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## **ITIL adoption in South African: A Capability Maturity view**

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### **Abstract**

The purpose of this study was to understand the practice of IT Service Management through the lens of the Capability Maturity Model in South Africa. Specifically, the objective was to assess capability maturity level of Information Technology Infrastructure Library (ITIL) processes of incident, problem, change, release, and information security in the organization; and the capability level of each key process area of Process, Procedures and Activities; Management Commitment; People, Roles and Tools; Metrics, KPI's and Reports; and Audits, TQM and Checks. The results indicate that change management received a higher capability maturity rating than the other processes, especially release and problem management. For each ITIL process, Management commitment and their involvement was regarded as the critical key process area. Further results indicate that knowledge creation and development of the people in each process was important so as to avoid vendor dependency.

**Keywords:** IT Infrastructure Library (ITIL), IT Service Management (ITSM) framework

### **Introduction**

The task of managing IT infrastructure continues to grow more complex as businesses rely more and more on Information and Communication Technology (ICT). This has put pressure on organizations to deliver effective and efficient ICT services (Galup, Dattero, Quan, & Conger, 2007). In order to manage their IT effectively and efficiently, organizations are now adopting IT Service Management practices and standards such as the Information Technology Infrastructure Library (ITIL) which provides implementation guidance and a common language of communication (Bailey, Kandogan, Haber, & Maglio, 2007; Tan, Cater-Steel, & Toleman, 2009).

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By adopting these standard practices, organizations are able to ensure that their "enterprise's IT sustains and extends the organization's strategies and objectives" (IT Governance Institute, 2007; Posthumusa & von Solms, 2005).

The need for IT Governance in South Africa has been strongly emphasized by the South African Institute of Directors

(IOD) who view IT governance as a framework that supports the effective and efficient management of IT resources in order for a company to reach its strategic objectives (IT Governance Institute, 2009). Despite this emphasis, it is believed that although good IT governance practices are known and applied, it is not universal (IT Governance Institute, 2008). The actual number of organizations adopting ITIL is not yet known, and in South Africa specifically, it is still not clear to what degree IT governance is adopted by organizations; and if at all adopted, it is not clear to what degree IT project governance is guided by IT governance. This paper investigates the capability levels of the implemented ITIL, and the capability levels by category within each primary process at a South African insurance company.

## THE IT Infrastructure Library (ITIL)

Organizations are increasingly becoming aware of the essential role of Information Technology (IT) within their organizations, and are under pressure to account for costs, and to manage risks associated with the ever increasing vulnerability of their IT infrastructure. To meet these challenges, organizations have turned to IT governance as the solution which in turn has highlighted the importance of IT service management (ITSM) - “the set of processes that detail best practices to enable and optimize IT services in order to satisfy business requirements and manage IT infrastructure both tactically and strategically” (Galup et al, 2007). ITSM has influenced numerous standards such as the British Standard BS 15000, the ISO 20000 standard as well as other vendor frameworks such as IBM’s Process Reference Model for IT (PRM-IT), the Control Objectives for IT (CobIT) and Microsoft’s Operating Framework (MOF). In order to manage, ITSM, the IT Infrastructure Library (ITIL) was proposed as the widely accepted best practice framework for IT service management (Addy, 2007; Clacy & Jennings, 2009; Gartner, 2010; Hochstein, Zanerkow, & Brenner, 2005). “ITIL is a top-down, business driven approach to the management of IT services that specifically addresses the strategic business value generated by the IT organization and the delivery of high quality IT services” (Winny, 2008). As a framework, it enables managers to document, audit, and improve their IT service management processes. ITIL consists of five processes namely incident, problem, change, release, information security as depicted in Table 1.

**Table 1. ITIL processes**

Process	Description
Incident	A deviation for the (expected) standard operation of a system or a service responsible for providing continuity by restoring IT service operations to customers in the quickest way possible by whatever means necessary (Cater-Steel, Toleman, & Tan, 2006; Sallé, 2004).
Problem	Undesirable conditions that have been defined and identified from one large incident or many incidents exhibiting common symptoms for which the cause is unknown and are managed so as to ensure that these types of incidents are prevented from happening or minimized from happening (Cater-Steel, Toleman, & Tan, 2006; Sallé, 2004).
Change	A change is an action that results in a new status for one or more components of the IT infrastructure (Cater-Steel, Toleman & Tan, 2006).The purpose of this process is to ensure that beneficial changes are made with minimum disruption to IT services using standardized methods and techniques (Cater-Steel, Toleman, & Tan, 2006).
Release	The release process is a collection of hardware, software, documentation, processes or other components required to implement approved changes to IT services so as to ensure that only authorized and correct versions of software are made available for operation (Cater-Steel, Toleman, & Tan, 2006; Sallé, 2004).
information security	The preservation of information confidentiality, integrity, and availability so as to ensure business continuity, to maintain legal compliance, and to achieve competitive edge (Saint-Germain, 2005).

