrete evidence to guide practice.

One downfall of utilizing the benefits listed in current literature is that often the lists produced are general in nature and analyse the entire ISO/IEC 20000 standard, incorporating all parts into the benefit analysis. None of the sources identified demonstrated a concise list of advantages particular to Part 1 of the standard and/or presented a list specific to those certified to Part 1 of the standard. Several sources provided lists of benefits to other standards and frameworks like ISO 9000 and ITIL. Additionally, the literature review conducted in Chapter 2 of this dissertation revealed that a definitive list of benefits of certification to ISO/IEC 20000-1 does not exist.

This section will examine the available literature and propose a credible taxonomy of benefits from certification to ISO/IEC 20000-1. It will then examine the list of benefits in the context of other academic literature and in the context of an Australian government organization.

3.1. Academic Literature: No List of Benefits for Certification to ISO/IEC 20000

The benefits from any standard are guided by the motivations and expectations of the organizations where the standard is implemented. Examining various sources enabled this research to show what the potential benefits of certification to ISO/IEC 20000 could be. Section 3.1 of this chapter will discuss the sources that provide information on the benefits of ISO/IEC 20000 adoption and provides a meta-analysis of the benefits derived from seven credible academic and industry sources.

One could believe that established standards and frameworks would have a detailed list of benefits. However, one may also imagine ISO/IEC 20000 being a relatively new standard and with a low uptake of certifications worldwide it may not have a detailed list of benefits. Looking towards more established or widely implemented standards demonstrate that neither ISO 9000 (Dick, 2000) nor ITSM (Gacenga, 2013) have shown a definitive taxonomy of benefits. The advantages that were discussed in service management literature were not purely ISO/IEC 20000 benefits and therefore were often commingled with the benefits of an organization adopting ITIL or other frameworks. Even in the occasional instances when a benefit specific to ISO/IEC 20000 certification were discovered, the reader is soon to learn that the benefit lacks supporting evidence to be considered reliable. A review of the academic literature demonstrated that there is no taxonomy or definitive list of benefits for an organization from certification to ISO/IEC 20000.

A list of benefits for two related, popular and established standards and frameworks also does not exist. Dick (2000) concluded that many benefits of ISO 9000 were espoused by various organizations, however through his exploration of the literature he finds that, 'there is no proven link between quality certification (ISO 9000) and improved business performance'. Likewise, the literature review conducted by Gacenga (2013) revealed that 'a definitive list or taxonomy of ITSM benefits does not exist'. If there is indeed no defined list of benefits for ISO 9000 or ITSM, it is quite possible that a similar deficiency exists with ISO/IEC 20000. When a potential source listing the benefits of ISO/IEC 20000 is located, the reader is quick to learn that the benefits discussed have been mixed in with ITIL or other parts of the ISO/IEC 20000 standard not related to certification.

Reading through academic and non-academic literature does not provide a reader with a definitive taxonomy of benefits of ISO/IEC 20000. Each author or promoter had a different perspective on how ISO/IEC 20000 could benefit an organization. Often these views converge, but frequently these views touch on other standards and frameworks that would be better suited to achieving the desired benefit. For example, one benefit listed by Cots et al. (2014) *"making staff aware and/or establishing a quality culture",* could possibly be better achieved through the application of an alternative standard or framework. ISO/IEC 20000 is capable of establishing a quality culture.

However, if this is the organization's aim they may be better suited to adopt the international standard for quality management systems (International Organization for Standardization, 2015b). In the occasional instances when a benefit is sourced that is particular to certification to the ISO/IEC 20000 standard, the reader soon discovers that the benefit listed lacks supporting evidence.

Generally speaking, even the benefits listed by the less credible sources like industry blogs (ISO 20000 Central, 2015), were consistent with the lists contained in the more credible sources, like B Grade[7] academic journals (Cots et al., 2014). The problem being that even when a benefit was listed by a credible source, the statement did not show evidence from a specific organization to support the author's claim. In the case of Stockport Council and APMG-International (2013) and Airwave Network and APMG-International (2013), the benefits were directly from an organization, however no data or methodology was given to allow an external party to verify the claims.

Australian service management professionals have the same ideas about the benefits of ISO/IEC 20000 as the international academic community. A presentation delivered by the Chief Executive Officer (CEO) of a known service improvement organization in Australia listed the benefits of ISO/IEC 20000 (Nyhuis, 2015). The CEO allocated the benefits across four perspectives, two external (Customer and Partner) and two internal (Management and Staff). The 16 benefits listed by the presenter across the four perspectives fitted accurately with the benefits listed in academic literature. Non-academic sources presented the same benefits as the academic sources, however all sources lacked concrete evidence to support their claims.

Dick (2000) claims that there is no evidence to support the link between ISO 9001 certification and business performance. Furthermore, Gacenga (2013) showed that a list of ITSM benefits does not exist. From the analysis of the data available in the literature, this researcher has come to a similar conclusion for ISO/IEC 20000. There is no proven link between business performance and service management system certification. Section 3.2 will examine the benefits listed by various sources and present a consolidated list of popularly held beliefs about the benefits of ISO/IEC 20000. The consolidated list of benefits will be used to examine the performance of one organization to see if the claims made by ISO/IEC 20000 advocates actually have real-world effects that can be substantiated by evidence.

3.2. Using the Available Literature to Produce a List of Benefits

Leveraging the systematic literature review presented in Chapter 2, seven papers were located that proposed a list of benefits from ISO/IEC 20000 certification. Unfortunately, there was limited diversity across the papers. Utilizing the available literature, a methodology was designed and a consolidated list of six possible benefits were produced.

3.2.1. Lack of diversity

The APMG-International (2015) website listed six probable benefits that organizations could expect to experience from the implementation of ISO/IEC 20000. This list of potential benefits

[7] As rated by Australian Council of Professors and Heads of Information Systems. (2013) *Rank Order - IS Journals*. Available at: http://www.acphis.org.au/index.php/is-journal-ranking/rank-order.

could be correct, however the author does not describe how the list was developed. Additionally, the list of benefits was in agreement with, but not entirely consistent with, other stated benefits listed in other literature distributed by the same organization (APMG-International, 2012; Dugmore, 2012b; Stockport Council and APMG-International, 2013; Airwave Network and APMG-International, 2013). This assortment of benefits likely represents the diversity of authors, audiences and the time frame over which each list was composed. Disterer (2012) and Cots et al. (2014) detail 30 benefits of ISO/IEC 20000 across their two papers and Kunas (2012) listed nine benefits. Academic and industry literature has presented a broad and generally concurring list of benefits from ISO/IEC 20000 certification. For the purposes of this dissertation, and for the benefit of fellow researchers, the 69 benefits currently listed in academic and industry literature have been distilled to a list of six benefits.

3.2.2. Methodology to produce the list

In order to set a baseline of expected ISO/IEC 20000 benefits that could be analysed for the purposes of this research objective, multiple sources were analysed and condensed to produce six generic benefits that an organization could realize from achieving certification to ISO/IEC 20000. This shortened list is purposely all encompassing, to achieve accuracy and brevity. There are some other sources of evidence for ISO/IEC 20000 benefits, however these have mostly appeared on webpages or blogs written by Service Management Consultants. These were not included in this meta-analysis. The list of benefits reported from the seven most reliable sources has been transcribed into a single table. These were then matched against each other, and common themes were eventually established. The results from this meta analysis are shown in Table **3-1**.

3.2.3. Constraints

In total, seven sources were utilized to produce this analysis of benefits. The available sources do not provide a wide and varied pool of information. The similarity of the wording and benefits listed in the two papers by Disterer (2012) and Cots et al. (2014) leaves the reader thinking not that the two papers support each other, but rather that one paper leveraged the other. These two papers should be read as one combined list rather then two agreeing sources. Similarly, four of the remaining papers Dugmore (2012b), APMG-International (2012), Stockport Council and APMG-International (2013) and Airwave Network and APMG-International (2013) were authored and/or edited and published by APMG-International, resulting in common themes across the four articles. Additionally, six of the papers were written in 2012 and the early 2013 period. The implication of this condensed time period is that it is unlikely that each author could benefit fully from the information and evidence that was produced by other authors in the same year.

Table 3-1. Meta-analysis of ISO/IEC 20000 Benefits

	Source						
Category of Benefit	**Disterer (2012)**	**Cots (Dec 2014)**	**Dugmore / APMG (2012)**	**Kunas (2012)**	**APMG (2012)[i]**	**APMG Airwave (2013)**	**APMG Stockport (2013)**
1. Service (I)	Customer orientation (E). [ii] Customer/user satisfaction (E).	Increase in user and client orientation and satisfaction (E). Improved services through continuous-improvement method.	Better Service (20%). [iii]	Improved quality of service.		Detailed understanding across the business leading to a passion to deliver service, generating very high levels of customer satisfaction. Granular monitoring and measurement of our customers' key drivers, focusing us on providing service where and how customers need it.	Improved customer satisfaction. Improved service delivery (incidents, changes, calls, complaints). Proactive (address issues before it is concern for customer).
2. Credibility and trust (E)	Marketing: trust and reputation (E). Competitive advantage (E).	Marketing argument, confidence and/or reputation (E). Competitive advantage (E).	Credibility improved (37%). Market advantage (16%).	Increased business and customer confidence. Market advantage through a certificate issued by a recognized, independent certification body. Improved reputation	Competitive advantage. Competitive differentiation. Demonstrable best practice.		
3. Staff commitment (at all levels) to service management (I)		Increasing staff motivation.	Top/senior management commitment to service management (15%).	Continuous improvement assured.	Enforces a measurable level of effectiveness. Creates a culture of continual	Top Management involvement.	Active staff contribution to improvement.

	Source						
Category of Benefit	**Disterer (2012)**	**Cots (Dec 2014)**	**Dugmore / APMG (2012)**	**Kunas (2012)**	**APMG (2012)[i]**	**APMG Airwave (2013)**	**APMG Stockport (2013)**
					improvement.		
4. Financial (I)		Reducing costs, increasing financial benefits or improving productivity.	Lower service costs (1%).	Optimized and controlled costs through transparent and optimized structures.	Lower costs through integration of processes.	ISO has provided an ongoing framework for us to continually assess the effectiveness of how we deliver our customer requirements. This has enabled us to deliver ongoing financial benefits and improvements.	The cost of delivering the IT service has reduced by over £0.75m (or 15%).
5. Processes (consistency, documentation, responsibility, knowledge, integration and communication) (I)	Quality of process documentation. Clarity of tasks, role and responsibilities Transparency and traceability of IT procedures. Standardization: uniformity and consistency of procedures. Process orientation Stability and reliability of IT procedures.	Impulse standardization, increased uniformity and consistency of processes and services.		Management and staff understand their roles and processes better. Consistency, interoperability. Service Management integrated into the overall business processes.	Streamlined conformance activity. Improving IT processes. Outsource core functions. Improved Merger & Acquisition (M&A). Integration of processes.	Improve operating practices and eliminate inefficiencies associated with organic growth as the business developed.	Structure and consistency. Improved security. Improved processes.

	Source						
Category of Benefit	**Disterer (2012)**	**Cots (Dec 2014)**	**Dugmore / APMG (2012)**	**Kunas (2012)**	**APMG (2012)[i]**	**APMG Airwave (2013)**	**APMG Stockport (2013)**
	Continuous improvement of all IT procedures.						
6. Compliance (E)	Fulfilling requirements, e.g. in tender processes (E).	Satisfying a present or future demand of clients or regulators (E). Establishing audits (E).	Legislative/ regulatory compliance (6%).		Improving the control, audit and documentation of processes. Access to key markets.		
*** MoR, ITIL, ISO 27005[iv]**			Reduced Risk (4%).				
*** N/A**			Other benefit / Don't know (2%).				
*** ITIL**	Ability to react on errors, incidents, deviations.	Improving the capacity to recover from an incident, error or catastrophic event. Reducing incidents, errors and deviations.					

	Source						
Category of Benefit	**Disterer (2012)**	**Cots (Dec 2014)**	**Dugmore / APMG (2012)**	**Kunas (2012)**	**APMG (2012)[i]**	**APMG Airwave (2013)**	**APMG Stockport (2013)**
*** ISO 9001**	Quality awareness of staff.	Making staff aware and/or establishing a quality culture.					
*** ITIL - Training and Knowledge management**	Training of new IT staff.	Enabling retention of knowledge and/or the introduction of new staff.					
***ITIL**	Planning and controlling of service management.	Increased ability to plan and control.					

[i] Note: – Some of the benefits listed in the columns entitled APMG(2012) and Stockport (2013) may not appear in the source documents. These benefits were extrapolated or contracted as required from both the lists and the narrative of these documents.

[ii] (E) – Both Cots S, Casadesús M and Marimon F. (2014) Benefits of ISO 20000 IT service management certification. *Information Systems and e-Business Management*. and Disterer G. (2012b) Why Firms Seek ISO 20000 Certification-a Study of ISO 20000 Adoption. *ECIS.* Paper 31. split their list of benefits into internal and external benefits. A (E) subsequent to the benefits shows that this was deemed to be an external benefit.

[iii] (%) – Percentage of survey respondents that rated the benefit as the most significant benefit of ISO/IEC 20000 to their organization.

[iv] *. – It was assessed that whilst it is possible that these benefits could be derived from ISO/IEC 20000 certification, it was deemed that there are other standards, frameworks and practices that would be a lot more effective at achieving this benefit if desired by the organization.

3.2.4. Common benefits

The common themes from the benefit meta-analysis were:

1. **Service (B1):** An increase in service levels, resulting from improvements in customer satisfaction, and customer orientation.
2. **Credibility and trust (B2):** Often called 'marketing advantage'. This is the benefit of having an external party verify that the organization is doing what the organization has said they are doing.
3. **Staff commitment (B3):** Staff at all levels were committed to service management. Motivating staff to do best practice and ensuring continual improvement endures.
4. **Financial (B4):** Reducing the cost of a service.
5. **Process (B5):** Improvements of consistency across processes, documentation accuracy and usefulness, staff responsibility for the processes and staff knowledge of processes. Process consistency also has the follow on effect of improving the speed and costs associated with merger and acquisition and outsourcing or insourcing of IT through the use of common languages and well documented processes.
6. **Compliance (B6):** Fulfilling tender requirements, audit compliance, legislative compliance and regulatory compliance.

The list of benefits that were provided from the available literature has been condensed into six clear and distinct benefits. A methodology was designed that took into account the variety of sources and the constraints of the available information. These six benefits will be discussed in detail in Section 3.3, discussing additional information provided by the sources that was not included in **Table 3-1** and also some benefits extrapolated from other literature. Section 3.4 will examine the list of benefits against the information presented in ISO/IEC 20000-10 (International Organization for Standardization, 2015c). Section 3.5 will examine the organization studied in this research and see how the six benefit areas were likely to have an effect on the organization examined in this case study.

3.3. Additional Information Available From Within the Literature

Section 3.2 produced six benefits of ISO/IEC 20000 certification. The aim of Section 3.3 is to analyse the existing literature against these six benefits to see if further information can be extracted. Using the APMG survey data of itSMF members, this dissertation will extrapolate the benefits most likely to be seen by ISO/IEC 20000 certification. This dissertation will then

discuss how benefits and outcomes could be confused by some organizations, and how the same benefit could be used to produce two very different outcomes.

3.3.1. Results from a survey of itSMF members

The most extensive and suitable survey conducted to date on ISO/IEC 20000 was directed by Dugmore (2012b). Figure 3-1 presents results from Dugmore's survey of itSMF members where the perceived benefits of ISO/IEC 20000 certification beyond ITIL have been considered by the members of the organizations surveyed.

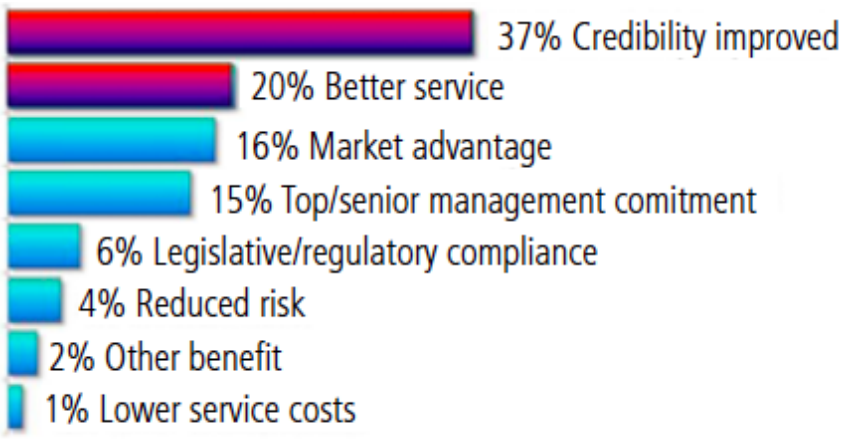

Figure 3-1. Benefits of Certification Under ISO/IEC 20000-1 Source: Dugmore (2012b)

Dugmore asked respondents to identify the single largest benefit of using ISO/IEC 20000 within their organization. The most common response was 'Credibility improved' with 37 per cent. Dugmore noted that this choice was similar in nature to 'market advantage', which had a 16 per cent result. When analysing these results it is important to remember that the respondents were asked to indicate the single largest benefit. This figure is not suggesting that 'Lower Service Costs' at 1 per cent was not a benefit; the survey simply showed that it was not the single biggest benefit of 99 per cent of surveyed organizations.

The survey showed that senior management were reported to be both for and against certification, with views ranging from resisting any best practice developed outside their top managements' control, through to support for the adoption of best practices in order to become certified under ISO/IEC 20000-1. 'Better service' was the second most chosen benefit of certification by survey respondents.

By adapting Figure 3-1 and mapping the results into this research's standardized benefit criteria, the likely perceptions of surveyed members across the common benefits list that was produced in the previous section can be seen.

Figure 3-2 demonstrates that according to the 2012 survey data, the biggest benefits to the organizations studied in this research were likely to be seen in Credibility and Trust (B2) and Service (B1). It is crucial to note that benefits to processes (B5) was not offered as an option to respondents. Had it been offered, this graph may present different results.

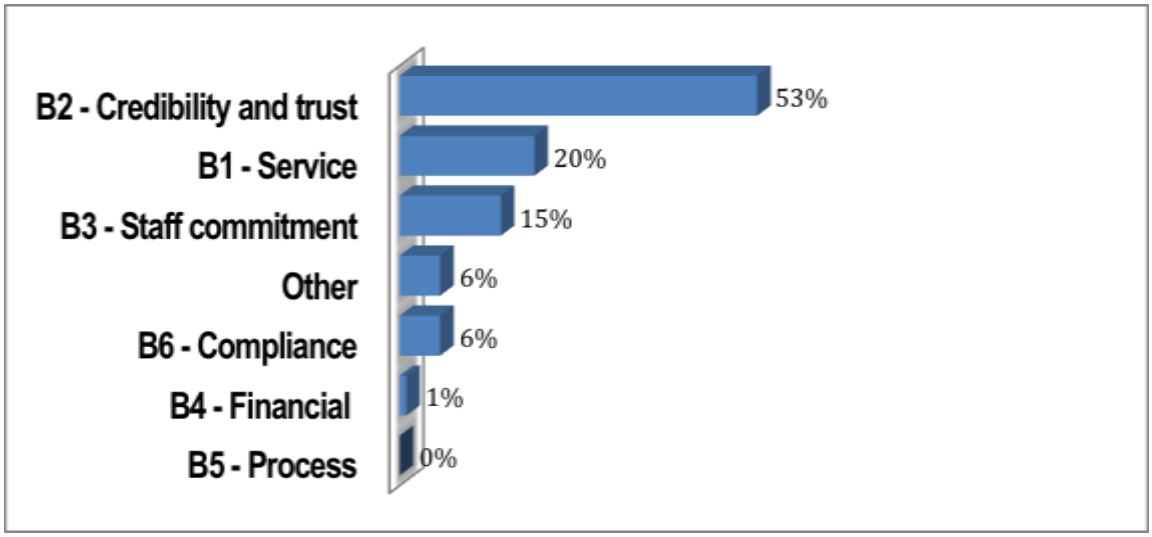

Figure 3-2. APMG Survey Responses Plotted Against Identified Benefits

3.3.2. Confusion between outcomes and benefits

The six benefits identified through the analysis conducted in Section 3.2, allowed this dissertation to explore the available literature with refined latitude for interpretation. Literature initially disregarded due to its unlikeliness to reveal any benefits of ISO/IEC 20000 certification, can now be reanalysed for evidence to support the six benefits reported in the aforementioned section.

Cater-Steel and McBride (2007) discussed the predicament a large government department had when attempting to outsource. The organization wanted to outsource certain services, but could not as the processes were not adequately documented. In this case, seeking certification to ISO/IEC 20000 could have resulted in improved process consistency (B5) and prepared the organization for outsourcing. Cater-Steel (2009) further commented on a large financial company that reported on ITIL adoption facilitated outsourcing of infrastructure support. Their view was consistent with that of Janssen and Joha (2008) who claimed that shared service centers based on service level agreements were often a first step towards outsourcing. Similarly, there is a perceived benefit of ISO/IEC 20000 certification improving processes (B5) and facilitating merger and acquisition or outsourcing.

Being 'able to outsource' is not a benefit of seeking ISO/IEC 20000 certification, but it may very well be an outcome. The benefit of ISO/IEC 20000 in the first case was improved processes (B5) and the second case showed an organization that could have used ISO/IEC 20000 to standardize processes as a precursor to introducing shared services to their organization. In both cases the benefit was or would have been improved processes (B5), however what senior management chose to use the improved processes for is a different matter.

Alternatively, Cater-Steel and McBride (2007) discussed a large organization in the financial sector that sought certification to ISO/IEC 20000 as a defence against outsourcing. They reported that this firm successfully changed the culture of the organization by urging IT staff to adopt a service-centric focus to enable the IT department to become the 'supplier of choice' for other departments in the organization. In this case, the dual benefits of improved service (B1) and increased staff motivation/orientation (B3) made for a case against merger and acquisition.

The 2012 survey of itSMF members conducted by Dugmore (2012b) showed the single biggest benefit of ISO/IEC 20000 certification was likely to be Credibility and Trust (B2). However, a common thread across literature is to confuse an outcome with a benefit. In some cases, outsourcing activities could be seen as an opportunity and in other cases outsourcing could be seen as a threat. Therefore, one cannot say that *"Outsource core functions"* as stated by APMG-International (2012) is a benefit of ISO/IEC 20000. One could say that improved processes, service levels and staff motivation were all benefits of ISO/IEC 20000 certification, but what these benefits are ultimately used for is at the discretion of the organizations management.

3.4. ISO/IEC 20000-10. Benefits from the Independent Assessment of an SMS Against ISO/IEC 20000-1

Part 10 of the ISO/IEC 20000 standard provides an overview of the concepts and the terminology of ISO/IEC 20000 (International Organization for Standardization, 2013). This part establishes a common framework for helping organizations to understand the purpose of all the parts of ISO/IEC 20000 and the relationships between the parts of the standard. Section 4.6 of Part 10 discusses the benefits of a service management system (SMS) based on ISO/IEC 20000.

The introduction to Part 10 does not explain that the benefits of ISO/IEC 20000 and as such this will be described further into the document. A review of current literature reveals that no one has identified or discussed the list of benefits that exists within the standard. Dobiáš (2013) and Kunas (2012) mention Part 10 as a document that is in development. Dufour and LaPorte (2014) and Cots et al. (2014) list Part 10 as a reference, but did not mention the document within the text or their articles. D'Agostini et al. (2012) and Müller (2014) mention Part 10, but only as part of the ISO/IEC 20000 series. Valentic (2014) is the only non-academic piece of literature to

discuss Part 10 and provides more insight than the aforementioned academic articles. Valentic still fails to make any mention of the list of benefits of ISO/IEC 20000.

On the 1st of November 2015, ISO/IEC 20000-10 was re-published, including additional information surrounding the benefits of ISO/IEC 20000 (International Organization for Standardization, 2015c). The original list of 14 benefits from the 2013 publication (International Organization for Standardization, 2013) remains, however they were slightly reordered. Two benefits that were moved to the top of the list were:

1. Improving service performance and the value provided by the service provider to the business and customers through the implementation and continual improvement of the SMS and services.
2. Reducing cost, time and disruption to services.

More noticeably, the 2015 version includes two new sections. Both sections are highly relevant to the content of this chapter. The two additional sections are:

1. Section 4.6.2 - Benefits from independent assessment of an SMS against ISO/IEC 20000-1.
2. Section 4.6.3 - Benefits related to different service management scenarios.

Section 4.6.2 of ISO/IEC 20000-10:2015 displays three additional paragraphs discussing benefits from an independent assessment (certification). These paragraphs have annotations in brackets to incorporate mapping of categories of benefits listed in Section 3.2.4.

1. An organization can choose to be independently assessed against the requirements specified in ISO/IEC 20000-1. This can have many advantages, including external recognition of their ability to continually improve and to deliver services by fulfilling service requirements (B2) and the achievement of customer satisfaction (B1). In an environment where services are sourced from a number of different suppliers this assurance is likely to become increasingly important.
2. Independent assessment can enforce process compliance so that all the benefits of best practice service management can be gained (B3). Instead of staff operating processes in an inconsistent way, they will have clear processes (B5) within the context of a management system conformant to ISO/IEC 20000-1, which will be assessed regularly.
3. An SMS can be integrated with other management systems such as a Quality Management System for ISO 9001 and Information Security Management System for ISO/IEC 27001. The integrated management system can facilitate efficiencies of management practice and cost savings (B4) for auditing (B6).

Whilst each of the six benefits identified in this chapter appear in the text of Section 4.6.2 of the standard, they do not contain a high level of detail. It is unlikely that the list included in the standard is designed to include all available benefits and is only attempting to highlight some of the major advantages.

Table 1, in Section 4.6.3 of the standard includes five different implementation scenarios for ISO/IEC 20000-1 and the potential benefits to be gained from each scenario. The final scenario presents an organization with a fully implemented SMS that has been certified by an external auditor. The benefits listed are:

a. SMS is operated and maintained (B5).

b. Continual improvement assured (B3).

c. Independent proof of good practice and commitment to service management and service excellence (B2).

d. Internationally recognized (B2).

e. Competitive advantage (B2).

f. Increased business and customer confidence (B2).

g. Improved reputation (B2).

Only three of the six potential benefits identified in the meta-analysis in this chapter are listed in the standard. This research will utilize the six identified benefits as a basis for assessment of the unit of analysis in this case study in the following chapters of this dissertation.

3.5. Benefits Likely to be Realized by an Australian Government Organization

The benefits detailed in Section 3.2 are a generic conglomeration of international studies previously conducted. This section will examine these generic benefits and ascertain if they are likely to match the expected benefits of an Australian government agency seeking ISO/IEC 20000 certification. Gacenga (2013) presented the results of a survey into the perceived benefits of ITSM adoption. Results of this survey showed that the main benefits perceived from ITSM adoption by itSMF Australia members within the 'Government Administration and Defence' category were Process Improvement (49 per cent) and Customer Service (20 per cent). These two categories map against two of the benefits of ISO/IEC 20000 certification Service (B1) and Process (B5). This section will now discuss the theoretically possible benefits that could be experienced by a government organization.

3.5.1. How the benefits discovered in literature relate to this unit of analysis?

Service (B1): The organization in this case study had been focused on transforming itself into a customer-focused organization since 2008. During the lead up to ISO/IEC 20000 certification in 2009, the organization was on a program of service improvement. In the case of this organization, it is important to look at the service level impacts of ISO/IEC 20000 certification in isolation to other service level improvement initiatives. This dissertation will discuss in detail the effects of ISO/IEC 20000 on service levels in Chapter 7.

Credibility and trust (B2): Within the government agency context, this could be shown as proving to the customer, via an external party, that the organization is doing what they have said they are doing. For this to have a significant positive effect, the customer would need to know or be educated in what ISO/IEC 20000 certification means and what it means to the customer. At the supplier level, it has the potential to set the standard required for service management. This means that if government agencies could demonstrate credibility in the way they provide service management, it could increase the impost on the suppliers of services to the agency to improve their service delivery. It may also raise awareness within the government agency on what 'good' service management looks like and as a result the government agency may insist that all their suppliers are certified to ISO/IEC 20000.

Staff commitment (B3): This benefit can work at all staff levels within a government agency. It will motivate low and mid level staff to commit to continual improvement in order to pass the next round of audits without any areas of concern or non-conformance on their section of the organization. Pending certification or recertification audits can motivate senior staff to allocate sufficient resources to certification. Additionally, areas of concern or areas of non-conformance can motivate senior management to allocate sufficient resources to rectify these issues. ISO/IEC 20000 certification may encourage staff training in service management and this could result in staff that understand their job more fully and enjoy their work more. In large government organizations, ISO/IEC 20000 can give senior management confidence that their employees are achieving the required level as directed. Within this benefit, targeted training could be provided to service management staff. ISO/IEC 20000 certification can mean that at all levels, staff are committed to service management, motivating them to do best practice and ensuring continual improvement endures.

Finances (B4): As discussed above, the key attribute of this benefit is reducing costs. In a resource-constrained environment, it allows management to target resources to high impact areas in order to achieve the aims and objectives of service management. However, within the service level agreement and ITSM performance reports for the government agency studied, this was not a set goal of the organization. Instead the goal of the organization was to be within budget forecasts. Initially performance was expected to be within ±10 percent of the target and later this was refined to an even more precise ±3 percent of the forecasted target. When analysing the effects of ISO/IEC 20000 certification in the context of this research, it is important to keep in mind that the goal was not to reduce costs, but to stay within forecasted

budgets. This dissertation will discuss the effects of ISO/IEC 20000 certification on finances in Chapter 7.

Process (B5): Government agencies often go through reshaping and reorganization. During the seven-year period of evidence collection for this dissertation, the organization studied went through three name changes, two group transfers and four managing directors. The organization also went through several internal reorganizations. It is possible that having well-documented and stable systems in place assisted this government organization during these times of transition. Additionally, due to operational demands, a small percentage of the organization (about 15 percent) was rotated into other areas of the parent organization. This rotation of employees meant that clear and well-documented processes needed to be in place in order to enable the smooth transition and rotation of the workforce. The flow on effects of the organization being capable of transitioning 15 percent of its workforce on a regular basis meant that for regular employee attrition and rehiring there was a very effective process in place for retraining new inductees into the organization. The organization is quite large and responsibility for the variety of processes can be unclear at times, a solid service management system allows for well-defined roles and responsibilities and most importantly accountability. Government departments are always looking to utilize public resources as effectively as possible, having a management system in place that is easily migrated to different organizations would allow for quick, easy and cheaper outsourcing if required in the future.

Compliance (B6): The organization studied in this dissertation was subjected to many audits throughout the year by auditing organizations from within the supported client external government auditors and the Australian National Audit Office. It is likely that having an internal audit program as specified by the service management system would assist in preparing the organization for the audit. Furthermore, annual ISO/IEC 20000 compliance audits conducted by the external Registered Certifying Body would satisfy some of the criteria required by the external audit bodies.

This section has discussed many possible benefits for government agencies with ISO/IEC 20000 certification. These benefits are only theoretical possibilities as derived from current academic literature, but it is possible that a government agency is eligible for all the benefits listed above. These benefits will be analysed in Chapters 6 and 7. This will be explored within the context of one government organization and additionally discuss the evidence supporting or disproving the effect of the proposed benefits of ISO/IEC 20000 certification.

3.6. Conclusion: Benefits of Certification

The analysis of the literature has found that there is very little evidence to support the benefits of an organization seeking ISO/IEC 20000 certification. What evidence there is, comes from only a few sources and are written over a very short time frame. This does not mean that there is no benefit from an organization in seeking ISO/IEC 20000 certification, only that the evidence

is limited. This research has produced a list of six benefits for an organization seeking ISO/IEC 20000 certification. The results from other papers and literature were analysed and discussed, explaining that many of the said benefits were actually outcomes. The six identified benefits were assessed against the benefits listed in ISO/IEC 20000-10:2015. This chapter carefully analysed each of the six benefits to hypothesize if the generic benefit would be likely to be realized from an Australian government organization.

This chapter has shown that there is a deficiency in academic knowledge. There is no definitive list of ISO/IEC 20000 benefits. This research has produced six generic benefits from the available literature, filling in the gap and allowing other researchers to use this as a starting point for analysing the impact of ISO/IEC 20000 in organizations. The subsequent chapters of this dissertation will further analyse one Australian government organization against these six benefits. This analysis against the six generic benefits - B1 to B6 - will fill a void of evidence in attempting to prove the effect that ISO/IEC 20000 certification has on organizations.

CHAPTER 4. THE CASE STUDY RESEARCH METHOD

The first step towards selecting a research method was to consider the research methods available. Niglas (2004: pg. 10) presented a scheme that attempts to summarise the relationships between different philosophical schools of thought and methodological traditions. Her diagram demonstrates just how many options are available for a modern researcher to choose from when commencing a line of inquiry. The first part of this chapter will present reasoning for selecting case study research as the preferred research method in order to achieve the objectives of this dissertation. The second part of this chapter explores the development of the selected research method into a robust and complete strategy that demonstrates the attributes of a quality research design. The two key documents underpinning the design of this research are the case study protocol and the case study evidence collection database. Both are discussed in detail and it is explained how the two documents are used to provide a valuable positive effect on the final report.

4.1. Research Method Consideration

Vogt et al. (2012: 86, p.86) says that 'all schemes for dividing up research designs (such as experimental and non-experimental or quantitative and qualitative) are somewhat arbitrary'. Nevertheless, this research has considered several different research methods, including ethnography, heuristic inquiry, experiment, history, mixed-methods, surveys and case study research.

This section aims to explain the criteria and values that were considered appropriate for this research situation and how the constraints of this research directed the use of a particular research method.

4.1.1. Criteria for research method

The objective of this dissertation is to investigate the how an organization benefits from having an independent evaluation of the organizations service management against the ISO/IEC 20000-1 standard. This objective falls within the broader socio-technological setting of the IS discipline. This requires a research method that:

a. Is capable of answering 'how' questions.

b. Does not require control of behavioural events.

c. Focuses on contemporary events.

These are exactly the specifications of the case study research method as defined by Yin (2014). Case study research is an empirical inquiry that investigates a contemporary phenomenon in depth and within a real-world context, expressly when the boundaries between the phenomenon

and the context may not be clearly evident. The aim of this research does exactly that to investigate the benefits of ISO/IEC 20000 in an Australian government organization. This information could be used by other organizations in the future to determine if seeking ISO/IEC 20000 certification would be beneficial to their organization.

Similarly, Gregor (2006) discussed the types of questions to be answered by case study research, including five types of theories on information systems. The classification of the five theories is dependent on the main or primary goals of the theory, rather than goals that are present only to a minor degree. Type II, explanation theory is described as a theory that explains how and why some phenomena occur.

In guiding this researcher to choose the most appropriate research method the table produced by Yin (2014) was found to be invaluable. As shown in Figure 4-1 there are three conditions for selecting the type of research method and each condition and shows how each is related to the five major research methods.

	(1)	(2)	(3)
METHOD	Form of Research Question	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	how, why?	yes	yes
Survey	who, what, where, how many, how much?	no	yes
Archival Analysis	who, what, where, how many, how much?	no	yes/no
History	how, why?	no	no
Case Study	how, why?	no	yes

Figure 1.1 Relevant Situations for Different Research Methods

SOURCE: COSMOS Corporation.

Figure 4-1. Relevant situations for different research methods Source: Yin (2014)

When determining the appropriate research method, three facts were inescapable;

1. The researcher had no control over behavioural events
2. The research is focused on contemporary events
3. The research question chosen was an explanatory ‘how’ question. Utilizing these three criteria and the table provided by Yin in Figure 4-1, the most

suitable method of achieving the objective of this study was found to be case study research.

4.1.2. Alternative research methods considered

Several other study methods were considered during the planning phase of this research, with each considered method found to have benefits and disadvantages. After considering the form of the proposed research question and the situation that the method would be used in, it was determined that the case study research method was the most suitable form of research. Further in depth discussion and analysis is presented at Annex F. This Annex describes why several potential research methods were considered inappropriate to achieve the objectives of this study.

4.1.3. Background to case study research

Gregor (2006) explains that in a subtype of explanation theory descriptions are given for how and why things happen in a particular real-world situation and that many case studies fall into this category. Furthermore, Avison et al. (2006) presents an analysis of three case studies of fairly catastrophic IS failures which showed that in all cases, there had been a lack of managerial attention to recognized IT governance and project management principles. 'Doing case study research remains one of the most challenging of all social science endeavours' (Yin, 2014). Additionally, case study research is the most common qualitative method used in information systems since the object of the discipline is the study of information systems in organizations (Alavi and Carlson, 1992; Orlikowski, 1993; Avison and Pries-Heje, 2005). The suitability for case study research in information systems research is due to the shift in interest from technical issues to organizational issues (Benbasat et al., 1987).

As a type of research, the case study has been viewed by researchers as a less than desirable form of inquiry (Yin, 2012). This dissertation will address the apprehensions listed by Yin that have concerned traditional researchers. The methods used to deal with these concerns include:

- Following a systematic procedure to ensure that the work is not careless and no equivocal evidence influences the direction of the findings reporting evidence fairly.
- Avoiding generalizations from this single case study.
- Following a systematic and contemporary composition of the study to avoid a lengthy narrative or an unmanageable workload.

4.1.4. Using case study as a research methodology

The literature review presented in Chapter 2 found only limited information on the topic of the value of ISO/IEC 20000 certification. A thorough systematic literature review has allowed this dissertation to develop a sharp and insightful question to be answered 'How' benefit has been received by an Australian government organization from ISO/IEC 20000 certification.

In this situation a case study examines contemporary events, however the relevant behaviours cannot be manipulated (Yin, 2014). Additionally, this type of study allows the use of sources of evidence not available if doing a purely historical archival analysis and direct observation of events and interviews of the persons involved and affected by the events. Choosing to do case study research has given this dissertation the unique strength in its ability to deal with a full variety of evidence such as documents, artefacts, interviews and observations, beyond what is available in a conventional historical study.

The method incorporates the linear but iterative process of case study research that is documented by Yin (2014) in his text book Case Study Research – Design and Methods. Figure 4-2 demonstrates the linear but iterative process described in the book. A great feature of Yin's approach is that it has allowed later parts of the process to be completed in conjunction with earlier parts.

