

2006

Challenge of adopting multiple process improvement frameworks

Aileen Cater-Steel

bUniversity of Southern Queensland, caterst@usq.edu.au

Wui-Gee Tan

University of Southern Queensland, wuigee@usq.edu.au

Mark Toleman

University of Southern Queensland, markt@usq.edu.au

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Recommended Citation

Cater-Steel, Aileen; Tan, Wui-Gee; and Toleman, Mark, "Challenge of adopting multiple process improvement frameworks" (2006). *ECIS 2006 Proceedings*. 177.

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CHALLENGE OF ADOPTING MULTIPLE PROCESS IMPROVEMENT FRAMEWORKS

Cater-Steel, Aileen, University of Southern Queensland, Toowoomba, Queensland, Australia,
caterst@usq.edu.au

Tan, Wui-Gee, University of Southern Queensland, Toowoomba, Queensland, Australia,
wuigee@usq.edu.au

Toleman, Mark, University of Southern Queensland, Toowoomba, Queensland, Australia,
markt@usq.edu.au

Abstract

The phenomenon of organisations concurrently implementing multiple process frameworks was highlighted in a recent survey conducted at the Australian Information Technology Service Management Forum. While the survey gathered insights on the status, issues and expectations of organisations implementing the IT Infrastructure Library (ITIL), it was evident from the data collected that many of these organisations are also adopting other frameworks such as Control Objectives for Information and related Technology (CobiT), Capability Maturity Model Integration (CMMI) and ISO 9001 (Quality Management System). Although a few practitioner articles have reported on this phenomenon, no research has been undertaken to determine the extent or motivation of organisations undertaking concurrent implementation of process frameworks and the challenges that they are facing.

This paper describes the processes included in ITIL, CobiT, CMMI and ISO 9001 and their increasing international diffusion throughout the Information Technology community. The possible motivation, significance and implications of this practice of multiple process frameworks adoption is explored based on the survey results and a case study. In highlighting the dearth of research to date, future research is called upon to provide theoretical support for the models, to explore the impact on worker morale and productivity, to assist managers to sequence process implementation, and to evaluate cost effectiveness.

Keywords: Process improvement frameworks, IT Infrastructure Library, ITIL, Control objectives for information and related technology, CobiT, Capability Maturity Model Integration, CMMI, Quality Management System, ISO 9001, IT governance, process improvement, IT service management.

1 INTRODUCTION

Many organisations are convinced of the value in implementing process improvement standards and frameworks. This is a world-wide trend prompted by increasing interest and demands for greater levels of governance, audit and control. Each framework comprises a complex set of processes; management, IT staff and clients need to understand the frameworks. Cost is a major consideration, as is prioritising and scheduling of the implementations with ‘real work’. Not only is there growth in the use of individual standards and frameworks but many organisations are implementing several frameworks simultaneously. Research, either qualitative or quantitative, related to the implementation of multiple process improvement frameworks is virtually non-existent, yet such ventures must present a daunting challenge for IS managers in many respects.

This paper highlights the increasing global adoption of IT process improvement frameworks by organisations and in particular the implementation of multiple frameworks. In discussing relevant theories and presenting some empirical evidence, it sets the scene for future research to help researchers and practitioners better understand this phenomenon.

In the next section (§2), the emergence and scope of frameworks such as ITIL (IT Infrastructure Library), CobiT (Control Objectives for Information and related Technology), CMMI (Capability Maturity Model Integration) and ISO 9001 (Quality Management System) are discussed. In §3, theories relevant to process improvement are considered and then current relevant literature about each of four frameworks, ITIL, CobiT, CMMI, and ISO 9001 is summarised as is the relatively scant literature related to multiple framework implementation. In §4, the results from a survey conducted at an Australian conference are used to highlight multiple framework adoption and a mini case study provides further insights. The discussion (in §5) focuses on the implications of implementing multiple frameworks, in particular highlighting issues such as selection and sequencing. The conclusion (§6) summarises the findings and also suggests directions for future research.