## The Capability Maturity Model Integrated (CMMI)

Many companies have experienced difficulties during implementation. For example, organizations have reported a lack of organizational guidance towards implementation; ITIL requires too much change in culture, and it is too focused on technology, toolsets and software; it is too high-level to implement; and the organization usually lacks experienced consultants in ITIL (Addy, 2007; Gartner, 2010). Translating these hurdles into critical success factors, would require senior management commitment, persistence and patience, a culture of continuous improvement, financial support, and metrics (Holub 2009).

The Capability Maturity Model Integrated (CMMI) has been adopted in this research to allow the assessment a company's attainment of the Critical success factors and also as a guide for organizations in assessing and improving their implementation processes. CMMI is known for its ability to evaluate how efficient a company is in designing, manufacturing and delivering its technology products (Paulk, 1993). The evaluation starts with an appraisal of the "as is" technology process maturity and once this has been determined the CMMI framework provides a methodology that guides the companies engineers and processes owners in a step by step approach towards more mature processes (Carnige Mellon, 2006). CMMI creates a path for the organization to improve from ad hoc, immature processes to disciplined, mature processes with improved quality and effectiveness by ensuring organizations are able to plan, define, implement, benchmark and improve their service management processes (SEI, 2009; Williams, 2008). The CMMI capability levels consist of six levels as depicted in Table 2; numbered 0 to 5 and the maturity levels consist of five levels numbered 1 to 5. A capability level for a process area is obtained when the goals for that level are met. Within each of these maturity levels are Key Process Areas (KPA) which characterize that level, and for each KPA there are five definitions: goals, commitment, ability, measurement and verification (Williams, 2008).

**Table 2. CMMI capability levels**  
(Herndon, Moore, Phillips, Walker, & West, 2003; SEI, 2009)

Level	Process	Description and goal
0	Incomplete	Process is not performed or partially performed. No goals exist for this level.
1	Performed	Process is performed according to specific goals that supports and enables the work needed to provide services. The organization lacks the necessary processes to sustain service levels. The process needs to be institutionalized
2	Managed	A level 1 process that has basic infrastructure in place to support the process, is planned and executed in accordance to policy, employs skilled people who have adequate resources to produce controlled outputs, involves stakeholders, is monitored, controlled and reviewed.
3	Defined	A level 2 process that is customised to meet specific business needs and the procedures are defined more rigorously with inputs, entry criteria, activities, roles, measures, verification steps, outputs and exit criteria.
4	Quantitatively Managed	A level 3 process that is quantitatively managed for quality and process performance.
5	Optimising	A level 4 process that is improved based on an understanding of the common causes of variation inherent in the process.

### Goals

The Goal KPA entails the analysis of how an organization does its work and includes the activities the organization has to perform so as to achieve internal or external objectives. According to SEI (2009) companies can focus on three critical areas to improve and achieve their internal or

external objectives: people who have the relevant skills, training, and motivation; procedures and methods defining the relationship of tasks or activities to be performed; and the tools and equipment required to execute the task.

### **Commitment**

According to the IT Governance Institute (2008) for the governance of IT services to be effective, management commitment and executive involvement and sponsorship is critical and will enable higher maturity levels to be achieved. IT services can also receive the correct prioritization if business requirements and priorities are communicated. This also enables the business to better understand the significance of IT services and how they support the business and in contrast helps IT manager understand the impact of IT services on the business. The ITG advocate management commitment in the preparation of business cases, obtaining budgets and the monitoring and reporting of the benefits.

### **Ability**

The ability to make the right decision quickly and execute them effectively is the trademark of a high performing organization IT Governance Institute (2007). To achieve this, organization need to have capable people whose roles have been defined and who have the tools to execute the tasks designated. The roles and responsibilities, specifically for management activities need to be clearly defined for a successful IT governance framework (IT Governance Institute, 2007). Each manager should be responsible and accountable and have activities and tools clearly allocated when designing a service or a process. ITIL software tools will facilitate the end-to-end and life-cycle view of IT services by integrating the recording of incidents with other processes such as change management and configuration management (Cater-Steel, 2009).