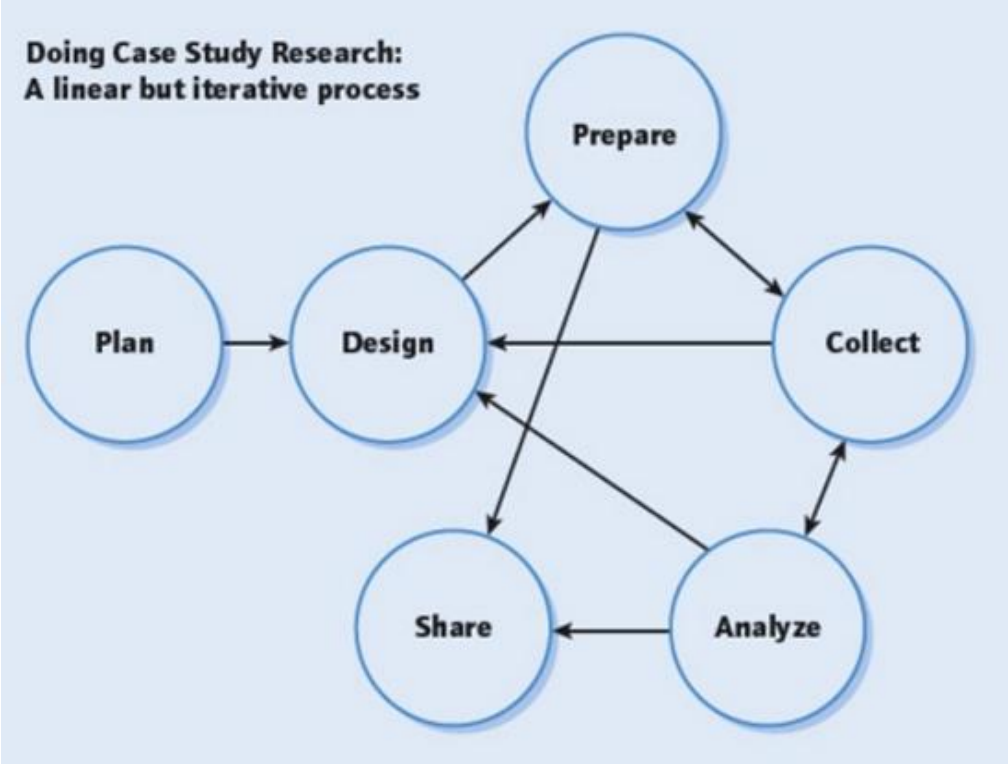

Figure 4-2. Case Study Research: A linear but iterative process Source: (Yin, 2014).

For the purposes of this dissertation the six steps displayed in Figure 4-2 have been concluded and presented in the following Chapters and Annexes of this dissertation:

- Plan
    - Chapter 4 - Selection of the research method
- Design – Selection of the organization select the theory, test the design

  - Chapter 4 - Selection of the organization
  - Chapter 4 – Develop the theory
  - Chapter 4 – Select the case study design
  - Chapter 4 - Test the design
- Prepare
  - Chapter 1 - Ethical approval for research
  - Chapter 2 – Systematic Literature Review
  - Annex C – Development of a case study protocol
- Collect
  - Annex C – Selection of sources of evidence
  - Chapter 5 – Triangulation of evidence
  - Annex D and E – Assemble data into a comprehensive Case study database
  - Chapter 6 and 7, Annex C and D - Maintenance of the chain of evidence
- Analyse
  - Chapter 6 and 7 - Display data,
  - Chapter 7 - Pattern match,
  - Chapter 5, 6 and 7 – Address rival explanations
  - Chapter 4 – Consider analytic techniques
- Share
  - Annex C - Define audience
  - Chapter 6 and 7 - Present evidence

Care and attention has been taken in selecting the most appropriate research method to achieve the aims of this dissertation. It has followed a rigorous and methodological path, commencing with a thorough literature review and thoughtfully composed research objectives. Formal and explicit procedures are specified by Yin (2014) to observe in the conduct of case study research. His guidelines will be followed, including protecting against threats to validity, whilst maintaining a chain of evidence and investigating and testing rival explanations.

4.2. General Approach to Research Design

A research design is a plan that "*guides the investigator in the process of collecting, analysing and interpreting observations*" (Nachmias and Nachmias, 1992: pg. 77). Section 0 describes the logical sequence that connects the organizations data to this papers research question and ultimately to the conclusions in this dissertation. The following six components of research designs have been explored by Yin (2014):

1. The case study's question
2. The case study's propositions
3. The Unit of analysis
4. Time boundaries
5. Logic linking the data to the propositions
6. Criteria for interpreting the findings

Each of these components, as related to this study, is discussed in detail in the remainder of this section.

4.2.1. Case study question/objective

The case study objective was developed and presented at the end of Chapter 2 and stemmed from the nexus between the information desired by the organization and the information available in the literature. The case study objective is the answer the question, 'How does the attainment of ISO/IEC 20000 certification provide benefit to an Australian government organization?'.

4.2.2. Research sub-questions

In order to answer the question described in Section 4.2.1 the following sub-questions need to be explored:

1. What does the literature say the benefits, above and beyond ITIL or other frameworks, of ISO/IEC 20000 certification are?
2. Which benefits of certification are applicable to an Australian government organization?
3. How much did it cost the organization studied to get ISO/IEC 20000 certification?
4. What metrics can be used to measure the benefits?
5. Did the certification have a measurable effect on these benefits?

4.2.3. Study propositions

It is possible that this research will find evidence to support or refute the following propositions:

a. There is benefit in standardized processes

b. There is benefit in service management and standardization of processes but negligible benefit from the final step of certification.

c. The customer did not request certification, nor understand the cost of the benefit of the certification.

d. Over time, customer service levels have improved and a marked improvement was recorded just before, during or just after ISO/IEC 20000 certification.

e. ISO/IEC 20000 certification had a negligible effect on customer experienced service levels.

f. The case study will present evidence of additional factors (not ISO/IEC 20000 certification related) that may have led to any benefit in customer service levels

g. That ISO/IEC 20000 certification has greater merit for an organization that must or wishes to prove the organizations skills at service management.

4.2.4. Unit of analysis

Much thought was put into selecting how many and which organizations should be selected for this research. Avison and Pries-Heje (2005) report that there are frequent debates over how many cases are necessary in case study research leading to a PhD. Similarly, Lee (1989) and Avison and Pries-Heje (2005) agreed that research based on a single case study is able to satisfy positivist criteria for scientific research and believed that there must be an additional compelling reason for conducting more than one case. Allison and Zelikow (1999) demonstrate how a single case study can be the basis for significant generalizations.

This dissertation could choose a different organization to study or use a questionnaire or another instrument to study these situations. However, according to Yin (2012), doing some original fieldwork as part of a case study might go further in helping the researcher best understand the situation. Since this is an initial study in an area with very little academic background and completed by a researcher at the start of his career, it was considered advantageous to study an organization that the researcher could immerse themselves in.

This government agency was certified to ISO/IEC 20000 between 2009 and 2014. They are responsible for the provision of Application Support Services for 40 bespoke business applications to internal department customers. There is a staff of approximately 200, incorporating all facets of service management delivery. The company is further described in Annex G.

4.2.5. Time boundaries

The organization was first certified to ISO/IEC 20000-1:2005 in November 2009 (ES018). It was recertified to ISO/IEC 20000-1:2011 in December 2012 (ES055). The organization moved into the departments IT group in February 2013 and were effectively absorbed into the IT group by June 2014. By June 2014 the company that looked very different to the organization that was recertified in 2012, decided not to seek recertification in 2014, which resulted in their ISO/IEC 20000 certification to lapse in September 2014 (ES064; ES076). In order to examine the journey and situation that lead to ISO/IEC 20000 certification and to properly measure the pre ISO/IEC 20000 performance levels, 18 months of service performance will be examined prior to initial certification. The effective time boundaries of this case study are between June 2008 to June 2015.

4.2.6. Linking data to propositions

Linking data to propositions foreshadows the data analysis steps of this case study. Chapter 7 demonstrates the use of two analytic techniques in detail pattern matching and time-series analysis. The collection of temporal markers and their insertion into the case study evidence collection database (Annex D) has allowed this research to collect and assemble all the data and to conduct a thorough time-series analysis. The development of expected patterns and the recording of these patterns in the case study protocol, which will be explained in detail in (Chapter 7) has allowed to the propositions to be pattern matched to the data.

4.2.7. Criteria for interpreting a case study's findings

For many studies, a common illustration of criteria is the determination of 'statistical significance'. This study does use quantitative data in the time-series analysis of service management performance data. However, this study does not solely rely on the use of statistics. One other strategy used is to address rival explanations to the findings. Several of these have

been anticipated and enumerated within the case study protocol. This early identification of rivals has allowed information to be gathered about these competing explanations during the data collection phase.

Some rival descriptions have not had data collected for them and will be used to justify and design future studies. The anticipated key rivals explanations are:

1. That the increase in service level was due to some other influence.
2. The benefits are not only measured by the service level such as standardization of service.
3. The metrics used in the customer reports were not true representations of customer satisfaction.
4. The metrics used in the customer reports were not supported by valid data.

Each of these rivals will be presented in further detail in Chapter 5.

This research design includes six components. The first four components defining the studies questions, propositions, unit of analysis and time boundaries have helped to identify the data to be collected. The last two components defining the logic linking the data to the propositions and the criteria for interpreting the findings have led to the design being in anticipation of the case study analysis. Further to this, design anticipation has paved the way towards thorough preparation in the data collection stage and provided direction and guidance to the discussions in Chapter 6 and Chapter 7.

4.3. Criteria for Judging Quality of Research Design

Yin (2014) describes four tests to examine the quality of the research design. These four tests commonly used in social science research include construct validity, internal validity, external validity and reliability. Section 4.3 will discuss Yin's four tests in detail, applying them to this study and presenting the results.

4.3.1. Construct validity

Yin (2014: pg 46) teaches that to ensure the quality of research design, it is important to ensure that research is not subjective and that is uses a sufficiently operational set of measures. He describes the two steps in meeting construct validity in case study research. The first, in relation to this study, is to define ISO/IEC 20000 value in terms of specific concepts. Secondly, to demonstrate construct validity the design must identify operational measures that match the concepts. The definition of 'value' is that value is a combination of utility and warranty (Cabinet Office, 2011d). The service within the organization is mature and negotiated between the provider and the customer, resulting in a service that it is fit for purpose (utility). Therefore,

to test the fitness of use (warranty) of the service this research will utilize the monthly service level reports that were provided to the customer by the service organization.

It is understood that there are some shortcomings in using service level reporting as a measure of fitness of use, namely that the report could be measuring erroneously or that the data underlying the report could be corrupted. However, service level reports are an industry standard best practice method of demonstrating business value to the customer (Cabinet Office, 2011b: pg. 121). Multiple sources of evidence to encourage a converging line of enquiry will be used to combat this, these include:

1. Documents (Service Level Reports, Tenders, Emails, Letters).
2. Archival records (Service Management Tool Database).
3. Interviews (Employees of the service organization).
4. Direct observation (ISO/IEC 20000 audit).
5. Participant observation (IM/PM audits, audit preparatory meetings, involvement in CSI).

To ensure construct validity in the design, three tactics will be employed. These include establishing a chain of evidence, using multiple sources of evidence and having the draft report reviewed by key informants.

4.3.2. Internal validity

The main concern of internal validity is the problem of making inferences (Yin, 2012). In an attempt to mitigate this concern, this dissertation will ensure a tight research design that that has anticipated rival explanations and possibilities and that the research has convergent evidence. This will be discussed in more detail in Chapter 5 and demonstrated within Chapter 6 and Chapter 7.

4.3.3. External validity

Yin's third test for judging the quality of research design deals with the problem of questioning if a studies findings are generalizable beyond the immediate investigation. This study of ISO/IEC 20000 has made findings that are generalizable beyond the subject organization, as they are analytical and not statistical generalizations. Section 4.3.3 discusses the theoretical propositions, describes the case of explicitly, demonstrates referent generality and discusses statistical conclusion validity.

Theory. The research questions and the unit of analysis coupled with the studies propositions and data links have forced some theory development early in this research project. Yin (2014: pg. 37) explains that the role of theory development prior to the collection of data is a key

difference between related qualitative methods like ethnography and grounded theory. The relevant data collection and field contacts for this research dissertation were dependent on the theory being studied.

This case study will attempt to show how certification to ISO/IEC 20000 provided significant gains to the organization through increased service levels. The benefit described in this study is only experienced from ISO/IEC 20000 certification and is above and beyond the benefits gained by adopting the advice given in service management frameworks or from adopting a service focus. This case study will show that the benefit discovered in this research from the certification of ISO/IEC 20000 was not simply due to the organization maturing or other external factors that impacted the organization over the period of the study. It will attempt to show that over time service levels, as perceived by both the customer and the user improved. These should be noticeable in the lead up to initial certification and a decline may be noticeable after the expiry of the certification. It is however possible that the benefits of ISO/IEC 20000 are long lasting and do not dissolve immediately after a certification lapses. This theory is dependent on the availability of historical data.

Generalizations. Statistical generalization is not possible from this case study. The single unit of analysis used is not an adequately sized sample to represent any population of over eight hundred ISO/IEC 20000 certified organizations. This research is an opportunity to shed empirical light about the benefit of ISO/IEC 20000 to organizations. The analytic generalizations made throughout this research can then be applied to and used to generalize from other studies in similar situations. The principles and lessons learned from this case study may still be applicable to all IT service organizations. The analytic generalizations developed by this research were not bounded by the theory initially developed during theory design and this study also included new concepts that arose upon completion of the case study. These new concepts are discussed in Chapter 6 and Chapter 7.

Describing the case explicitly. A first step in the task of establishing external validity described by Yin (2014) is to ensure that generalizations can be made to organizations not involved in the represented case study. This research is not necessarily representative of the population of situations to which this research could be extrapolated. In order to broaden this study to other businesses and agencies, careful attention has been taken in explicitly describing the organization as the independent variable. The ability to replicate the outcomes from this study in another organization nears on the degree of impossibility. While it may be impossible to replicate the case study exactly, the case has been described in Annex G in enough detail to allow other researchers to gauge the extent to which the results can be generalized to another organization. Complete descriptions of the measurement methods underlying the service level performance metrics, and associated reliabilities, are included in the redacted example ITSM

Performance Report, which is included as part of the case study database at Annex H. This detail is included in order to permit reasonable ecological generalizations and enhance external validity.

Referent generality. Kratochwill (1978) implores researchers commissioning time-series designs to consider using multiple dependent measures, not only for generalization purposes, but for differentiation purposes as well. For these purposes, using multiple measures serves to increase the credibility of intervention-effect relationships in time-series designs. This study uses multiple measures of service management performance to increase validity in referent generality. The five measures utilized in this case study are, incident management, problem management, availability, user satisfaction and financial management. These metrics are discussed in detail in Annex I of this dissertation.

Statistical conclusion validity. In the context of time-series designs, a proponent issue seems to be the choice of a proper statistical test to deal with a series of auto correlated observations (Kratochwill and Levin (1978). The monthly data collected from ITSM performance reports are correlated data. These correlation factors derived using the Pearson correlation coefficient are presented in Chapter 7.

4.3.4. Reliability

The goal of reliability is to minimize errors and biases in a study (Sheppard, 2003). The objective is to ensure that if a later researcher follows the same procedures and conducts the same case study again, then they too will arrive at the same findings. All procedures followed within the case, starting with the literature analysis will be documented. The thorough documentation of each procedure allows error checking to be done and allows a reader to repeat some sections for clarification of results. The use of the case study protocol is discussed in Section 4.4. The development and use of the case study database to improve reliability will be discussed, along with how this dissertation has maintained the chain of evidence and protected electronic records.

Case study database. By utilizing an evidence collection database, this dissertation has allowed future scholars the ability to investigate the data to draw the conclusions within this report. The evidence database consists of two separate tables. The first table contains numeric data, with some supporting text, and comprises a consolidated view of the data sourced from the 85 ITSM performance reports generated by the organization over the period June 2008 to June 2015. Information gathered was guided by the data collection shell, designed during the case study preparation phase and outlined in Section 4.4 of this chapter and described in Section 3.1 of Annex C, The Case Study Protocol. The completed data collection table can be viewed in Annex E. The data contained in the table was crosschecked against information gathered

through other sources, including archival records from the service management tool and financial records.

The second table is more narrative in style and contains evidence composed from 120 other evidence sources, including organizational documentation, interviews, direct observation and participant observation. Using an annotated bibliography, all records were catalogued and collated into one central electronic repository. Each entry in the case study evidence database links to the electronic copy of the original source document. This allows any reader with the appropriate organizational approval to inspect all sources of evidence. The evidence database is included in Annex D. Sufficient information is included within subsequent chapters to ensure that a reader can form the same conclusions and interpretations similar to that of this research. Footnotes within the text of this dissertation reference the evidence collected in the database and allow the researcher to follow the chain of evidence from a conclusion. This is then drawn back to the case study database and onto the original document. In order to direct the reader to the relevant part of the document, the original documents have in most cases been clearly annotated with Adobe Acrobat Reader highlights and comments.

There are of course some flaws in choosing to look at organizational records as a major source of information for this research. The records are not completely neutral, Vogt et al. (2012: pg. 87) describes that *"interpretation is built into any collection, organizational records that were thought to be valuable are kept, or useless and discarded, or embarrassing and destroyed".* The authors go on to describe that the data in organizational records have not been collected with the needs of researchers in mind. Therefore, much searching and sorting must be done before the archival materials are usable.

However, the key benefit of using this information is that it would be far superior in answering this research question to anything that could be produced by this researcher. Collecting information about happenings and service levels in 2008 from interviews or survey respondents is likely to be marred by forgetful memories or coloured by perceptions. Appreciating that archival records are not completely neutral, this dissertation presents a best effort of an unbiased presentation of the evidence.

Chain of evidence. This dissertation is cited and footnoted so that the reader can trace conclusions in the final chapter of this report backwards through the case study report and into the case study archive. Specific information within the documents in the archive have been highlighted or underlined to facilitate easier information retrieval. The information gained from these documents is linked to the case study protocol from within the case study database and the case study protocol links these topics to the objective and questions posed by this case study.

Electronic records. The organization keeps most official records in an electronic format. They have a dedicated Record Management System (RMS) that is effective at recording changes to both draft and published documents. Most documents on internal web pages are linked back to the RMS and all documents are given a unique identifying alphanumeric number. Where available, this alphanumeric number was utilized as the document ID within the case study database. Alternate sources were crosschecked against the RMS to ensure reliability.

Section 4.3 has described four tests that this dissertation considered relevant to ensure quality within this study design. Various tactics have been discussed in detail, however further tactics relating to data collection, analysis and collation will be described in further detail later in this dissertation.

4.4. Evidence/Data Collection Protocol

The case study protocol is a desirable part of any single case study research design (Yin, 2014: pg. 84) . The protocol, included in Annex C, lists the rules and procedures to be followed in the conduct of this investigation. Protocols are essential for team research, but they also present benefits for a single researcher. Most importantly this protocol lists data collection questions. These questions coupled with the data collection database have ensured that during the data collection phase the correct evidence was located and recorded and that not too much or too little evidence was collected.

Using this protocol increases the validity of the research. Reliability being one of the four criteria discussed in Section 4.3 to be used for judging the quality of the study. If this research is to be used as a basis for a further, multiple case analysis, then the protocol will be an important step to ensure that same procedures can be replicated. The protocol at Annex C is divided into four sections:

1. Section A gives an overview of the study, the objectives, issues surrounding the study and some key references used to prepare for the study.
2. Section B details the data collection procedures, ethical issues, likely sources of data, details of organizational support.
3. Section C lists the specific questions that the researching was seeking to answer when investigating the evidence. These questions are then linked into the evidence collection database.
4. Section D gives an outline of this report.

The four sections of the case study protocol are all important, as the protocol ensured that this study stayed targeted at the research objective. Additionally, compilation of the protocol allowed anticipation for potential problems and helped plan to overcome these issues prior to

subsequent phases. The case study protocol was used throughout the entire research of this case study. In particular, the questions and sections proposed in Section 3 of the Annex are linked to the evidence in the collection database. This linking of protocol to evidence keeps the research on track, but most importantly it allows the researcher to reference both the protocol and the evidence when drawing conclusions and writing the final report.

At one stage, it was realized that the information was deviating away from the protocol and evidence collection was not related to any of the questions stipulated in the case study protocol. This research initially set out to only collect data on the effects of ISO/IEC 20000 on service levels, however there was data to support the other benefits elicited in Chapter 3. The strength of the protocol is that this presented the researcher with a decision point, to amend the case study protocol to include this additional line of inquiry or to cease this irrelevant data collection and to refocus on the original objectives.

Part way through the data collection phase, it was realized that there was sufficient evidence to present a case not only for an increase or decrease to service levels, but also the effects of ISO/IEC 20000 on the other five benefits discussed in Chapter 3. A key advantage of case study research is the flexibility it allows a researcher to pursue a line of inquiry not originally intended (Yin, 2014: pg. 94). A decision was made pursue this additional line of inquiry and the case study protocol was amended to reflect these changes.

4.5. Research Design

Among the specific case study designs, four major types of design follow a two by two matrix, (see Figure 4-3). The first pair in the matrix consists of single case and multiple case designs. The second pair, which can occur in combination with either of the first pair, distinguish between holistic and embedded designs (Yin, 2012). The type of design for this study is a holistic, single case design.

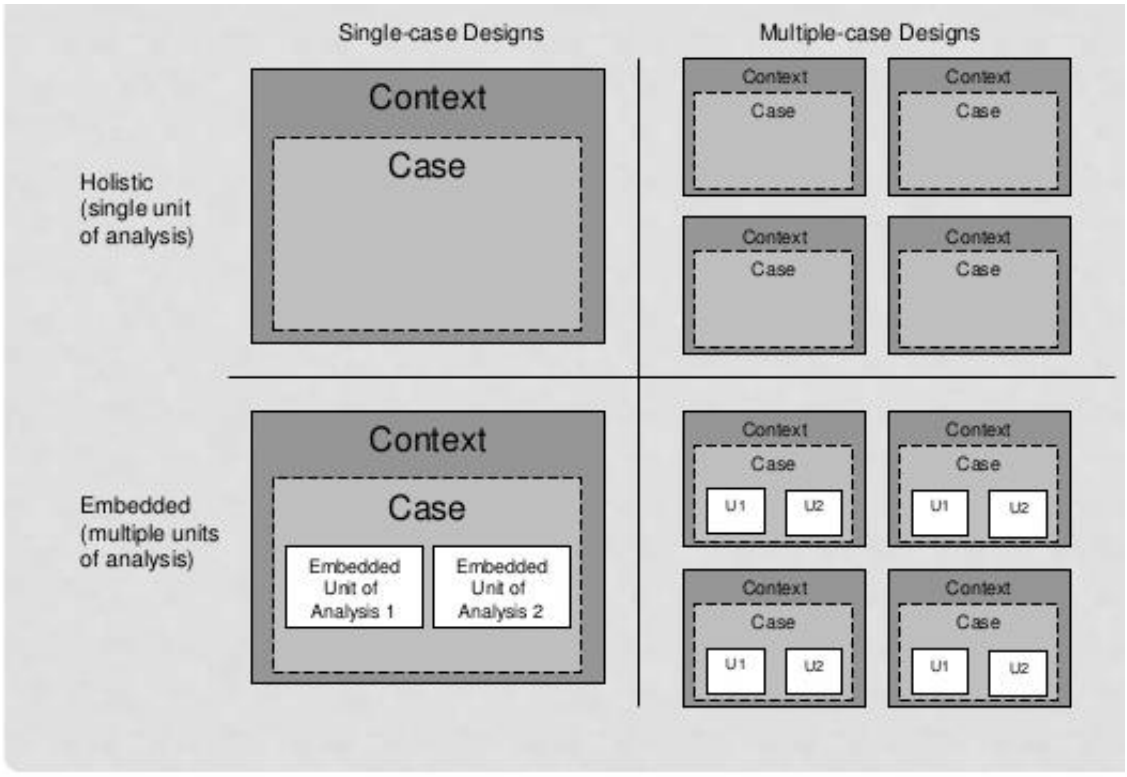

Figure 4-3. Basic types of Case Study research design. Source: Thomas (2014)

In Chapter 2, the systematic literature review demonstrated that very little academic research had been conducted into ISO/IEC 20000. There is an opportunity to access to observe and analyse ISO/IEC 20000 within an organization, a phenomenon that has not to this point been analysed with academic rigor within an organization, nor specifically, an Australian or government organization. This study will also assess the organization over a period of time, fulfilling a second criteria proposed by Yin (2012) in that longitudinal studies are more suited to single case studies.

This research studies how service levels changed over time, relative to certification to ISO/IEC 20000 by the company. This dissertation will ensure that this information can be used as a pilot case and thus further research can be completed through a multiple case study. There is vulnerability in this design, that the organization chosen for this study may not have been suitable for this study. In this instance, the research design would be revisited or an alternative organization chosen and re-confirmation of the research proposal will be sought.

The two variants of a single case study, holistic and embedded have both their strengths and weaknesses (Yin, 2012). The holistic design is advantageous in this situation as no logical subunits can be identified and ISO/IEC 20000 within the organization is that of a holistic nature. Potential problems will be avoided within this research by ensuring that the specific phenomenon of ISO/IEC 20000 certification is studied in detail and that clear data is produced to support the results of this research. To ensure that the entire nature of the case study does not

shift during the course of this study the research questions that were stated in the confirmation proposal have been maintained throughout the study. If slippage from these research questions is noted, then the research design will be revisited and recreated as a new study.

4.6. Conclusion: Case Study Research

Multiple research methods have been assessed for suitability in achieving the objective of this study. Case study research, as taught by Professor Robert Yin, has been selected as the most appropriate method of research to answer the question of how certification to ISO/IEC 20000 provided benefit within an Australian government organization. This chapter has detailed the general approach to the research design, detailing the objective and how this research planned to achieve the objective.

There are four tests to judge the quality of the research design, these tests have been addressed and the following chapters will demonstrate the effectiveness of these tests. Two key documents underpinning the design of this research are the case study protocol and the case study evidence collection database. A simple and thorough research design has allowed for the successful achievement of the research objective within the allocated timeframes and resources. The well documented and repeatable research design can be used as a basis for which a multiple unit case study can be conducted from in the future.

CHAPTER 5. DATA ANALYSIS APPROACH AND PLANNING

There is a theory explained by Gregor (2006) that describes how and why things happen in particular real-world situations. Gregor (2006) supports Yin's case study research as an approach to develop explanation theory. Analysing case study evidence is especially difficult because the techniques are yet to be well defined (Yin, 2014).

The evidence collection database was the repository used to collect all the evidence that protocol suggested was required to meet the research objectives. Chapter 4, explained how the data collection protocol assisted the research on staying on track and collecting the correct evidence to support the research objectives. This chapter will detail how the protocol and database are linked, what was done with the evidence collected and how that evidence was analysed.

It is not surprising that case study analysis is the most difficult stage of doing case studies and novice investigators are especially likely to have a troublesome experience (Yin, 2014). One recommendation, affirmed by Yin, is to begin with a simple and straightforward case study, even if the research questions are not as sophisticated or innovative as might be desired. Experience gained in completing such a straightforward case study will result in being able tackle more difficult topics in subsequent case studies (Yin, 2012). With this advice in mind, this case study is aimed at a simple objective – Is this standard beneficial for the organization being studied?

Dugmore (2012b) showed that the two biggest benefits of using the ISO/IEC 20000 standard are credibility improved and better service. This dissertation will focus Chapter 7 on better service and provide a time-series analysis from the data collected from the organization to see the effect of certification on service levels. After discussing the selected analytic strategy, this chapter will further examine the invalidating influences that are suggested by Kratochwill and Levin (1978) and (Gast and Ledford, 2014). Among others, this dissertation looks at the effects that history or testing can have on data and provide measures for countering these results, or at a very minimum, identifying that the data has been affected.

The method of conducting a time-series analysis and identify likely patterns to be seen in the data will also be discussed. Whilst this research cannot use a statistical model for the unit of analysis, one can incorporate statistical models for the embedded data. Annex I to this dissertation explains the different pieces of service level data that were collected, how the data was collected and how the data is analysed. This data is then examined against the competing rival hypotheses and expected patterns are established. Throughout this dissertation there is the challenge to produce a high quality analysis. The end of this chapter will discuss how this high

quality was achieved through the collecting, displaying and presenting of all the evidence and done so without bias.

5.1. General Analytic Strategy

Four general analytic strategies are described by Yin (2014: pg. 136) relying on theoretical propositions, working data from the ground up, developing a case description, and, examining plausible rival explanations. The author states that having a self-developed strategy is also acceptable. This section examines the four strategies proposed by Yin, then selects two of the strategies to combine in order to achieve the objectives of this research. Developing a case description was discarded as a strategy. Whilst the Organization was the first government agency to achieve ISO/IEC 20000 certification, the implementation is not unusual or a particularly exemplar adoption of ISO/IEC 20000. This research considered that there was likely to be more merit in the other analytic strategies.

Additionally, this case study is focused on the outcomes from ISO/IEC 20000 and less so on the process that led to the implementation of ISO/IEC 20000. Working with data was considered as a strategy, but after a short time of manipulating the data, this research considered working with the initial theoretical propositions offered in Chapter 3 more likely to fulfil the objectives of this case study. Gregor (2006) describes that possible alternative explanations as to what caused a particular outcome should be examined and assessed to bolster internal validity. Examining plausible rival explanations was used in concert with the theoretical propositions already recommended, giving a rounded and safe strategy in which to commence analysis of the data.

This research anticipated seven possible rival explanations for the findings in this report. During data collection, special attention was given to ensure that as much data as possible was collected in order to either support or discredit these rival explanations. The four rivals identified are listed in Chapter 4, Section 4.2.7. The expected patterns of these rivals and the system employed to identify and prove or discredit these rivals is discussed in detail in Section 5.4.3. In supporting the general analytic strategy, Section 4.2.2 discussed some theoretical propositions; these are further expanded and amplified in the case study protocol in Annex C.

The purpose of the general analytic strategy is to link the data collected in the case study database to the concepts of interest proposed in the case study protocol, then to use the concepts to give direction in analysing the data. This research has used a method derived strategy based on two of the strategies recommended by Gregor (2006) and Yin (2014) developing theoretical propositions and examining rival explanations. In attempting to answer the questions posed by these two lines of inquiry, the research identified that the data collected may have some invalidating influences.

5.2. Possible Invalidating Influences

5.2.1. Internal invalidity introduction

Kratochwill and Levin (1978) and (Gast and Ledford, 2014) list several possible invalidating influences: history, maturation, testing, instrumentation, multiple-treatment interference, instability, changes in experimental-unit composition, reactive interventions, experiment effects, selection and interaction of selection with other sources of invalidity. The influences applicable to this case study are discussed in detail in this section.

5.2.2. History: The effects of social events

The effect of history on internal validity can be seen when certain events that might be expected to influence service levels, occur at the same time or soon before certification to ISO/IEC 20000. These events are completely external to the organization and the business, but nonetheless, could have some effect on the employees of the organization and consequently the service levels provided. The obvious method to counter this invalidating influence would be to have a 'control group'. Also a different organization would be influenced by the historical events of the real world and appropriate measure could be made of both data sets to identify correlation. In the single case study presented in this dissertation, there is no control organization included.

Using multiple organizations would be beneficial for future studies, to ensure that the results post intervention were not just a quirk due to historical influences. This research will attempt to describe events throughout the seven year data collection period and the influence these events had on the data. Campbell et al. (1963) describes that the influence must not only be plausible, but must be possible as well. It is possible that the World Financial Crisis, the Victorian Bushfires, the Queensland floods or swine flu have had an influential effect on the employees of the transition, but how much of an effect did history have on service performance? Kratochwill (1978) describes that even with proper precautions to control for history as an internal validity factor, the potential interaction of history and certification could still pose an external validity problem. This study has made best efforts to identify potential events and note them in the results.

5.2.3. Maturation: Organization maturity

In this context, maturation refers to processes operating within the organization as a function of the passage of time. The influence of maturation is not linked to any specific external events, as above in the case of history. The process of maturation is a threat to internal validation when the process operates in addition to the intervention being assessed. In this study, some change is to be expected as part of a long-term maturational trend. To counter this, data from a long pre-certification phase is collected in an attempt to measure the annual increase due to maturation,

thus ensuring that any increase in service levels due to certification are measured to be above and beyond the expected levels of maturation.

5.2.4. Testing: Adoption of KPIs to measure service levels

Confounding due to testing occurs when changes on a post-test are in part due to subjects having taken a pre-test. As with history, if an appropriate control group is employed, testing becomes an external validity problem. Confounding due to testing could occur in this case study due to the introduction of ITIL and the adoption of specific key performance indicators (KPI) to be reported via the service level reporting mechanism to the customer. The organization, over a period of reporting periods would undoubtedly understand more fully what had cause and effect on these KPIs. Over months, the organization, would work to improve the KPIs and subsequent service levels displayed to the customer.

In the Organization studied, service level monitoring was introduced 18 months prior to certification to ISO/IEC 20000. Kratochwill and Levin (1978) and Institute of Education Sciences (2014) describe that repeated testing might be an advantage of the time-series design, insofar as adaption to testing may occur prior to intervention, as is the situation in this case. Testing confounding can also arise when the measurement process is stimulus for change. That is, the measurement of service levels may have been the stimulus to increase the service levels provided to the customer. This aspect of testing will be further discussed in the context of experimental effects in Section 5.2.8.

5.2.5. Instrumentation: Service level measurement tools

Kratochwill (1978) describes that if an intervention occurs coinciding with change in the method of collecting data on the dependent variable, effects of the intervention are said to be confounded with instrumentation. While such an invalidating influence is unlikely in a planned experiment where control of the measuring system is monitored and remains consistent throughout data collection, it is a major consideration in this situation as the data collection was retrospective. This is a certain potentially invalidating influence in this situation, as over the data collection period three different Service Management Tools were utilized to collect the raw data. Additionally, numerous policy changes and reporting nuances were changed during the surveyed period. Recognizing this as a potential confounding factor within the Organization's and Customer's data, every effort was made by the case study organization to keep reporting standardized across all years. Changes to measurement are documented and noted in the Service Level reporting and in the evidence collection shell. A change of service management tool is noted one month prior to the initial certification to ISO/IEC 20000. Assessment of the accuracy and reliability of the data in this time-series has been assessed and, in circumstances when the

data was unreliable or a different measure to the rest of the data set, the data has been flagged in the case study database and has been not included in the analysis of the dataset.

5.2.6. Instability: Variability of data

Kratochwill (1978) describes that in any time-series analysis researchers must determine if the intervention has a true effect or if the change may be due to chance or random variation. This research will use steps outlined by Institute of Education Sciences (2014) to determine the variability of the data and the effect of variability on the results. The variable nature of the data collected and the large changes from month to month are a result of the data coming from an organization in the real world. However, this data must be carefully analysed to ensure that the effect of certification is not mistaken.

Kratochwill (1978) explains that there are two methods to analyse the data in a time-series statistically and visually. Statistical and visual methods as described by Institute of Education Sciences (2014) will be discussed in detail in Chapter 7. The use of moving averages has been employed to level out the noise produced in this real world study. The statistical analysis of the data will mitigate an instability hypothesis. However this statistical analysis will only inform this research if there is an increase or decrease in the data. The purpose of the remainder of this chapter is to ensure that there are no other confounding dimensions affecting the data.

5.2.7. Changes in experimental-unit composition: Organizational change

In a dynamic organization with approximately 200 employees and between 10-20 casually employed contracted staff, any change in composition of the group that occurs coincident with, soon before or after the introduction of the certification, could contaminate the certification effects. The organization changed and fluctuated (+- 5%) over the period of the data collection, however there was no systematic change in the number or composition of employees or significant changes to the organizational structure over the study period. The largest changes to the organization came from the organizations positioning within the Department and to whom the organization reported, within the Department or Group. Due to strong leadership within the organization and a low annual staff turnover, these potentially confounding changes were limited and are not believed to have affected the service level data.

5.2.8. Reactive interventions: Immediate increases in levels

Kratochwill and Levin (1978) explain that interventions may be formulated as reactions to past or impending changes in the system into which an intervention is introduced. This confuses the results with an abrupt change in the level or direction of the data series, which may be due either to the intervention or to other changes in the system, which brought about the intervention. This study is seeking to identify a steady upward trend over time and not a sharp increase in service levels immediately post certification. This is partly due to the improvements from certification

potentially being experienced during the journey to certification, that is, the organization may have been 'ready' to pass a certification audit six months prior to the external auditor arriving and consequently the benefits to service levels will have commenced from this earlier date.

Additionally, this research does not expect an immediate increase in service levels in the month post certification, as 'bedding in' time is required for the full effects of the certification to be realized. Thus this dissertation expects the service levels six to 18 months post certification to be significantly higher than the service levels measured from 18 months to six months prior to certification. Concern over reactive intervention effects would be considered more important to this study if there are only a few observations after the certification, however as there are years of data after the certification this is less of an issue.

Figure 5-1 graphically shows the stability of the incident management service level achievement as a measure. The upper and lower measures show the average of the measures in the proceeding and following 12 months period of each data point. The data point for each month represents the data taken from monthly ITSM performance reports provided to the customer. The data point in this graph represents the service level achievement for incident management. The data points and averages leading up to certification in December 2009 are relatively stable and no reactive movement of the data is to be expected post certification.