2 BACKGROUND

The scope of the study is restricted to ITIL, CobiT, CMMI and ISO 9001: four frameworks currently often mentioned in the practitioner press. Other frameworks gaining recent awareness are Sarbanes-Oxley, Six Sigma, Balanced Scorecard, ISO 17799 (IT security techniques - code of practice for information security management), PMBOK (Project Management Body of Knowledge) and Prince 2.

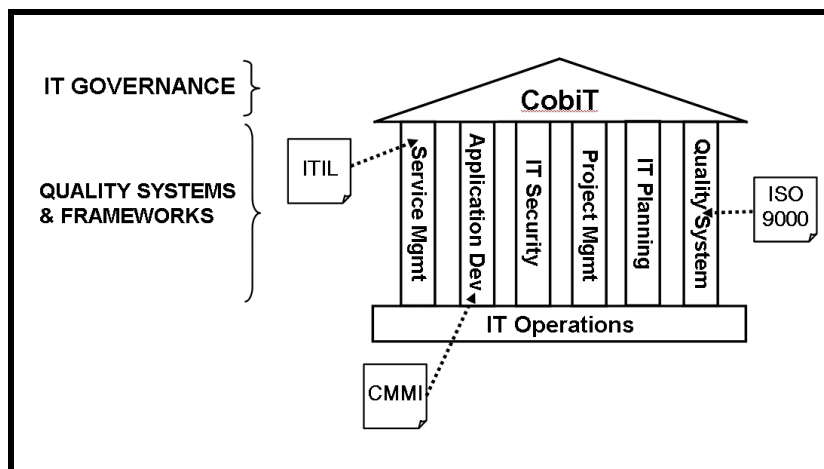


Figure 1 Relationship of four frameworks to IT functions (Adapted from Ratcliffe, 2004).

As shown in figure 1, the four frameworks apply to different functions of an IT department. The next sections explain the origin, focus, scope and extent of adoption of each of the four frameworks discussed in this paper.

2.1 ITIL

In response to serious economic downturn in the late 1980s, the UK's Central Computer and Telecommunications Agency (CCTA) developed the ITIL framework to lower costs and better manage IT service delivery (Sallé, 2004). The focus of ITIL is to provide a comprehensive and cohesive set of templates and best practices for core IT operational processes. As shown in table 1, the framework comprises three primary segments. The first two, service support and service delivery define key processes that IT organisations must have in place to provide quality IT services for its users. The third area consisting of ITIL processes such as security management and application management which, although important, are not of central concern to IT service management. The service support segment deals with the day to day support and maintenance processes associated with the provision of IT services. Within service support is the service desk function, which is designed to be the main contact point between the user and the IT organisation. The service delivery segment covers the processes required for the planning and delivery of quality IT services and looks at the longer term processes associated with improving the quality of IT services delivered.

ITIL has a strong following in Europe, especially in the government sector, and adoption is growing in Australia and North America (Barton, 2004). EXIN International, the leading international certification organisation for ITIL training, has administered approximately 170,000 training certificates to individuals (Computer Economics, 2005). The ITIL framework is currently administrated by the UK Office of Government Commerce and its best-practice processes are supported by the British Standards Institute's BS 15000 Standard for IT Service Management.

2.2 CobiT

The first version of CobiT was developed in 1969 by the International Systems Audit and Control Foundation (ISACF), the research arm of the Information Systems Audit and Control Association (ISACA) (Campbell, 2005). In 2003, ISACF was renamed Information Technology Governance Institute (ITGI). CobiT, developed and distributed by ITGI, provides senior management, auditors, and users with a set of generally accepted objectives to assist them in developing appropriate IT governance. Version 3 of the CobiT framework consists of 34 IT processes (listed in table 1) accompanied by high level control objectives, management guidelines, a maturity model and scorecards to form key goal and performance indicators (Van Grembergen, De Haes, & Guldentops, 2003). CobiT's control objectives are categorised in four domains: planning and organisation, acquisition and implementation, delivery and support, and monitoring. The planning and organisation domain covers the use of IT and how it can help the organisation achieve its goals and objectives. The acquisition and implementation domain addresses the organisation's strategy in identifying its IT requirements, acquiring the technology, and implementing it within the organisation's current business processes. The delivery and support domain focuses on the delivery aspects of IT applications and also covers the support processes that enable the effective and efficient execution of these applications. The monitoring domain deals with the organisation's strategy in assessing its IT needs and whether or not the current IT applications still meet the objectives for which they were designed and the controls necessary to comply with regulatory requirements. Although the increasing adoption of CobiT has been publicised, actual estimates of adoption are not reported by ITGI.