### **Measurement**

Goals, metrics, key performance indicators and resulting reports can be used to monitor service improvement and to drive continual improvement. According to Institute IG (2009) goals and metrics affect attitude and behavior and argue that care should be taken to ensure goals and metrics that are selected to encourage positive attitudes and behaviors required to deliver the anticipated outcomes and expectations of the business. For example, level 4 capability maturity is achieved when a process is quantitatively managed using statistical and other quantitative methods (SEI, 2009).

### **Verification**

The verification KPA involves the process of continuous quality management, auditing and performing rigorous checks. This is because the quality of a product or service is dependent on the quality of the process used to create it (Baker & Fisher, 2007). The quality of all contributing processes does not only generate high-quality products or services, higher customer satisfaction, but it also enables companies to reduce costs and execution times (Conti, 1993).

## **ITIL AND CMMI**

This study intends to understand the practice of IT Service Management through the lens of the Capability Maturity Model in South Africa. Because IT service management are realized through ITIL processes, the ITIL processes (incident, problem, change, release, information security) formed part of the research framework; and to determine the capability levels for each ITIL process area, the Key Process Areas (KPA) was designed into the framework as depicted in Table 3. That is, for each ITIL process, for example, Incident process, all the KPA (Process, Procedures &

activities; Management Commitment; People, Roles & Tools; Metrics, KPIs & reports; and Audits, Total Quality Management & Checks) were investigated.

**Table 3. ITIL process and CMMI KPA**

Incident				Change				Problem				Release				Information Security			
Goals	Commitment	Ability	Measurement	Verification	Goals	Commitment	Ability	Measurement	Verification	Goals	Commitment	Ability	Measurement	Verification	Goals	Commitment	Ability	Measurement	Verification

## Methodology

The research philosophy was exploratory and a combined approach of quantitative and qualitative research was used to gather data from a South African insurance company X. The company was chosen because it provided a contemporary real life situation and enabled an in depth treatment and analysis of the selected ITIL processes. Organization X has an extensive broker network and has been operating in South Africa for more than 50 years. Although the organization has a mature business network, a strategy shift has increased the requirement for new enterprise IT infrastructure and systems. The company has been implementing ITIL for more than 5 years, but not all of the processes have been fully implemented. The case study was cross sectional as it represents the state of the organization at a point in time. The study was conducted over a period of 5 months.

The sampling method was purposive and the source of the population came from the IT and Business department. The respondents were chosen because of the role in IT and the functions they performed within the process areas. The sample constituted of 41 people out of a target population of 66 and 5 process owners from the sample were interviewed after the assessment. The survey instrument based on the CMMI appraisal questionnaire adapted from the CMMI® for Services, Version 1.2 model and Standard CMMI® Appraisal Method for Process Improvement, Version 1.2: Method Definition (Cater-Steel et al., 2009) was used on a sample population within an insurance company to gather the quantitative data. A SCAMPI class B appraisal was used as this allowed for selected processes (incident, change, problem, release and information security management) to be appraised. Reliability statistics were carried out on the questions which resulted in alpha coefficient above .8. For each process, the Cronbach’s summary was: Incident = .987; Change = .982; Problem = .984; and Information Security = .987.

The participants in the study are directly involved in the process area that was examined. Several processes areas were examined and consistency was achieved across the process areas. The appraisals from each respondent were captured from the website into a Microsoft SQL Database. The online capture used validation techniques to ensure questions were answered correctly. The database tables were exported into separate spread sheets which were then collated into one master spread sheet with worksheets per process area. The statistical analysis was conducted with IBM SSPS version 19 and verification on the results was conducted by Statistics Solutions Inc. as show in Figure 1. After the appraisal, unstructured interviews were conducted with the managers and process owners.

The objective of the interviews was to understand the overall process area; understand the history of the ITIL implementation and to gain extra information and insights into the process areas. The interview subjects were selected based on their role and involvement in service management within the organization. During the unstructured interviews, various forms of documentation supporting the organizations processes were examined to gain further insights and evidence.