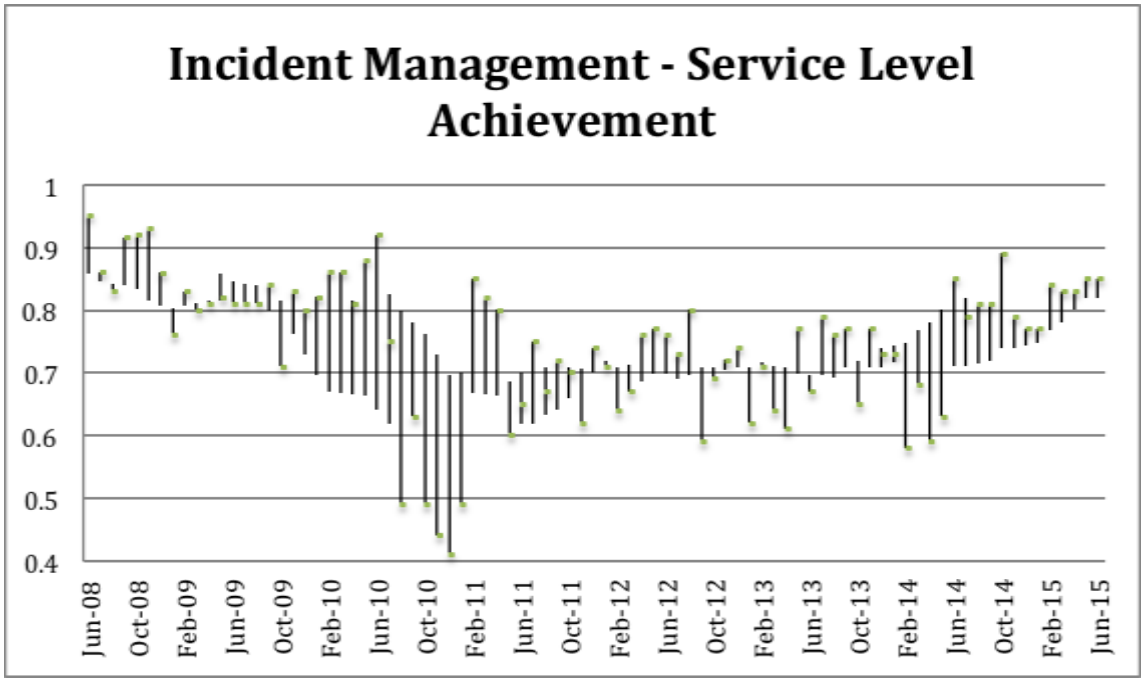

Figure 5-1. Incident Management - Average levels of Service Level Achievement

Section 5.2 has presented several threats that provide reason for the choice of analysis design. These factors have been considered in detail and effects to militate these factors have been put in place. Had the selection of this analysis method been chosen prior to 2009, then there may have been further steps that could have been taken to prevent some of these invalidating

influences from affecting the results. However, conducting the research ex post facto has allowed this research to avoid the pitfalls of experimental effects and selection biases. The careful analysis of invalidating influences in this case study research has allowed for some qualified conclusions regarding certification effects. The potential merits associated with this time-series design will be discussed in detail in Section 5.3.

5.3. Analytic Technique (a Choice of Five Analytic Techniques)

To further develop internal and external validity, Yin (2014) recommended using an analytic technique within the general strategy developed and explained in Section 5.1. Yin (2014) teaches using any of five analytic techniques; pattern matching, explanation building, logic models and cross-case synthesis and time-series analysis. Consideration was given to all five techniques, however in answering the theoretical propositions developed in the research design in Chapter 4 of this dissertation, logic models were considered unsuitable for achieving the aim of the case study. Utilizing logic models as an analytic technique was considered inappropriate for two key reasons. Firstly, there was not a chain of cause and effect patterns, although had the time period of the study been brought forward, the study could have assessed the effects of ITSM adoption, ITIL implementation and ISO/IEC 20000 certification and the consequences of these three events. Secondly, there was not a chance to collaboratively develop the logic model with the Organization's executives prior to the data being recorded. Similarly, using cross-case synthesis was deemed unsuitable as this study is of a single case. Pattern matching and explanation building were considered suitable to achieve the aims of the research, however due to the large number of time data points, a time-series analysis was chosen as the most suitable technique to be used in concert with the general strategy discussed in Section 5.1.

5.3.1. Analytic technique: Introduction to the time-series analysis

Of the five analytic techniques discussed by Yin (2014), this researcher has selected the technique of using a time-series analysis. Time series research was initially characterized by Campbell and Stanley (1966: pg. 37) as: *"the presence of a periodic measurement process on some group or individual and the introduction of an experimental change into this time-series of measurements, the results of which are indicated by a discontinuity in the measurement in the time-series"*.

There are multiple forms of time-series analyses. Yin (2014) describes two types; simple and complex time-series. Kratochwill and Levin (1978) describes ten types: Basic, Single N-Multiple I, Multiple N, Single I, Multiple Baseline, Multiple N-Multiple I, Inverted, Operant, Interaction, Sequential Multiple N-Multiple I, and Stratified Multiple N-Single I.

In this case study, the method and amount of the data that was gathered and the way in which the organization is certified has limited the choice of time-series designs and has dictated the

design employed. This dissertation acknowledges the advice provided by Kratochwill and Levin (1978) in that, where the researcher has little choice over the design strategy, inferences about a treatment effect may be weakened. In this case a simple time-series design, as described by Yin (2014) is utilized. Multiple measures are utilized in this simple time-series to assist with boosting internal validity. This method of multiple measures (N) with a single intervention (I) is described by Kratochwill and Levin (1978) as Multiple N - Single I.

This dissertation expects the behaviours of the organization to change permanently from certifying to the ISO/IEC 20000 standard. Whilst some regression may follow a lapse of certification, for most parts, the effects of certification are permanent within the organization. The Institute of Education Sciences (2014) stipulates in their single case design standards that an intervention associated with a permanent change in behaviour should be evaluated with a multiple baseline design.

The 85 observation points selected for use within this case study are a continuous monthly measure from June 2008 to June 2015. The data yielded by a this time-series analysis is expressed in the form of a series consisting of; 18 observations (O_1 O_2 , . . , O_{18}) prior to the certification of the organization, 46 observations whilst the organization was certified (O_{19} O_{20} , . . , O_{64}) and 21 observations (O_{65} O_{66} , . . , O_{85}) after the final certification audit achieved by the organization. Figure 5-2 indicates some possible outcome patterns for a time-series into which an intervention is introduced as indicated by the vertical line X. Reference to these patterns will be provided in subsequent sections.

Glass et al. (2008) illustrates how a temporary versus continuous intervention can mediate the strength of evidence for an intervention effect. In this case study, where the effects are continuous, as is the case for ISO/IEC 20000 certification, for the confidence in the intervention effect to be strong, the data must show a steady increase, as in line A in Figure 5-2, and not just an increase and then a return to normal pre-certification levels as line B in Figure 5-2. Any deduction must of course take into account the previously discussed internal validity problems such as instability or maturation before reaching conclusions on the effect of the intervention. In the case described by this research, if the data showed that a repeated intervention does not sustain the initial post-intervention levels as displayed by line A in Figure 5-2, the intervention may indeed have a weak effect.

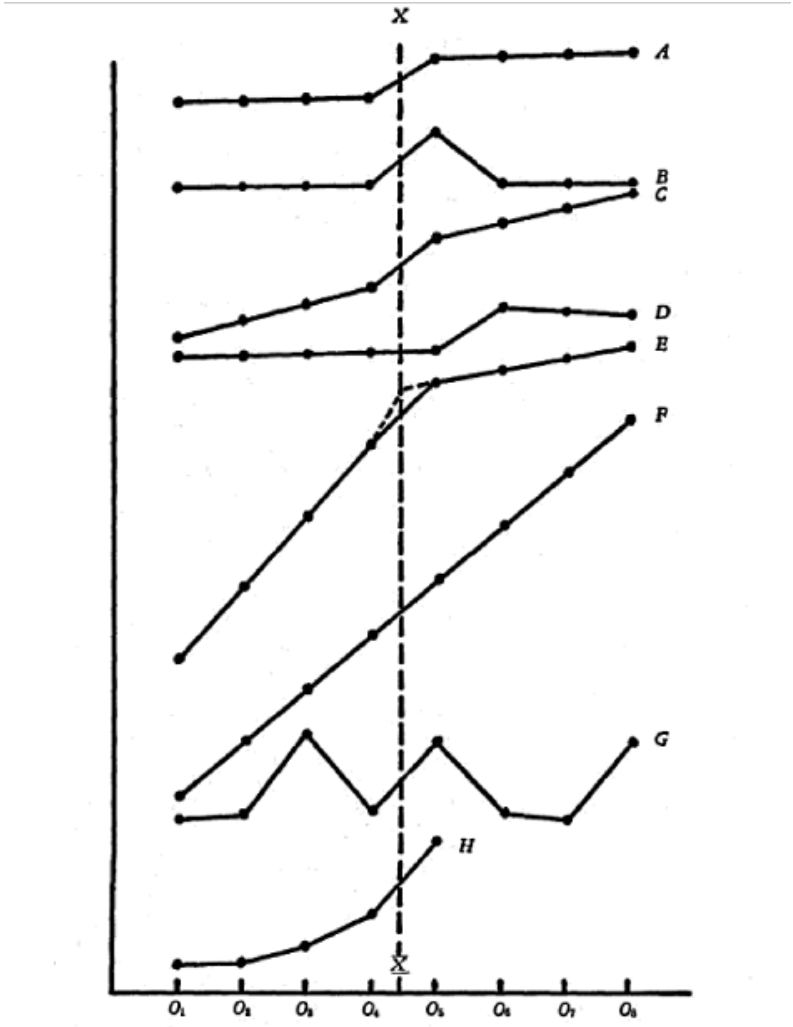

Figure 5-2. Possible outcome patterns from the certification of the organization at point X into a series of measurements over a time-series O1 to O8. Except for D, the gain O4-O5 gain is that same for all time-series, while the legitimacy of inferring an effect varies widely, being strongest in A and B, and totally unjustified in F, G, and H. Source: Campbell and Stanley (1966)

Kratochwill and Levin (1978) advise that a methodological consideration in the use of the time-series design relates to ruling out the instability hypothesis. Data in the pre-intervention phase must be stable, as demonstrated by lines A, B or D in Figure 5-2, (i.e. they must not exhibit a trend, C, E, F, or H in Figure 5-2 exhibit trends) or must exhibit a trend in the direction opposite from that expected for the post-intervention phase. The six features provided by the Institute of Education Sciences (2014) will be utilized to demonstrate a credible effect.

Within this study, care must be taken to demonstrate a credible effect across the multiple sources of data chosen. In order to rule out an instability hypothesis, this research should discover all variables trending in a similar manner. However, there may be a short delay after certification as the organization awaits the bedding in period. Section 3.2 of the case study protocol directs the researcher to gather data to correctly demonstrate this period of bedding in.

Some of the benefits from certification may have started to be felt prior to the actual audit and some effects may take a few months to materialize. As the data collected for this case study is from an organization working in the real world, it is unlikely that the results will be as obvious as those demonstrated in Figure 5-2, except perhaps in line G. Where applicable, this research will smooth out the data using moving averages. This process will smooth the month-to-month fluctuations. This case study will present a case to rule out the instability hypotheses in Chapter 7.

Collecting from multiple sources and having multiple measures adds complexity to this time-series and has created greater challenges for data collection. However, having multiple measures also leads to a more elaborate set of trends that have been central to a stronger and more reliable analysis. Any match of predicted results with an actual time-series, when both are complex, will produce better evidence for an initial theoretical proposition.

One concern researchers have when completing a time-series analysis is that not all gaps between observation points are equal. The advantage of completing chronological sequences is a major strength of case studies, allowing the researcher to easily trace events over time. The data for each observation point is the same distance as the next. All data is compiled as recorded at the first of each month.

This dissertation provides explanatory value and not just a descriptive rendition of events. This case study, whilst based on a complex time-series analysis, is not limited to the analysis of time trends alone. Inferences are very important to this study, as is the multiple sources of evidence used to create this time-series analysis. This dissertation will examine the data collected during this research. This examination is completed so as to guide the time-series analysis. However, other parts of this research will look into how other factors affected other benefits not covered by this time-series analysis.

Replication logic is not required in the instance of this single case study. However, the process used is simple, well documented and easily replicated, allowing future studies to replicate the process and allowing the comparison of other cases against the organization studied in this dissertation.

5.3.2. Alternative variables considered

Within the process of doing pattern matching or a time-series analysis, there is benefit in identifying some variables that are unlikely to be affected by the process and result of certification. The ITSM performance report was identified as a potential source and was searched for variables that would be unlikely to be affected by the certification to ISO/IEC 20000. Limited data was collected on a specific hardware (Radio Frequency Identification) and department training (in the applications supported by the organization) in a hope that this could

be selected as potentially suitable measures. Unfortunately, both these measurers had insufficient amounts of data or the data was not available over a suitable timeframe. The net result resulting in this research not being able to use any variable not expected to be affected by ISO/IEC 20000 certification.

5.3.3. Visual vs. statistical analysis of time-series data - Por qué no los todos?

When dealing with time-series data, Kratochwill and Levin (1978) state that researchers have three data analysis options; visual analysis, statistical analysis or a combination of visual and statistical analysis. Traditionally, single-case researchers have relied on visual analysis of the data to determine whether evidence of a relation between an independent variable and an outcome variable exists and the strength or magnitude of that relation (Kennedy, 2005; Parsonson et al., 1992).

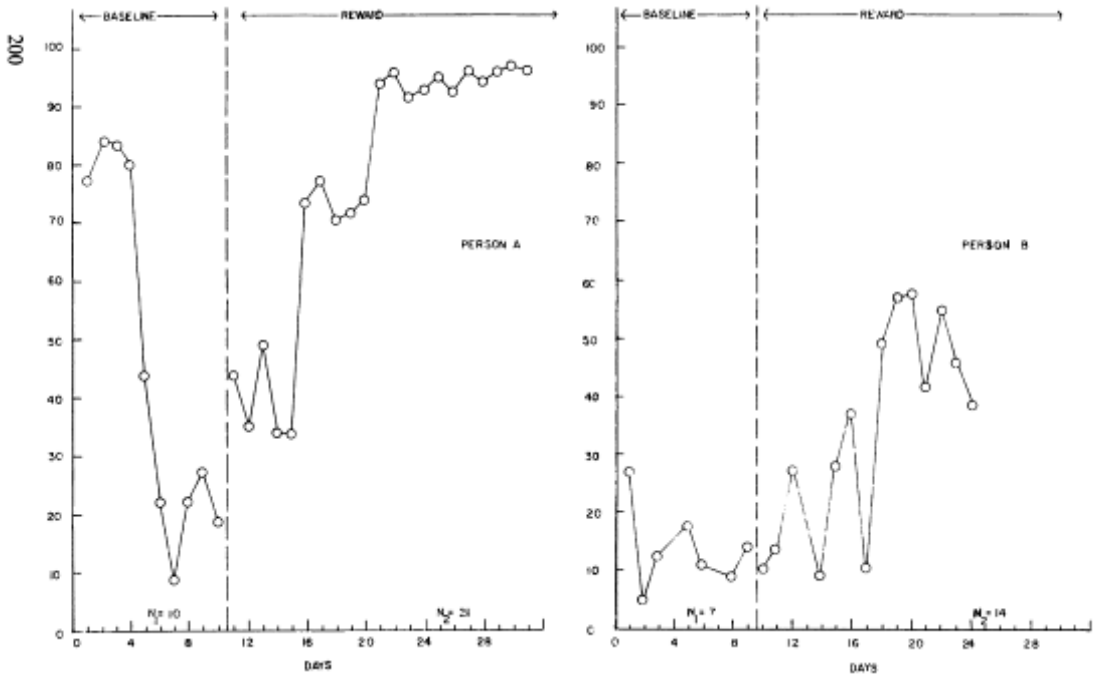

Figure 5-3. Two graphs illustrating a study on the relationship between 'eyeballing' the data and time-series analysis of intervention effects in the interrupted time-series experiment.

The two charts in Figure 5-3 are reproduced from an earlier experiment by Gottman and Glass (1978) and are represented in Chapter 4 of Kratochwill (1978). The authors conducted an experiment where they asked 13 researchers to 'eyeball' the graphs and judge whether or not an intervention effect was present. The same data was put through a statistical analysis. The results of both analysis varied greatly both from judge to judge and from statistical analysis to judge. The data for Person A whilst erratic and non stationary, when analysed with first order integrated moving averages, showed to be highly statistically significant, however the seven out of 13 judges deemed the same data, after visual analysis, as statistically reliable. Likewise

analysis was completed on Person B, showing no statistically significant shift at the point of intervention, however 11 of 13 judges, with their eyes only, felt there was a significant upward shift.

Gottman and Glass (1978) did not suggest that that visual analysis should not be continued, but argue that visual analysis can be refined and made more discriminating if exercised along with statistical methods. To provide strength to the conclusions of this dissertation, this research, as recommended by Gottman and Glass (1978), will use a combination of both visual and statistical analysis. Chapter 7 will continue the discussion on statistical (Section 7.9) and visual analysis (Section 7.8).

This section has examined how using a specific analytic technique, within the general analytic strategy, has strengthened both the internal and external validity of the case study. Using a time-series analysis in this case, with multiple measures on one intervention, has proved to be a strong method of using the data gathered in the evidence collection database. This research attempted to use other variables that would not be affected by certification to ISO/IEC 20000. This chapter has shown that to provide the strongest conclusions to this dissertation this research must use a combination of both visual and statistical analysis.

5.4. Performance Analysis

5.4.1. Selection of performance metrics

Gacenga (2013) describes that the main challenge in measuring and reporting benefits is using the correct metrics to provide truth on tangible benefits. The evidence in the collection database was analysed and five performance measures were chosen to represent observations of a potential improvement in service levels to the customer. This study is aimed at showing the benefit gained by the customer and provider organization through the independent assessment of ISO/IEC 20000, not from the use of the information in the service management standard itself.

The following measures were selected, as they were the five measures consistently reported to the customer over the longitude of the study. The service management measures are:

1. Incident Management Performance (IM);
2. Problem Management Performance (PM);
3. Availability Performance (Avail);
4. Financial Management Performance (Fin); and
5. User Satisfaction (User).

Each of the five performance analysis criteria have their own intrinsic biases, however whilst each criterion is included in the ITSM Performance Report, the source and the original author and compiler of the criteria vary, providing some degree of assuredness against bias if two or more criterion are used in unison. The sources and biases of each individual metric are discussed in detail in Annex I.

5.4.2. Expected patterns for selected service metrics

Looking at the patterns presented in Campbell and Stanley (1966), this dissertation expects the patterns for Incident Management Performance (IM), Problem Management Performance (PM), Availability Performance (Avail) and User Satisfaction (User) to all resemble Line A from Figure 5-2. For a positive effect on Financial Management Performance (Fin) one should see the line flattening and approaching closer to zero percent.

To enable pattern matching within the time-series analysis, information was collected from various sources on key events that had potential to show a spike or trend that could be noticed in the data. It is expected that key events indicating a potential change should be represented by the data.

5.4.3. Expected patterns and mitigation for rival hypotheses

The following list of seven potential rival hypotheses is expanded from the list provided in Chapter 4. The rival hypotheses, their expected patterns and or the mitigation for these theorems are as follows:

1. **Null hypothesis.** If the visual outputs are similar to Line F in Figure 5-2, one can deduce that the increase in service levels may be due to chance circumstance and that had an independent assessment of ISO/IEC 20000 not been pursued and attained, the same result would have been achieved. A solid baseline of data will be analysed and presented to counter this rival; the research will use 18 months of data previous to the independent assessment to ascertain a reliable baseline. From this baseline the researcher will measure increases across five service metrics. Additionally, this research will measure the effect of these five metrics after the certification lapsed.

2. **Threats to validity.** There is a threat that the metrics used in the customer reports were not supported by valid data. Or that, the metrics used in the customer reports were not true representations of customer satisfaction. The data within the customer reports has been crosschecked against the raw data in the service management tool. It is possible that the metrics were not a true representation and the research acknowledges that the data collected is only on incident response i.e. the data does not measure the satisfaction of a user who never contacts the

helpdesk. For example, the data across the five metrics should be somewhat correlated, if there is a decrease in percentage of incidents closed during the month. Then, if the data is correlated, one should see a decrease in customer satisfaction. Ideally, the results would show four lines (Financial Management performance excluded), similar to the A line in Figure 5-2.

3. **Investigator bias.** It is possible that the researcher would be reactive to the research conducted and would modify the proposition to ensure an outcome that was desirable for the study. It is acknowledged, that as a previous employee of the organization, the researcher would potentially have a bias towards not discrediting the organization or his colleagues. This bias is acknowledged and the use of a case study collection database presents mitigation for this bias in two ways. Firstly, the database allows the identification of the bias during the data collection phase. Secondly, the database allows an independent researcher to review the data collected and draw their own independent observations and conclusions of the potentially biased interpretation and analysis of the original data.

4. **Direct Rival.** It is a risk that any improvements in Service Levels were a result of ITIL adoption and maturity (or some other direct rival) and not a direct result of the independent assessment to ISO/IEC 20000. ITIL was initially adopted by the organization in 2007, the data collected for the 18 months prior to certification will provide this research with a reliable baseline from which to assess the effects of ITIL adoption and maturation. This research may see that ITIL maturation had stagnated and without an independent assessment of ISO/IEC 20000 looming, current service levels would not have been achieved. To confirm this rival ideally, this research will see a graph similar to Line D in Figure 5-2. The only change from what is displayed on Line D is that the effect would be witnessed before the intervention, and not after as displayed in Figure 5-2.

5. **Commingled rival.** If ISO/IEC 20000 certification does indeed lead to an increase in service levels, there may be other factors that also contributed to the increase in service levels. Some examples include; the maturity of the organization, change in leadership, change in organizational structure or a change in placement within the organization. A time-series of analysis of all data will be conducted, plotting significant events along a time-series to visualize and assess the effects of these commingled factors. The assessment of the effects of these commingled factors is difficult, due to the lack of clarity over the timeframe of the effects of the intervention. It is very difficult in a real environment to completely discredit the effects of a commingled rival. Further research into this area is required in order to

measure the effects of certification across multiple cases, thus reducing the chances of a commingled rival. For this rival to be true, one would see patterns similar to those in Lines A or B in Figure 5-2, however these rivals would be witnessed in the months other than when the certification occurred.

6. **Implementation rival.** For this rival to be found true, this research may find that the process of working towards ISO/IEC 20000 certification would have achieved the same results and that gaining certification in itself did not lead to any improvement. This type of rival is similar to the observer effect or Hawthorne effect, a term initially coined by Landsberger (1958). This is a very valid rival in this circumstance and Chapter 7 will present evidence demonstrating that this effect does not occur. Similar to the direct rival, one would expect to see a graph similar to the Line D in Figure 5-2. The only change from what is displayed on Line D is that the effect would be witnessed just before the intervention and not after, as displayed in Figure 5-2.

7. **Super Rival.** A super rival is the theorem that a force larger than ISO/IEC 20000 produced the results. ISO/IEC 20000 may have helped, but the results were mostly affected by some other occurrence. All available evidence will be thoroughly reviewed to ensure a force larger than the certification audit was not at play in affecting the service management levels. Unlike the commingled rival, the super rival will be much easier to detect from the available evidence, however it is likely that the pattern will be similar to that of Line A in Figure 5-2.

8. **Societal rival.** There is a distinct possibility that social trends and not the certification to ISO/IEC 20000, were key in producing better service levels in the organization. This is a statement describing that the increases in performance were simply worldly effects; a critic would say 'the performance was always going to improve anyway'. Similar to the commingled rival, the most effective way to discredit this rival is through the assessment of multiple studies. For this dissertation, evidence will be collected to ascertain if there was a societal rival in play and the study of multiple organizations will remain for future studies.

5.5. High Quality Analysis

This research has at all times aimed to achieve a high quality of analysis. The resulting quality has been based on four tenets that have permeated the entire study and analysis:

- **All the evidence.** The case study has attended to all the evidence. The analytic strategy and the use of rival hypotheses, exhaustively covered all the evidence and provided an answer to the clear and sharp research questions that were formulated

during research design. This research had access to a large volume of physical evidence available to the researcher from his direct involvement in the organization. During the analysis phase, this research aimed to consider as much of the evidence as possible. This consideration was made to ensure that all data was backed by multiple sources. The interpretations of this data have accounted for all the evidence and leave no loose ends.

- **Rival explanations.** Section 5.4.3 of the case study has identified, discussed and mitigated eight plausible rival interpretations for the information presented in this study. During this study, all attempts have been made to collect evidence supporting or discrediting all rival interpretations. Chapters 6 and 7 identify two rivals with insufficient evidence to be discredited. These rivals are noted and presented as work to be addressed in future studies.
- **Focus.** The method of analysis for this study has addressed the most significant aspect of this case study, which, as stated from the outset, written into the case study protocol and re-iterated throughout is 'Did an ISO/IEC 20000 certification have benefit to the Organization'. By focusing the analysis onto the independent assessment and certification of the organization, and clearly identifying six potential benefits, the analysis has ensured that the research remained focused and avoided potential detours towards lesser issues.
- **Information access.** The researcher's prior expert knowledge was used as an advantage to the information gathering conducted during this case study. Being an employee of the organization for some of the time period of the case study allowed the researcher information access and to extract intrinsic knowledge of the case that would be unachievable for an outside researcher. Additionally, experience in service management and external ISO/IEC 20000 audits within the organization, place the researcher at a clear advantage over others within the small pool of academics with professional ISO/IEC 20000 exposure. This pool of people is no doubt due to the small handful of Australian organizations with certification. A lack of experience in research methods was to be expected by a novice researcher completing a Doctorate of IT and was offset by leaning on the experience and knowledge presented in the key text on case study research design and methods presented by Yin (2014). Additional expertise was garnered through the assistance of a very experienced and senior academic supervisor. The use of a systematic literature review as described by Pickering and Byrne (2014b) ensured that the researcher was up to date on all the current academic literature on ISO/IEC 20000 and that all the expert knowledge was at hand.

5.6. Conclusion: Analysis Approach

This chapter discussed the development of a general analytic strategy that examined plausible rival explanations and theoretical propositions. These propositions were initially detailed in the case study protocol. Several threats were identified that have the potential to have an invalidating influence on this strategy. These factors have been considered in detail and effects to militate these factors have been put in place. The strategy to best employ the time-series analysis as an analytic technique was discussed in detail. Possible patterns that may emerge from the data were investigated and the patterns providing the most legitimacy were highlighted. Similarly, the patterns that were unjustified in inferring an effect were also identified and the option to do both visual and statistical analysis was selected.

From the available data, five performance metrics were selected as the most likely to give valid representations of a potential improvement in service levels. Each of the five performance analysis criteria had their own intrinsic biases and each was discussed in detail. The seven potential rival hypotheses identified in Chapter 4 were discussed and their expected patterns or mitigation was detailed. Four principles were identified and discussed to ensure that a high quality of analysis was achieved; all the evidence was attended to, rival explanations were supported or discredited, the study remained focused on the proposed goals and the information gathered through the conduct of the study was unlikely to be available to any other suitably qualified researchers. Utilizing the case study protocol as a basis, the next chapter will present and discuss the evidence analysed from the case study database.

CHAPTER 6. IMPLEMENTATION AND THE EFFECTS ON TRUST (B2), STAFF (B3), PROCESSES (B5) & FINANCIAL (B6) BENEFITS

The journey to ISO/IEC 20000 certification is perceived by some to be a long and expensive road. As demonstrated in Chapter 3, the benefits are not well defined or quantified. The most obvious benefit for an external service provider is the trust and credibility that is associated with certification. But an internal service provider generally has less trust issues with their customer. This leads to the research objective 'why would a government organization seek certification?'.

This chapter examines the key steps that led the organization to pursue ISO/IEC 20000 certification. The data collection protocol guides the researcher to seek the evidence to questions that underpin the research objective. This chapter seeks to answer the data collection questions presented in Sections 3.2 and 3.4 of the Case Study Protocol in Annex C. Sections 3.2 and 3.4 of the case study protocol directed this research to investigate the who, how, when, what and why the organization attained certification to ISO/IEC 20000. These sections of the case study protocol link to four of the six benefits identified in Chapter 3; credibility and trust (B2), staff commitment (B3), process (B5) and compliance(B6)

The chain of evidence is maintained in this chapter by annotating all comments about specific documents to a single entry in the case study evidence database (e.g. ED001). A concern of every case study is to ensure thorough evidence collection. Chapter 4 presented the research methodology and explained how this research has attempted to ensure that no key documents were missed. Informal interviews were conducted with selected employees of the organization to probe the memories of those involved, for direction to relevant evidence and for the location of the evidence in the corporate records. All cross-references contained within the evidence collected was checked to ensure that the evidence was complete. For further details on how the chain of evidence is preserved please see Annex J.

The focus of the organization was initially ITIL process implementation. After ITIL was implemented, ITIL maturity became the focus. Throughout the ITIL journey, there was a drive from senior management to seek ISO/IEC 20000 certification as an organizational goal. In early 2008, the IT Governance team took ownership of the ISO/IEC 20000 initiative under the umbrella of the Portfolio Governance Framework (PGF) and informally began taking steps to employ the standard as a means for measuring organizational process maturity, efficiency and effectiveness. Activity around these initial stages was most notable with the conduct of a training session from which the organization's attendees gained the formal qualification in the *ISO/IEC 20000 IT Service Management Foundations Certificate* (ED116).

The requirement for certification to ISO/IEC 20000-1 was not mentioned in Service Level Agreement (SLA) negotiations. However, follow-up meetings for attendees of the foundation

certificate training began to build stronger support for the initiative. With no formal recognition or backing for the activity there became a requirement to formalize the process. Formalization and approval of the Service Management Improvement Project (SMIP) confirmed senior management support and commitment to the proposed undertaking of ISO/IEC 20000 certification. An intensive research and planning process ensued, including investigation and communication with other government agencies such as the Victorian State Revenue Office (ED116). This introduction has given a brief overview of the activities the organization undertook prior to deciding to seek ISO/IEC 20000 certification. The next section discusses specific dates and how certification came to be an organizational goal.

6.1. How and When did the Organization Decide to Seek ISO/IEC 20000 Certification?

The journey to ISO/IEC 20000 certification for the Organization commenced in 2008. This research did not discover any credible evidence that supports an exact date of when ISO/IEC 20000 certification was first conceived as a possible organizational goal. Two separate documents, written by the same author stated that the initial conception for ISO/IEC 20000 certification came on the 11th June 2006 (ED110, ED111), however this research could not locate multiple sources of evidence to support this as a date for the initial conception.

In 2008, ideas of ISO/IEC 20000 certification as an organizational goal started to appear in corporate documents (ED107, ED221). The 2005 (ED101) and 2006 (ED102) SLAs between the Organization and the Customer do not mention any requirement for ISO/IEC 20000 certification. In fact, a review (ED103) conducted on the ITIL implementation project in June 2007, also contains no mention of ISO/IEC 20000 as a method to achieve the aims of the ITIL improvement project. The ITIL review also identified that while significant progress has been made, further work will be required to bring the Organization in line with ITIL.

The ITIL review (ED103) identified variations in relation to the consistency of the application of ITIL Service Support and Delivery processes, including clarity of boundaries between incident and problem management, levels of change management authorization and disparate configuration management practices. Whilst there is some evidence of defined SLAs (called an Materiel Support Agreement at this point in time), Service Level Management deficiencies were identified as an issue. Improved service level management was assessed as also helping to improve the effectiveness of all other Service Support and Delivery processes. At this point in 2007, ITIL is not as effective as the best practice framework could be and ISO/IEC 20000 was not being considered as a solution for aligning and integrating processes. If the goal of ISO/IEC 20000 certification was first conceived on the 11th June 2006, the goal was certainly not widely documented across the organization and was not incorporated into the ITIL review.

The Group to which the Organization belonged to was ISO 9000 certified (ED106) and insisted on a culture of continual service improvement (CSI). In fact, the culture of formal CSI existed (ED106) in the organization before ITIL or ISO/IEC 20000 were adopted. The stated aim of CSI in the Organization is to *"increase the probability of enhancing satisfaction to customers"*. The Organization had a customer focus, or at least a customer focus statement, prior to ITIL or ISO/IEC 20000 being proposed.

ISO/IEC 20000 certificate training was provided to key middle managers in August 2008 (ED110). This was to mark the start of the ISO/IEC 20000 journey for the organization. October 2008 saw the first meeting (ED109, ED221) of the Service Management Improvement Project (SMIP). This was a four-phase project, with the end state of phase 3 defined as passing an external ISO/IEC 20000 audit and gaining certification (ED110). The SMIP and the project's supporting documentation provide the main core of the evidence in answering the questions in Section 3.2.1 of the protocol.

On the 12th November 2008, the Managing Director announced in a presentation (ED107) to the entire organization that the PGF was to be established. The PGF shows the organization was seeking to include all of the governance initiatives and activities under one umbrella. ISO/IEC 20000 is one of the activities placed within the PGF. At a similar time a gap analysis (ED108) was conducted by a middle manager within the organization. This gap analysis identified and mapped the relevant sections of the ISO 9000 standard to the relevant sections of the ISO/IEC 20000 standard. The author of the document, then continued their analysis of the organization and concluded that the organization indeed met most of the requirements for ISO/IEC 20000. The manager did however note a deficiency within the change management process. This document reveals that at least from the inside, the organization thought they were in a good position to attempt an independent assessment against ISO/IEC 20000.

On the 20th November 2008, the second meeting (ED109) of the SMIP was held. This meeting held discussions around the triggers and benefits for seeking ISO/IEC 20000 certification. The members of the meeting, mostly middle managers, requested clarity of the benefits and asked top management explain and clearly communicate the triggers and value of certification to the organization and to justify the effort.

This research did not locate any comments by senior business managers about the value of the certification or use of ISO/IEC 20000 in general. Concerns were raised about the current workload of individuals and additional work that may be required of others as a result of this project. Concerns were also raised by middle managers as to whether ISO/IEC 20000 certification held any value for the organization. The only answer the project coordinator could provide the audience as justification for the level of work that was required, was that the project expected ITIL and ISO 9000 would provide synergies and thus reduce the impost on the

employees of the organization to achieve the requirements of the standard. In the same month, external contractors were employed (ED110, ED130) and a schedule put in place to achieve certification within the next 12 months (ED109). It is interesting to note that a schedule had been set, but the benefits to the business had not been fully identified.

The benefits identified were not specific and were simply generic benefits akin to those discussed in Chapter 3 of this dissertation. The benefits identified by the Organization are listed at Section 6.3. The project manager of the SMIP states in his opening presentation (ED110), that getting certified was not the primary goal of the project. The goal was to *"Demonstrate a commitment to improvement and improve ITSM capability and efficiency"*. The presenter states that the plan focuses on improving the business, not on certification, and that phase two of the plan focuses on quick wins and providing benefit to the business, not on producing documentation that nobody reads. Figure 6-1 lists the key points have been extracted from the presentation to middle managers (ED111).

Purpose: Baseline current performance; Set the agenda for an improvement program; Identify the causes of operational issues; Determine whether existing IT processes and tools are fit for purpose

Triggers: (1) To satisfy own requirements for internal governance and continual improvement. (2) To objectively demonstrate a consistent and reliable IT Service Management practice to all: Existing customers; Potential customers; Management

Benefits listed as:

a. Confidence for stakeholders
b. Re-assurance of the service customers are receiving
c. Independent and economic assessment
d. Examines effectiveness and identifies deficiencies
e. Provides baseline for improvement activities
f. Valuable input/direction
g. Alignment with business strategy
h. Practical help
i. Be able to demonstrate ITSM capabilities

Figure 6-1. Key Preparatory Information for the Service Management Improvement Project

Dowse and Lewis (2006) note that the adoption of IT governance and service management process frameworks in many organizations often occurs within a shift towards centralization and a reduction in Business-IT alignment. However, in the case of the government organization in this study, there was no shift to centralization and the evidence presented in Figure 6- 1 suggests that adoption of the standard was an attempt to align the organization with the customer.

As part of the preparatory phase of the SMIP (ED116), there was an assessment of the gap (ED117) between the current state and ISO/IEC 20000 certification. The inference this research makes is that had the gap been too large or too costly, perhaps the project would not have proceeded. The alternative view is that a larger gap would have been even more of an impost to seek certification.

In December 2008, a second gap analysis was completed (ED112) against the organizations ICT controls framework. Once again, the assessor calculated that the organization was well situated for an ISO/IEC 20000 audit. Following the two gap analyses, the SMIP project manager developed a self-assessment tool (SAT) (ED113). The SAT consisted of 686 questions complied from BIP0015:2006 IT Service Management Self Assessment Workbook (MacFarlane and Dugmore, 2006)[8]. The first two gap analyses proposed that the organization was well placed to attempt ISO/IEC 20000 certification. The questions contained in the SAT and the accompanying analysis, revealed that the organization was not as prepared for an independent assessment against ISO/IEC 20000 as the initial gap analyses anticipated. This SAT was compiled in February 2009 and *"the results of the questionnaire demonstrated: 37% compliance, 14% minor deficiency, 40% significant deficiency and 8% requiring further clarification or excluded"* (ED117). The self-assessment was recompleted in March 2009 and the results showed only a 46% compliance with the requirements of an SMS, as ordained by ISO/IEC 20000-1 (refer Figure 6-2 and Figure 6-3). The self-assessment also showed that 41% of the requirements showed a significant deficiency.

After several iterations of the gap analyses and assessment being completed by different people in different parts of the organization, all which revealed similar findings, the organization had significant remediation action required to meet the requirements of the standard.

[8] This book has since been updated to the 4th edition Dugmore J. (2012a) *IT Service Management Self-Assessment Workbook BIP 0015:2012*, London: British Standards Institute.