2.3 CMMI

The Capability Maturity Model (CMM) was developed by the Software Engineering Institute (SEI) of Carnegie Mellon University and described the principles and practices underlying software development process maturity. The framework was intended to help software development organisations improve their software processes by following an evolutionary path from ad hoc, chaotic to mature, disciplined software processes. A suite of models developed by the SEI including the Software CMM, the Systems Engineering CMM, and the Integrated Product Development CMM have recently been merged and extended into the CMM Integration (CMMI) (CMMI Product Team, 2002).

The CMMI provides two views of capability: a staged view and a continuous view. The staged view, summarised in table 1, provides five levels of evolution towards organisational maturity (initial, managed, defined, quantitatively managed and optimizing). The continuous view includes six levels of process capability (incomplete, performed, managed, defined, quantitatively managed and optimizing) (CMMI Product Team, 2002). CMMI is not only an assessment method, it is also a capability map that describes specific goals and practices that an organisation requires to reach a level of capability and maturity. A total of 868 CMMI appraisals involving 3,250 projects were reported to SEI up to June 2005. Evidence of the increasing influence of this framework outside the USA is the fact that 59 percent of the 782 organisations were non-USA enterprises (SEI, 2005). In Europe, CMMI adoption is led by the UK (29 appraisals), followed by France (26), and Germany (16). Ten or fewer appraisals have been reported from Belgium, Denmark, Finland, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, and Turkey (SEI, 2005).

2.4 ISO 9000

ISO 9000 is sponsored by the International Organization for Standardization (ISO) and refers to a set of quality management standards that enable an organisation to fulfil 'the customer's quality requirements and applicable regulatory requirements, while aiming to enhance customer satisfaction, and achieve continual improvement of its performance in pursuit of these objectives' (ISO, 2005b). ISO first published the standards in 1987, revised them in 1994, and then republished an updated version in 2000. ISO 9000 currently includes three quality standards: ISO 9000:2000, ISO 9001:2000, and ISO 9004:2000. ISO 9001:2000 documents requirements, while ISO 9000:2000 and ISO 9004:2000 present guidelines. ISO 9000 is generic in nature and applicable to all public and private sector organisations, regardless of the type and size, and it is applicable to all categories of products or services. At the end of 2004, the worldwide total of certificates to ISO 9001:2000 was 670,399 in 154 countries, an increase of 35 percent of certifications over the previous year (ISO, 2005a).

2.5 Relevance and design of the study

There is much hype promoting the value of process frameworks such as ITIL, CobiT, CMMI and ISO 9001. A body of knowledge is accumulating based on surveys and case studies relating to the implementation of each framework. One topic area which appears to be totally neglected by researchers is the phenomenon of multiple concurrent adoptions of these frameworks. This study summarises current research on multiple concurrent process framework implementations, and provides survey and case study evidence indicating that many organisations are in fact at various stages of adoption of various frameworks. From a practitioner's perspective, this study asks 'why are IT managers adopting multiple frameworks?', and 'what are the implications of this practice?' The study is important on account of the significant investment in such frameworks and the impact on IT managers, staff and clients.