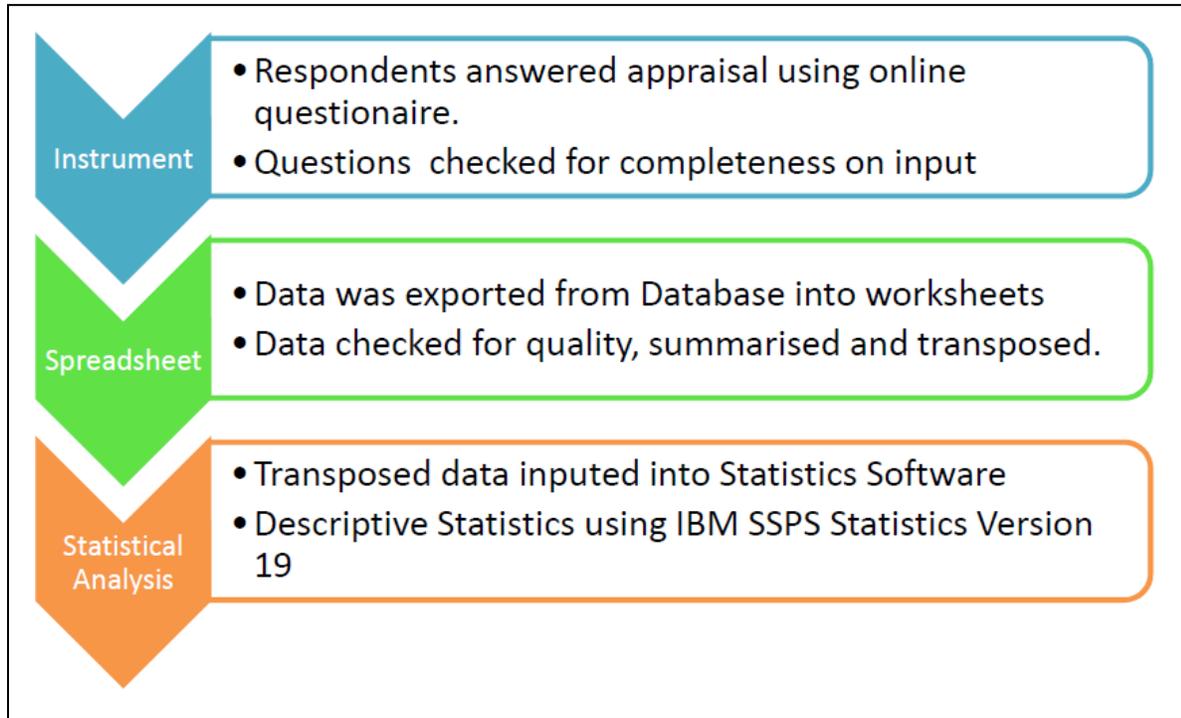


Figure 1: Process steps of measuring ITIL maturity level

## Data Analysis and Results

### Capability Levels of the Primary ITIL Processes

The results, in Figure 2 show that change management was highly praised whilst problem management received the lowest score with 1.24. Further analysis (ANOVA, Levene's test and Bonferroni post hoc comparison) reveal significant differences between the release process and change management process subscale mean scores with a mean difference of -1.12 ( $p = .012$ ). The change management was statistically higher than problem mean score. There were no significant findings between the other processes in the analysis. The mean difference of -1.12 ( $p = .012$ ) can possibly be explained by the later adoption of the processes, i.e. incident and change were the main focus of the initial adoption in 2005, whilst problem and release have matured on the back of the early wins of incident and change management.