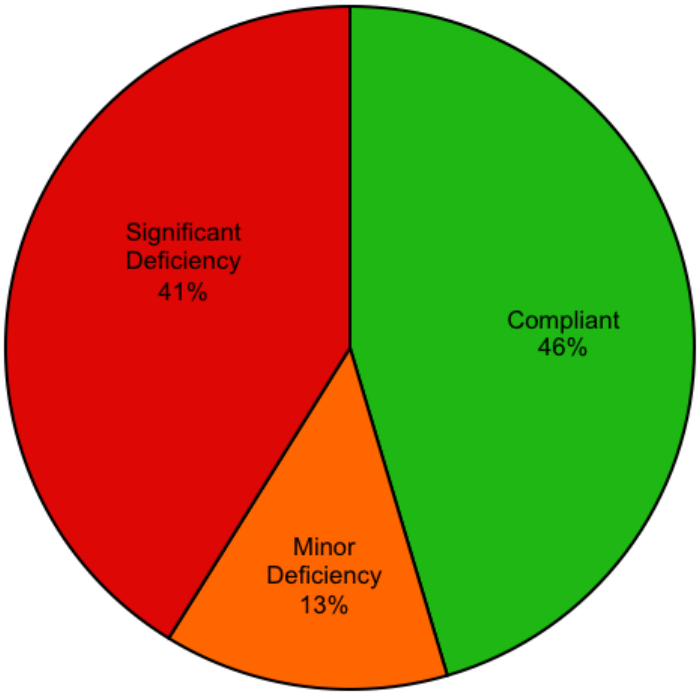

Figure 6-2. Summary of compliance to ISO/IEC 20000-1, results from SAT. (ED121)

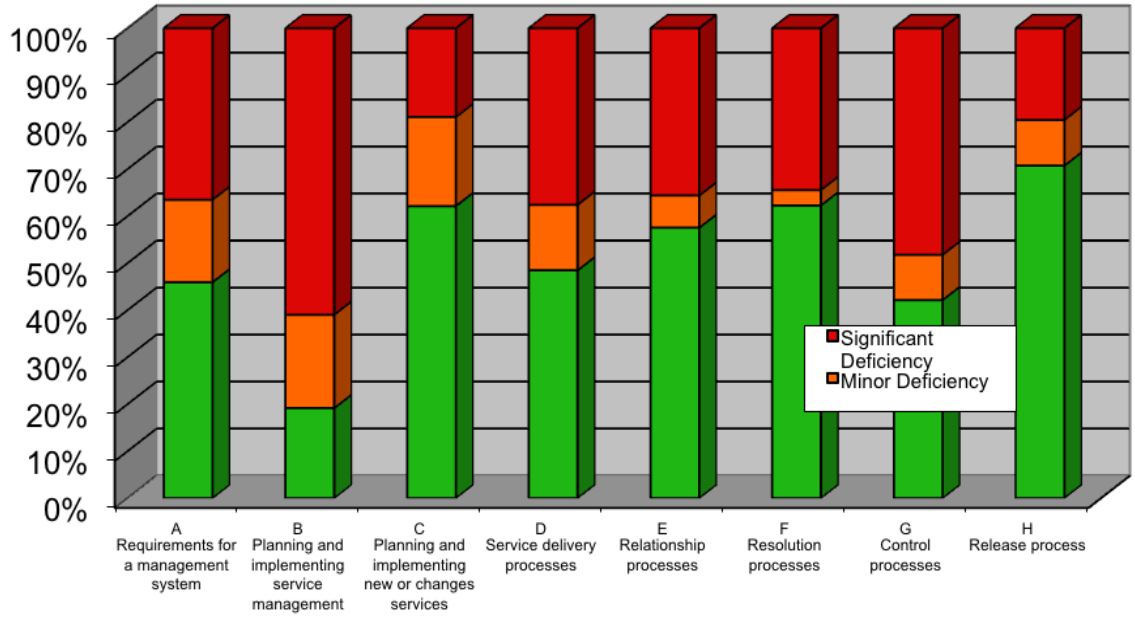

Figure 6-3, Results from SAT (ED121). Compliance to various sections of ISO/IEC 20000-1

The SMIP project plan records the commencement of the project in early 2008. The plan (ED116) states *"Initially the focus of the organization was ITIL process implementation. As this drew to an end, ITIL maturity became the focus. Throughout these processes there has been and still is drive from senior management that ISO/IEC 20000 certification be a goal."*

Even after ISO/IEC 20000 training provided in August 2008, any real steps towards certification did not start until the end of 2008, when the first high level gap analyses (ES007) were commenced. The first SMIP meeting (ED221) and the first organizational presentation outlining ISO/IEC 20000 as a goal was presented in November 2008. The project management plan for ISO/IEC 20000 certification was not endorsed formally by top management until February 2009 (ED222). However not until the middle of 2009 (ED124, ED125, ED126, ED127, ED128, ED129 and ED130) is significant drive and change within the organization towards ISO/IEC 20000 witnessed. A status report (ED137) from the contractor to the Organization confirms this analysis and concurs that, despite meetings and analyses, the Organization has not been making inroads towards certification.

Whilst some background work had been done by the external contractors, the final gap analysis, completed in July 2009 (ED135), shows that apart from the production of some process documentation, little had been realized in achieving the end state of certification so far. However, this research noted that the production of documents, prompted meetings with managers and in turn actions by managers to contribute to and implement what was written by contractors into the policies and procedures. The initial work did not produce outcomes, but this did lay a critical foundation for the push towards final certification being achieved.

The contractor was initially working on the project in some form from October 2008, however this was more in a business support role. In November 2008 the supporting contractor officially commenced the planning phases of SMIP and in February 2009 this project was given the official approval for execution. In July 2009, one can see contracted resources moved and realigned to give the ISO/IEC 20000 certification effort priority. Concurrently, one sees the employees of the organization start to take interest in and move towards the goal of certification.

An initial mock or pre audit was conducted in August 2009 (ED151, ED150, ED148). This was completed by a fully qualified auditor from the United Kingdom who so happened to be working for the contractor in Melbourne at the time. The results of this pre audit were not promising. The auditor surmised that there were major gaps in the SMS and many plans are not in existence, or if written, were out of date. In the best case, if the plan or process was in date, there was no evidence to show that the process/plan was followed. Additionally, the auditor states that measurement and customer communication needed improvement. The auditor

discussed that there needs to be greater monitoring and measuring of the service management processes. Whilst there was monthly reporting on for incident and problem management for the customer, this was inadequate to demonstrate the ability of processes to achieve planned results.

The auditor suggested coaching of process owners was required as a 'significant number of responses from process owners to the ISO/IEC 20000 requirements do not appear to be part of a formally designed and documented SMS'. There were indications that responses and supporting documentation/records are 'best efforts' to provide information, but do not form part of a designed SMS. The conclusion of the pre-audit was that the system was, at the time, inadequate. The pre auditor recommended that the independent assessment scheduled for October should be used to formally identify the gaps (major findings) to better prepare the organization for the next audit and that certification is unlikely to be achieved.

The official audit was at the end of October 2009 (ED155). Existing coverage of ISO 9001 resulted in the ability to do both the Stage 1 & 2 audits[9] concurrently. The official dates for the initial audit are recorded as 19th - 23rd October 2009. The assessor identified four areas of concern that required an action plan from the organization. The assessor also identified 21 areas that showed potential for improvement. This is a very good outcome for a first audit to ISO/IEC 20000-1. This result shows very good drive by the organization to turn around their systems and presentation of those systems to an auditor. In the space of two months, the organization prepared the SMS for an ISO/IEC 20000 audit. Essentially, until this point, procedures had not changed significantly and it is in this two month period the organization transforms from a 46% ready organization to an organization that is fully compliant with the standard, albeit with a few areas of concern.

The organization was officially certified as compliant to ISO/IEC 20000:1:2005 in November 2009.

6.2. Who/What Aided the Organization in Achieving ISO/IEC 20000 Certification?

6.2.1. People

The key personnel involved in achieving the end state of the SMIP were broken into four distinct groups:

1. **Top Management.** These directors provided the resources and direction and possibly the motivation for the project.

[9] A stage one audit is a readiness audit, to determine if the organization is ready to attempt an official audit.

2. **Contracted support staff.** Started as one person, and grew to a team of seven towards the end of the SMIP. These people were process specialists, but more importantly, they had time to devote to achieving the aims of the project.

3. **Business Improvement Staff.** These internal organization employees were ultimately responsible for the adoption and maintenance of the SMS amongst other components of the PGF.

4. **Application and service management Support Staff.** These middle managers were the workhorses of the project, putting the systems built and designed by the contracted staff into a working functional system that provided value to the organization. Most importantly, it was this group of people that presented the components of the SMS to the auditor.

6.2.2. Technology

Gaining certification for the organization to ISO/IEC 20000 was not achieved through any technological innovations. The service management tool was changed one month prior to the certification audit. However, this was a business instigated change linked to certification, but not predicated by the desire to achieve ISO/IEC 20000 certification.

6.2.3. Resources

Mingay and France (2006) reported that certification costs are generally not significant, however the process implementation costs could be and they will certainly vary a great deal from one situation to another, depending on the process maturity of the organizations in question. Mingay and France also stated that the process of certification can cost as little as USD$30,000, however cost depends on the size and scope of the services encompassed by the certification. ISO/IEC reflects nothing more than good practices, so should not be onerous for any service provider that has good processes.

The organization studied in this dissertation is a medium sized Australian government organization. This research concurs with the findings of Mingay and France (2006) and have found that certification represents only a small cost component of providing a service to a customer and the implementation costs are a reflection of achieving good practices, rather than an outlay to achieve a standard.

Initial projected costs of the SMIP were estimated at between AUD$80,000 – $100,000 (ED110). However, this research could not find evidence that showed that this included the effort and man-hours required by salaried staff in the Organization. Predating the desire to achieve ISO/IEC 20000 certification, was the idea of having a framework that covered all areas of governance. The PGF was dedicated to achieving a streamlined approach to compliance. The

PGF consolidated and merged various teams within the organization into a central team responsible for fulfilling the requirements for audits and control frameworks, both internal and external to the organization. This team was built utilizing existing staff resources from within the organization. The contracted support staff were resourced from existing budgets and the total cost amounted to approximately AUD$80,000 (ED110). Actual certification costs were budgeted at AUD$30,000 (ED110), however the initial certification cost only amounted to AUD$15,000 (ED146). A realignment of existing resources allowed the certification to be achieved approximately 0.25% of operating expenses for the financial years covered by the project.

To put this further into perspective, ED193 informs the researcher that the projected costs for the ISO/IEC 20000 audit in FY13/14 is AUD$18,000. However, compliance and assurance activities are forecast to cost AUD$240,000 and CSI is forecast to cost the organization AUD$1.3 million per year. Figure 6-4 presents the approximated cost of each service management process.

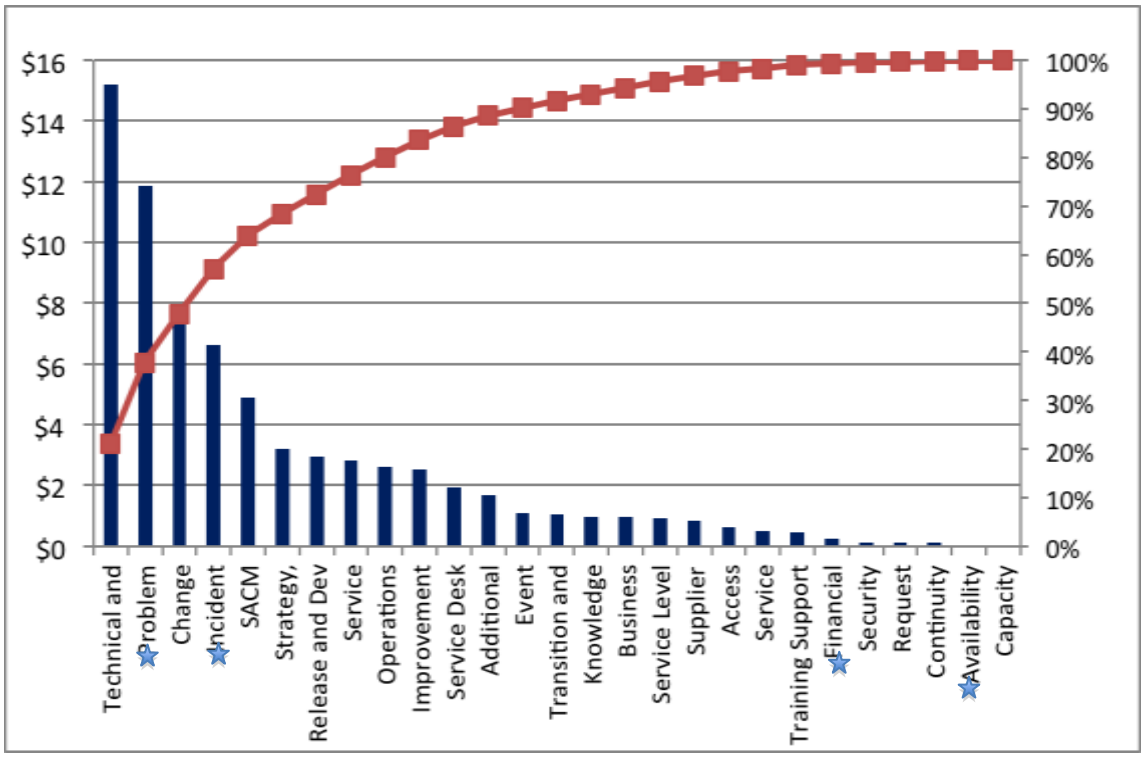

Figure 6-4. Top 10 ITSM Functional Area by Full Cost (Pareto Principle) - FY12/13 (ED202)

This research agrees with the proposition presented by Mingay and France (2006) that certification represents only a small cost component of providing a service. ISO/IEC 20000 reflects nothing more than good practices and is not onerous for a service provider that has good processes. The use of the ISO/IEC 20000 standard underpins all the processes and expenses

presented in Figure 6-4. Comparatively, the cost is very minimal to externally validate that an organization has a working SMS.

6.3. Conclusion: Anticipated Benefits as Perceived by the Organization Prior to Certification

The organization did not attempt to do a thorough benefits analysis prior to deciding to seek certification This section aims to analyse the evidence available to see if the benefits listed in Chapter 3 of this dissertation hold any similarity to the potential benefits identified by the organization. The benefits listed in Chapter 3 are Service, Credibility and Trust, Staff commitment, Financial, Process and Compliance.

ED157 discussed the organizations control of non-conformances and system improvement issues. One of the espoused benefits (Disterer, 2012) of ISO/IEC 20000 is the ability of the standard to provide 'continuous improvement of all IT procedures'. One could deduce from this document, that the organization already had a process in place to ensure continual service improvement.

Minutes from the second meeting of the SMIP (ED109) present a discussion around triggers and benefits for seeking ISO/IEC 20000 certification. The members of the meeting desired clarity of the benefits and did not seem convinced that the benefits were specific to their organization. Figure 6-5 is an extract (emphasis is original) from the presentation (ED110) presented at the SMIP meeting (ED109).

At the third SMIP meeting (ED111) a month later, the same benefits listed in Figure 6-5 are presented (ED114), albeit with the support of a top manager. The minutes of the meeting record *"The presenter briefly commented on the purpose, triggers and benefits as discussed previously. Any specific concerns were offered to be addressed at a later time via e-mail, telephone or during meetings to complete the self assessment tool."* From the benefits being a discussion point, a month earlier, a line in the sand was drawn and middle managers were expected to accept these benefits. Page 7 of the Service Management Improvement Project Plan (ED116) confirms the aforementioned list of benefits of the plan, albeit in a different order. Please remember, that whilst a major outcome of the SMIP was ISO/IEC 20000 certification, this was not the goal of the project and the benefits listed are more holistic than the benefits listed in Chapter 3 of this dissertation. Minutes of the monthly SMIP meeting (ED117) infer that a benefit of ISO/IEC 20000 is that ISO/IEC 20000 can be used as a tool to improve ITSM. This inferred benefit seems to be particular to this organization, which may be stagnating in its service management journey.

- ***Confidence*** *for stakeholders. Provided confidence to stakeholders that the ORG IT Service Management practice is:*
  - ***in line with good practice,***
  - ***meeting customers' needs, and***
  - ***providing competitive advantage to ORG when seeking new business.***
- ***Re-assurance*** *of the service customers are receiving. Provided re-assurance to the organization's existing customers on the:*
  - ***reliability,***
  - ***consistency, and***
  - ***value of the service they are receiving.***
- *Independent and economic* ***assessment.*** *Provides an independent and economic assessment of the organization's IT operational processes.*
- *Examines* ***effectiveness*** *and identifies* ***deficiencies*** *Examines the effectiveness of processes, people and tools and identifies deficiencies.*
- *Provides* ***baseline*** *for* ***improvement activities.***
- *Valuable* ***input/direction*** *Provides valuable input into improvement activities.*
- ***Alignment*** *with business strategy advice to help align IT Service Management with business strategy.*
- *Practical* ***help*** *provide practical help to solve problems encountered during ITIL/ISO 20000 implementation.*
- *Be able to demonstrate ITSM* ***capabilities*** *At the end of the project, understood how to demonstrate its Service Management capabilities to new and existing stakeholders.*
- *Service Management Tool - To provide support or otherwise for a tool (Infra, HP SM7, etc.).*
- *Improved processes, efficient and increased customer satisfaction? [sic]*

Figure 6-5. Benefits listed in a SMIP presentation (ED110)

After reviewing all the documentation, the most compelling piece of evidence as to what the actual goal of the certification was revealed in a presentation at the sixth SMIP meeting (ED142), written on the 5th August 2009. The presenter's notes show that ISO/IEC 20000 was the tool chosen to improve service levels. The other stated benefits were generic benefits and not organization specific. The benefit presented at this time was due to the audit drawing closer and the contractor was trying to motivate the organization towards the end state. Consistent with current literature, it is likely that an independent assessment against ISO/IEC 20000 would help the organization improve service levels.

Anecdotal evidence (ED223, ED224) presents the claim that the key goal of ISO/IEC 20000 certification was to provide the Customer with proof the Organization was providing good service management. No evidence was found to corroborate these claims, despite them coming from two different employees. There is also no evidence that suggested that the Customer understood what ISO/IEC 20000 was or that the customer requested the certification.

Figure 6-6 demonstrates that the organization was up to date with ISO/IEC 20000 literature and could list the benefits that were expected from ISO/IEC 20000 certification as detailed in current literature. The first column in Figure 6-6 is taken from Chapter 3. The second column in

the table is a dot point synopsis of the benefits identified from examining the organizations project documents.

Category of benefit identified in Chapter 3	Perceived benefit identified by organization prior to ISO/IEC 20000 certification
1. Service (I)	• Increased customer satisfaction. • A tool to improve ITSM. • Improve service levels. • Alignment of IT with business strategy.
2. Credibility and trust (E)	• Confidence. • Re-assurance to the customer. • Be able to demonstrate ITSM capabilities.
3. Staff commitment (at all levels) to service management (I)	• Examines the effectiveness of people. • Provides baseline for improvement activities. • Provides valuable input into improvement activities.
4. Financial (I)	• Improved efficiencies.
5. Processes (consistency, documentation, responsibility, knowledge, integration and communication) (I)	• Independent and economic assessment or processes. • Examines the effectiveness of processes. • Examines the effectiveness of tools. • To provide support or otherwise for a tool (Infra, HP SM7, etc.). • Continuous improvement of all IT procedures. • Improved processes. • Practical help for ITIL implementation.
6. Compliance (E)	• Fulfilling requirements (e.g. in tender processes) (E)

Figure 6-6. Analysis of perceived organizational benefits against the meta-analysis of benefits provided in chapter 3

Figure 6-6 provides little value in seeking to answer the question about what the organization perceived the benefits of ISO/IEC 20000 to be. The most compelling evidence was found in ED141, as a statement to middle management and not as a specifically highlighted dot point in the project plan. An excerpt from ED141 is presented in Figure 6-7.

This excerpt can be dissected to discover a purpose of ISO/IEC 20000 certification. The SMIP is concerned with the improvement of services to the customer. ISO/IEC 20000 is the tool the project had decided to use to achieve and improvement in services. This evidence points towards an increase in service levels as the primary goal of seeking certification.

1. What is SMIP?
   - It is as the name describes: Service Management *Improvement.*
2. Why do we need it?
   - Because it is our business to deliver IT Service Management services.
   - We should try to do it to the best of our ability.
   - That means that each and every individual in the organization should come to work each and every day and try to do his or her best to deliver quality ITSM services.
3. How do we know if we are doing a good job?
   - There are tools that describe what is quality ITSM.
   - ITIL maturity model.
   - The ISO20000 standard is one such tool. It is also the tool that we have decided to use.

Figure 6-7. Excerpt from the chair address at the 6th SMIP meeting

6.4. Conclusion: When, How and Why did the Organization Seek Certification?

Section 2.12 presented the research objective of this dissertation, 'How does ISO/IEC 20000 certification provide benefit to an Australian government organization?'. Chapter 4 described the methodology behind the development of the case study protocol. The case study protocol presented a series of data collection questions to guide this research. The answers to these data collection questions is split between Chapter 6 and 7 of this dissertation. This chapter answered the when, how and why the organization achieved ISO/IEC 20000 certification. This chapter shows that from as early as 2006, certification was mentioned, however a formal plan was not endorsed until February 2009. As at July 2009, the organization was only 46 per cent compliant with the standard.

July 2009 was a turning point in the organization, which commenced a concerted effort by both the contracted team and the employees of the organization to strive for certification. Top management support for ISO/IEC 20000 certification was acquired by consolidating all audits and compliance under one framework. An external contracted team was hired to lead and provide manpower for the project, This team was supported by subject matter advice from application support middle management.

Why the organization desired certification is less clear, there is no evidence to suggest it was requested by the customer. Generic benefits are listed in approval documentation, but there is no evidence to show a benefit analysis was conducted. The evidence did not find any comments by senior business managers about the value of the certification or use of ISO/IEC 20000 in general. The most compelling reason to seek certification, mentioned during a project meeting, is that ISO/IEC 20000 was the tool chosen to improve the service levels provided by the organization.

This research agrees with the proposition presented by Mingay and France (2006), that certification represents only a small cost component of providing a service. ISO/IEC 20000 reflects good practices and is not arduous for a service provider that has good processes. The organization processes required improvement. Even so, it is assessed that in the case of this organization, the certification was achieved at a total cost of approximately 0.25 per cent of operating expenses for the financial years covered by the project.

Four potential benefits from the meta-analysis presented in Chapter 3 were investigated in this chapter; credibility (B2), staff commitment (B3), process improvement (B5) and compliance (B6). No evidence was discovered that showed the organization had any trust or credibility issues, or that the customer or end users had any knowledge of how ISO/IEC 20000 certification provided credibility to the organization (B2). The evidence indicated that, until the impending arrival of the external auditors, the organizations' staff showed reluctance towards improving processes and contributing to improvement (B3). In the two months prior to the certification audit this research saw a significant improvement in staff commitment to achieving the requirements of the standard (B3).

The gap assessments conducted in the initial phases of ISO/IEC 20000 indicated that the Organizations processes were deficient (B5). The pre audit conducted prior to certification noted that the Organization's processes were still deficient (B5). Two months after the pre-audit, there is an improvement in processes and the registered auditor noted that the organizations processes were compliant with the standard (B5). Improved and streamlined compliance was identified as an initial goal of the Organization's service management improvement project (B6). The evidence indicates that several synergies across compliance audits were realized by certification to ISO/IEC 20000 and that the ISO/IEC 20000 audit could be used as evidence to prove compliance during other audits and regulatory checks (B6). This research has assessed that ISO/IEC 20000 certification had significant effect on staff commitment (B3), process improvement (B5) and compliance (B6) but no effect on credibility (B2).

The next chapter, will discuss the effects of ISO/IEC 20000 on service levels and financial benefits, the remaining potential benefits that have not yet been analysed.

CHAPTER 7. EFFECTS ON SERVICE (B1) AND FINANCE (B4)

Chapter 6 covered a discussion of the key events that predicated the journey to ISO/IEC 20000 certification. This chapter discusses the effects that ISO/IEC 20000 certification had on service levels. Service (B1) and financial (B4) benefits, which were two of the six benefits identified in Chapter 3, will be discussed in this chapter.

Miles (1994) suggested the use of an empty table shell to collect data to be analysed for a case study. Section 3.1 of the case study protocol generated the shell and directed the researcher to investigate and annotate the shell with the information discovered from the evidence. This chapter discusses and analyses the data populating the data shell. Data analysis consists of examining, categorizing, tabulating, testing, or otherwise recombining evidence, to produce empirically based findings (Yin, 2014). The concepts for presenting the visuals in this chapter are taken from Jelen (2013).

The first six sections of this chapter discuss the data available, how this data can be used, and which data should be disregarded as showing invalidity influences. Section 7.7 wraps up the discussion on the suitability of the data and presents a data set that is free from invalidating influences and is suitable for visual and statistical analysis. Sections 7.8 and 7.9 of this chapter analyse the data that is deemed to be most suitable. The suitable data is put through a visual and statistical analysis to determine if there is an effect from ISO/IEC 20000 on service levels.

7.1. Performance Metrics and Data Series

As indicated in Chapter 4, Annex I provides detailed information on performance metrics. For the ease of the readers of this dissertation, a synopsis of these measures is included below:

1. **Incident Management Performance (IM%).** The monthly percentage of incidents resolved with the agreed time frame as stipulated by the SLA.
2. **Problem Management Performance (PM%).** The monthly percentage of problems resolved with the agreed time frame as stipulated by the SLA.
3. **Availability (Avail%).** The monthly percentage of time that systems were available for.
4. **Financial Management Performance (Fin%).** Percentage of deviation from budget forecasts.
5. **User Satisfaction (SU%).** The percentage of positive (Good, V. Good, Excellent) users responses to service received.
6. **Incident Management - End of Month (IM EOM)** – The number of incidents that remain open at the end of the month.
7. **Incident Management Resolution (IM Res)** – The number of incidents that were resolved in the month.

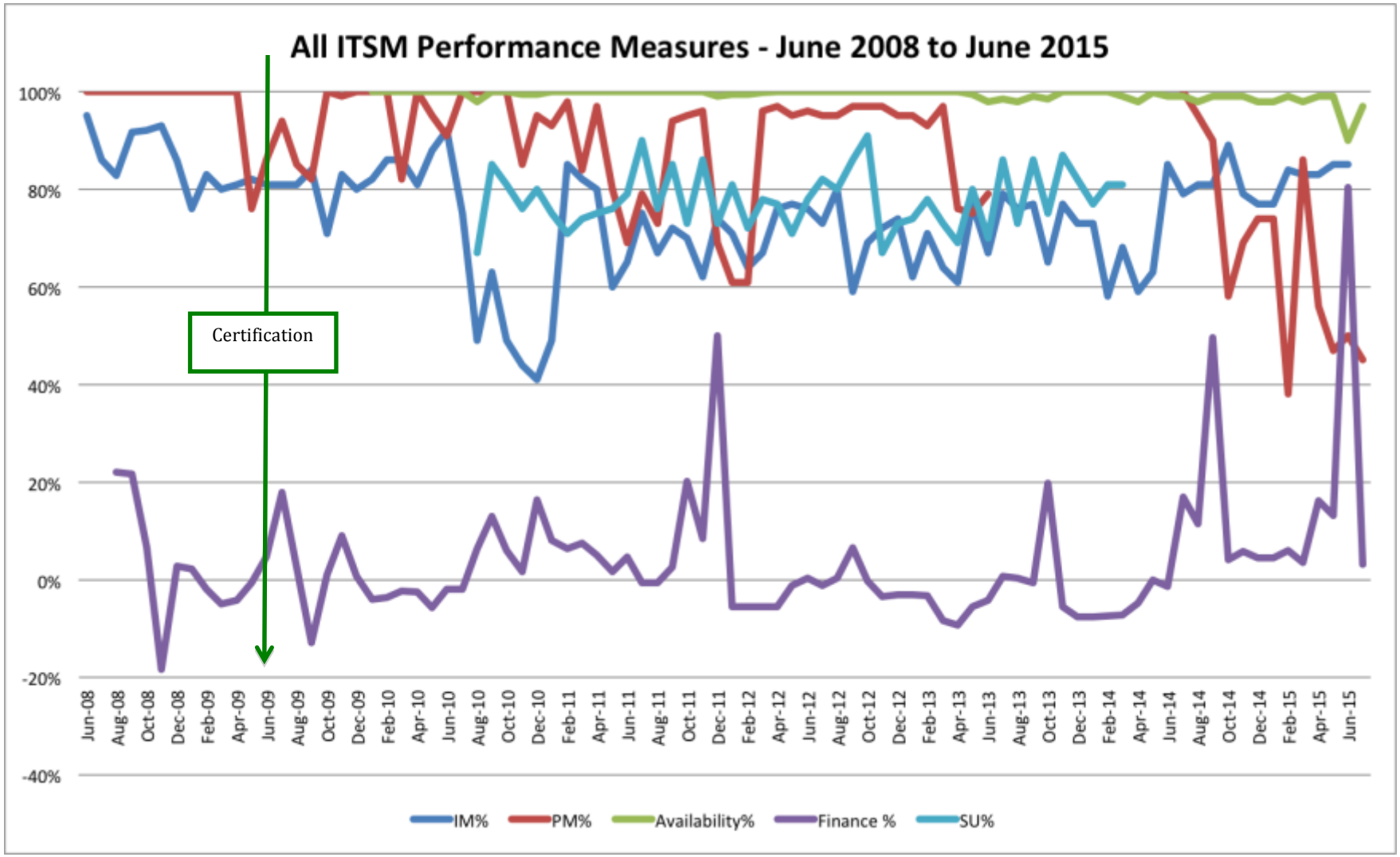

Figure 7-1. All ITSM performance measures

7.2. Initial Presentation of Results

A summary graph of the measurements associated with this time-series analysis are reported in Figure 7-1. Subsequent sections of this chapter will dissect and analyse these metrics in detail. A reader may initially believe that there is an apparent decrease in service levels six months after certification. The word 'apparent' is used advisedly here, since this research, as discussed in Chapter 5 and again in Section 7.4 shows not everything that strikes the eye can be regarded as real from a statistical or reliability perspective. The five data series used to generate the graph in Figure 7-1 are briefly described in Section 7.1. For further information on how the five metrics are calculated please see the in depth description provided in Annex I.

7.3. Data Correlation

In some instances correlations are useful and in other situations correlations must be accounted for and removed. One would expect that in most instances that time-series data would be correlated. Correlations are useful when attempting to predict results and when attempting to demonstrate a contribution of effect between variables. However, correlations can provide spurious evidence to support an effect when the underlying data forms a time-series. Section 7.3 investigates the data to determine in which instances the data is correlated. This research will determine in which scenarios the correlations are useful and in which situations the data may require treatment to remove correlation. Correlations are useful because they can indicate a predictive relationship which can be exploited in research. However, statistical dependence is not sufficient to demonstrate the presence of a relationship, that is to say, correlation does not imply causation (Aldrich, 1995).

Figure 7-2 presents trend lines for the complete data set for each series. Incident management, performance management and availability performance demonstrate a trend downwards over the period recorded. In contrast, financial management performance and user satisfaction performance over the data period display an upward trend. The R^2 values for each line are displayed on the graph. One trended time-series regressed against another will often reveal a strong, but spurious, relationship. The correlation observed is simply that the measures are all dependent on time. However, correlated data can be used to predict results.

Section 3.1.2.9 of the case study protocol asks if the data is correlated strongly enough so that the data from a measure can be used to back predict the data for a correlated measure. Section 3.1.2.10 of the case study protocol asked the question, 'Can a researcher expect ISO/IEC 20000 to have the same effects on all measures?'. This section will present correlation calculations and describe how these calculations can be used.

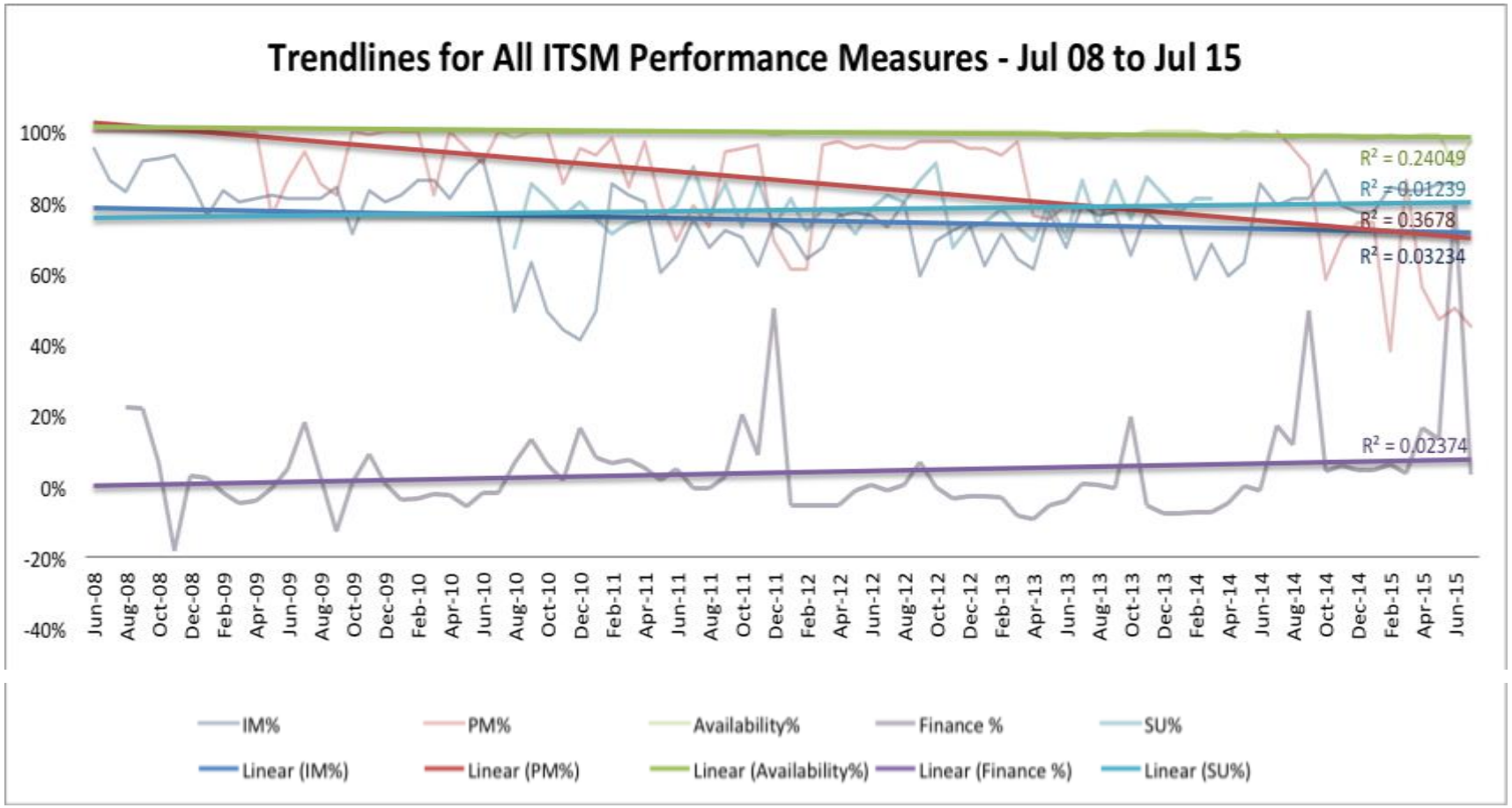

Figure 7-2. Trend lines for all ITSM performance measures

The Pearson product-moment correlation coefficient is a numerical value between -1 and 1 that expresses the strength of the linear relationship between two variables. When r is closer to 1 a strong positive relationship is indicated. A value of 0 indicates that there is no relationship. Values close to -1 signal a strong negative relationship between the two variables (Arcidiacono, 2015). Jones et al. (1977) and Anglim (2009) suggested that a figure over .40 at a lag of 1 shows significant correlation.

Due to the scarcity of earlier data across all of the service level areas, thought was given to back predict results of service levels that lacked sufficient historical data. However, a Pearson's correlation coefficient analysis of the data has showed that the data which required a strong correlation to be utilized to back predict results was not sufficiently correlated. Pearson's correlation coefficient is appropriate when both the variables are measured on an interval scale. Calculations were also completed using the CORREL function in Microsoft Excel. The calculations between CORREL and PEARSON were the unchanged. For the sake of brevity, only the calculation for PEARSON will be presented in this dissertation. If desired, the results of CORREL can be studied at Annex E.

The results of the PEARSON calculations are presented in Figure 7-3 and Figure 7-4. Information on the column headings is included in Section 7.1. Two additional columns have been added to the table. IM Res is the number of incidents resolved per month. IM EOM is the number of incidents remaining open at the end of the month. A visual identifier was included to highlight strong correlations (over 0.4 and under -0.4) and moderate correlations (between 0.2 and -0.2).

Month to Month Pearson correlation coefficient

IM	IM Res	IM EOM	PM	Avail	Fin	SU
0.64	0.57	0.98	0.61	0.36	0.29	-0.17

Figure 7-3. Results of a Pearson correlation coefficient calculation produced on each data series

The results presented in Figure 7-3 are calculated by examining the correlation between each month in the series and the following month. In this example, array 1 is June 2008 through to May 2015 and array 2 is July 2008 through to June 2015.

Researchers expect time-series data to be correlated and that the value of one month is likely to be correlated to the value of the previous month. The reader can see strong positive correlation across four of the measures, Availability and finance show moderately strong positive correlations and satisfied users show a weak negative correlation. There is nothing startling or surprising from the calculations, they confirm that the time-series data captured is correlated. To reduce the effects of monthly correlation, all data will have the trend removed by utilizing differencing. The selected method for removing the trend in this time-series data is called link relatives. The equation for link relatives is shown in Equation 7-1. Unfortunately, this reduces the amount of data remaining for analysis, but due to the size of this data set, this loss is only small. Link relatives divide each point by the point that came before:

$$y'(t) = y(t) / y(t-1)$$

Equation 7-1. Link Relatives

The resulting data with the trend removed is displayed in the final analysis in Annex E.

Figure 7-4 is calculated by examining the correlation between each series. Some of the metrics are internally related. IM, IM Res and IM EOM are each correlated.

Pearson correlation coefficient

	IM	IM Res	IM EOM	PM	Avail	Fin
IM res	-0.45					
IM EOM	-0.37	0.63				
PM	-0.05	-0.09	-0.25			
Avail	-0.16	-0.02	0.12	0.47		
Fin	0.07	0.03	0.04	-0.24	-0.65	
SU	0.07	-0.09	0.00	0.09	0.22	-0.07

Figure 7-4. Result Matrix of a Pearson Correlation Coefficient Calculation Produced across Data Series

This correlation analyses has presented four degrees of correlation:

1. **Negative Correlations.** The negative correlation between incident management performance and the number of incidents resolved per month, is an understandable example of metrics being internally related. It also demonstrates, that in a month where there was a high number of incidents resolved, many of these incidents will have already been outside SLA targets and, consequently, IM performance would have been lower. After examining the evidence, this research was unable to ascertain why there was a strong negative correlation between availability performance and finance performance. It is likely that the correlation between availability performance and finance performance is simply an example of time-series data being spuriously correlated.

2. **Moderate Negative Correlations.** A moderate negative correlation was witnessed between incident management performance and the number of incidents open at the end of the month. This correlation coefficient is only .03 away from being classified a strong correlation. It is logical that this has strong correlation, as when the incident management performance is high, the total number of incidents open at the end of month should reduce.

   It is also logical that the number of incidents open at the end of the month should be correlated with problem management performance. In the organization, incidents that are attached to a problem remain open until the problem is solved and the logged problem is closed. The net result is that in a month where many problems are resolved and performance is high, many incidents are also closed, reducing the number of incidents open at the end of the end of the month. It is less logical for problem management

performance to be moderately correlated to financial performance. This may be due to seasonal influences and will be examined in more detail in Section 7.4.1.

3. **Positive Correlations.** A strong positive correlation between the number of incidents resolved in a month and the number of incidents open at the end of the month is to be expected. In a month where a lot of incidents were closed, this high closure rate should reduce the number open at the end of the month. A positive correlation between problem management performance and the availability of systems is also expected.