	ITIL	CobiT	CMMI	ISO 9001
Focus	IT service management and operations	IT governance and control	Software development process improvement	Generic quality management system
Target	IT service providers	All organisations	Software development organisations	All organisations
Documentation	Set of books providing best practice guidelines	Hierarchy of control objectives organised in four domains	Detailed guidelines on process areas, goals and practices	Family of standards providing requirements and guidelines for certification
Process Improvement	An early version of ITIL CMM is available	Weak on process improvement as it is essentially a control framework	Framework is devoted to process improvement	ISO 9004 provides high level guidance for process improvement
Processes	<p>SERVICE MANAGEMENT</p> <p>Service Support</p> <ul style="list-style-type: none"> Service Desk Incident Management Problem Management Change Management Release Management Configuration Management <p>Service Delivery</p> <ul style="list-style-type: none"> Service Level Management IT Financial Management Capacity Management Availability Management IT Service Continuity Management <p>SECURITY MANAGEMENT</p> <p>ICT INFRASTRUCTURE MANAGEMENT</p> <p>APPLICATION MANAGEMENT</p> <p>SOFTWARE ASSET MANAGEMENT</p>	<p>PLANNING AND ORGANIZATION</p> <ul style="list-style-type: none"> PO1 Define a strategic IT plan PO2 Define the information architecture PO3 Determine the technological direction PO4 Define the IT organization and relationships PO5 Manage the IT investment aims and directions PO6 Communicate management aims and directions PO7 Manage human resources PO8 Ensure compliance with external requirements PO9 Assess risks PO10 Manage projects PO11 Manage quality <p>ACQUISITION AND IMPLEMENTATION</p> <ul style="list-style-type: none"> A11 Identify automated solutions A12 Acquire and maintain application software A13 Acquire and maintain technology infrastructure A14 Develop and maintain IT procedures A15 Install and accredit systems A16 Manage changes <p>DELIVERY AND SUPPORT</p> <ul style="list-style-type: none"> DS1 Define and manage service levels DS2 Manage third-party services DS3 Manage performance and capacity DS4 Ensure continuous service DS5 Ensure system security DS6 Identify and allocate cost DS7 Educate and train users DS8 Assist and advise customers DS9 Manage the configuration DS10 Manage problems and incidents DS11 Manage data DS12 Manage facilities DS13 Manage operations <p>MONITORING</p> <ul style="list-style-type: none"> M1 Monitor the processes M2 Assess internal control adequacy M3 Obtain independent assurance M4 Provide for independent audit 	<p>LEVEL 5: OPTIMIZING</p> <ul style="list-style-type: none"> Organizational Innovation and Deployment Causal Analysis and Resolution <p>LEVEL 4: QUANTITATIVELY MANAGED</p> <ul style="list-style-type: none"> Organizational Process Performance Quantitative Project Management <p>LEVEL 3: DEFINED</p> <ul style="list-style-type: none"> Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management for IPPD Risk Management Integrated Teaming Integrated Supplier Management Decision Analysis and Resolution Organizational Environment for Integration <p>LEVEL 2: MANAGED</p> <ul style="list-style-type: none"> Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management <p>LEVEL 1: INITIAL</p>	<p>Management Responsibility</p> <p>Quality System</p> <p>Contract Review</p> <p>Design Control</p> <p>Document Control</p> <p>Purchasing</p> <p>Customer-Supplied Material</p> <p>Product Identification & Traceability</p> <p>Process Control</p> <p>Inspection and Testing</p> <p>Inspection/Measuring/Test Equipment</p> <p>Inspection and Test Status</p> <p>Control of Nonconforming Product</p> <p>Corrective Action</p> <p>Handling, Storage, Packaging & Delivery</p> <p>Quality Records</p> <p>Internal Quality Audits</p> <p>Training</p> <p>Servicing</p> <p>Statistical Techniques</p>

Table 1. List of processes included in ITIL, CobiT (version 3), CMMI (staged view) and ISO 9001 frameworks (Summarised from Curtis, 2005; Garbani, Koetzle, & Powell, 2005; ISO, 2005b; Lucid IT, 2005; Mingay & Brittain, 2003).

From a review of the literature, a questionnaire was designed to explore current process improvement initiatives and progress. As well as demographic information, the survey focussed on critical success factors of ITIL adoption. A convenience sample of delegates attending the information technology Service Management Forums (itSMF) Australian national conference was chosen for the survey. The case study was undertaken as an interview with one of the survey respondents who expressed interest in participating in further ITIL research.