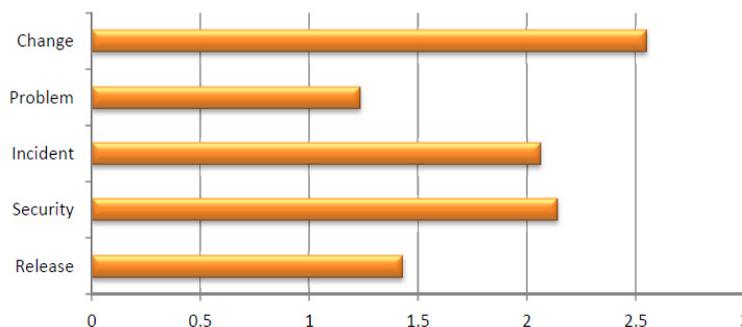


Figure 2: Capability levels

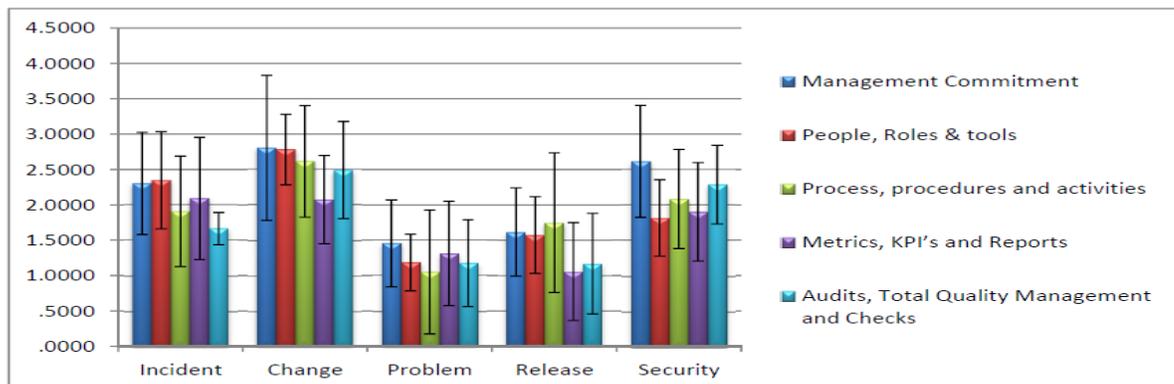
The interviews with the process owners revealed that the initial difficult point for the organization was the “help desk” and incident management process because these were the first processes to be implemented and the organization had no fully management support yet. They however indicated that the *tangible results achieved with the initial help desk and incident management implementation facilitated further management commitment and sponsorship to introduce further ITIL service support processes of change and problem management*. Although the process owner of the help desk was pleased with the tangible results, he indicated bitterly that the process was a *vendor and consultant led process and as a result there was minimal learning done by the organization*. This was discussed and addressed by all process managers. According to the incident manager, once the initial adoption of ITIL had *matured* and was at level 1 process, and *after our staff, the manager and staff and the ITIL user community had become better trained, the knowledge enabled a transition from a tool / consultant / vendor led approach to a process led approach*.

Release management received the second lowest capability ratings because according to the interviewee it had been *on the backburner* and managed by the software development team who made the process have a *silo effect and less integration with release management processes*. The process owner has noted that this is a problem which should be avoided in future implementation and indicated that *the responsibility for the process will fall within the service management team and software development will just have inputs and outputs into the overall release management process*. These future actions do provide evidence of an understanding of the gaps in the processes and that a process of incremental continual improvement exists. The process improvement plans are registered as projects and are being measured which is further evidence of the commitment of management and the process owners in improving the overall capability.

The managers for each process indicated jointly that training and knowledge acquisition allowed staff to realize that ITIL was not just a help desk process – that is *awareness of what is going on, training and people development are important success factor in the acceleration of our ITIL implementation* (Incident manager interview). There was clear evidence that certain individuals in the organizations were seen as the key champions on the ground in driving the adoption and maturation of ITIL process. The release of ITIL V3 has also stimulated all staff to have ITIL foundation training and there is a strong drive towards mentoring and coaching which is seen as a long term strategic knowledge creation

### **CMMI Capability Levels in the Five Categories within Each Process Area**

For each ITIL Process, the capability level for each KPA was investigated (Figure 3).



**Figure 3: Capability levels per category**

## Incident management

Incident management shows an overall CMMI Score of 2.06 with a standard deviation of .70; and the KPA within incident management scored between 1.66 (Audits, Total Quality Management, and Checks) and 2.30 (People, Roles, and Tools). The unstructured interview with the incident manager revealed that the service desk was the main driver for incident management adoption in 2005 and *for most of us the initial impression of ITIL was that it was all about the help desk*. The help desk has now transitioned into a service desk in ITIL terminology. The service desk does have a high turnover of staff and is sometimes referred to as *temporary stock and it uses staff from other areas of the business and forms part of the empowerment strategy which does create re-training and people capability issues*. To combat the issue of staff turnover, the service desk is made up of 1st level and 2<sup>nd</sup> level service desk analysts with the concept that the 1st level analysts are mentored and coached by the senior and more technically advanced 2nd level analysts. *We designed this so that even though there is a staff turnover, the 2nd level analysts are there to pick up the slack*.

## Change management

The results showed that the change management ITIL process had the overall higher capability rating of 2.55, and management commitment was the highest KPA praised. Further analysis (Bonferroni post hoc comparison) indicates that metrics/KPIs/reports had a significantly lower mean score than the other KPA. The unstructured interview revealed that the change management team has been working together for 3 years and there is strong inter-communication with other departments and process areas which explains a higher level of integration. It is also apparent from the unstructured interview that the team is passionate about their role and understands the critical importance of their roles and responsibilities. The attitude and approach is also very positive and the implication is that the capability of change management will likely improve very quickly. The benefit of benchmarking a process is that it also shows where calibration and improve is required and small actions can improve the capability to a level 3 capability.