4. **Moderate Positive Correlation.** Whilst the reader would be surprised that there is not a strong correlation between satisfied users and availability, they must remember that Annex I explains that the percentage of satisfied users was only solicited from those users who had reported an incident during the reporting period.

In the organization's service management tool, incidents are often linked to problems. Consequently, when problems are closed, this results in a high number of incidents closing also. The expected reason for the weak correlation calculated is likely to be a result of three factors. Firstly, the same people work on both incident and problem resolution. Secondly, the incident closure is not automatic upon the closure of a problem and there are many instances when open incidents are related to closed problems for days and weeks after problem resolution. Thirdly, the definitions and calculations surrounding of problem and incident resolution have not remained constant over the time span of the data collection period.

Anglim (2009) described that it is sensible to combine variables that are correlated with each other. The author describes that if a researcher examines the correlation matrix for the set of tests and see that a subset of tests correlate highly with each other (e.g., r greater than .4 or .5 or .6 or .7), this suggests that this subset is measuring something in common. The purpose of this research is to observe the effects of ISO/IEC 20000 certification on service levels. A composite general measure of service would fulfil the purposes of this research. To provide more stable measures of the service levels, this research attempted to form composites with unit-weighted z scores of constituent data series (Ackerman and Cianciolo, 2000: pg 264). Unfortunately the correlation calculation performed on the data suggests that the only data suitable for composition would be problem management and availability. This research consequently decided that all individual metrics should remain. This presents an added, but necessary level of complexity to the analysis. The results of the combination can be viewed in Annex E.

Figure 7-6 provides a visual demonstration of the correlation between incident management performance and the number of incidents open at the end of the month. After a failed release in 2010, the reader can see a decrease in incident management performance. This decrease is negatively correlated to an increase in the number of incidents open at the end of the month. The calculations represented in Figure 7-4 confirm this correlation. Most importantly the reader can see the strong effect that was witnessed in mid-2010, which resulted in a sharp decrease in incident management

performance. To ensure the validity of the data and analysis, this event will be accounted for and a discussion on how this event is treated is presented in detail in Section 7.4.1.

This section has demonstrated that the evidence and uncorrelated data available is insufficient to back predict results from correlated measures. The data is correlated between months in the time-series and is treated for this correlation in subsequent sections. The data showed some limited correlation across a few data series, however ISO/IEC 20000 is not expected to have a visibly similar effect on all data series. Each data series will need to be examined and assessed individually.

7.4. Data Influences

The collected data showed signs of influence by a range of factors. These factors have been classified into two categories; seasonal influences and non-seasonal influences. The data was visually analysed for peaks and troughs. This analysis was crosschecked with data from the evidence collection database to explore motives behind the peaks and troughs. The purpose of the seasonal and non-seasonal analyses are to ascertain and treat rival hypotheses.

7.4.1. Seasonal influences

To highlight the effects of seasonal influences seven graphs were produced. Each graph represents the data collected on the ITSM performance metrics. Each graph shows a solid line which represents an average figure for the data collected in that month. To indicate the spread of the data, the graphs also display bars representing the data collected across the months for individual years. This section will now discuss the effects of seasonality on the performance metrics.

Figure 7-5 shows that incident management performance peaks in the middle of each year and is lowest in December-January. This data is corroborated by data collected about the number of incidents resolved in Figure 7-6. There is a minimal dip in IM performance in October. This shows some support for the claim that when recertification audits are conducted annually, manpower is distracted from fulfilling incident management roles to answering questions for auditors. However looking at Figure 7-7 the data actually shows an average increase in the number of incidents resolved during October.

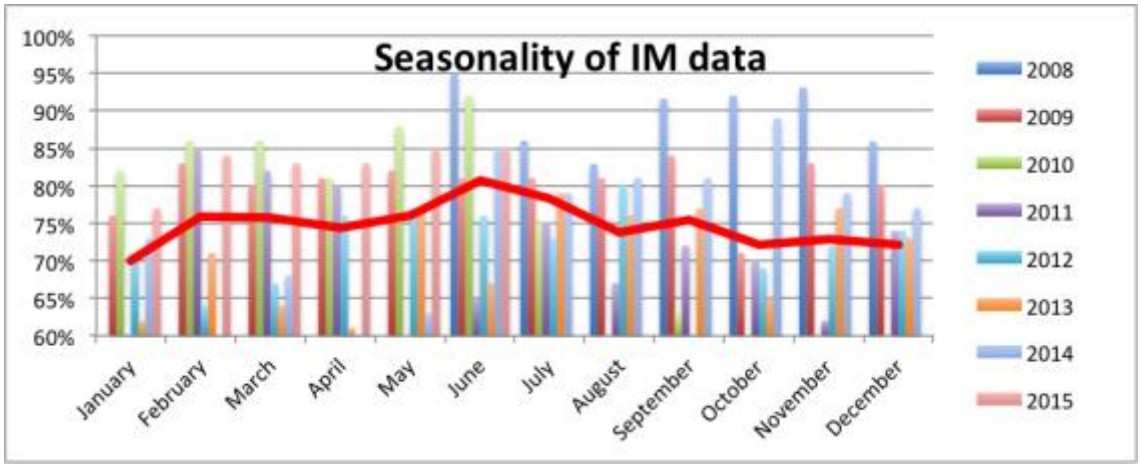

Figure 7-5. Seasonality of Incident Management Performance

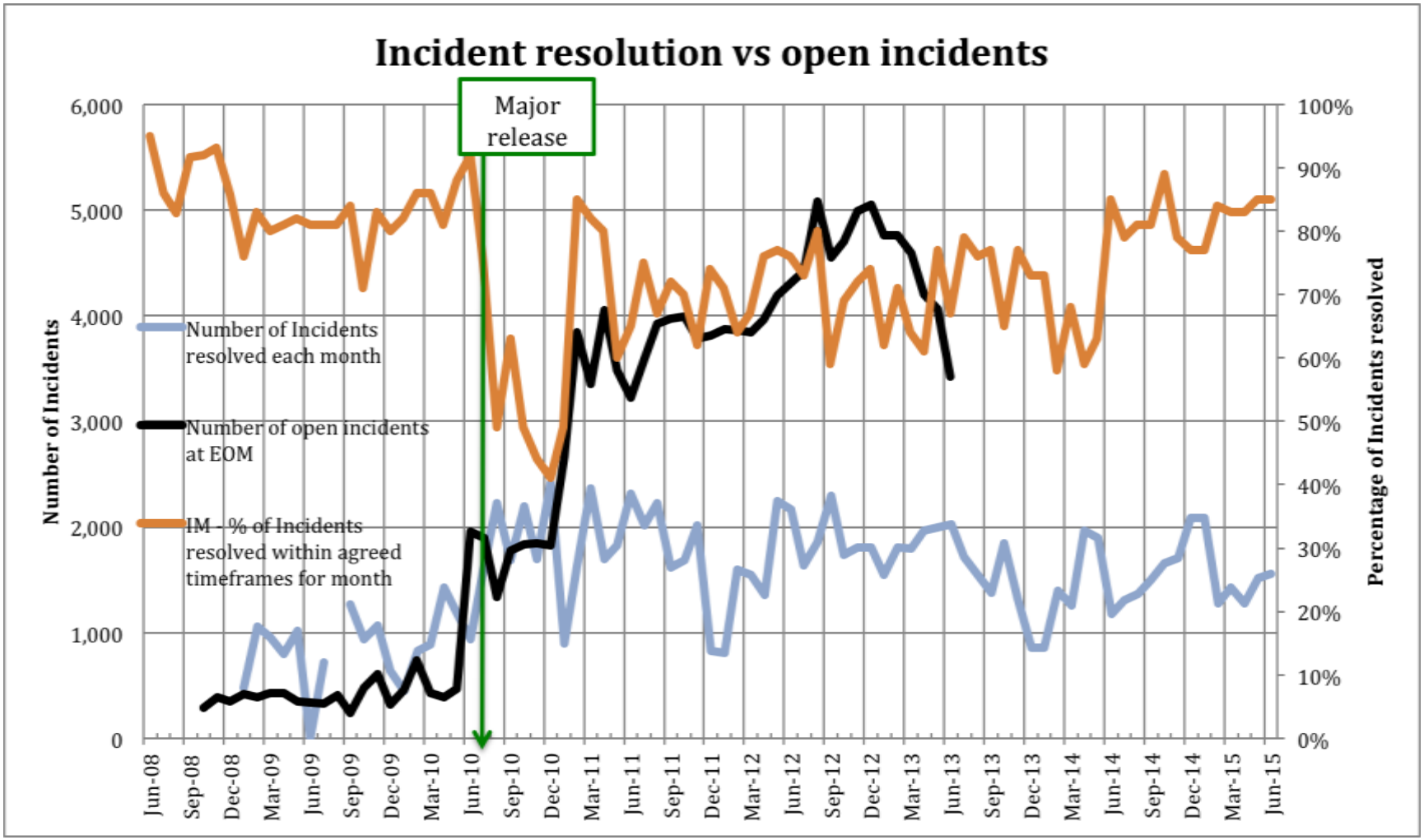

Figure 7-6. Incident resolution vs. open incidents

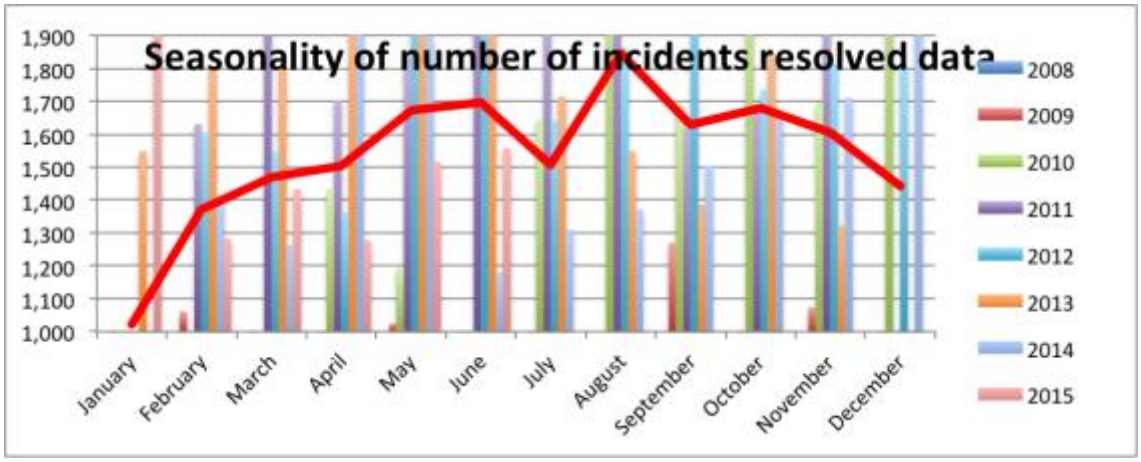

Figure 7-7. Number of incidents resolved per month

Each year in December and January a reduction in business activity is seen. Correspondingly, the organization encourages employees to take leave over this period. The December-January period sees performance reduce in the areas of Incident Management only.

January and February each year sees a general reshuffle of personnel and jobs across the Department. Correspondingly there is a sharp increase in service requests, due to the increase in the number of user profiles requiring to be altered. Service requests are not reflected in the data presented in this chapter. However, it is possible that the increase in service requests may have an effect on the user satisfaction metric over the first few months of each year. The satisfied users data in Figure 7-8 does not show any seasonal fluctuations for January and February. It is possible that the number of skilled staff did not remain constant over the period, however this research could not located any data to contact an analysis of the effects of trained staff on user satisfaction.

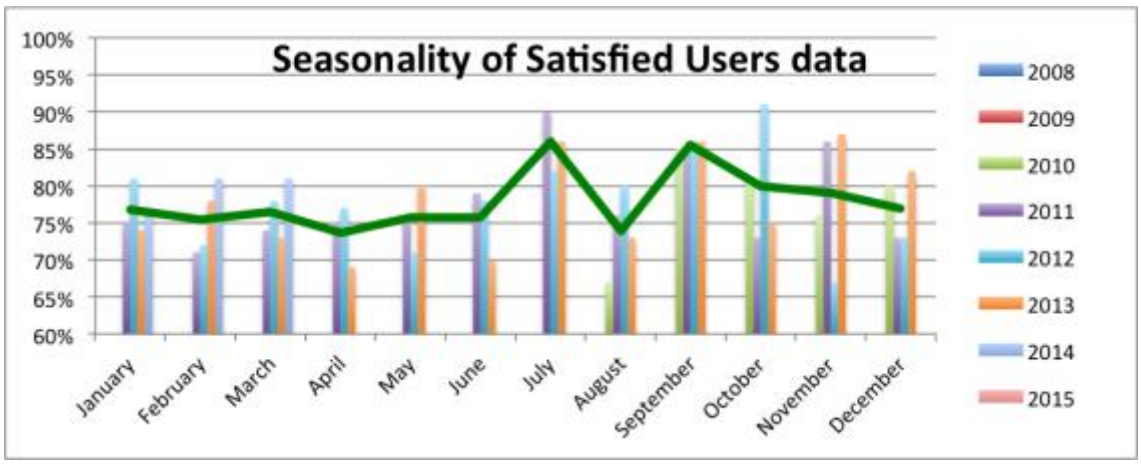

Figure 7-8. Seasonality of User Satisfaction

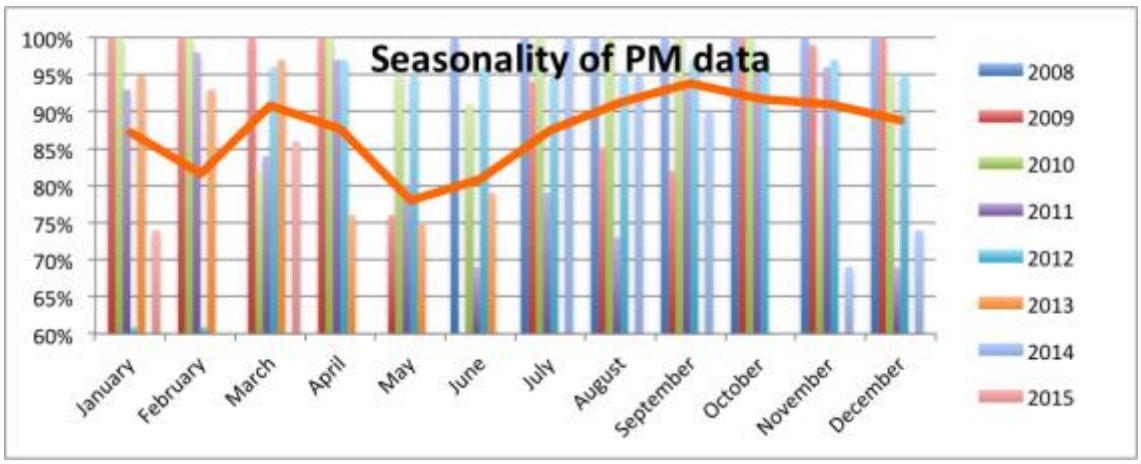

Figure 7-9. Seasonality of Problem Management Performance

Whilst there is some monthly fluctuations in the PM data shown in Figure 7-9, no evidence was gathered to support a reason for these fluctuation. The financial management data presented in Figure 7-10 does show seasonal fluctuations. As expected, the achievement of budgets is erratic and sometimes not within defined targets at the commencement of the financial year. However, these fluctuations smooth out each year as the end of the financial year draws to a close and yearly budgets are achieved within targets.

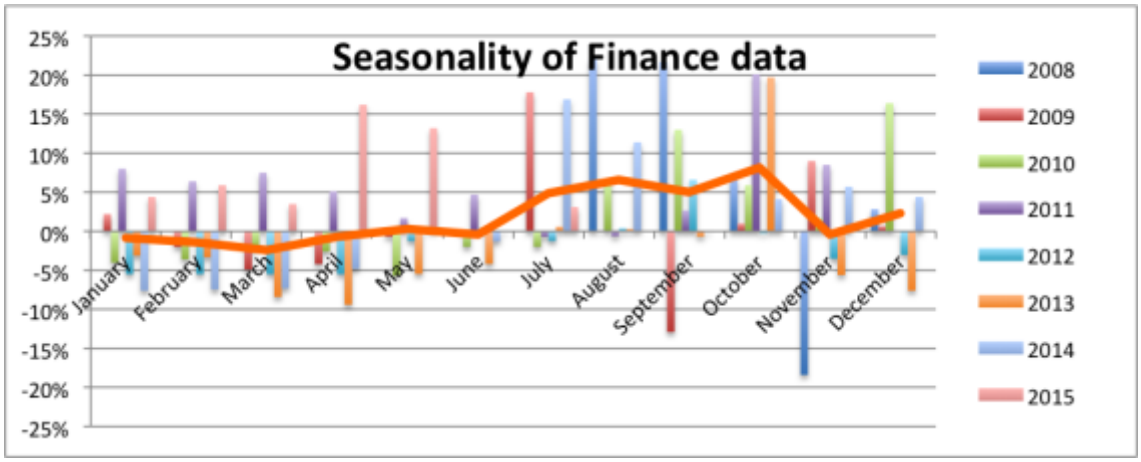

Figure 7-10. Seasonality of Financial Management Performance

Figure 7-11 is an attempt to smooth out the volatility of the uncorrelated IM, PM and SU data. The average line does not provide any significant evidence for this case study. As discussed in Section 7.3, the data will not be combined to produce a composite measure of service levels.

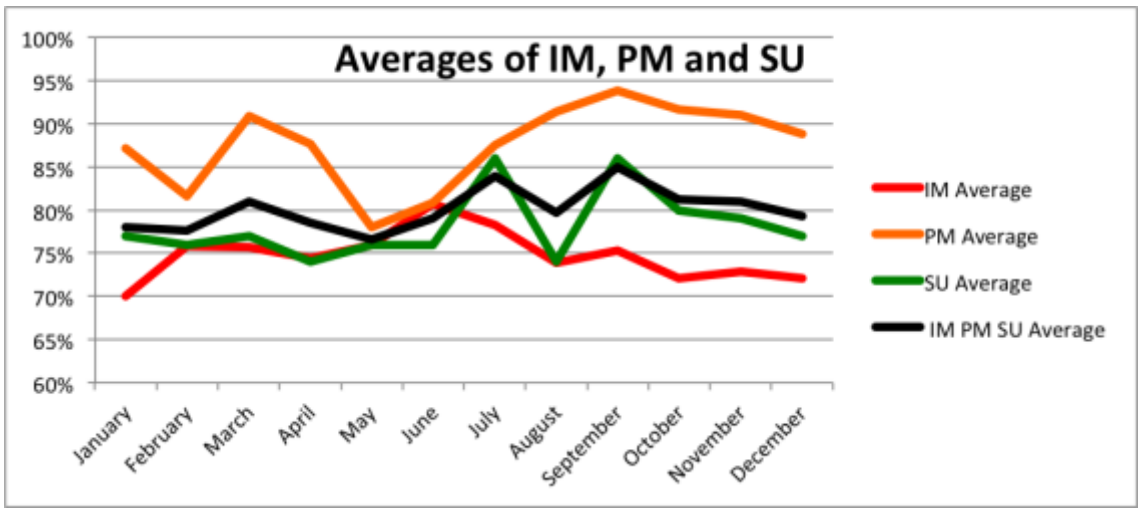

Figure 7-11. Seasonal averages of IM, PM and SU

Figure 7-12 demonstrates the average of IM and PM data. This average line is less volatile than the individual lines. The organization utilizes the same staff for both IM and PM. The flattening of the average line on the graph demonstrates that the same staff are working on the achievement of both metrics. The average data does show a dip in May, but there is no evidence available to support why this occurs.

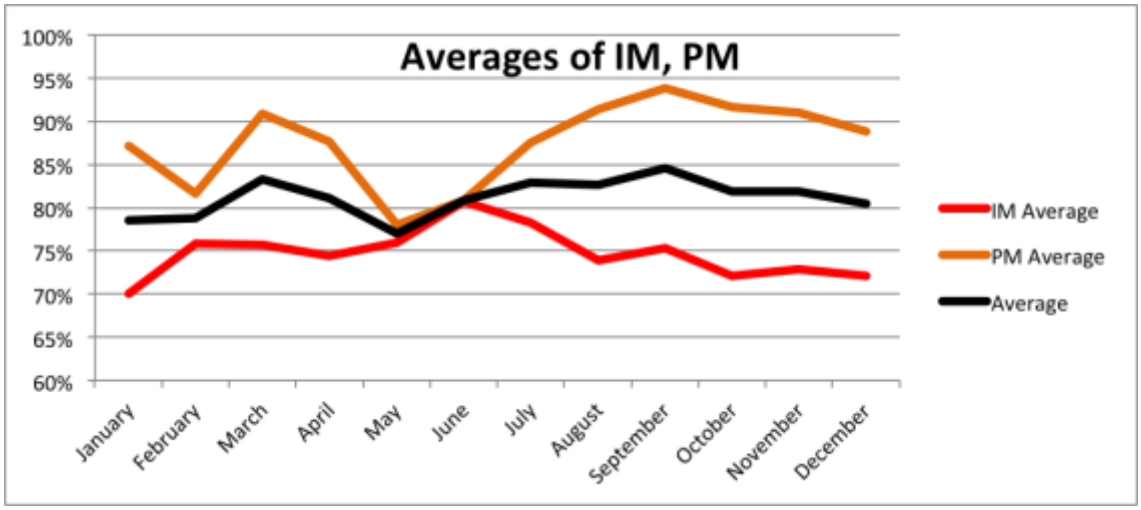

Figure 7-12. Seasonal averages of IM and PM

Figure 7-13 presents IM performance after a seasonal index is added. This was produced by dividing the monthly performance by the average IM performance for that calendar year. The resulting graph shows an average line very similar to Figure 7-5.

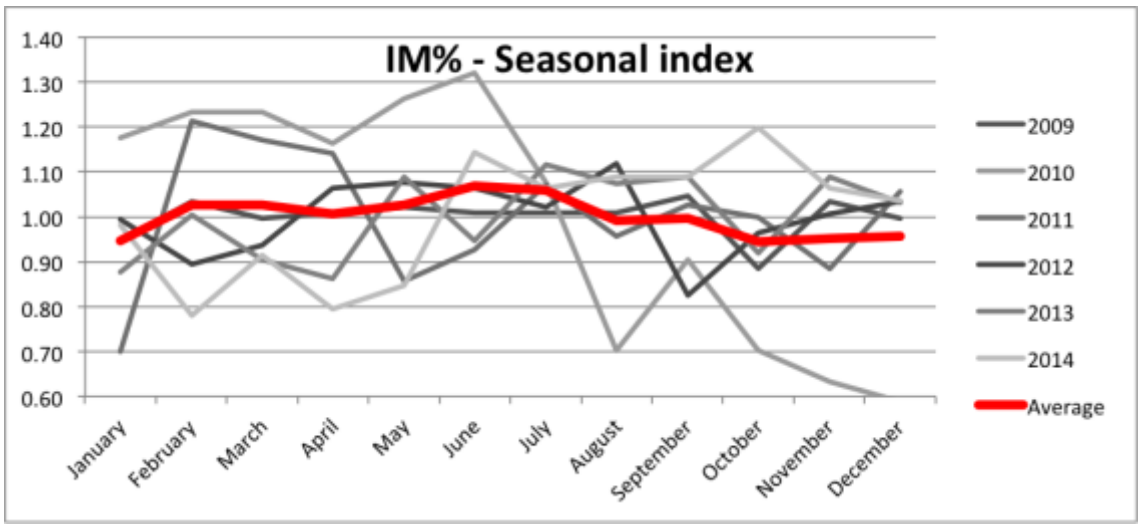

Figure 7-13. Seasonal index - Incident Management Performance

Generally the data collected is erratic and there is not enough years of data to show a smoothed line and consistent seasonality. There is enough of a seasonal effect on all data series to require smoothing to account for seasonal variation. A linear trend line or 12 month moving average will be applied to all data sets prior to visual analysis.

7.4.1. Non seasonal influences

The purpose of Figure 7-14 is to demonstrate that whilst the data seems to be too erratic to cajole a trend from, the erratic nature of the data is due to real world events. This research is not suggesting that the data is not erratic or that there is a valid hypothesis available for each peak and trough. This research is suggesting there is more to this data then initially meets the eye.

The following list expands on the information provided in the blue arrows on the chart:

1. **September to October 2009:** One could predict a dip in performance as the organization ramps up preparation for certification and focus potentially moves away from resolution and towards the audit. However, as shown in Figure 7-14, the performance of both problem management and financial management increase. October 2009 saw a change in service management tool for incident management. This change of tool could understandably cause a spike in the number of incidents, as employees productivity is reduced as the new tool is learned and the possibility that some incidents are recorded twice in error, once in the new tool and once in the old tool. This research was not able to disaggregate the effects of the service management tool change from the audit preparations. However, in the immediate term, seeking certification does not seem to have a negative effect on the three service management metrics that were reported on during this period.
2. **April and May 2010:** A freeze on problem management resolution was enforced as data was migrated from the old service management tool to the new tool.

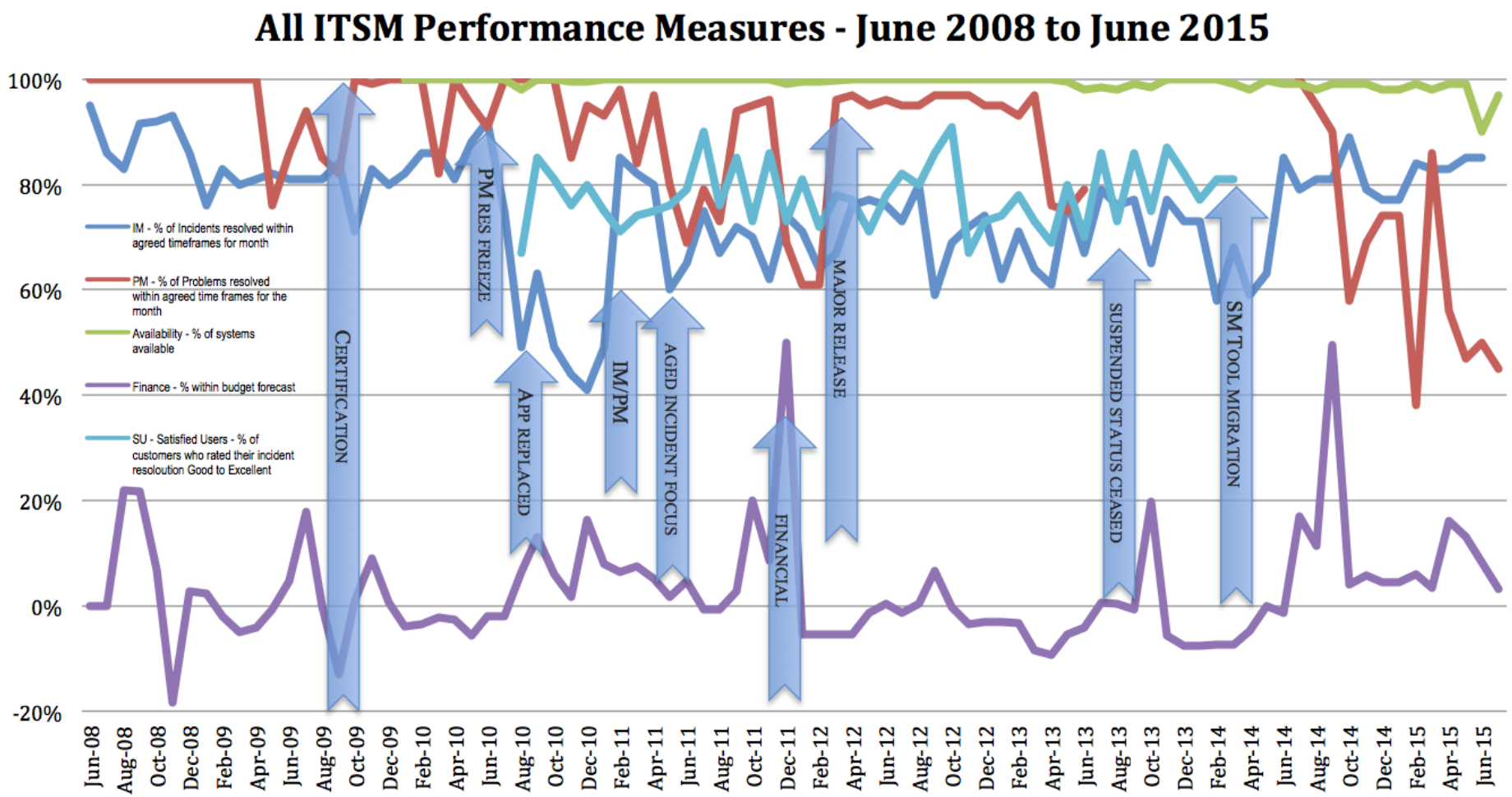

Figure 7-14. All ITSM Performance measures July 2008 to July 2015: annotated with key events

3. **July 2010 onwards:** A major application was replaced in July 2010. The application lacked sufficient service validation and testing and consequently users reported many incidents in the following months. Many of these incidents were linked to problems and code was rewritten for subsequent releases. This poorly managed change had a substantial impact on the performance of the organization over subsequent years and will be discussed further in Section 7.7. Over the subsequent months, staff were reprioritized and focused on testing future releases to enable the closure of problems, which contributed to a drop in performance for incident management.
4. **February 2011:** An IM/PM team is appointed to consolidate incidents to problems. This improves IM performance and decreases problem management performance.
5. **April and May 2011:** Data remediation period. Where associated problems have been resolved, the resolution teams were working to close out aged associated incidents. Employees focused on oldest incidents, which had a negative effect on IM performance.
6. **October 2011:** An error in the financial accounting system caused a spike in the data. The following month the error was corrected.
7. **March 2012:** Many aged problems were closed due to a new release of software for major application replaced in July 2010. Problems fixed by the release were subsequently closed and performance improved.
8. **August 2013:** A system wide policy change on the use of the service management tool created greater data visibility for the customer. Previously not reported incidents were now visible, which caused a visually negative impact on IM performance.
9. **September 2013 to September 2014:** Certification lapses.
10. **April 2014:** There is a change in the service management tool used for IM and PM, user satisfaction is no longer reported and an improvement in IM is realized.

The effects of the failed release in July 2010 had a major impact on the captured data. It is assessed that any attempt to analyse the data for IM and PM performance between the periods of July 2010 and July 2014, will be thwarted by a commingled rival. User satisfaction data remains unaffected by the failed release, as collection of this data was not commenced until August 2010. As Section 7.3 demonstrated, the user satisfaction data has only minor correlations with the other data series, consequently this metric cannot be back predicted.

This analysis has demonstrated that there are non-seasonal effects on the data. However, the variable nature of the data provided in the service management reports shows that the numbers does require further treatment to make the data appropriate for analysis. The linear trend line or 12 month moving average applied to the data for the purpose of removing seasonal effects will also flatten the variability in the data, due to the non-seasonal effects listed above. Figure 7-15 presents the data with a 12 month moving average applied to each performance metric.

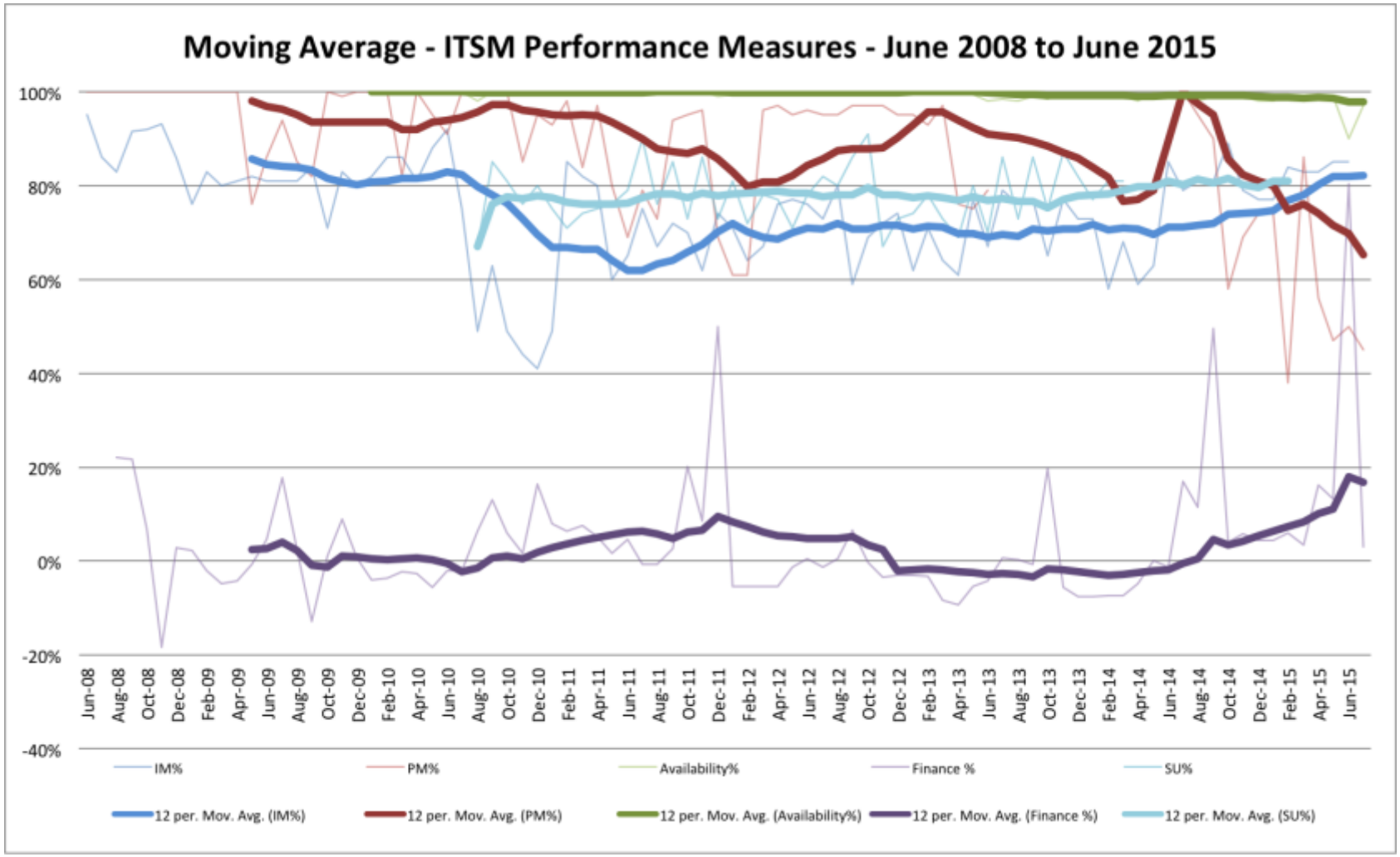

Figure 7-15. ITSM Performance Measures - with 12 month moving average applied

7.5. Potential Improvement in Post-certification Metrics due to Certification

There is potential that service level measurement improved due to certification to ISO/IEC 20000. However, this research has not found any evidence that confirms this possibility. The pre-audit (ED150) conducted by an external contractor identified that performance measurement was not being done particularly well. It is completely possible that having the organization assessed to the ISO/IEC 20000 standard may have improved the organizations measurement activities. The organization initiated the current ITSM performance metrics. ITSM performance reporting started being provided to the customer in June 2008 (ES001). These metrics evolved over time, but at no time did the research see a considerable and consistent shift in the monitoring and measuring of the service management processes.

In his report provided to top management on the results of the pre-audit (ED150), the contractor noted that *'Whilst there is monthly reporting on for incident and problem management for the customer, this is an inadequate to demonstrate the ability of processes to achieve planned results.'* This research did not witness a significant shift away from this level of reporting at anytime after certification. Despite the contractor's comments this research concludes that, the official auditors, the customer and the organization were all satisfied with the level of reporting. From a research perspective, this reporting was well done, well documented and archived. Whilst reporting could have covered more processes, the reporting covered the basics and this researcher believes that the metrics were sufficient for the customers needs. ISO/IEC 20000 did not appear to have a noticeable effect on the quality of the reporting. There was better reporting in the years after certification, however it is believed that this was simply a process of maturity and there was a not a significant jump in measurement performance due to ISO/IEC 20000.

7.6. Score Overlap

Kratochwill et al. (2010) argue that the degree to which the scores between adjacent phases overlap can also present a problem in data analysis. Parsonson and Baer (1978) state that, generally speaking, the less overlap, the more convincing the effect. Figure 7-16 is produced by breaking the data into three phases; before certification, whilst certified and after certification lapsed. There is minimal overlap between the phases, providing a convincing effect that whilst the organization was certified to ISO/IEC 20000, the average performance of incident management was lower then the phases where the organization was not certified. If this graph is taken at face value, the reader would assume that ISO/IEC 20000 certification would have negative effects on an organization. However, this graph has not allowed for the non-seasonal effect of the application replacement mentioned in Section 7.4.1. The next section will discuss the mitigation for this and several other invalidating influences. Accordingly, the resultant data has significant overlap, presenting a potentially less convincing effect.