3 LITERATURE REVIEW

Researchers have used various theories and concepts from many disciplines to explain concepts related to process improvement frameworks such as those examined in this paper. All four frameworks require specific processes to be defined with a view to improvement. Since the advent of the Total Quality Management (TQM) movement, many organisations have used this approach. Regardless of the particular flavour of TQM implemented, process definition, control and improvement is always included since it is a core TQM principle (Hackman & Wageman, 1995). The main idea behind process control is that organisations are sets of interlinked processes and improvement of these processes is the foundation of performance improvement (Dean & Bowen, 1994). Theory to support these concepts can be found in research from industrial engineering (Taylor, 1911), and management (Hammer & Champy, 1993). Economic theories also provide a useful framework to analyse some of the risks inherent in IT management and the opportunity for standard process frameworks to provide external governance to reduce such risks. For example, in applying transaction cost theory, Milgrom (1988) declared that over a period of time, workers accumulate firm-specific knowledge, so that if they leave, the firm incurs additional costs. These risks can be reduced by applying standard frameworks to define processes.

Both CobiT and CMMI are based on maturity models, and ITIL also includes a process maturity framework (OGC, 2002). Staged maturity models have a long history from Plato's four stage ascent of the mind, through Marx's four stages of society development and Rostow's five stages of economic growth. 'Stage models, whether of philosophers, economists, quality gurus, or software engineers, can be seen as occupying a respectable place in that utopian tradition' (Tully, Kuvaja, & Messnarz, 1999, p. 56). Following on from the work of TQM pioneers such as Deming and Juran, Crosby (1979) developed the quality management maturity grid and encouraged managers to use the grid to assess the current situation and to identify actions needing to be taken for improvement.

Since Crosby's work, maturity models have gained popularity and have been proposed for a range of activities including quality management, software development, supplier relationships, research and development effectiveness, product development, innovation, product design, product development collaboration and product reliability (Fraser, Moultrie, & Gregory, 2002). The next section moves from the broad management and manufacturing literature to focus on research that is specific to the individual and concurrent adoption of ITIL, CobiT, CMMI and ISO 9001.

3.1 Literature related to each framework: ITIL, CobiT, CMMI and ISO 9001

To date, there has been limited academic research about ITIL (Hochstein, Tamm, & Brenner, 2005) and the same has been claimed for CobiT (Liu & Ridley, 2005). However, there is an increasing volume of information about ITIL and CobiT in the popular press, practitioner magazines, consultants' promotional material, conference proceedings such as itSMF, and training materials. Recent surveys and case studies have reported an upsurge in awareness and adoption of ITIL (Casson, 2005; Hochstein et al., 2005; Niessink & van Vliet, 1998; Potgieter, Botha, & Lew, 2005) as well as CobiT (Deloitte, 2003; PricewaterhouseCoopers).

The SEI provides a wealth of reports and advice related to CMMI on its web site (www.sei.cmu.edu/cmmi/) and CMMI research is reported at Software Engineering Process Group (SEPG) and Software Process Improvement (SPI) conferences and journals.

Since 2001, the International Organization for Standardization has published the ISO Management Systems magazine with updates about new standards, advice regarding standards implementation, and case studies. ISO 9001 research also appears in journals focussing on quality as well as general management and operations journals. However, despite the evident research effort and interest in each of the four frameworks, there is scarcely any literature – academic or practitioner – related to the challenges and benefits of concurrent implementation of multiple frameworks. This study is an initial step towards addressing this identified research deficiency.

3.2 Research into multiple process frameworks

Recently, organisations have been urged to adopt multiple frameworks (Mingay & Brittain, 2003), in particular CobiT and ITIL. Managers are advised that IT service management and governance frameworks are not mutually exclusive, and when combined provide powerful IT governance, control and best practice in IT service management (Mingay & Bittinger, 2002; Sallé, 2004). Although ITIL provides good documentation of IT process flows and interactions, it is not a complete approach in that it lacks a specific measurement system for process improvement. Organisations are urged to use CobiT to put their ITIL program into the context of a wider governance and control framework (Mingay & Bittinger, 2002; Sun Microsystems, 2005). Furthermore, a detailed mapping of both CobiT and ITIL onto CMMI has been developed by Curtis (2005), and a consultant's comparison view of CobiT, CMMI, Balanced Scorecard and ISO 9000 is provided by Carter and Pultorak (2003).