## Problem management

Problem management process findings indicate an overall CMMI Score of 1.24 with a standard deviation of .75. The KPA scored between 1.05 and 1.46. Further analysis showed that there were no significant differences in the KPAs management commitment, people/roles/tools, process/procedures/activity, metrics/KPIs/reports, and audits/TQM/checks.

## Release management

The release management process scored a CMMI capability level of 1.43 with a standard deviation of 0.7; and the KPAs scored between 1.06 and 1.75. A Bonferroni post hoc comparison revealed that the metrics, KPIs and reports (1.06, .69); and the Audits, TQM, and checks KPA (1.17, .70) had a significantly lower mean score than management commitment (1.62, .87), people, roles, tools (1.57, .62) and process, procedures, activity (1.75, .74)KPA.

## Information security management

The finding for the information security management process is an overall CMMI Score of 2.14 with a standard deviation of .54. Using the Bonferroni post hoc comparison, the KPAs scored between 1.82 and 2.62; with people/roles/tools having a significantly lower mean score of 1.82, .69 than the audits/TQM/checks at 2.29, .56. The unstructured interview with the security manager revealed that *information security has become a "hot topic" and the organisation is under compliance pressures, particularly in the requirements for data privacy*. He indicated that the primary driver for this is corporate and IT governance and the organisation has established 2 year

data privacy compliance plan and is looking to implement ISO 27002 Information Security framework. As a result, the information security management was allocated further budget to assess the gap in information security processes and to improve the processes. There is also *a drive to define the requirements and processes before implementing the toolsets, but we are starting to engage vendors to look at the different information security toolsets. We can therefore expect information security management capability levels to improve over the next 24 months as the processes are improved and integrated with other process areas.* Another comment from the security manager was that the *compliance requirement has not only increased management commitment, but management involvement in meetings, process reviews and communication has increased dramatically.* This commitment, he indicated, has had a significant impact on the teams overall attitude and the individuals in the teams commitment. Training and awareness programmes have also been implemented and the organization is looking at organizational training plan to ensure awareness of information security

## Discussion

The results indicate a strong dependency on people to adequately perform their duties, that management commitment and involvement is critical and that knowledge creation and development of the people is important. It was evident that there was serious focus on the service desk by organization X. These findings are not new because Hochstein et al (2005) and Cater-Steel (2009) noted that most organizations initial focus tend to be on the service desk and incident management as a “quick win” so as to obtain tangible results which strategically enabled the IT organization and process owners to obtain continued commitment, budget for training and personnel development.

Change management was also a central issue for the organization when ITIL was adopted. Within this ITIL process, Management commitment was identified as the critical KPA. The interviews indicated that senior management commitment during the initial phases was very high and communication, briefings and the intranet where used to keep all stakeholders informed, this is despite the *drive over the last 18 month to reduce cost and internal communication.* The significant importance of management commitment is highly supported by Cater-Steel et al (2009) who indicated that continued senior management support is critical to the success of any major IT initiative and that it needs to sustain and extend the organizations strategy.

Whilst the Change Management ITIL process showed a higher capability rating, release and problem management scored low capability levels. The first observation is that release management was unable to receive the adequate focus as it was under a different division, i.e. it fell under software development and release management was not seen as an infrastructure process, but rather as a software release process. However, with ITIL v3 and the re-training and certification there has been awareness that the infrastructure release process requires some focus.

## Conclusion

This study used the CMMI appraisal methodology to measure the maturity of the ITIL processes using a case study of approach on a single South African insurance company. The research on the capability levels on the incident, change, problem, release and information security management processes revealed an overall CMMI capability rating of 1.81. The result revealed how the service desk and the development of the incident management process was the initial drivers for ITIL adoption and quick wins with tangible benefits were crucial to gain continued management commitment for the further implementation of ITIL processes. The report makes a contribution to the empirical examination of ITIL adoption, however more in depth analysis of all the ITIL processes are required and a longitudinal approach would be recommend with multiple companies.

The recommendation for future research would be to use a longitudinal case study approach across several companies to create more generalizable theory and to explore the wider context of ITIL adoption.

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## Biographies



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