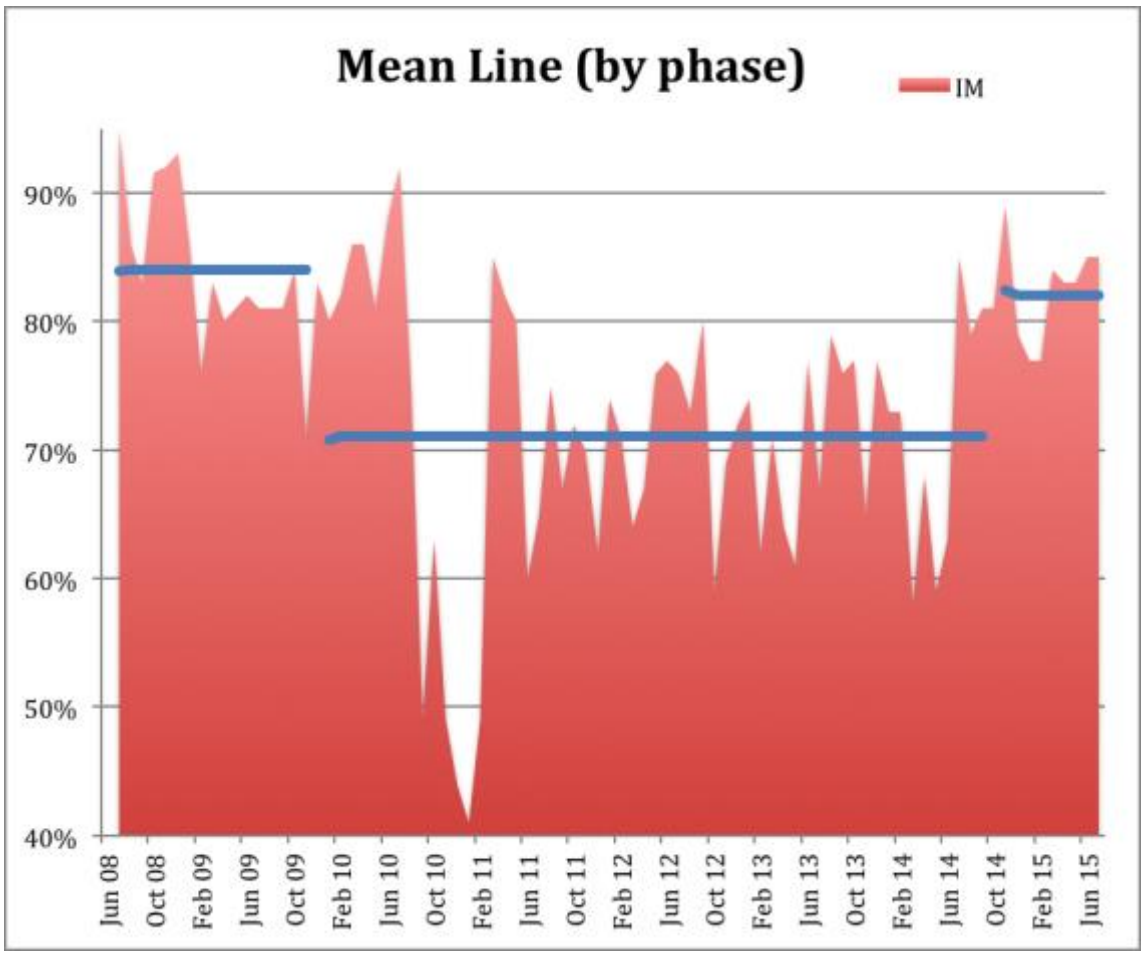

Figure 7-16. IM% Mean Line (by phase)

7.7. Selection of the Data for Visual and Statistical Analysis

The data analysed in the last few sections of this chapter was treated and selected to ensure that minimal invalidating influences were present. Annex I explains the various metrics and data available to this research from the service management tool and ITSM performance reports. Careful thought was given to ensure the validity of the analysis from the selected data. Data that was considered to be corrupted by external influences was excluded from this analysis.

To mitigate the effects of the application replacement identified in Section 7.4.1, the data for incident management and problem management performance between July 2010 and July 2014 will be disregarded for the purpose of this analysis.

This research identified a settling in period where the organization, for all intensive purposes, met all the requirements of ISO/IEC 20000-1. However, this research expects that there will be a delay before the effects of certification are noticed in service levels. Chapter 6 discussed the journey over time for the organization to reach certification. In August 2009, an independent auditor assessed the organization as not being compliant with the standard. At the end of October, the organizations was independently assessed as compliant with the standard.

It is impossible to know on which day the organization switched from not being compliant with the standard to being compliant with the standard. This research has taken the two dates that are known, disregarded the data between these two dates removed September and October from calculation. This

two month gap between the baseline and the effect datasets provides a buffer to reduce overlap. This two month buffer is regarded as the settling in period and any effects of ISO/IEC 20000 certification are expected to be witnessed from November 2009.

The data used for the analysis of this organization was produced during June 2008 and June 2010 with two months (September and October 2009) excluded from analysis as a buffer between pre- and post-certification.

7.8. Visual Analysis of Time-Series Data

To determine the magnitude of the relation between variables, single case researchers have traditionally relied on visual analysis (Kazdin, 1982; Kratochwill, 1978; Institute of Education Sciences, 2014). A contribution of effect is demonstrated if the data across two phases, pre- and post-certification, changes as a result of the manipulation of an independent variable, in this case certification to ISO/IEC 20000. An effect is documented when the data pattern in one phase was more than would be expected in the baseline phase (Horner et al., 2005).

This dissertation will examine five of the six features described by the Institute of Education Sciences (2014): (a) level, (b) trend, (c) variability, (d) immediacy of the effect, and (e) overlap. As there were no similar phases, the consistency of data across similar phases was unable to be examined. The six year gap between the pre-certification phase and the certification lapsed phase was too great to provide a validated analysis.

The failed release of a major application replacement had significant effects on performance levels. To avoid the effects of a rival explanation muddying the analysis, only data collected prior to July 2010 was used. Each of the five performance metrics was evaluated, however availability and user satisfaction data was unable to be used. Availability performance commenced measurement in January 2010 and was measured at 100% for each of the periods prior to the failed release. There is no availability data to establish a baseline phase with and the data available after the base line phase is all measured at 100%. Measurement and reporting of user satisfaction commenced after the date of the failed release.

Incident management performance, problem management performance and financial management performance were analysed between the period of June 2008 to June 2010. The months of September 2009 to October 2009 were removed from the dataset, as these were determined to be the periods in which the organization moved from being non-compliant with the standard to being fully compliant with the requirements of the standard.

Figure 7-17, Figure 7-18 and Figure 7-19 represent the data over the assessment period. The green line represents the average mean **level** for the data within a phase. The **trends** of each phase are represented by the slope of the thin blue and red lines, which are the best-fitting straight lines for the data within a phase. Thick black lines showing the range of the data for each phase represent the **variability** across phases. The **immediacy of the effect** refers to the change in level between the last three data points in one phase and the first three data points of the next. The **overlap** refers to the proportion of data from one phase that overlaps with data from the previous phase.

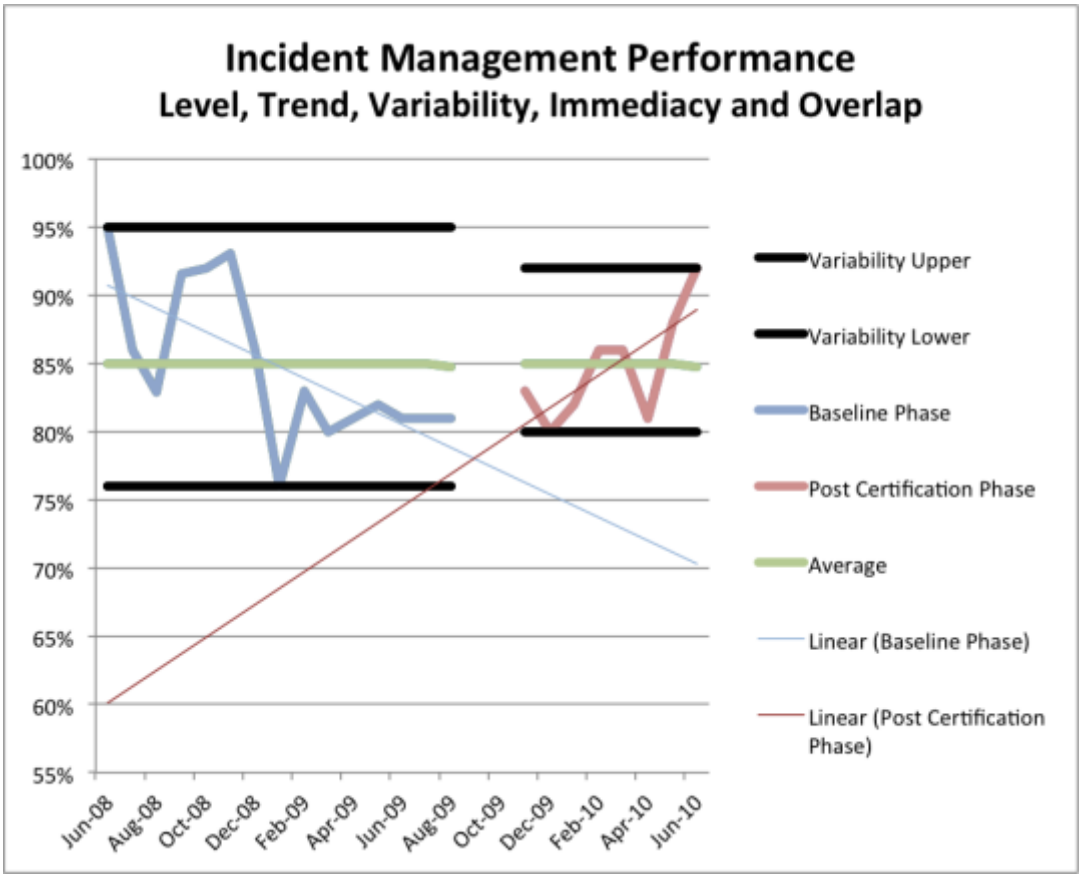

Figure 7-17. Incident Management Performance: Level, Trend, Variability, Immediacy and Overlap

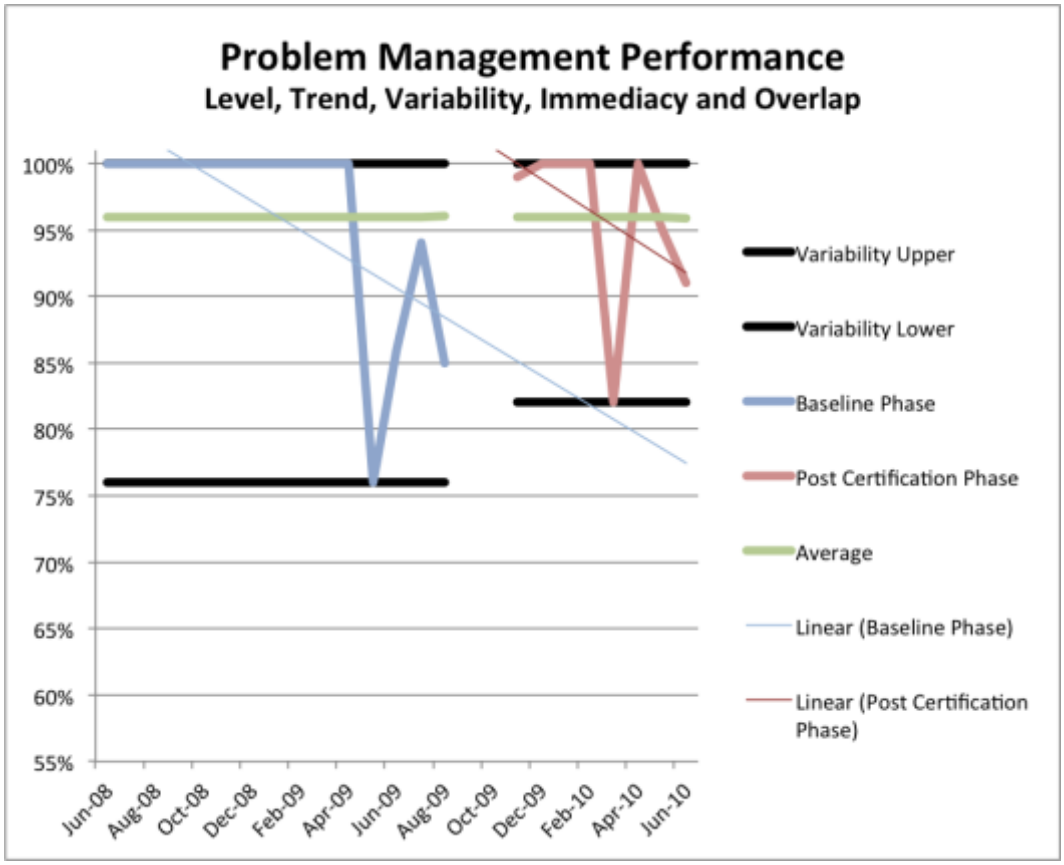

Figure 7-18. Problem Management Performance: Level, Trend, Variability, Immediacy and Overlap

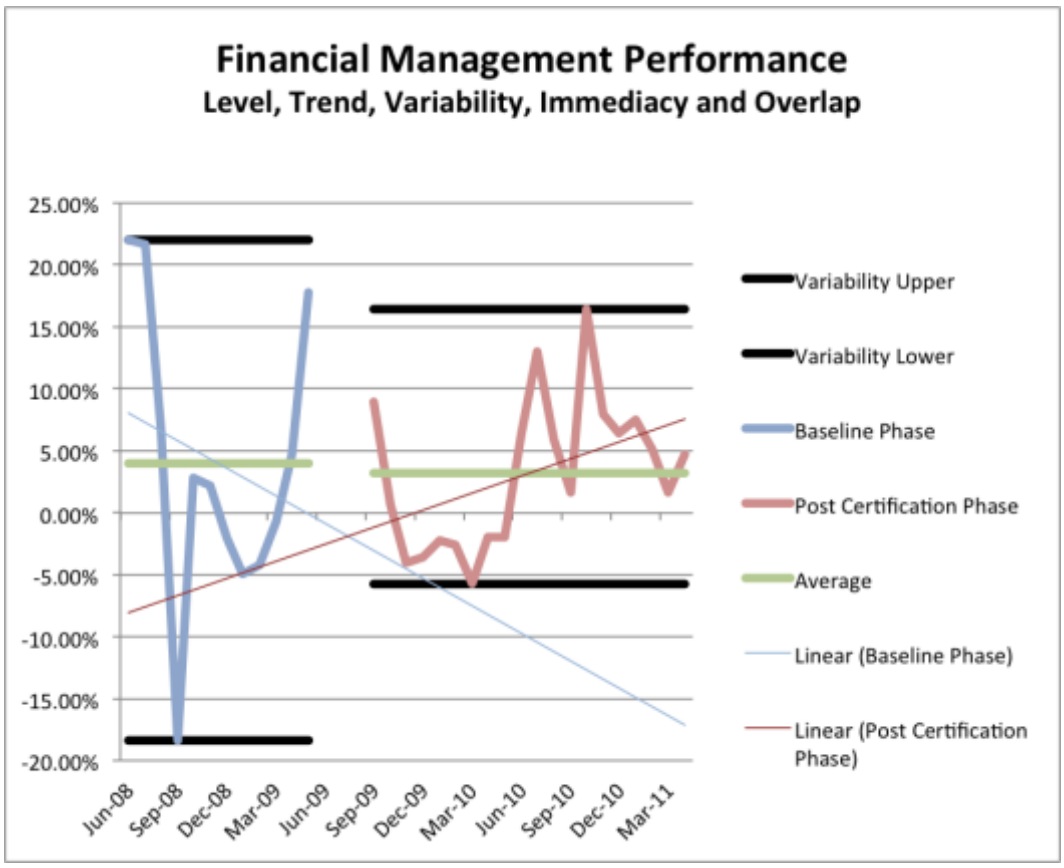

Figure 7-19. Financial Management Performance: Level, Trend, Variability, Immediacy and Overlap

The graphs presented in Figure 7-17, Figure 7-18 and Figure 7-19 show a visual representation of service level data from the organization. This visual analysis has attempted to use data that is not commingled with other effects on service level performance. A visual analysis of the graphs will seek to determine if there is sufficient evidence to determine a contribution of effect between ISO/IEC 20000 certification and an increase in service levels (B1). Despite the visual variability of the baseline phase, the baseline has more than three data points and does not end with an outlying data point, which makes all three baselines suitable to establish a stable baseline from which to measures effects from (Institute of Education Sciences, 2014).

For both IM and PM performance, a reader can see that the level has not changed (B1). For financial management performance the change in level is less then 1 percent (B4). The aim for financial management performance is to be as close to zero percent as possible. The slight negative change in the level towards zero per cent for financial management is an affirmative change. However, as the change in level is only minor and well within the standard deviations of the data of other phases, there is insufficient evidence from the change in level to determine a contribution of effect. There is an affirmative change in trend for incident management and no change in trend for problem management. The trend in financial management is positive, however as the metric fluctuates around zero per cent, an affirmative trend change would be a flattening of the line.

Collectively across the three metrics, there is insufficient evidence from the change in level to determine a contribution of effect. Across all three metrics there is a reduction in variability around the

mean after certification. The difference of variability is in some part due to the phases being different lengths. However, even when the variability is viewed across similar length phases the reader can see that post certification there is less variability in the data. Collectively across the three metrics this research has witnessed a reduction in the variability of the data. Benefits to processes (B5) include consistency of outputs removing variability due to staff changes, time and knowledge fade. Any immediacy of effect cannot be seen due to the similarity in the levels and the variability of the data. This research may have witnessed some predicted delayed effects or gradual effects of the intervention that would influence the phase length in this study. However, the super rival of the software release that occurred in July 2010 would negate any witnessed effects in a longer phase length. Although all data across all metrics and phases shows significant overlaps, this does not provide a compelling demonstration of an effect of certification.

An effect is documented when the data pattern in one phase (e.g., an intervention phase) differs more than would be expected from the data pattern observed or extrapolated from the previous phase (e.g., a baseline phase; (Horner et al., 2005)). A thorough analysis would attempt to examine the effect of an intervention across similar phases. The data available to this research does not allow the comparison across similar phases. Instead, data from three different service level metrics were used to provide evidence of the effect of a change in service levels. Across the three metrics with suitable data, the three metrics do not show that ISO/IEC 20000 had an effect on the service levels (B1, B4).

7.9. Statistical Analysis of Time-series Data

Visual analysis permits a visual impression of a trend or intervention effect. Jones et al. (1977) argues, since the eye can be misled and because a researcher often desires a reliable criterion on which to base a conclusion, statistical analyses have been employed in time-series designs. Kratochwill (1978) argues, that although more than one reasonable statistical analysis strategy is available it is generally agreed that the simple adaptation of conventional parametric techniques (e.g., varieties of t tests, analysis of variance, multiple regression) is not appropriate. Kratochwill and Levin (1978) state that the problem in using conventional techniques stems from the auto correlated nature of the data, combined with the feature of multiple observation points. The time-series analysis conducted by this research first transforms the monthly raw scores collected from the ITSM performance reports to un-correlated or serially independent scores. In the second step of this time-series analysis, this research statistically compares the transformed scores from adjacent phases in the design.

Kratochwill and Levin (1978) state that the difficulty in applying conventional analysis strategies to time-series designs is essentially one of an unwarranted inflation of the number of independent estimates of error arising from data which is not independent. As a result, statistical tests based on known distributions such as F and t, are almost certainly in error and, in particular, contain Type I errors (i.e., rejecting a no-difference hypothesis incorrectly) more often than one would expect. This section will discuss the removal of serial dependency from the data and the conduct of an effect size analysis using Hedges' *g*.

Jones et al. (1977) describes that serial dependency precludes the uncritical use of certain conventional statistical methods (e.g. analysis of variance to compare means from two or more phases.) Serial dependency interferes with visual inferences about change. This research has taken data measured on a monthly basis. The analysis in Section 7.3 shows that the 86 temporarily ordered scores in this series are not independent of one another. That is the data from January 2010, is related to the data for February 2010, which is related to the data collected from March 2010 and so on. Jones explains that when this occurs, the sequence of scores are said to be serially dependent.

Serial dependency is appraised by calculating a statistic called an autocorrelation coefficient. These calculations are presented in Section 7.3 of this chapter. The calculations in Section 7.3 show that the sequence of data points are serially dependent and therefore must be treated prior to statistical analysis being completed (Hartmann et al., 1980). A statistical analysis will be used to supplement the visual analysis of change in service level data. The added support of statistical analysis adds weight to any conclusion drawn visually from the data. The method utilized is procedurally identical to regression analysis for testing change in level, trend, and change in trend between baseline and treatment phases. However, in the analysis conducted in this research, the values assigned to the dummy variables are functions of the serial dependency in the scores, whereas in standard regression analysis, no dependency is reflected in the dummy codes.

For continuous outcomes, the Institute of Education Sciences (2014: pg. 22) has adopted the most commonly used effect size index, the standardized mean difference known as Hedges' *g*, with an adjustment for small samples. Hedges' *g* incorporates an adjustment which removes the bias of Cohen's D (Huber, 2013). Stangroom (2015) states that Hedges' *g*, provides a measure of effect size weighted according to the relative size of each sample, and is suitable alternative where there are different sample sizes. The pre and post certification sample sizes are different in size.

The data is first transposed to serially independent data by using the standardize function in Microsoft Excel. This function uses the average and standard deviation of the entire array of data from June 2008 to June 2015 to produce a corresponding array of serially independent data. The Hedges' *g* calculator provided by Stangroom (2015) utilizes the sample size, standard deviation and average mean of the pre and post certification phases to produce an effect size. The raw data and calculations are included in in Annex K. A summary of these calculations are shown in Figure 7-20.

The Institute of Education Sciences (2014) considered effect sizes of 0.25 standard deviations or larger are to be substantively important. The effect size in this study is between 0.00 and 0.02 standard deviations and does not show substantive importance. The statistical analysis of the three ITSM performance metrics concurs with the visual analysis of the data, demonstrating that ISO/IEC 20000 did not have an effect on service levels.

	(B1) Incident Management	(B2) Problem Management	(B3) Financial Management
Pre-certification			
Mean	0.88	0.53	-0.01
Standard deviation	0.55	0.51	0.81
Sample size	15	15	12
Post-certification			
Mean	0.88	0.53	-0.37
Standard deviation	0.36	0.44	0.31
Sample size	8	8	8
Hedges g	0.00	0.02	0.02

Figure 7-20. Results of Hedges *g* calculations (Source: Annex K)

7.10. Conclusion: Effects on Service (B1) and Finance (B4)

Initial viewing of the entire untreated data range presents a highly variable set of measures with significant overlap between pre- and post-certification phases. The collected metrics required careful viewing and analysis to make the data suitable to draw conclusions from. The time-series data was shown to be serially correlated between monthly results. The calculations also demonstrated some correlation between various performance measures. However, none of these measures allowed the use of cross-correlation to back predict results, reducing the number of available metrics to three. The correlation calculation performed on the data suggests that the only data suitable for composition would be PM and availability, and the research consequently decided that all metrics should remain as individual measures and not be combined into one service level metric.

An analysis of seasonality demonstrated that treatment was required to aid in visual analysis. Consequently, a linear trend line and a 12 month moving average was applied to all data sets prior to visual analysis. Analysis showed that there was better reporting in the years after certification, however there was not a significant jump in measurement performance due to ISO/IEC 20000. The visual and statistical analysis concurs in showing no effect on service levels from certification. It is almost sensational just how little effect ISO/IEC 20000 certification had on the service levels within the organization. A slight effect would have led to an inconclusive analysis, but the even result lends weight to the assertion that ISO/IEC 20000 certification did not have an effect on service levels in the organization.

Three individual service level metrics were analysed in this chapter, relating to three benefits identified in Chapter 3 of this dissertation; process benefits (B5), financial benefits (B4) and increase service levels (B1). Incident management and problem management demonstrated no increases in performance during the measurement period (B1). This research assessed that, in the case of this

particular organization, the goal of ISO/IEC 20000 certification was less concerned with reducing the cost of the service and aimed at making the service costs more predictable and closer to budgeted amounts (B4). The evidence supports that costs were slightly closer to expected budgets and there was slightly less volatility in the deviation from the budgeted costs. These effects in financial performance, whilst present, were not statistically significant (B4). A reduction in the variability of the data post-certification shows that there were benefits in processes being executed more consistently (B5). This research has assessed that ISO/IEC 20000 certification had no effect on financial benefits (B4) or service levels (B1) and a positive effect on processes (B5).

Jones et al. (1977: pg: 10) noted that there is something to be learned by studying the failure of an intervention to produce an effect. In doing the experiment and having the interactions, knowledge is gained through understanding the nature of the interactions and subsequently provides suggestions for the design of subsequent programs, *"or at least permit a 'moderated' conclusion from seemingly negative evaluation findings"*. The visual and statistical analysis of service management performance measures presented in this dissertation is a first. This chapter presents data collected before and after certification, quantifying the effects of certification across three service management processes. The analysis shows that in this particular organization, ISO/IEC 20000 certification did not have an effect on service levels. Further studies will be required in other organizations to determine if this lack of effect is to be expected across all organizations implementing ISO/IEC 20000.

CHAPTER 8. CONCLUSION: ISO/IEC 20000 PROVIDES BENEFITS

The need for action presented in Chapter 1 posed a question concerning the benefits available to an Australian government organization in seeking ISO/IEC 20000 certification. Investment of resources would achieve certification, without necessarily a quantifiable outcome and a return on the investment. A review of the available literature presented a lack of information, not only in the space of benefits to an Australian government organization, but a gap in the research around ISO/IEC 20000 and the advantages from certification to the standard.

This dissertation used case study research as a method of investigating the effects of ISO/IEC 20000 certification in an organization. Key literature from Disterer, Cots, Dugmore, Kunas and APMG was analysed. The works of these authors was consolidated into a single analysis and resulted in a synthesized list of six commonly perceived benefits of ISO/IEC 20000. Looking at each of these benefits in a single case, this dissertation determined that ISO/IEC 20000 certification had positive effects across three of the six identified potential benefits.

Future researchers may be able to explore the benefits of ISO/IEC 20000 certification based on this comparative analysis. This dissertation presents evidence that supports these authors, with the testimony that ISO/IEC 20000 has benefits for an Australian government organization. Further work is required to confirm that this statement is applicable across multiple cases.

8.1. Summary of the Research

This research has been concerned with how an organization receives benefit from ISO/IEC 20000 certification. A small number of previous researchers have discussed ISO/IEC 20000, even less discuss the benefits of the standard and none have presented a well documented and quantified case of the benefits realized in a real world organization.

Table 8-1 presents the summary of the analysis of the organization from Chapters 6 and 7, alongside the six potential benefits identified in Chapter 3. As stated, only three benefits were achieved to demonstrate an effect of ISO/IEC 20000 certification in supporting the benefit in the case of this particular Australian government agency.

Table 8-1. Final scorecard measuring the effects in the organization of ISO/IEC 20000 certification on the proposed benefits

Benefit 1: Service		
Negative effect	No effect	Significant benefit
Sections 7.8 and 7.9 present the analysis of the three individual service level metrics analysed by this study. One metric, (financial management) is already represented on this scorecard. The two remaining metrics, incident management and problem management demonstrated no increase in performance during the measurement period.		
Benefit 2: Credibility and Trust		
Negative effect	No effect	Significant benefit
Chapter 6 discussed that no evidence was discovered that showed the organization had any trust or credibility issues, or that the customer or end users had any knowledge of how ISO/IEC 20000 certification provided credibility to the organization.		
Benefit 3: Staff commitment to service management		
Negative effect	No effect	Significant benefit
The evidence presented in Chapter 6 indicated that until the impending arrival of the external auditors, the organizations staff was reluctant to improve processes and contributing to CSI. A significant improvement in staff commitment to achieving the requirements of the standard is witnessed in the two months prior to the certification audit.		
Benefit 4: Financial		
Negative effect	No effect	Significant benefit
To have a positive effect, it was assessed that in this organization that the goal was not reducing the cost of the service, but making the service costs more predictable and closer to budgeted amounts. The evidence presented in Sections 7.8 and 7.9 support that costs were slightly closer to expected budgets and there was slightly less volatility in the deviation from the budgeted costs. These effects whilst present were only minimal.		
Benefit 5: Processes		
Negative effect	No effect	Significant benefit
Chapter 9 discussed that the gap assessments conducted in the initial phases of ISO/IEC 20000 which indicated that the organizations processes were deficient. The pre audit conducted prior to certification noted that the organizations processes were still deficient. Two months after the pre-audit, an improvement in processes is observed and the registered auditor noted that the organizations processes were compliant with the standard.		
Benefit 6: Compliance		
Negative effect	No effect	Significant benefit
Improved and streamlined compliance to external audit requirements (ANAO, Customer ICT Controls, ISO 9000) was identified in Chapter 6 as an initial goal of the organizations service management improvement project. The evidence indicated that several synergies across compliance audits were realized by certification to ISO/IEC 20000, and that the ISO/IEC 20000 audit could be used as evidence to prove compliance during other audits and regulatory checks.		

Chapter 6 presented evidence that the resources invested to achieve ISO/IEC 20000 were minimal. The total cost was less than a quarter of a per cent of the Organizations operating costs per financial year, which was not significant. It would seem that in this case that ISO/IEC 20000 was utilized as an effective tool to motivate the organization towards providing effective service management. ISO/IEC 20000 also assisted the organization in meeting external compliance requirements placed on them from other agencies. Process consistency, knowledge and integration were all improved as a result of the organization achieving ISO/IEC 20000 certification. The three benefits received were significant and potentially outweighed any initial and not significant costs in certification.

This case represents a single instance in which an organization received benefit from ISO/IEC 20000 certification. Further investigation should be made into multiple organizations to determine if the benefits realized in this study are applicable to other groups.

8.2. Contributions to Theory and Practice Through the Achievement of the Research Objective

Section 4.1 presented and discussed the case study research method. Without requiring the control of behavioural events, this research method worked well to discuss and analyse contemporary event and answer the 'how' question posed by this research. Section 2.12 of this dissertation presented the research objective of:

How does the attainment of ISO/IEC 20000 certification provide benefit to an Australian government organization?	
Sub-objective one:	How can a researcher determine the extent of the benefits of ISO/IEC 20000 certification?
Sub-objective two:	Given the method determined in sub-objective one, what is the extent of the benefits from ISO/IEC 20000 certification in an organization?
Sub-objective three:	Do the benefits of ISO/IEC 20000 certification justify the costs of the investment?

Developing the list of benefits from the literature in Chapter 3 meets sub-objective one. The results of the analysis discussed in Chapters 6 and 7 supports sub-objective two. The lack of supporting evidence to provide clear quantified results means that sub-objective three remains uncertain.

Based on the list of six potential benefits, three elements were unsupported by the evidence as providing benefit to an Australian government organization and three elements showed a significant benefit to the organization. The research determined that ISO/IEC 20000 certification provided benefits to the organization in:

a. Improving staff commitment to service management.

b. Increased uniformity and transparency of operating processes.

c. Fulfilling and streamlining compliance requirements.

As discovered through the analysis of academic literature, there is little research into the implementation and benefits of ISO/IEC 20000. The research that is available focuses on survey data and does not present evidence supporting the stated benefits of survey respondents. The contributions that this work has made to the body of knowledge were presented in Chapters 2, 3, 6 and 7. In summary, achievement of the three sub-objectives of this research makes five contributions:

a. The first systematic literature review on ISO/IEC 20000.

b. The first meta-analysis of benefits from certification to ISO/IEC 20000 providing a succinct list of benefits from which to use as a basis of assessment for the introduction of the standard.

c. An examination of the benefits realized by an Australian government organization through certification to ISO/IEC 20000.

d. An examination of the costs of ISO/IEC 20000 certification for an Australian government organization.

e. The only evidence based longitudinal case study of the effects of ISO/IEC 20000 certification conducted through the analysis of organizational records.

These contributions will be refined and published in academic journals upon the successful completion of this dissertation. In delivering these three contributions, the research has met the need for action described in Chapter 1 of this dissertation by describing and presenting the evidence supporting why an organization would voluntarily choose to certify themselves to a standard that is not demanded by the government or the customer.

Section 4.2.3 presented seven propositions that this research may find evidence to support or refute. Each proposition is discussed below:

a. *There is benefit in standardized processes.* Benefit 5 explicitly discusses the benefit to standardized processes from ISO/IEC 20000 certification, however no evidence was discovered to support the proposition that benefit was gained from the standardized processes.

b. *There is benefit in service management and standardization of processes but negligible benefit from the final step of certification.* The evidence collected showed that there was benefit in service management and the standardization of processes, the benefits gained in Staff Commitment, Processes and Compliance would not have been achieved without the final step of certification and the external audit conducted.

c. *The customer did not request certification, nor understand the cost of the benefit of the certification.* This research did not discover evidence that the customer requested certification hence, this research also did not find evidence that the customer sought to

understand the cost of the benefit. However, this research has demonstrated that the costs of certification were outweighed by the benefits.

d. *Over time, customer service levels have improved and a marked improvement was recorded just before, during or just after ISO/IEC 20000 certification.* The research was not able to identify a significant increase in customer service levels during the measurement period.

e. *ISO/IEC 20000 certification had a negligible effect on customer experienced service levels.* The research was not able to identify a significant increase in customer experienced service levels during the measurement period.

f. *The case study will present evidence of additional factors (not ISO/IEC 20000 certification related) that may have led to any benefit in customer service levels.* The case study has presented many influences on service levels in section 7.4 and in particular Figure 7-14 that effected service levels. However, there was no evidence gathered to demonstrate that these influences had a significant positive benefit.

g. *That ISO/IEC 20000 certification has greater merit for an organization that must or wishes to prove the organizations skills at service management.* As seen in the analysis of benefit 2, no evidence was gathered to demonstrate an effect on credibility and trust of the organization.

8.3. Limitations of the Study

This dissertation has investigated the ability for ISO/IEC 20000 certification to have an effect on the service levels in an organization. There are several limitations to this claim, the study researched only one organization and the information discovered cannot be unilaterally applied to all other service management organization across the world. In fact, the findings cannot be applied to government organizations or Australian organizations. However, these findings can be used as a starting point for future research.

In single case studies it is commonly accepted that three demonstrations of an intervention effect at three different points in time is required to prove an effect (Horner et al., 2012: & Smolkowski, 2012). The data available was insufficient to achieve this requirement. Further research should be carried out across multiple organizations to increase confidence in experimental control (Kratochwill and Levin, 2010).

On reflection, after a long time spent in research, this study could have been more focused on collecting the correct evidence to avoid being distracted from the research objective. The case study protocol was successful in keeping the research on task and the relevant evidence was located after spending some time exploring various alternatives.

Every attempt has been made to include all available evidence and measure a broad selection of metrics. Key interviews with employees of the organization pointed the researcher in the correct

direction to locate evidence, but the evidence collection was conducted in retrospect and some documents were lost to the effects of time.

There are many service level metrics in use across service management organizations throughout the world, this research only quantified three metrics. This research could have been more refined if it had been conceived prior to the organization's journey to certification commencing. Additional metrics could have been included and more validity assigned to discrediting rival hypotheses. Had this been the case, evidence would have been collected as it was produced, preventing the loss of data over time.

8.4. Further Research Opportunities

This research has presented some interesting findings, but the findings alone are less important than the numerous opportunities for further research that have arisen from this work. As discussed in Chapters 2 and 3, there has been some research into ISO/IEC 20000. However, the application of this research to organizations in context has only just commenced. The next step is to develop on what has been discussed in this dissertation.

The systematic literature review presented in Chapter 2 can now be used as a starting point for other researchers to investigate ISO/IEC 20000. The benefit analysis from Chapter 3 can be utilized as a bench mark on which to evaluate ISO/IEC 20000 adoptions. Further researchers now have a benchmark of six benefits from which they can measure ISO/IEC 20000 certification.

This case study can be viewed as a pilot case from which future investigators can utilize as starting point. The protocols and research methods documented provide a basis from which to commence further research into the effects of ISO/IEC 20000 on organizations. This case study could be utilized as the beginning of an investigation of why ISO/IEC 20000 certification is not more widely used globally and what can be done about increasing the uptake of ISO/IEC 20000 within Australia.

The concepts and methodology of this study could potentially be applied to other popular IS management frameworks like COBIT or ISO/IEC 38500 - the international standard for governance of IT (International Organization for Standardization, 2015a).

In no way do the findings that ISO/IEC 20000 had no effect on service levels present a case that ISO/IEC 20000 certification is pointless. These findings present a hypothesis that further study in this area of the effects on ISO/IEC 20000 on service levels is warranted. Extant literature on the topic of ISO/IEC 20000 benefits is very limited. This work has provided a succinct and clear benefits that could be sought from ISO/IEC 20000 certification. Further research should analyse each of these six points, both individually and collectively, to determine if there are indeed benefits from ISO/IEC 20000 certification.

Although this single case study yields valuable insights, a multiple case study design is likely to produce results that are more widely applicable. Horner et al. (2005) describes that when implemented with multiple design features (e.g., within- and between-case comparisons), single-case designs can

provide a strong basis for causal inference. This single case study has provided a basis for inference on the effects of ISO/IEC 20000 certification on service levels. However, confidence in the validity of intervention effects demonstrated within cases is enhanced by replication of effects across different cases, studies, and research groups (Horner and Spaulding, 2010).

As a consequence of time and research constraints, this study remained a single case study. Therefore it is recommended that a follow up study be conducted which uses a multiple case design. The selected organizational units should represent four differing perspectives. One organization where ISO/IEC 20000 was implemented and another organization where it was concluded that certification was not required. Additionally, it would be beneficial to examine two additional cases which show an organization that gained benefit through ISO/IEC 20000 certification and another organization where no benefit was gained.

The software release in 2010, and the inundation of incidents and problems to the organization, prevented the use of the data contained in the ITSM performance reports after July 2010 due to invalidity concerns. Aggregating the raw data, direct from the three Service Management tools over the study period, then removing the data related to the software release would allow better analysis of the data without this confounding variable.

It is possible that there is a relationship between ITIL skilled staff and service level performance. In light of the seasonal effects identified in Chapter 7, it would be interesting to study the effects of staff absences and the possible shortage of staff with formal ITIL skills and the impact this has on service levels.

The changes in the standards between the 2005 and 2011 versions, and potential changes in future versions present some interesting opportunities for researchers to explore the changes in the patterns of benefits between versions.

This case presents a study on a single organization. Further work is required for this case study to meet the requirements of demonstrating a strong basis for inference across the service management field. The following three points, adapted from the single case design standards presented by Institute of Education Sciences (2014) should be considered:

- At least four more case studies should be conducted examining the effect of ISO/IEC 20000 on service levels.
- The case studies must be conducted by at least three different research teams with no overlapping authorship at three different institutions.
- The combined number of cases organizations studied should total at least 20.

This research has presented numerous opportunities for further research. There has been some previous research into ISO/IEC 20000. However, the application of this research to organizations in

context has only just begun. The next step is to develop further on what has been presented in this dissertation.

8.5. Concluding Remarks

Chapter 1 of this dissertation discussed the importance of measuring IT investments, standards and governance to understand the value of standards in context. This dissertation uncovered that the importance was not correlated by global adoption of the standard. Previous work conducted by Dugmore (2012b) presented the results of a survey asking respondents about their experiences with ISO/IEC 20000 and ITIL. The survey generated two business reports detailing the effects of ISO/IEC 20000 in two UK organizations. The business reports provided interesting information, however they lacked the depth of analysis and academic rigor required to make assessments on the benefits of ISO/IEC 20000 in a real world context. This dissertation has measured an IT investment in ISO/IEC 20000 and the benefits gained from the investment in the context of an Australian government organization.