However, most of those promoting concurrent multiple adoptions do not consider the challenges faced by organisations in adopting multiple frameworks. Although Anthes (2004) refers to IT managers being faced by a 'bewildering array' of quality frameworks, and a Forrester article refers to the 'management process alphabet soup', both reports urge practitioners to combine elements of the major frameworks (Garbani et al., 2005).

From the results of the Gartner survey on ITIL adoption in the Asia Pacific region (Bittinger, 2005), it can be assumed that many organisations in Hong Kong, Singapore and Australia are adopting ITIL, CobiT, CMMI and ISO 9001 concurrently. However, as only the adoption figures for each framework are presented, it is not possible to estimate the extent of multiple adoptions, or in fact the combinations of process frameworks being adopted. The authors of this paper have been unable to identify any research quantifying the extent of multiple concurrent adoptions of process improvement frameworks such as those discussed in this paper.

4 EVIDENCE OF MULTIPLE ADOPTION OF FRAMEWORKS

4.1 IT Service Management Forum Survey results

At the 2005 itSMF conference, a survey was conducted to gauge the extent and benefits of ITIL adoption. From a total of 500 delegates, 110 responses were returned, representing all Australian states with two thirds of the responses from private sector organisations. A detailed report of the findings of the survey is available (Cater-Steel & Tan, 2005). There was wide variation in the size of the IT departments: 15 percent employed less than 50 IT staff and 32 percent employed in excess of 300 IT staff. Organisations were asked to indicate their implementation status in relation to a range of service management frameworks as well as other quality and project management frameworks. As shown in table 2, all respondents had committed to the implementation of ITIL, and many organisations were also implementing other frameworks.

Framework	Number of survey responses	Status of implementation					Number of firms implementing framework
		No plans	Starting	Partially	Largely	Fully	
<i>ITIL</i>	110	0	26	64	17	3	110
<i>CobiT</i>	91	63	20	7	1	0	28
<i>CMM/CMMI</i>	86	63	10	12	0	1	23
<i>ISO 9001</i>	94	59	4	10	5	16	35

Table 2. Implementation progress of *ITIL*, *CobiT*, *CMMI* and *ISO 9001*.

To explore the extent of concurrent adoption of multiple frameworks, an analysis was conducted to determine how many of the four frameworks discussed in this paper were being implemented by each organisation. The result shown in figure 2 indicates that 38 organisations are adopting one other framework along with *ITIL* (*CobiT*, 13; *CMMI*, 6; *ISO 9001*, 19), 15 responded that they are adopting two other frameworks, and six are adopting all four of the frameworks discussed here. That is, over one-half of the respondents are implementing more than one framework, including *ITIL*, and nearly one-fifth are implementing at least three of the frameworks being considered here.

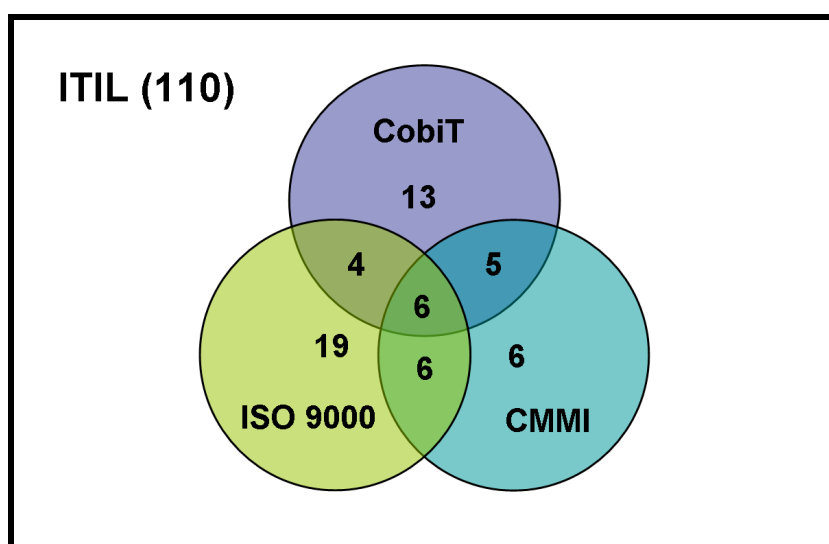


Figure 2. Number of organisations adopting *CobiT*, *CMMI* and *ISO 9001*. All organisations are in the process of implementing *ITIL*, or have completed *ITIL* implementation.