This research is based on an organizational question posed by the CEO of one government agency that has adopted ISO/IEC 20000. This question was – 'What benefit does the organization get from ISO/IEC 20000?'. The literature review identified a gap in research within the adoption of ISO/IEC 20000 amongst Australian agencies and businesses. Due to this, the research problem and this dissertation focuses on demonstrating the benefits ISO/IEC 20000 can have to an Australian government agency.

The results of the literature review, case study and analysis will be available for future researchers who can utilize the framework to analyse further organizations and determine if benefit exists for their organization to gain certification. The literature review presented an opportunity to contribute to the body of academic knowledge. This study has filled the gap in the literature by providing a study of an organization and the benefits of seeking ISO/IEC 20000 certification.

A case study into an organization was observed, evidence gathered and insights made about the journey this particular organization made in achieving ISO/IEC 20000 certification. An attempt has been made to present research that is well executed and demonstrates technical competence in handling case study research. The researcher's professional knowledge and experience with ISO/IEC 20000 was enough to provide a working understanding of the standard. However, through systematic research, the review of available literature and discussions with human sources, the researcher expanded this knowledge and gained mastery of the subject matter.

There was unparalleled access to information and raw data from the organization, which, when well-handled and consolidated into a database, provided evidence for an argument that is strong, comprehensive and coherent. The advice provided by Yin (2014) proved to be invaluable in guiding the researcher to use appropriate theory, methods and techniques in order to obtain solid, if unexpected results and answers to research questions posed in the case study protocol. This research has made a

modest contribution to the field, providing evidence for six benefits of ISO/IEC 20000 certification. Three of these six benefits were supported by evidence in the organization examined.

If an organization is not serious about service management, then certification is likely to be expensive and non-rewarding. However, for any organization that is focused on service management, ISO/IEC 20000 certification provides guidance on what the minimum requirements of a service management system are. ISO/IEC 20000 certification is a cost effective way to achieve the service management aims of an organization.

In answering the question, 'How does an Australian government organization benefit from ISO/IEC 20000 certification?', this research concludes with this statement:

> The preparation and the associated audit costs provided the organization studied in this research with a return on investment and delivered significant benefits to the organization across the areas of processes, staff and compliance.

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ANNEX A. LIST OF AUSTRALIAN ORGANIZATIONS CERTIFIED TO ISO/IEC 20000

Certified organizations by Accreditation bodies (as at 16 Oct 15) Source: JAS-ANZ (2015), APM Group (2015) and State Revenue Office Victoria (2015)

a. SAI Global Certification Services Pty Ltd Trading as SAI Global:

- Empired Ltd.
- Fujitsu Australia Limited.
- DORIC Group Holdings Pty Ltd (Deregistered 28/9/2015).
- Public Safety Network Management Centre.
- SingTel Optus Pty Limited.
- ASG Group Limited.
- Datacom Systems SA Pty Ltd.
- Logistic Information Systems Branch (Deregistered 01/10/2014).

b. International Standards Certifications Pty Ltd (ISC was acquired by DNV GL early 2015. DNV GL Not able to give any historical information on number of certificates issued):

- Net logistics.

c. Lloyd's Register Quality Assurance (LRQA):

- CSC Australia.

d. Accredited through a non-Australian accreditation body:

- State Revenue Office, Victoria.

The data provided by SAI-Australia on the number of certification provided each year is included in Table A-1.

Table A-1. Historic ISO/IEC 20000 Certification Data from SAI Global-Australia[10]

Jul-15	Feb-14	Nov-13	Jul-13	Apr-13	Jul-12	Jul-11	2010	2009
9	8	7	6	7	6	6	4	0

[10] The certification data includes three Non-Australian organizations

ANNEX B. PRISMA STATEMENT

Section/Topic	#	Checklist Item	Reported in section
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	N/A
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	2
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	2
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	2
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	N/A

Section/Topic	#	Checklist Item	Reported in section
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	N/A
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	2
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	N/A
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	N/A
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N/A
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A

Section/Topic	#	Checklist Item	Reported in section
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	2
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	2
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	2
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	1

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097
For more information, visit: **www.prisma-statement.org**

ANNEX C. CASE STUDY RESEARCH PROTOCOL.

1. **Overview**
   - **1.1. Mission and Goals.** see main document
   - **1.2. Case study questions.** see main document
   - **1.3. Purpose.** The purpose of this protocol is guide the researcher in providing a standardized agenda and keeping the research on the determined line of inquiry. Answering the questions within this protocol will provide the evidence for a robust report.
   - **1.4. Audience.** Dissertation examiners
2. **Data collection procedures**
   - **2.1. Names of contacts.** Names redacted for anonymity purposes
   - **2.2. Data collection sources:**
     - **2.2.1. Human**
       - 2.2.1.1. Employees
         - 2.2.1.1.1. How it works in the organization?
         - 2.2.1.1.2. Why did they propose 20000?
         - 2.2.1.1.3. Location of documentation of related projects
     - **2.2.2. Records**
       - 2.2.2.1. WWW documents
       - 2.2.2.2. Internal Web Documents
       - 2.2.2.3. Service Management Tool data
       - 2.2.2.4. Organizational record management system
       - **2.2.2.5. Types of questions answered by records**
         - 2.2.2.5.1. Implementation plans
         - 2.2.2.5.2. Start state
         - 2.2.2.5.3. Policies
         - 2.2.2.5.4. Procedures
         - 2.2.2.5.5. Outcomes
       - 2.2.2.6. 2012 APMG survey data
   - **2.3. Access.**
     - **2.3.1. Letter of Org support.** From Company director
     - **2.3.2. Site access.** ID card required
     - **2.3.3. Office area access.** Letter of organizational support
     - **2.3.4. Interviewees.** To be contacted via email/telephone to organize a time. Must arrange access to suitable meeting room. Perhaps if this meeting room has a spare terminal near it, it can be used to search and examine documents.

2.3.5. **Company IT network access.** Already approved and cleared

2.3.6. **Data collection activities'**

2.3.6.1. **People.** Initial interviews complete by Mar 14. Follow up interviews complete by 1 Dec 15.

2.3.6.2. **IT Systems.** Complete by 1 Nov

2.4. Prior prep. Protocol complete before collection commences

3. **Data collection questions.** These questions are level 2 questions as defined by (Yin, 2014: pg. 90) Focus is on the data shell perhaps may not include sections 3.2 and 3.3.

3.1. **Empty table shell** (Miles, 1994)

3.1.1. Y axis

3.1.1.1. Monthly from July 2008 to July 2015

3.1.2. X Axis

3.1.2.1. Percentage - IM

3.1.2.2. Percentage - PM

3.1.2.3. Percentage - Availability

3.1.2.4. Percentage - Finance

3.1.2.5. Percentage - User satisfaction

3.1.2.6. Word Column – Significant events

3.1.2.7. Cost of implementation/maintenance, (yearly)

3.1.2.8. Why was this data chosen?

3.1.2.9. If data for some metrics are unavailable, does any of the data correlate, and can the data be used to back predict results.

3.1.2.10. Do the different measures listed in protocol 3.1.2.1 to 3.1.2.5 correlate? i.e. can we expect ISO/IEC 20000 to have the same impact on each metric?

3.1.2.11. Number – The number of incidents resolved per month

3.1.2.12. Number – The number of incidents open at the end of the month

3.2. Implementation ISO/IEC 20000 in the organization

3.2.1. Describe the implementation in detail,

3.2.1.1. What date did ITIL start being used

3.2.1.2. What date did you start the journey to ISO/IEC 20000

3.2.1.3. What date was the first audit

3.2.1.4. What date was the initial certification

3.2.1.5. When did procedures changed?

3.2.1.6. When did the contractor arrive?

3.2.1.7. Was there a pre audit?

3.2.1.8. When was the audit(s)?

3.2.1.9. When did the certification occur?
3.2.1.10. Was performance better? (See section 3.1)
3.2.1.11. Describe personnel involved
3.2.1.12. Describe technologies involved
3.2.1.13. Where did the idea come from
3.2.1.14. Was there a planning process
3.2.1.15. Who approved it?
3.2.1.16. How was it resourced?
3.2.1.17. How much of the cost can be attributed to ITIL adoption/best practice?
3.2.1.18. How did it work
3.2.1.19. What were the original goals and targets on certification
3.2.1.20. How was it funded, within budget or additional were additional resources required
3.2.1.21. How well were metrics done prior to certification? Was there better measuring post certification due to certification

3.3. Ongoing Describe the status quo in detail, personnel, technologies
3.3.1. What is being measured? (Section 3.1)
3.3.2. What are the measurements? (Section 3.1)
3.3.3. What other reasons are there for these outcomes? Rivals
3.3.4. Did service levels drop during the period of an external audit?
3.3.5. Was there any annual fluctuations/seasonal changes? (Fourier analysis)

3.4. Benefits
3.4.1. Describe benefits of ISO/IEC 20000 – Meta analysis
3.4.1.1. Benefit 1
3.4.1.2. Benefit 2
3.4.1.3. Benefit 3
3.4.1.4. Benefit 4
3.4.1.5. Benefit 5
3.4.1.6. Benefit 6
3.4.1.7. Benefit 7
3.4.1.8. Benefit 8
3.4.1.9. Benefit 9
3.4.1.10. Benefit 10
3.4.2. Identify the benefits specific to organization studied.
3.4.2.1. Benefit 1
3.4.2.2. Benefit 2

3.4.2.3. Benefit 3
3.4.2.4. Benefit 4
3.4.2.5. Benefit 5
3.4.2.6. Benefit 6
3.4.2.7. Benefit 7
3.4.2.8. Benefit 8
3.4.2.9. Benefit 9
3.4.2.10. Benefit 10

3.4.3. Are there other metrics that could be used in this case study from other literature (SERVQUAL, ITSM, ISO 9000)?

3.5. Uptake

3.5.1. Describe the historical uptake of ISO/IEC 20000 within Australia

3.5.2. Analyze and discuss how many of these organizations were government agencies

3.5.3. Analyse and discuss the Australian component of the ITIL/ISO/IEC 20000 survey completed in 2012 by APMG.

4. Case study report

4.1. **Audience.** Dissertation review committee

4.2. ISO/IEC 20000 in operation

4.3. Benefits of the certification

4.4. Context and history pertaining to certification

4.5. Chronology of events

4.6. Trends in service levels

4.7. References to relevant documents/case study database

ANNEX D. CASE STUDY EVIDENCE DATABASE

This information has been removed from the public version of this thesis. Please contact the author for access to the information contained in this annex.

Annex E. Data collection table

Evidence Reference Number	Reporting Month	IM%	IM first differences	IM link relatives	IM seas index	IM ztest	IM STD	Number of Incidents resolved each month	Number of open incidents at EOM	PM%	PM - First value	PM- Link relatives	PM STD	AVG IM and PM	Availability%	AV STD	Finance %	FIN STD	SU%	SU STD	STD AVG	User satisfaction				
																						Poor	Average	Good	VG	Ex
ES001	Jun-08	95%				1.00	1.79	#N/A	#N/A	100%			0.80	1.29	#N/A		#N/A		#N/A		1.29	na	na	na	na	na
ES002	Jul-08	86%	-9%	0.905		1.00	0.99	#N/A	#N/A	100%	0%	1.000	0.80	0.89	#N/A		#N/A		#N/A		0.89	na	na	na	na	na
ES003	Aug-08	83%	-3%	0.964		1.00	0.71	#N/A	#N/A	100%	0%	1.000	0.80	0.76	#N/A		22.0%	1.22	#N/A		0.91	na	na	na	na	na
ES004	Sep-08	92%	9%	1.105		1.00	1.48	#N/A	#N/A	100%	0%	1.000	0.80	1.14	#N/A		21.7%	1.20	#N/A		1.16	na	na	na	na	na
ES005	Oct-08	92%	0%	1.004		1.00	1.52	#N/A	285	100%	0%	1.000	0.80	1.16	#N/A		6.8%	0.18	#N/A		0.83	na	na	na	na	na
ES006	Nov-08	93%	1%	1.012		1.00	1.62	#N/A	389	100%	0%	1.000	0.80	1.21	#N/A		-18.4%	-1.54	#N/A		0.29	na	na	na	na	na
ES007	Dec-08	86%	-7%	0.923		1.00	0.98	#N/A	348	100%	0%	1.000	0.80	0.89	#N/A		2.8%	-0.09	#N/A		0.56	na	na	na	na	na
ES008	Jan-09	76%	-10%	0.885	0.95	0.83	0.10	483	410	100%	0%	1.000	0.80	0.45	#N/A		2.2%	-0.13	#N/A		0.26	na	na	na	na	na
ES009	Feb-09	83%	7%	1.092	1.03	1.00	0.72	1061	383	100%	0%	1.000	0.80	0.76	#N/A		-2.0%	-0.42	#N/A		0.37	na	na	na	na	na
ES010	Mar-09	80%	-3%	0.964	1.00	1.00	0.46	964	423	100%	0%	1.000	0.80	0.63	#N/A		-4.9%	-0.62	#N/A		0.21	na	na	na	na	na
ES011	Apr-09	81%	1%	1.013	1.01	1.00	0.54	797	420	100%	0%	1.000	0.80	0.67	#N/A		-4.2%	-0.57	#N/A		0.26	na	na	na	na	na
ES012	May-09	82%	1%	1.012	1.02	1.00	0.63	1025	347	76%	-24%	0.760	-0.81	-0.09	#N/A		-0.7%	-0.33	#N/A		-0.17	na	na	na	na	na
ES013	Jun-09	81%	-1%	0.988	1.01	1.00	0.54	638	332	86%	10%	1.132	-0.14	0.20	#N/A		4.7%	0.04	#N/A		0.15	na	na	na	na	na
ES014	Jul-09	81%	0%	1.000	1.01	1.00	0.54	717	329	94%	8%	1.093	0.40	0.47	#N/A		17.8%	0.93	#N/A		0.62	na	na	na	na	na
ES015	Aug-09	81%	0%	1.000	1.01	1.00	0.54	NA	404	85%	-9%	0.904	-0.21	0.17	#N/A		#N/A		#N/A		0.17	na	na	na	na	na
ES016	*Sep-09*	*84%*	*3%*	*1.037*	*1.05*	*1.00*	*0.81*	*1269*	*233*	*82%*	*-3%*	*0.965*	*-0.41*	*0.20*	*#N/A*		*-12.9%*	*-1.17*	*#N/A*		*-0.26*	*na*	*na*	*na*	*na*	*na*
ES017	*Oct-09*	*71%*	*-13%*	*0.845*	*0.88*	*0.00*	*-0.34*	*942*	*477*	*100%*	*18%*	*1.220*	*0.80*	*0.23*	*#N/A*		*1.0%*	*-0.22*	*#N/A*		*0.08*	*na*	*na*	*na*	*na*	*na*
ES018	**Nov-09**	**83%**	12%	1.169	1.03	1.00	0.72	**1074**	**606**	**99%**	-1%	0.990	0.73	0.73	#N/A		**9.0%**	0.33	#N/A		0.59	**na**	**na**	**na**	**na**	**na**
ES019	Dec-09	80%	-3%	0.964	1.00	1.00	0.46	639	314	100%	1%	1.010	0.80	0.63	#N/A		0.7%	-0.24	#N/A		0.34	na	na	na	na	na
ES020	Jan-10	82%	2%	1.025	1.18	1.00	0.63	454	454	100%	0%	1.000	0.80	0.72	*100.0%*	0.48	-4.0%	-0.56	#N/A		0.34	na	na	na	na	na
ES021	Feb-10	86%	4%	1.049	1.23	1.00	0.99	828	732	100%	0%	1.000	0.80	0.89	*100.0%*	0.48	-3.6%	-0.53	#N/A		0.43	na	na	na	na	na
ES022	Mar-10	86%	0%	1.000	1.23	1.00	0.99	896	428	82%	-18%	0.820	-0.41	0.29	*100.0%*	0.48	-2.2%	-0.44	#N/A		0.15	na	na	na	na	na
ES023	Apr-10	81%	-5%	0.942	1.16	1.00	0.54	1432	382	100%	18%	1.220	0.80	0.67	*100.0%*	0.48	-2.6%	-0.46	#N/A		0.34	na	na	na	na	na
ES024	May-10	88%	7%	1.086	1.26	1.00	1.16	1193	465	95%	-5%	0.950	0.46	0.81	*100.0%*	0.48	-5.7%	-0.67	#N/A		0.36	na	na	na	na	na
ES025	Jun-10	92%	4%	1.045	1.32	1.00	1.52	938	1952	91%	-4%	0.958	0.19	0.86	*100.0%*	0.48	-2.0%	-0.42	#N/A		0.44	na	na	na	na	na
ES026	Jul-10	75%	-17%	0.815	1.08	0.55	0.01	1644	1892	100%	9%	1.099	0.80	0.41	*100.0%*	0.48	-2.0%	-0.42	#N/A		0.22	na	na	na	na	na
ES027	Aug-10	49%	-26%	0.653	0.70	0.00	-2.29	2226	1330	100%	0%	1.000	0.80	-0.75	98.0%	-0.99	6.4%	0.15	67%	-1.83	-0.83	24%	9%	7%	15%	45%
ES028	Sep-10	63%	14%	1.286	0.90	0.00	-1.05	1693	1769	100%	0%	1.000	0.80	-0.13	100.0%	0.48	13.0%	0.60	85%	1.17	0.40	10%	5%	7%	19%	59%
ES029	Oct-10	49%	-14%	0.778	0.70	0.00	-2.29	2202	1835	100%	0%	1.000	0.80	-0.75	100.0%	0.48	5.9%	0.12	81%	0.51	-0.08	11%	8%	4%	15%	62%
ES030	Nov-10	44%	-5%	0.898	0.63	0.00	-2.73	1697	1847	85%	-15%	0.850	-0.21	-1.47	99.5%	0.11	1.7%	-0.17	76%	-0.33	-0.67	20%	4%	4%	12%	60%
ES031	Dec-10	41%	-3%	0.932	0.59	0.00	-3.00	2419	1825	95%	10%	1.118	0.46	-1.27	99.5%	0.11	16.4%	0.84	80%	0.34	-0.25	14%	7%	7%	3%	70%
ES032	Jan-11	49%	8%	1.195	0.70	0.00	-2.29	898	2661	93%	-2%	0.979	0.33	-0.98	100.0%	0.48	8.0%	0.26	75%	-0.49	-0.34	19%	5%	6%	10%	59%
ES033	Feb-11	85%	36%	1.735	1.21	1.00	0.90	1631	3838	98%	5%	1.054	0.66	0.78	100.0%	0.48	6.4%	0.15	71%	-1.16	0.21	21%	8%	8%	12%	51%
ES034	Mar-11	82%	-3%	0.965	1.17	1.00	0.63	2370	3352	84%	-14%	0.857	-0.27	0.18	100.0%	0.48	7.5%	0.23	74%	-0.66	0.08	20%	6%	5%	8%	61%
ES035	Apr-11	80%	-2%	0.976	1.14	1.00	0.46	1704	4046	97%	13%	1.155	0.60	0.53	100.0%	0.48	5.1%	0.06	75%	-0.49	0.22	19%	5%	5%	8%	62%
ES036	May-11	60%	-20%	0.750	0.86	0.00	-1.32	1833	3485	80%	-17%	0.825	-0.54	-0.93	100.0%	0.48	1.7%	-0.17	76%	-0.33	-0.38	19%	5%	2%	10%	64%
ES037	Jun-11	65%	5%	1.083	0.93	0.00	-0.87	2322	3225	69%	-11%	0.863	-1.28	-1.08	100.0%	0.48	4.7%	0.04	79%	0.17	-0.29	13%	7%	4%	3%	72%
ES038	Jul-11	75%	10%	1.154	1.07	0.55	0.01	2023	3588	79%	10%	1.145	-0.61	-0.30	100.0%	0.48	-0.7%	-0.33	90%	2.01	0.31	7%	4%	5%	7%	78%
ES039	Aug-11	67%	-8%	0.893	0.96	0.00	-0.70	2229	3918	73%	-6%	0.924	-1.01	-0.85	100.0%	0.48	-0.6%	-0.33	76%	-0.33	-0.38	17%	7%	3%	6%	67%
ES040	Sep-11	72%	5%	1.075	1.03	0.01	-0.25	1617	3974	94%	21%	1.288	0.40	0.07	100.0%	0.48	2.7%	-0.10	85%	1.17	0.34	7%	8%	5%	5%	75%
ES041	Oct-11	70%	-2%	0.972	1.00	0.00	-0.43	1689	3985	95%	1%	1.011	0.46	0.02	100.0%	0.48	20.1%	1.09	73%	-0.83	0.16	23%	4%	5%	8%	60%
ES042	Nov-11	62%	-8%	0.886	0.88	0.00	-1.14	2022	3776	96%	1%	1.011	0.53	-0.30	100.0%	0.48	8.5%	0.30	86%	1.34	0.30	9%	5%	7%	8%	71%
ES043	Dec-11	74%	12%	1.194	1.06	0.24	-0.08	835	3806	69%	-27%	0.719	-1.28	-0.68	99.0%	-0.26	50.0%	3.14	73%	-0.83	0.14	22%	5%	2%	4%	67%
ES044	Jan-12	71%	-3%	0.959	0.99	0.00	-0.34	813	3871	61%	-8%	0.884	-1.82	-1.08	99.5%	0.11	-5.5%	-0.66	81%	0.51	-0.44	16%	4%	1%	8%	72%

Evidence Reference Number	Reporting Month	IM%	IM first differences	IM link relatives	IM seas index	IM ztest	IM STD	Number of Incidents resolved each month	Number of open incidents at EOM	PM%	PM - First value	PM- Link relatives	PM STD	AVG IM and PM	Availability%	AV STD	Finance %	FIN STD	SU%	SU STD	STD AVG	Poor	Average	Good	VG	Ex
																						User satisfaction				
ES045	Feb-12	64%	-7%	0.901	0.90	0.00	-0.96	1603	3863	61%	0%	1.000	-1.82	-1.39	99.5%	0.11	-5.5%	-0.66	72%	-0.99	-0.86	19%	8%	3%	8%	61%
ES046	Mar-12	67%	3%	1.047	0.94	0.00	-0.70	1548	3837	96%	35%	1.574	0.53	-0.08	99.8%	0.29	-5.5%	-0.66	78%	0.01	-0.11	15%	7%	4%	8%	66%
ES047	Apr-12	76%	9%	1.134	1.06	0.83	0.10	1361	3956	97%	1%	1.010	0.60	0.35	100.0%	0.48	-5.5%	-0.66	77%	-0.16	0.07	17%	4%	2%	10%	65%
ES048	May-12	77%	1%	1.013	1.08	0.96	0.19	2245	4190	95%	-2%	0.979	0.46	0.33	100.0%	0.48	-1.3%	-0.37	71%	-1.16	-0.08	21%	9%	2%	10%	59%
ES049	Jun-12	76%	-1%	0.987	1.06	0.83	0.10	2166	4313	96%	1%	1.011	0.53	0.32	100.0%	0.48	0.4%	-0.26	78%	0.01	0.17	16%	7%	2%	7%	69%
ES050	Jul-12	73%	-3%	0.961	1.02	0.07	-0.16	1639	4421	95%	-1%	0.990	0.46	0.15	100.0%	0.48	-1.3%	-0.37	82%	0.67	0.22	11%	9%	2%	7%	73%
ES051	Aug-12	80%	7%	1.096	1.12	1.00	0.46	1861	5078	95%	0%	1.000	0.46	0.46	100.0%	0.48	0.4%	-0.26	80%	0.34	0.30	11%	10%	2%	10%	68%
ES052	Sep-12	59%	-21%	0.738	0.83	0.00	-1.40	2302	4544	97%	2%	1.021	0.60	-0.40	100.0%	0.48	6.6%	0.17	86%	1.34	0.24	9%	4%	5%	11%	70%
ES053	**Oct-12**	**69%**	10%	1.169	0.97	0.00	-0.52	**1736**	**4698**	**97%**	0%	1.000	0.60	0.04	**100.0%**	0.48	**-0.3%**	-0.30	**91%**	2.17	0.49	**4%**	**5%**	**2%**	**5%**	**84%**
ES054	Nov-12	72%	3%	1.043	1.01	0.01	-0.25	1812	4991	97%	0%	1.000	0.60	0.17	100.0%	0.48	-3.5%	-0.52	67%	-1.83	-0.31	25%	8%	3%	7%	57%
ES055	Dec-12	74%	2%	1.028	1.03	0.24	-0.08	1812	5053	95%	-2%	0.979	0.46	0.19	100.0%	0.48	-3.0%	-0.49	73%	-0.83	-0.09	16%	11%	1%	4%	68%
ES056	Jan-13	62%	-12%	0.838	0.88	0.00	-1.14	1549	4763	95%	0%	1.000	0.46	-0.34	100.0%	0.48	-3.1%	-0.50	74%	-0.66	-0.27	16%	9%	4%	7%	63%
ES057	Feb-13	71%	9%	1.145	1.00	0.00	-0.34	1806	4755	93%	-2%	0.979	0.33	-0.01	100.0%	0.48	-3.3%	-0.51	78%	0.01	-0.01	15%	7%	3%	7%	68%
ES058	Mar-13	64%	-7%	0.901	0.90	0.00	-0.96	1803	4591	97%	4%	1.043	0.60	-0.18	100.0%	0.48	-8.4%	-0.86	73%	-0.83	-0.31	18%	9%	3%	6%	64%
ES059	Apr-13	61%	-3%	0.953	0.86	0.00	-1.23	1974	4197	76%	-21%	0.784	-0.81	-1.02	100.0%	0.48	-9.4%	-0.93	69%	-1.49	-0.80	23%	8%	1%	2%	66%
ES060	May-13	77%	16%	1.262	1.09	0.96	0.19	2002	4062	75%	-1%	0.987	-0.88	-0.34	99.5%	0.11	-5.5%	-0.66	80%	0.34	-0.18	14%	6%	3%	4%	73%
ES061	Jun-13	67%	-10%	0.870	0.95	0.00	-0.70	2025	3425	79%	4%	1.053	-0.61	-0.65	98.0%	-0.99	-4.2%	-0.57	70%	-1.33	-0.84	19%	10%	2%	5%	63%
ES062	Jul-13	79%	12%	1.179	1.12	1.00	0.37	1715							98.5%	-0.62	0.6%	-0.24	86%	1.34	0.21	5%	9%	3%	6%	77%
ES063	Aug-13	76%	-3%	0.962	1.07	0.83	0.10	1549							98.0%	-0.99	0.3%	-0.26	73%	-0.83	-0.49	19%	9%	6%	5%	62%
ES064	Sep-13	77%	1%	1.013	1.09	0.96	0.19	1385							99.0%	-0.26	-0.7%	-0.33	86%	1.34	0.24	13%	1%	3%	6%	77%
ES065	Oct-13	65%	-12%	0.844	0.92	0.00	-0.87	1846							98.5%	-0.61	19.7%	1.06	75%	-0.49	-0.23	18%	7%	4%	8%	63%
ES066	Nov-13	77%	12%	1.185	1.09	0.96	0.19	1323							100.0%	0.48	-5.6%	-0.67	87%	1.51	0.38	9%	3%	2%	4%	81%
ES067	Dec-13	73%	-4%	0.948	1.03	0.07	-0.16	864							100.0%	0.48	-7.6%	-0.81	82%	0.67	0.05	13%	6%	2%	5%	75%
ES068	Jan-14	73%	0%	1.000	0.98	0.07	-0.16	865							100.0%	0.48	-7.6%	-0.81	77%	-0.16	-0.16	13%	9%	6%	18%	53%
ES069	Feb-14	58%	-15%	0.795	0.78	0.00	-1.49	1396							100.0%	0.48	-7.5%	-0.80	81%	0.51	-0.33	11%	8%	6%	2%	73%
ES070	Mar-14	68%	10%	1.172	0.91	0.00	-0.61	1263							*99.0%*	-0.26	-7.3%	-0.79	81%	0.51	-0.29	10%	8%	2%	1%	78%
ES071	Apr-14	59%	-9%	0.868	0.79	0.00	-1.40	1966							*98.0%*	-0.99	-4.8%	-0.61			-1.00	na	na	na	na	na
ES072	May-14	63%	4%	1.068	0.85	0.00	-1.05	1897							*99.8%*	0.33	na				-0.36					
ES073	Jun-14	85%	22%	1.349	1.14	1.00	0.90	1179							*99.0%*	-0.26	-1.3%	-0.37			0.09					
ES074	Jul-14	79%	-6%	0.929	1.06	1.00	0.37	1310		100%			0.80		*99.0%*	-0.26	16.9%	0.87			0.45					
ES075	Aug-14	81%	2%	1.025	1.09	1.00	0.54	1371		95%	-5%	0.950	0.46		*98.0%*	-0.99	11.4%	0.50			0.13					
ES076	Sep-14	81%	0%	1.000	1.09	1.00	0.54	1504		90%	-5%	0.947	0.13		99.0%	-0.26	49.5%	3.10			0.88					
ES077	Oct-14	89%	8%	1.099	1.20	1.00	1.25	1656		58%	-32%	0.644	-2.02		99.0%	-0.26	4.1%	0.00			-0.26					
ES078	Nov-14	79%	-10%	0.888	1.06	1.00	0.37	1711		69%	11%	1.190	-1.28		99.0%	-0.26	5.7%	0.10			-0.27					
ES079	Dec-14	77%	-2%	0.975	1.04	0.96	0.19	2088		74%	5%	1.072	-0.95		98.0%	-0.99	4.4%	0.02			-0.43					
ES080	Jan-15	77%	0%	1.000		0.96	0.19	2088		74%	0%	1.000	-0.95		98.0%	-0.99	4.4%	0.02			-0.43					
ES081	Feb-15	84%	7%	1.091		1.00	0.81	1283		38%	-36%	0.514	-3.36		99.0%	-0.26	5.9%	0.12			-0.67					
ES082	Mar-15	83%	-1%	0.988		1.00	0.72	1433		86%	48%	2.263	-0.14		98.0%	-0.99	3.5%	-0.05			-0.11					
ES083	Apr-15	83%	0%	1.000		1.00	0.72	1278		56%	-30%	0.651	-2.15		99.0%	-0.26	16.2%	0.82			-0.22					
ES084	May-15	85%	2%	1.024		1.00	0.90	1516		47%	-9%	0.839	-2.76		99.0%	-0.26	13.2%	0.62			-0.37					
ES085	Jun-15	85%	0%	1.000		1.00	0.90	1558		50%	3%	1.064	-2.56		90.0%	-6.86	80.4%	5.22			-0.82					

ANNEX F. ALTERNATIVE RESEARCH METHODS CONSIDERED

During the preparation of this dissertation several alternative research methods were considered prior to selecting case study research.

Ethnography, which according to Culyba et al. (2004) is now often used broadly to mean nearly any method of qualitative data collection and analysis. However using the definition by Lewis and Weigert (1985: pg. 380) that Ethnographers immerse themselves in the lives of the people they study it would seem appropriate given the amount of time spent working within the organization as an intrinsic spoke in the service management wheel. However, using a case study could combine the benefits of knowledge gained from within the organization and providing that the risks of bias were accounted for could leverage from these observations to complete are more fully comprehensive research report.

Heuristic inquiry is a form of phenomenological inquiry that brings to the front the personal experience and insights of the researcher. Heuristic inquiry as a form of research does not provide an unbiased and scientific report. As discussed in the previous chapter, former research into ISO/IEC 20000 has already been conducted, founded on personal experiences and observations, this research desires to provide an balanced and systematic report.

Experiments deliberately separate a phenomenon from the phenomenon's context (Yin, 2012), in this dissertation, context is everything. Experiments are conducted when variables can be controlled, the research reported in this dissertation views an organization in context. A history on the other hand, does deal with the entangled situation between phenomenon and context, but it does not focus on contemporary events. ISO/IEC 20000 was first released in 2005, and has been in the organization studied since 2008. It is important that this dissertation studies the contemporary events surrounding the phenomenon.

Surveys try to deal with phenomenon and context (Yin, 2012), but a surveys ability to investigate the context is extremely limited. As a survey designer, the researcher would struggle to limit the number of items in a questionnaire to fall within the statistical limitations of his survey group, which in the case of this organization, the survey would be very small and not provide statistical accuracy.

Mixed-method research, that is research that includes qualitative and quantitative elements, using both primary and secondary data, is becoming more common (Kara, 2012). Mixed methods research would be an option of combining data from both qualitative and quantitative data sources. Qualitative data could include the information garnered from interviews with employees of the organization. Quantitative data could include data gathered from service level reports.

Although mixed-method research is attractive, Mingers (2003) identifies barriers to doing mixed method research, in that culturally, the problem is that the information systems discipline tends to split into subcultures based around particular countries, university departments, journals, or even methods. Researchers, especially junior ones, find themselves under pressure to 'follow the party line' (Applegate and King, 1999). Mixed method research can be time consuming and sometimes expensive (Mingers, 2003) and in most cases outside the grasp of a new researcher.

ANNEX G. DESCRIPTION OF THE UNIT OF ANALYSIS

In describing a similar but different government agency, Dowse (2007) could have been describing the organization studied in this dissertation.

> *"Although some inertia can be expected in such a large organization arising from other priorities, competition for resources, mandatory project procedures and stakeholder consultation, the lack of progress in addressing these deficiencies is symptomatic of the direction provided to the IT organization. Given that many of the initiatives required resources and coordination across the IT organization, a commitment to improvement by management was critical."*

The organization studied in this report is a small, but critical element in a large business. The business is an Australian government service provider, providing three core services to the Australian public. These are noted as Service A, Service B, and Service C. A number of internal supporting services are operational within the business. One of the supporting internal services provided is to the customer. The unit of analysis for this study is a supporting organization for the customer. Figure G-1 displays an organizational chart for the business.

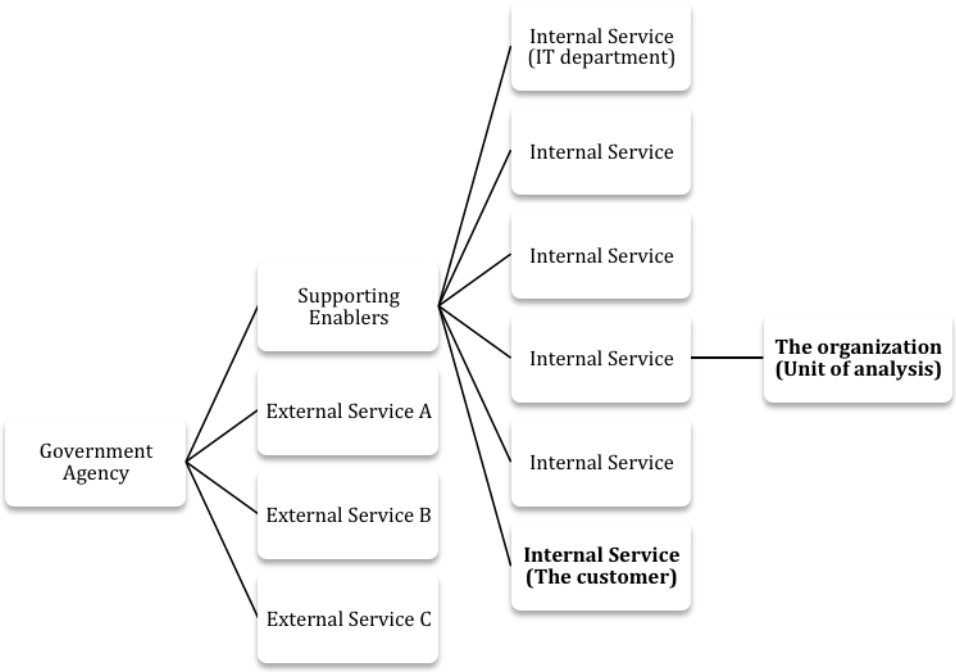


Figure G-1. Organizational Structure

The organization provides application specific IT support for the customers specific applications. The users of the applications are across the business including employees within the internal and external services.

The organization name and position within the company has changed over the study period, however, the role of the organization stayed essentially unchanged and the core workforce remained unchanged. The organization's role was to manage a specific line of applications within the broader established IT systems.

ISO/IEC 20000 certification requires the organization to be bounded, this study will utilize the same organizational boundaries as used by the auditor. This definition is based on the information supplied in the most recent external audit report by SAI Global.

> *The provision of Application Support Services to internal business customers by the Organization. Number of Staff 176. The organization for the purposes of the certification and this report, incorporates the staff and systems within all facets of ITSM delivery, but excludes organizations operational support team (HR, Facilities, Registry etc.) and the application training team.*

Some of the application specific, IT Service Strategy was directed by the customer, but due to the service management immaturity of the customer, much leeway was allowed by the organization to direct their own path in achieving the goals of the business. The organizations role was not to provide hardware, or manage servers, this was achieved by the organizations IT department. The organization was to use the systems in place to manage and provide applications to operate on these systems.

This is a very broad overview of the organization and where it sits within the government agency. As stated, its position and location has changed over the time period of the study, however the core role, function and workforce has remained steady. The organization in January 2013 went through a transition that achieved efficiencies by placing the organization within the IT department. Over the next 24 months the organization was broken up and absorbed into the wider IT department. The decision to not to recertify the organization to ISO/IEC 20000 came from IT department as there was a question on the value it offered in maintaining certification given that the organization had reached a certain maturity level.

The organizations stated purpose for implementing ISO/IEC 20000 is:

> *To ensure compliance with the Corporate ITSM framework, the organization, through its Assurance, Compliance and Improvement team use ISO 20000 accreditation, ANAO audits and appropriate IT Controls.*

The Organization
ITSM Performance Report – June 2010

Executive Brief on KPIs

Measure	Target	Actual	Achieved (Y/N)
Incident Management	Monthly Incident resolution to exceed 80%.	**92%**	**Y**
Problem Management	Monthly Problem resolution to exceed 80%.	**91%**	**Y**
VIP Operations	Monthly VIP Incident resolution to exceed 80%.	**100%**	**Y**
Training Effectiveness	Between 60% and 80%	**83%**	**Y**
Percentage of Training delivered to schedule	Between 60% and 90%	**94%**	**Y**
Financials – Sustainment	Variance within ± 10%	**-1.98%**	**Y**

Purpose This report represents the performance of the Organization according to the SLA KPIs.

Audience & Distribution:

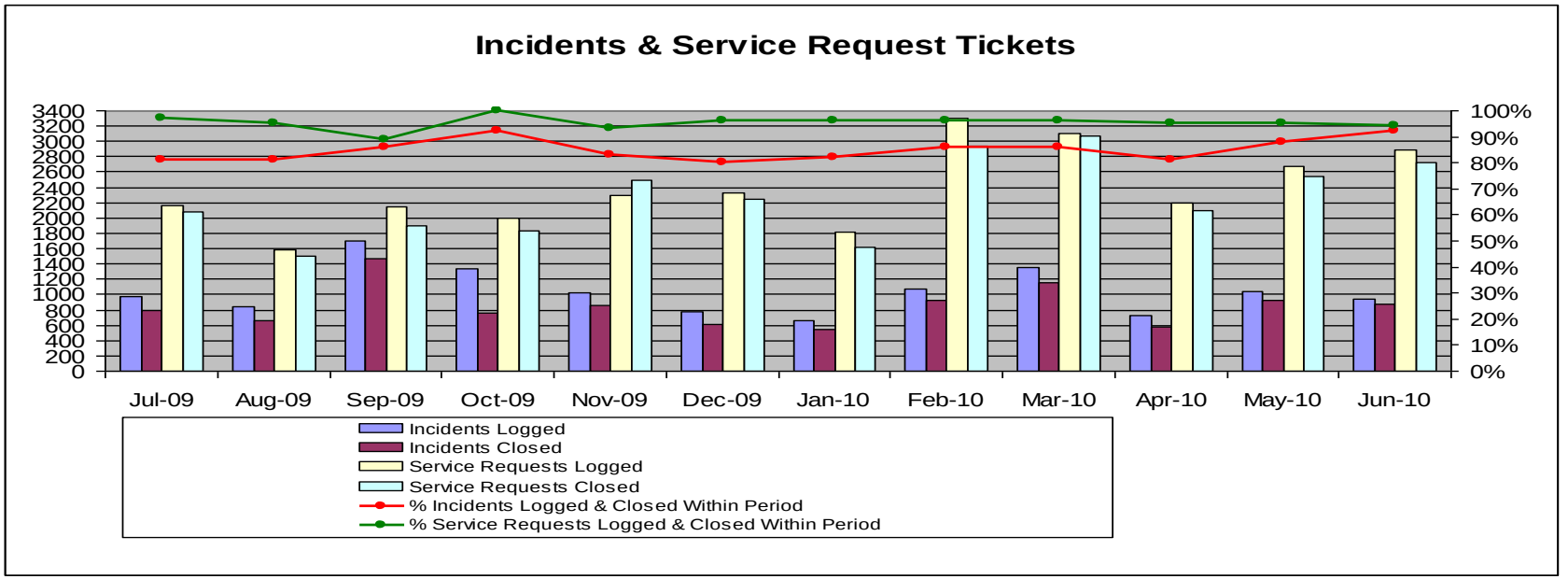
- CIC

Data Source:

- CIC

INCIDENT MANAGEMENT

Measure	**Monthly Incident resolution is to exceed target.**											
Measure Rationale	This table provides a percentage of total incidents that have been **raised and closed** within the reporting period.											
MSA Target	Equal to or above 80% for all Priority Levels for the month.											
Month	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**
Result	**81%**	**81%**	**84%**	**71%**	**83%**	**80%**	**82%**	**86%**	**86%**	**81%**	**88%**	**92%**
Trend Analysis	➢ Targets continue to be met consistently despite resource constraints that are MAJ APP related.											
Performance Issues	➢ Oct 09: As represented in Section 1.1, there were a large number of incidents transferred from CIMS and Infra during the period as part of SM7 data migration activities.											
Actions	➢ None.											

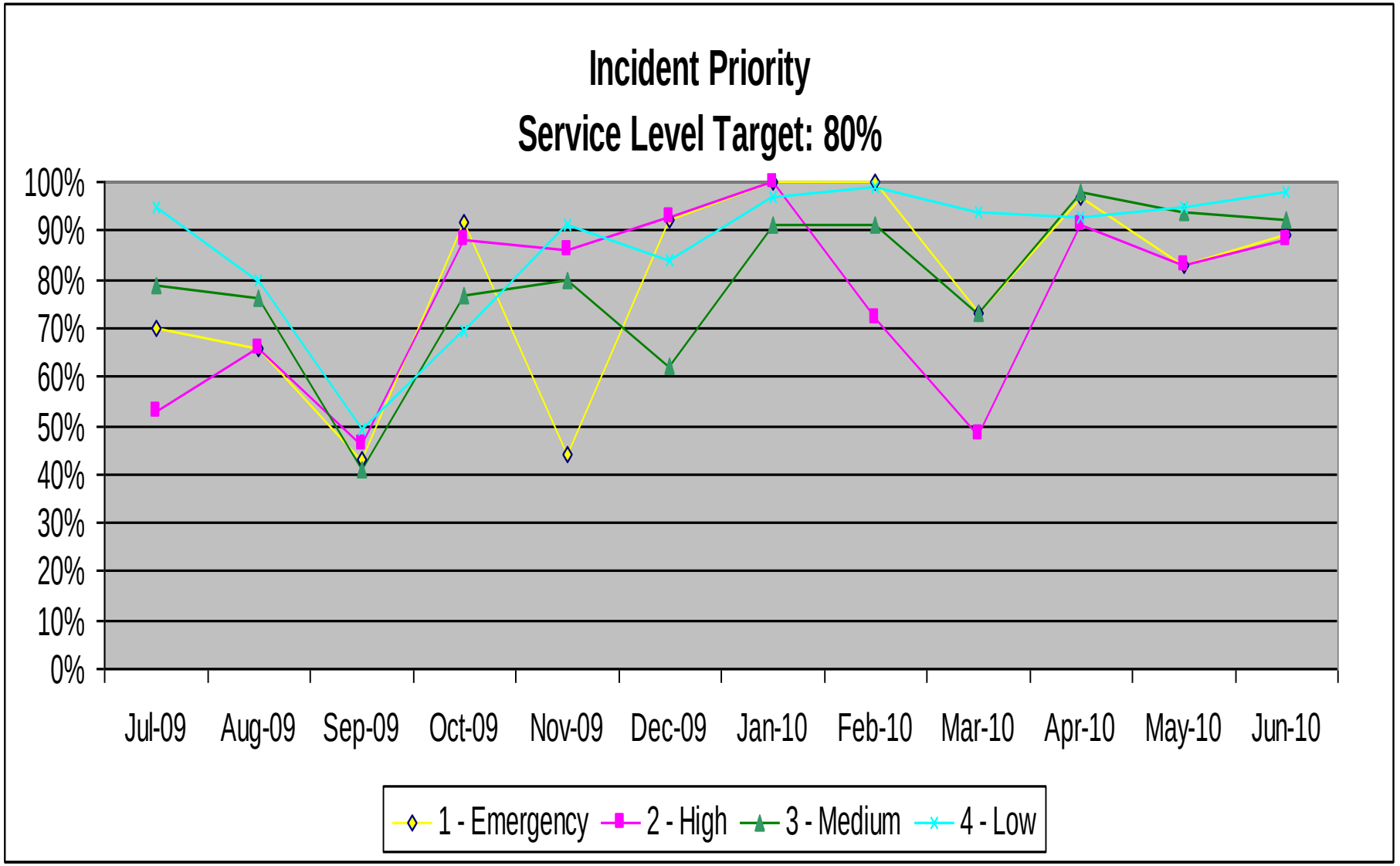


TOTAL INCIDENTS OPEN END OF MONTH

Measure	Number of incidents remaining open at the end of the period											
Measure Rationale	This table represents the number of incidents that remain open at the end of the period, as a break down of the number of days they have been open.											
Month	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**
1-10 Days	108	54	92	369	155	15	69	325	125	80	131	76
11-30 Days	37	122	42	96	168	114	70	120	80	66	105	64
> 30 Days	184	228	99	12	283	185	315	287	223	236	229	244
Total	**329**	**404**	**233**	**477**	**606**	**314**	**454**	**732**	**428**	**382**	**465**	**384**
Trend Analysis												
Performance Issues												
Actions	There has been a reduction in incidents outstanding due to closure of MAJAPP related tickets.											

INCIDENT RESOLUTION

Measure	Incident resolution by priority				
Measure Rationale	This table provides a breakdown of ALL incidents resolved for the period according to its priority level and resolution time.				
MSA Target	Equal to or above 80% for all priority levels				
Priority Level	**Resolution Time**	**SLA Met**	**SLA Not Met**	**% Achieved**	**Total Incidents**
1 - Emergency	**1 day**	16	2	89%	18
2 - High	**2 days**	23	3	88%	26
3 - Medium	**7 days**	334	30	92%	364
4 - Low	**14 days**	519	11	98%	530
TOTAL		**892**	**46**	**95%**	**938**
Performance Issues	None				
Actions	None				


Incident Priority
Service Level Target: 80%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
1 - Emergency
2 - High
3 - Medium
4 - Low

Where there is a break in the line, this is an indication there were no calls for that priority in the given month.

TOP 10 INCIDENTS

Measure	**Top 10 incidents logged**		
Measure Rationale	This table provides a list of the top 10 incidents that were logged over the last 2 reporting periods, allowing for analysis of frequently occurring incidents.		
Top 10 Incidents Last Reporting Period		**Top 10 Incidents This Reporting Period**	
APPLICATION	438	APPLICATION	194
APPLICATION	345	APPLICATION	121
APPLICATION	176	APPLICATION	119
APPLICATION	67	APPLICATION	62
APPLICATION	51	APPLICATION	61
APPLICATION	49	APPLICATION	37
APPLICATION	48	APPLICATION	30
APPLICATION	44	APPLICATION	29
APPLICATION	44	APPLICATION	28
APPLICATION	42	APPLICATION	25
Trend Analysis	APP and APP continue to generate the majority of incidents.		
Performance Issues	With MAJ APP Go-Live pending it is anticipated there will be a large number of tickets logged under MAJ APP for July.		
Actions	None		

PROBLEM MANAGEMENT

Measure	Problem resolution is to exceed target.				
Measure Rationale	This table provides a breakdown of all problems resolved for the period according to its priority level and resolution time.				
MSA Target	Equal to or above 80% for all priority levels				
Priority Level	**Resolution Time**	**SLA Met**	**SLA Not Met**	**% Achieved**	**Total Incidents**
1 - Emergency	**5 day**	0	1	0%	1
2 - High	**39 days**	5	1	100%	6
3 - Medium	**172 days**	10	10	50%	20
4 - Low	**Next Release**	107	0	N/A	107
TOTAL		**122**	**12**	**91%**	**134**
Actions	A number of old APP problems have been closed off as they will not carry over with MAJ APP.				

VIP INCIDENT RESOLUTION

Measure	Monthly Incident resolution is to exceed target.				
Measure Rationale	This table provides the percentage resolution rate of all incidents resolved for the period that relates to activities actioned by VIPT.				
Target	Equal to or above 80% for all priority levels				
Priority Level	**Resolution Time**	**SLA Met**	**SLA Not Met**	**% Achieved**	**Total Incidents**
1 - Emergency	**1 day**	0	0	-	0
2 - High	**2 days**	0	0	-	0
3 - Medium	**7 days**	2	0	100%	2
4 - Low	**14 days**	2	0	100%	2
TOTAL		**4**	**0**	**100%**	**4**
Performance Issues	None				
Actions	None				

RFID Status Report

Measure	RFID Functional Capability											
Measure Rationale	This table provides a breakdown of the average availability of RFID readers for Australia and Worldwide. Mobile RFID readers are excluded from this analysis.											
Target	Average availability equal to or above 85% of RFID Readers during the month.											
Month	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 10	FEB 10	MAR 10	APR 10	MAY 10	JUN 10
World Availability	96%	92%	89%	93%	90%	67%	55%	34%	56%	11%	77%	86%
Australia Availability	96%	95%	94%	96%	95%	94%	92%	95%	96%	96%	91%	88%
Trend Analysis	Targets continue to be met within Australia.											
Performance Issues	May figures are best estimates, as data for a week could not be restored after the database corruption.											
Actions	None											

New Performance Measures Background

As a part of the Service Management Improvement Project, there is a new requirement to provide extended ongoing reporting on all ITIL processes and functions as follows:

CHANGE MANAGEMENT SYSTEM OUTAGES REQUIRED

Measure	**Monthly changes requiring a system outage outside the scheduled maintenance window.**											
Measure Rationale	This table provides the Percentage of changes requiring system outages to implement the change.											
Target	Equal to or below **10%** of changes implemented during the period.											
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues											
Actions	None.											

CHANGES DELIVERED

Measure	**Monthly Changes delivered is to exceed target.**											
Measure Rationale	This table provides the Percentage of changes delivered within the agreed customer time frame.											
Target	Equal to or above **80%** of changes delivered during the period.											
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues											
Actions	None.											

CRITICAL CHANGES DELIVERED

Measure	**Monthly critical changes implemented in the period.**											
Measure Rationale	This is a quantitative measure where target is to be equal or less than 2.											
Target	Equal to or less than **2** changes during the reporting period.											
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues											
Actions	None.											

RELEASE MANAGEMENT

TIMELINESS OF RELEASES

Measure	**Monthly Releases implemented is to exceed target.**											
Measure Rationale	This table provides the Percentage of on time releases during the period.											
Target	Equal to or above **80%** of releases implemented during the period.											
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues											
Actions	None.											

RELEASES BACKED OUT

Measure	**Monthly releases backed out are to be below the target.**										
Measure Rationale	This is a quantitative measure where target is to be equal or less than 10% of total releases during the period.										
Target	Equal to or less than **10%** of total releases during the period.										
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues											
Actions	None.											

CONFIGURATION MANAGEMENT

CONFIGURATION ITEMS (CI) ADDED

Measure	**Cumulative number of CIs at the end of the reporting period.**										
Measure Rationale	This is a quantitative measure to indicate the development progress of Configuration Management Data Base (CMDB).										
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**931**	**1029**	**1119**	**1433**	**1433**	**1530**	**1532**	**1532**	**1564**	**16861**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	Will be available with Decision Centre.											
Actions	None.											

SUPPLIER MANAGEMENT

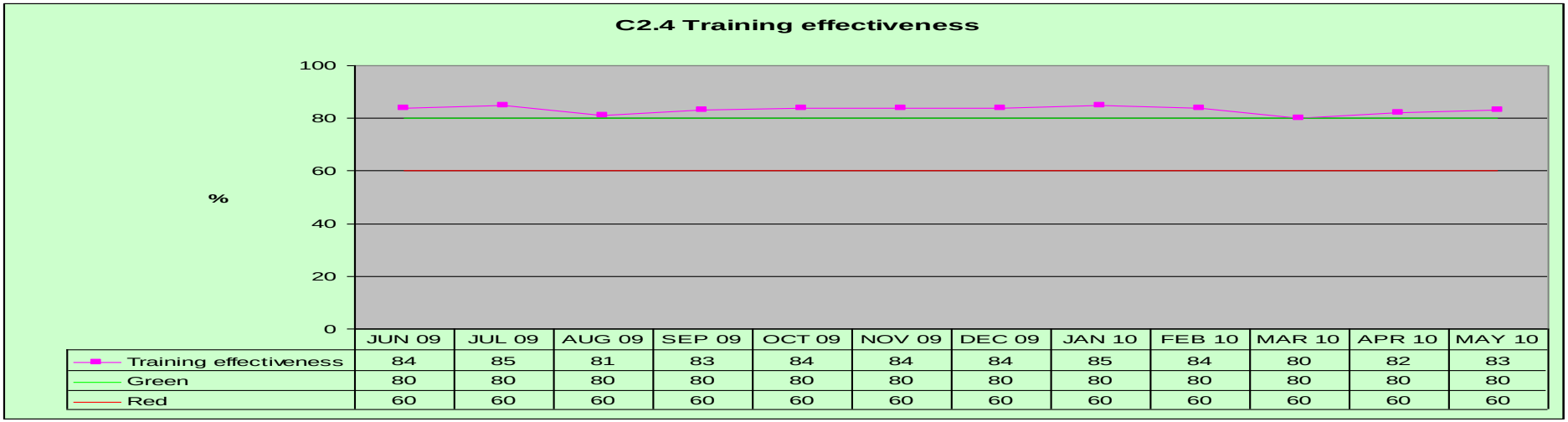
CONTRACT PERFORMANCE REVIEW

Measure	**Contract Performance Reviews to be conducted.**										
Measure Rationale	This is a quantitative measure to indicate the partnership development with all Suppliers.										
Target	Review 100% of the scheduled Suppliers' performances in the reporting period.										
Month	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**	**JUN 10**	**JUL 10**	**AUG 10**
Result	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**		
Trend Analysis	This is a new performance measure introduced which is to be consolidated over time.											
Performance Issues	No performance issues.											
Actions	None.											

TRAINING

OVERALL EFFECTIVENESS

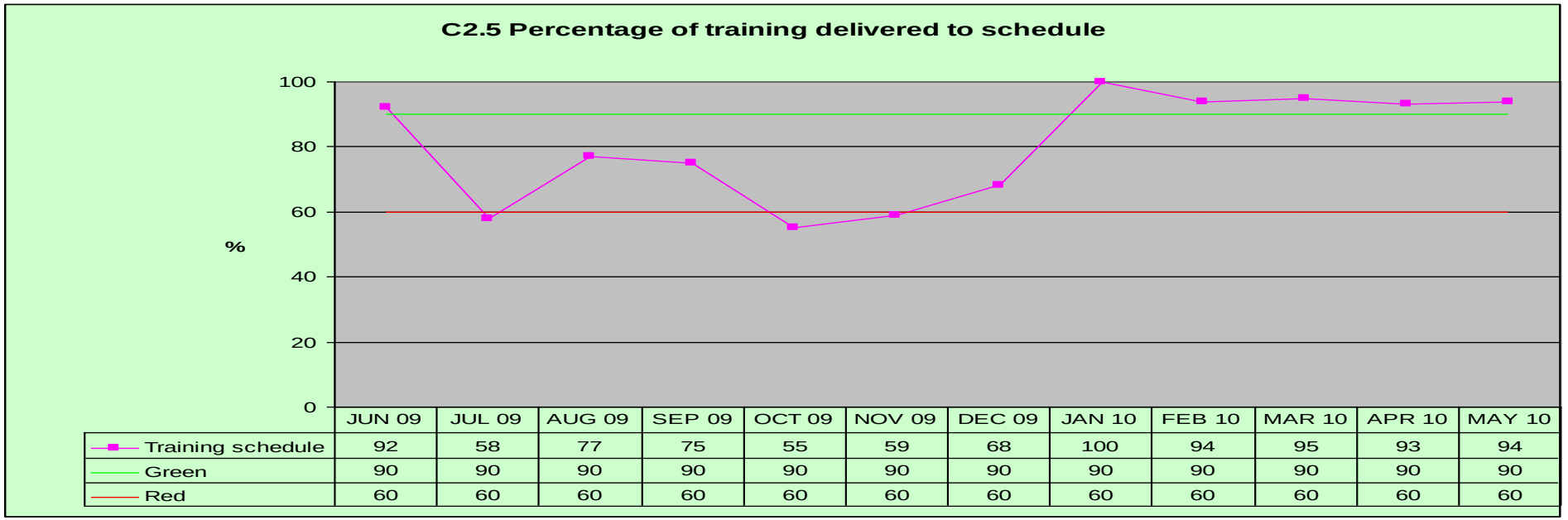
Training effectiveness is measured by calculating the average percentage score from the five criteria from the training programs against KPI C2.4 and is computed for the second preceding month. Training Effectiveness results for June 09 to May 10 are shown in the following graph.



	JUN 09	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 10	FEB 10	MAR 10	APR 10	MAY 10
Training effectiveness	84	85	81	83	84	84	84	85	84	80	82	83
Green	80	80	80	80	80	80	80	80	80	80	80	80
Red	60	60	60	60	60	60	60	60	60	60	60	60

PERCENTAGE DELIVERED TO SCHEDULE

Training delivered to schedule is measured as a percentage of the training programs scheduled against KPI C2.5 and is computed for the second preceding month. Course cancellations due to insufficient nominations are now included in CP2.5. Courses are generally required to be 80 percent full to proceed. Training delivered to schedule during June 09 to May 10 is shown in the following graph.



	JUN 09	JUL 09	AUG 09	SEP 09	OCT 09	NOV 09	DEC 09	JAN 10	FEB 10	MAR 10	APR 10	MAY 10
Training schedule	92	58	77	75	55	59	68	100	94	95	93	94
Green	90	90	90	90	90	90	90	90	90	90	90	90
Red	60	60	60	60	60	60	60	60	60	60	60	60

EFFECTIVENESS OF MATERIALS

Measure	**Monthly Training effectiveness of materials is to exceed target.**											
Measure Rationale	This table provides a student feedback in relation to the effectiveness of materials used on its courses within the reporting period.											
Target	Equal to or above **80%** effectiveness.											
Month	**JUN 09**	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**
Result	**84%**	**85%**	**82%**	**84%**	**86%**	**87%**	**84%**	**91%**	**85%**	**80%**	**83%**	**84%**
Trend Analysis	Target continues to be met consistently.											
Performance Issues	No performance issues											
Actions	None.											

EFFECTIVENESS OF PRACTICE

Measure	**Monthly Training effectiveness of Practice is to exceed target.**											
Measure Rationale	This table provides a student feedback in relation to the effectiveness of training practice followed on its courses within the reporting period.											
Target	Equal to or above **80%** effectiveness.											
Month	**JUN 09**	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**
Result (%age)	**85%**	**86%**	**84%**	**84%**	**86%**	**87%**	**85%**	**87%**	**86%**	**82%**	**83%**	**84%**
Trend Analysis	Target continues to be met consistently.											
Performance Issues	No performance issues											
Actions	None.											

EFFECTIVENESS OF COURSE

Measure	**Monthly Training effectiveness of Course is to exceed target.**											
Measure Rationale	This table provides an evaluation of questionnaires to gain student feedback in relation to the effectiveness of its courses within the reporting period.											
Target	Equal to or above **80%** effectiveness.											
Month	**JUN 09**	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**
Result	**84%**	**86%**	**83%**	**84%**	**85%**	**85%**	**85%**	**84%**	**84%**	**82%**	**83%**	**84%**
Trend Analysis	Target continues to be met consistently.											
Performance Issues	No performance issues											
Actions	None.											

RELEVANCE OF COURSE TO CURRENT JOB

Measure	**Monthly Training effectiveness of Course is to exceed target.**											
Measure Rationale	This table provides an evaluation of questionnaires to gain student feedback in relation to the relevance of its courses delivered within the reporting period to the participants' jobs.											
Target	Equal to or above **80%** Relevance.											
Month	**JUN 09**	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**
Result	**82%**	**84%**	**78%**	**80%**	**80%**	**79%**	**83%**	**81%**	**82%**	**77%**	**80%**	**81%**
Trend Analysis	Target continues to be met consistently.											
Performance Issues	No performance issues											
Actions	None.											

VALUE OF INVESTMENT OF TIME

Measure	**Monthly Training effectiveness of Course is to exceed target.**											
Measure Rationale	This table provides an evaluation of questionnaires to gain student feedback in relation to the value of Investment time of its courses within the reporting period											
Target	Equal to or above **80%** attainment.											
Month	**JUN 09**	**JUL 09**	**AUG 09**	**SEP 09**	**OCT 09**	**NOV 09**	**DEC 09**	**JAN 10**	**FEB 10**	**MAR 10**	**APR 10**	**MAY 10**
Result	**86%**	**85%**	**80%**	**82%**	**84%**	**83%**	**86%**	**84%**	**83%**	**80%**	**79%**	**83%**
Trend Analysis	Target											
Performance Issues	No performance issues											
Actions	None.											

FINANCIAL ALLOCATIONS & EXPENDITURE AS AT 30 JUN 2010

SUSTAINMENT

SUSTAINMENT	2009/10 Guidance	YTD Phasings	YTD Accruals	Variation	Percentage	Monthly Spend	Remaining Budget
SLA	**$CIC**	**$ CIC**	**$ CIC**	**-$ CIC**	**CIC**	**$ CIC**	**$ CIC**

Graph removed to retain confidentiality

ITSM PERFORMANCE REPORT – ACRONYMS AND DEFINITIONS

Acronym	Definition
Change Management	Process of controlling changes to applications, in a controlled manner, enabling approved changes with minimum disruption.
Financial Management	The set of processes that enable the IT organization to account fully for the way money is spent (particularly the ability to identify costs by customer, by service and by activity).
Incident	An event which is not part of the standard operation in service which causes an interruption to or a reduction in the quality of that service.
Incident Management	Goal is to restore normal service operation as quickly as possible with minimum disruption to the business.
Information Technology Infrastructure Library (ITIL)	The Office of Government Commerce (OGC) IT Infrastructure Library – a set of guides on the management and provision of operational IT services.
IT Infrastructure	The sum of an organisation's IT related hardware, software, data telecommunication facilities, procedures and documentation.
Problem	The unknown underlying cause of one or more Incidents.
Problem Management	Goal is to minimise the adverse effects on the business of Incidents and Problems caused by errors in the infrastructure, and to proactively prevent the occurrence of Incidents.
Release Management	A collection of new and/or changed Configuration Items, which are tested and introduced into the live environment together.
Request For Change (RFC)	Form, or screen, used to record details of a RFC to any Configuration Item within an infrastructure or to procedures and items associated with the infrastructure.
RFID	Radio Frequency Identification Device.
Service Level Management (SLM)	The process of defining, agreeing, documenting and managing the levels of customer IT service, that are required and cost justified.
Service Manager 7 (SM7)	Service Manager 7 (SM7) is the IT Service Management tool used across ORG.

ANNEX I. SELECTION OF SERVICE MANAGEMENT PERFORMANCE METRICS

Incident Management Performance

One of the primary measures used in compilation of the monthly ITSM reports produced for the organizations customer is 'incident management'. The definition used for incident management in the organization is the one given by the Cabinet Office (2011c) and included in the definitions on Page xviii of this dissertation. For the purposes of the data collected during this case study, incident management performance is calculated using the following formula.

$$Incident\ Management\ Performance\ \% = \frac{Breached\ incidents}{All\ incidents\ logged}$$

Equation I-1. Incident Management Score Equation

All incidents logged for the monthly period are broken down according to the incidents priority level. The priority level is determined initially by the user/operator logging the incident into the service management system. The service desk agents then initially review the user-determined priority, and then the priority is reviewed again by the incident resolution agents to ensure accordance with processes. In practice this review process does not always occur, however the data is correct enough for the aggregate purposes of service reporting. There is a process document and knowledge base article to help ensure that the priority level is applied consistently across all incidents. The company acknowledges that it does not get the priority 100% correct for each incident and there are some errors across the data.

Each priority level has a different time objective required to be met by the service organization. This time objective is determined by agreement between the service provider and customer during yearly service level agreement (SLA) negotiations. If the incident is not resolved within the agreed time period, then the incident is considered to be in breach of the Service Level Agreement.

This 'breach' is automatically recorded within the service management tool and at the end of the month, the total number of 'breached' incidents is divided by the total number of logged incidents. The resultant percentage is considered the 'incident management performance'. The SLA stipulates a target of 80 percent performance within incident management for the service organization. The incident management data supplied within the ITSM performance reports was cross checked against data sourced from the service management system to confirm the reports accuracy.

The priority definitions evolved and changed during the time period of the study. Included below is the initial priority definition and time targets as supplied to the customer when Service Management reporting commenced in June 2008.

Table I-1. The Organizations Priority Definitions Statement

Priority Definitions		Resolution Time Target
Emergency	Business critical system and/or service are unavailable affecting majority of sites or customers.	1 day
High	Business critical system and/or service is severely degraded or partial loss of mission critical features / functionality. No known workarounds available.	2 days
Medium	Any system and/or service is degraded or non-business critical functions or features are nonoperational or unavailable to a group of users. There are known workarounds.	7 days
Low	Any system and/or service is experiencing minor degradation or non-business critical functions or features are nonoperational or unavailable to few customers. There are known workarounds.	14 days

The organization studied had a dedicated team for supporting the most critical business operations, this team was made up of experienced professionals and in most part this team was focused on immediate and effective support. This teams incident management performance was not included in the dataset for this study as it rarely fell below 100%. An additional reason for not including it in this study is that the team's performance was not consistently reported in the Monthly ITSM performance reports.

Problem Management Performance

The definition used for problem management within the organization is the one given by the Cabinet Office (2011c) and included in the definitions on page xviii of this document. The problem management performance criterion is calculated using the following formula.

$$Problem\ Management\ Performance\ \% = \frac{Breached\ problems}{All\ problems\ logged}$$

Equation I-2. Problem Management Score Equation

Similar to the incident management performance criteria, problems logged within the monthly period are broken down according to the problems priority level. The operator logging the problem into the service management system determines the priority level initially. The organizations problem managers to ensure accordance with processes then review this priority. There is a process document and knowledge base article to help ensure that the priority level is applied consistently across all problems.

Each priority level has a different time objective required to be met by the service organization. This time objective is determined by agreement between the service provider and customer during yearly service level agreement negotiations. If the problem is not resolved within the agreed time period, then the problem is considered to be in breach of the service level agreement. This 'breach' is recorded within the service management tool and at the end of the month, and the total number of logged

problems divides the total number of 'breached' problems. The resultant percentage is considered the 'problem management performance'. The service level agreement stipulates a target of 90 percent performance within problem management for the service organization. The problem management data supplied within the ITSM performance reports was cross checked against data sourced from the service management system to confirm accuracy and validity of the data.

The ITSM performance report provides a breakdown of all problems logged for the period according to its priority level. The report also reflects the target resolve time for each priority and identifies if the target service levels were met.

The priority definitions for problem management evolved and changed during the time period of the study. The definition of a problem and the goal of problem management is consistent with the direction given by (Cabinet Office, 2011c) and the definition given in on page xviii of this document. The organization emphasis the following caveat in the performance report. *"Although every effort will be made to resolve the problem as quickly as possible this process is focused on the resolution of the problem rather than the speed of the resolution."* Included below in Table I-2 are the time targets as supplied to the customer when service management reporting commenced in June 2008.

Table I-2. Target Resolve Times for Problems

Resolve Time	
Emergency	5 days
High	39 days
Medium	172 days
Low	Next scheduled time release

Financial Management Performance

Financial Management Performance is calculated by working out the variance between actual expenditure and the expected expenditure within the organization. These figures are calculated across the financial year and accumulated to the date of the report, referred to as 'year to date' in the organizations literature. This expenditure does not include regular personal costs, as these are agreed separately, and in most part, remain constant during the calendar year. This data is sourced from the organizations finance systems and calculated by the finance staff. A sample of the data supplied was cross-checked for accuracy from data within the financial management system. Initially the SLA stipulates the service organization should maintain expenses within a target range of ±10 percent. This figure was later refined to a very accurate ±3 percent. The financial management performance criterion is calculated using the following formula.

$$Financial\ Management\ Perf\ \% = \frac{Actual\ Expenditure - Forecast\ Expenditure}{Forecast\ Expenditure}$$

Equation I-3. Financial Management Score Equation

Availability Performance

Availability Performance is calculated by measuring the actual online time and dividing it by the total agreed online time. The total agreed online time, does not account for agreed downtime for system maintenance. The availability performance criterion is calculated using the following formula.

$$Availability\ Performance\ \% = \frac{Actual\ Online\ time}{Total\ agreed\ online\ time}$$

Equation I-4. Availability Performance Score

The organization peaked at managing 39 different applications in 2015. Not all applications were included when calculating availability performance. Overtime the number of applications included in this reporting increased, this had an adverse reaction on the performance, as there were more systems to maintain. Nonetheless, the organization rarely fell below 98% performance in this area. Overall, availability performance was high throughout the time period analysed by this study. This consistently high performance looks great for the organization, however does not indicate an increase or decrease in performance.

System outage duration, reason and system information was supplied by the Technical Support team to the service management team for inclusion in the monthly ITSM performance report. This data was unable to be cross-checked for accuracy.

User Satisfaction Performance

Data for the User Satisfaction performance metric was sourced from user feedback entered into the Service Management Tool. This feedback was only sourced from users who had lodged a support request or logged an incident through the service desk. This feedback was voluntary and there was no incentive for users to supply feedback to the service organization. Users rated the performance as either: Poor, Average, Good, Very Good, or Excellent. Note that this is not Likert type data as the responses are not balanced (Likert, 1932). For the purposes of this case study the responses from the to three categories, Good, Very Good and Excellent were combined to give a user satisfaction score. The user satisfaction score is calculated using the following formula.

$$User\ satisfaction\ perf\ \% = \frac{User\ response\ (Good,\ Very\ Good, Excellent)}{Total\ number\ of\ user\ responses}$$

Equation I-5. User Satisfaction Score

Generally, users who are dissatisfied with the service are more likely to respond, this is consistent with the high number of responses in the ‘poor’ category. However, there are many more responses in the ‘excellent’ category, demonstrating that there are many users within the Department, who have logged an incident that are satisfied.

ANNEX J. MAINTAINING THE CHAIN OF EVIDENCE

The chain of evidence is maintained by annotating all comments about specific documents to a single entry in the case study evidence database (e.g. ED001). The database reference number is contained in the first column of the database. This database contains hyperlinks linking from each summarized document to the original document. All original documents have been highlighted or annotated to direct the viewer to the particular page or paragraph relevant to the comments made in this chapter.

Both the research dissertation and the evidence collection database contain links to the relevant sections of the case study protocol. These links ensure that only relevant information is collected and presented. Figure J-1 displays an overview of the chain of evidence. A few original documents that had high levels of commercially sensitive data and minimal academic value were removed from the evidence collection repository, however the relevant information extracted remains in the database. To protect the organizations identity and commercial information access to the case study evidence repository is restricted. For access please contact the author.

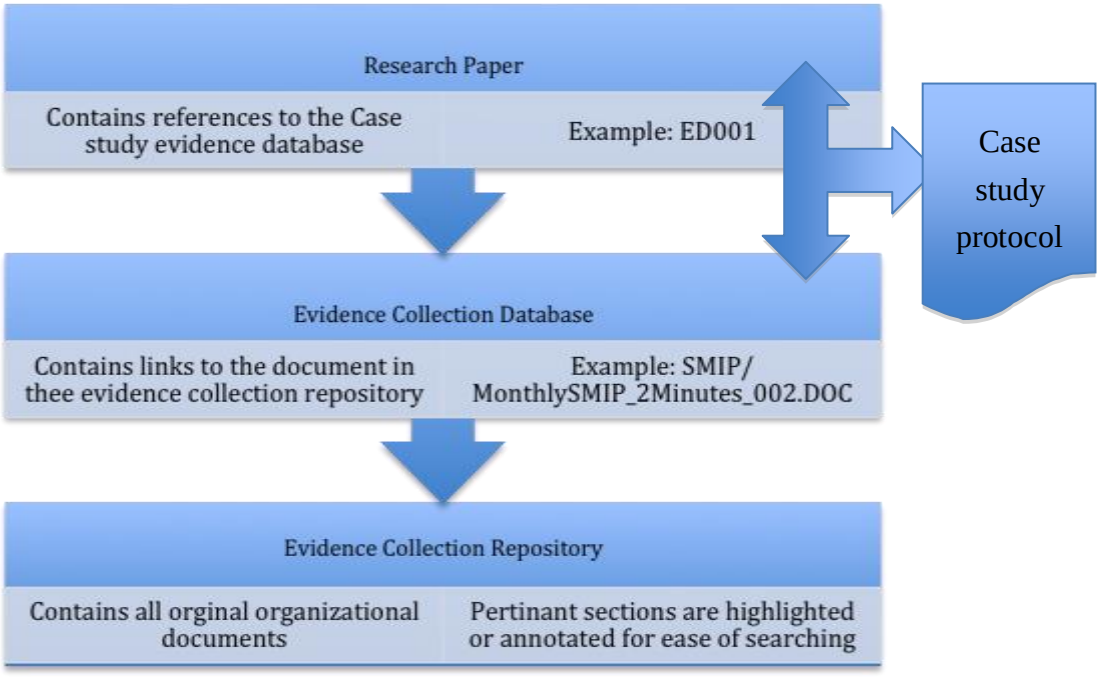


Figure J-1. The Chain of Evidence

ANNEX K. STATISTICAL ANALYSIS - HEDGES *G*

Month	IM%	IM STD	PM%	PM STD	Finance %	FIN STD
01-Jun-08	95%	1.785	100%	0.798	#N/A	#N/A
01-Jul-08	86%	0.988	100%	0.798	#N/A	#N/A
01-Aug-08	83%	0.713	100%	0.798	22%	1.221
01-Sep-08	92%	1.484	100%	0.798	22%	1.200
01-Oct-08	92%	1.519	100%	0.798	7%	0.177
01-Nov-08	93%	1.617	100%	0.798	-18%	-1.544
01-Dec-08	86%	0.979	100%	0.798	3%	-0.092
01-Jan-09	76%	0.102	100%	0.798	2%	-0.133
01-Feb-09	83%	0.722	100%	0.798	-2%	-0.422
01-Mar-09	80%	0.456	100%	0.798	-5%	-0.621
01-Apr-09	81%	0.545	100%	0.798	-4%	-0.573
01-May-09	82%	0.633	76%	-0.811	-1%	-0.333
01-Jun-09	81%	0.545	86%	-0.141	5%	0.036
01-Jul-09	81%	0.545	94%	0.396	18%	0.933
01-Aug-09	81%	0.545	85%	-0.208	#N/A	#N/A
	mean	0.878	**mean**	0.535	**mean**	-0.013
	stdev	0.500	**stdev**	0.507	**stdev**	0.812
	sample sz	15.000	**sample sz**	15.000	**sample sz**	12.000
01-Sep-09	84%	0.811	82%	-0.409	-13%	-1.169
01-Oct-09	71%	-0.341	100%	0.798	1%	-0.217
01-Nov-09	83%	0.722	99%	0.731	9%	0.331
01-Dec-09	80%	0.456	100%	0.798	1%	-0.240
01-Jan-10	82%	0.633	100%	0.798	-4%	-0.559
01-Feb-10	86%	0.988	100%	0.798	-4%	-0.532
01-Mar-10	86%	0.988	82%	-0.409	-2%	-0.439
01-Apr-10	81%	0.545	100%	0.798	-3%	-0.463
01-May-10	88%	1.165	95%	0.463	-6%	-0.675
01-Jun-10	92%	1.519	91%	0.195	-2%	-0.421
01-Jul-10	75%	0.013	100%	0.798	-2%	-0.421
	mean	0.877	**mean**	0.522	**mean**	-0.375
	stdev	0.357	**stdev**	0.435	**stdev**	0.311
	sample sz	8.000	**sample sz**	8.000	**sample sz**	8.000
	Hedges g	**0.000**	**Hedges g**	**0.021**	**Hedges g**	**0.021**