Sector	Annual Turnover	Total full-time staff	Implementation status				
			IT staff	<i>ITIL</i>	<i>CobiT</i>	<i>ISO 9001</i>	<i>CMMI</i>
Govt admin & defence	Don't know	500-2000	10-24	Partially	Starting	Fully	Starting
Finance and insurance	>\$150 million	500-2000	25-49	Partially	Starting	Largely	Starting
Finance and insurance	>\$150 million	>2000	>300	Partially	Partially	Partially	Partially
Communication services	>\$150 million	>2000	>300	Partially	Starting	Partially	Partially
Property/business services	>\$150 million	>2000	>300	Partially	Starting	Partially	Partially
Finance and insurance	>\$150 million	>2000	>300	Partially	Starting	Starting	Starting

Table 3: Details of six organisations implementing all four frameworks

Table 3 summarises the characteristics of the six organisations implementing all four frameworks. These are mainly large organisations and four of the six have extensive IT departments. It can be seen

that CobiT implementation is not as advanced in these six firms compared to the other frameworks. It is not surprising that three of the six firms belong to the finance and insurance industry sector as this industry would tend to be more conscious of risk and the need for audits and controls.

4.2 Case study: University Information Technology Section

To gain a deeper insight into the phenomenon being analysed, the researchers considered the case of the Information Technology Section (ITS) of a University. ITS was certified to ISO 9001 in 1996 and although it updated to ISO 9001:2000, due to a restructure of the section, it has been decided to reconsider the value of proceeding with the next audit. Earlier this year, the University's review of Information and Communications Technology (ICT) was released and its recommendations included adoption of CobiT and ITIL. Although many staff (ICT and non-ICT) have now completed the ITIL foundations course, the newly appointed Chief Technical Officer (CTO) views implementation of CobiT as a higher priority than ITIL and ISO 9001. It is proposed that the current decentralised arrangement of faculty IT support staff will undergo radical changes with the adoption of a federated structure with all IT support staff and ICT purchases brought under the control of the CTO.

5 ISSUES AND CHALLENGES OF MULTIPLE FRAMEWORKS

5.1 Why are organisations adopting multiple frameworks?

One of the key questions for organisations considering adopting any or several process improvement frameworks is 'Why adopt?'. For some IT Managers, adoption is a matter of legal compliance, for others, a risk management strategy, a cost saving measure, or a means to satisfy customers more effectively. As shown in table 1, it is clear that the different frameworks are aimed at different levels and stakeholders in an organisation including management, operational staff and developers of systems. Senior management may see these frameworks as potentially giving them more control of their organisational processes while operational staff may see specific benefits to their work situation such as providing standard ways to respond to queries and requests.

Over the last decade, global IT development and operation efforts have become the industry norm rather than the exception (MacGregor, Hsieh, & Kruchten, 2005). Previously, systems were either developed and operated locally, or software development was carried out in countries with relatively mature software industries. With the recent liberalisation of markets and economic progress in many developing nations, emerging countries such as India are increasing in ICT capability, and gaining a greater share of the international market.. In order to maintain a role in the domestic and international market, IT departments and firms are under pressure to comply with internationally recognised process improvement frameworks. As well as providing a defence against outsourcing and off-shoring, compliance may provide competitive advantage in the form of opportunities to participate in the global IT industry. Furthermore, the use of widely known frameworks, rather than internally developed standards, facilitates collaborative teams and reduces the learning curve for new hires and migrant workers.

The increasing adoption has spawned a global industry of consultants offering training, assessments, implementation and advice, as well as vendors claiming to have compliant products and services. At the itSMF Conference and Expo in Chicago in 2005, more than 100 vendors exhibited their ITIL products and services, however buyers are cautioned to be wary of existing products being relabelled as compliant with frameworks such as ITIL and CobiT (Computer Economics, 2005). Although the academic community has been slow to research the phenomenon of multiple framework adoption, some consultants and vendors (such as Borland) have recognised the opportunity to reduce the complexity by providing services related to multiple frameworks (Curtis, 2005).

5.2 The challenges for IT management, IT staff and clients

Organisational change involving restructuring, defining and deploying new processes, and the installation of new tools and systems can place a significant burden on staff and result in increased stress, loss of morale and productivity. Staff are expected to 'do the real work' as well as cope with the complexities of multiple framework implementations. IT managers understand that resistance to change can be reduced by effective change management, but identifying and involving all stakeholders in multiple implementations may present an operational challenge. From a somewhat negative perspective, some will see implementation of these frameworks either as bureaucratic overkill, 'flavour of the month' or as certification hunting by individuals and organisations. Information technology organisations are not unknown for chasing the next new thing.

Another issue raised in the popular press relates to the optimal sequence of implementing the processes within each framework (Mendel, 2005). This problem is exacerbated with multiple frameworks, in particular due to the inter-relationships and process overlaps, for example, configuration management is included in CMMI as well as in ITIL. It is vital that an overall plan is adopted rather than separate plans for each process framework adoption. IT managers are currently concerned with system integration but also need to be aware of the complexity of integrating all the processes from multiple frameworks.

6 CONCLUSION

In summary, this paper has not only described four important frameworks, but has also highlighted the phenomenon of their concurrent adoption. The review of the literature has exposed a paucity of publications, both academic and practitioner, and has provided motivation to explore the issues and implications affecting IT managers, staff and their clients. From the earlier material presented, it is clear that ITIL and CobiT are complementary and more organisations can be expected to adopt them concurrently, especially in this climate of increased governance and international competition. CMMI is widely adopted by firms involved in software development and is used by organisations as a defense against outsourcing, off-shoring and by IT providers for competitive advantage. Implementation of ISO 9000 and its derivatives continues to grow.

In terms of future research, concerns have been raised about the lack of theoretical support for models such as the CMMI (Bollinger & McGowan, 1991) and the need to confirm the theory underlying such frameworks by empirical research (Fenton, Pfleeger, & Glass, 1994; McBride, 2004). Gray (1998), for example, used grief theory from psychology to model resistance to software process improvement. This study has drawn on literature from broad theories of management but future research into this phenomenon could consider theories from a wide range of sources for example, diffusion of innovation theory (Moore & Benbasat, 1991; Rogers, 1995); Mintzberg's organisational theory (Larsen & Kautz, 1997); and the organisational behaviour literature (Abrahamsson, 2001).

This research also highlights the need for research to assess the impact of concurrent multiple adoptions. A theoretical basis for that research is important but few such theories appear to have been used. Modularity theory, developed by Sanchez and Mahoney (1996) based on work of Herbert Simon may provide an overarching meta theory. Modularity theory may be useful in identifying the myriad of process interdependencies and could help determine how the various processes overlap, how they can be linked, split, recombined and sequenced to achieve a successful outcome.

One of the key research questions is how do perceived benefits of these frameworks relate to actual benefits and have the particular perceived threats been mitigated by implementation of the frameworks. Research is required to evaluate the success of these process improvement frameworks in addressing the issues and concerns of the various stakeholders particularly where multiple frameworks have been implemented. Surveys of implementation success may be suitable for some combinations of framework implementation, but case studies of particular organisations may be the

most suitable approach for organisations implementing several frameworks. Surveys and case studies are complementary and enable both a broad view of the phenomenon as a whole and a richer, more detailed picture of a few organisations (Groves, Nickson, Reeve, Reeves, & Utting, 2000). Only when this research is complete will we be in a position to advise practitioners about the optimal selection and sequencing of implementing these frameworks, their cost effectiveness, and their impact on IT practitioners and clients.

Acknowledgement: The authors thank Robert L Glass for his contribution during early discussions of this paper.

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