

# E-government: ITIL-Based Service Management Case Study

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## ABSTRACT

E-government services require certain service levels to be achieved as they replace traditional channels. E-government also increases the dependence of government agencies on information technology based services. High quality services entail high performance, availability and scalability among other service characteristics. Strict measures are required to help e-governments evaluate the service level and assess the quality of the service. In this paper we introduce the IT Infrastructure Library (ITIL) framework - a set of best practices to achieve quality service and overcome difficulties associated with the growth of IT systems [17][21]. We conducted an in depth assessment and gap analysis for both of the service support and service delivery processes [16], in a government institution, which allowed us to assess its maturity level within the context of ITIL. We then proposed and modeled these processes in accordance to ITIL best practices and based upon agency aspirations and environment constraints.

## Categories and Subject Descriptors

D.3.3 [Management of computing and information systems, Government]:

## General Terms

Management, Measurement, Performance, Design, and Standardization.

## Keywords

ITIL, ITSM, e-Government Infrastructure, Service Management, ITIL Framework

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## 1. INTRODUCTION

The Many governments and IT organizations attempting to increase service levels, decrease costs and improve security look to the ITIL framework for guidance. ITIL, or the IT Infrastructure Library, is widely accepted as the world's leading compilation of IT best practices [8].

E-government services require a certain service levels to be achieved as they replace traditional channels. E-government also increases the dependence of government agencies on information technology based services. High quality services entail high performance, availability and scalability among other service characteristics [5]. Defining the requisite service levels for such characteristics is key activity. ITIL provides a systematic approach for achieving pre-defined service levels for various service characteristics. The processes identified, designed and implemented as part of the ITIL framework can be considered as a tool or means to achieve pre-defined service levels for e-government [3] [18].

A large and increasing number of organizations rely on ITIL. In the U.S., organizations such as Procter & Gamble, Caterpillar, State Farm and Boeing have incorporated aspects of ITIL and IT Service Management into their IT management strategies. However, many misconceptions still exist about ITIL, which sometimes confound even long-time IT practitioners [9].

The objectives of this study are:

- Investigating the best practices standards for Information Technology (IT) service management that would be applied for the government institution.
- Developing a service management self assessment plan for the government agency.
- Conducting an ITIL government agency Gap Analysis. This is a document outlining the current state of the government agency with respect to ITIL standards.
- Design and model the TO-BE processes based upon agency aspirations and environment constraints.

## 2. INFORMATION TECHNOLOGY SERVICE MANAGEMENT (ITSM)

One primary origin of ITSM can be found in the systems management services and functions historically done in large scale mainframe environments. Through constant refinement over the years these services and functions attained a high level of maturity [12][10]. Problem and change management,

configuration management, capacity planning, performance management, disaster recovery, availability management, etc. are some examples.

ITSM is process-focused and in this sense has ties and common interests with process improvement movement (e.g., TQM, Six Sigma, Business Process Management, CMMI) frameworks and methodologies [4][6]. The discipline is not concerned with the details of how to use a particular vendor's product, or necessarily with the technical details of the systems under management. Instead, it focuses upon providing a framework to structure IT-related activities and the interactions of IT technical personnel with business customers and users.

IT Service Management is aimed at providing services that facilitate the achievement of corporate objectives and business goals in a timely and cost effective manner.

Service Management consists of a Service Delivery section and a Service Support section. Service Delivery realizes the relationship between the government agency senior management and the IT Department, by way of a Service Level Manager.

ITSM and ITIL upon which it is based are both an integrated, process based, set of best practices to manage IT services. Whereas ITIL defines and documents the best practices, ITSM employs them to meet unique customer requirements and priorities.

### 3. INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY (ITIL)

The Office of Government Commerce (OGC), the developer of ITIL, defined ITIL as “a set of best practice guidance for ITSM” (figure 1) and ITSM as “a top-down, business driven approach to the management of IT that specifically addresses the strategic business value generated by the IT organization and the need to deliver a high-quality IT service [2]. ITSM is designed to focus on the people, processes and technology issues that IT organizations face [16]. It takes its name from a series of publications written by dedicated IT professionals and industry experts giving guidance on Best Practice IT Service Management (ITSM) [20].

ITIL describes 2 domains and 11 processes of IT service management as follows [16]: the service support domain with the processes of service desk, incident management, problem management, configuration management, change management, and release management; and the service delivery domain with the processes of service-level management, capacity management, IT service continuity management, availability management and financial management for IT services. A hierarchical structure of roles and responsibilities is provided within each process as well. Moreover, the International Organization for Standardization (ISO) established the ‘ISO20000’ as the specification of international standards for IT service management in 2005 [10][11], which succeeded the ‘BS15000’ specification of the British Standard Institution based on the ITIL of OGC [16]. The United Kingdom's Central Computer and Telecommunications Agency (CCTA) created ITIL in response to the growing dependence on Information Technology to meet business needs and goals. ITIL provides businesses with a customizable framework of best practices to achieve quality service and overcome difficulties associated with the growth of IT systems.

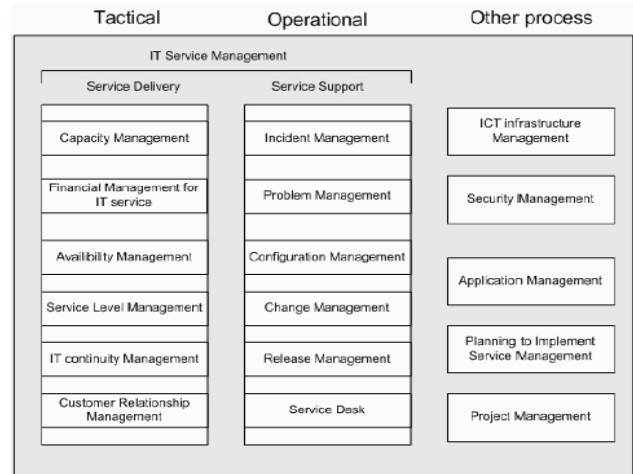


Figure 1. ITIL Infrastructure

As shown in Table 1, the core of ITIL comprises five service delivery processes and five service support processes and one service support function (service desk). Service support processes apply to the operational level of the organization whereas the service delivery processes are tactical in nature.

Table 1. Description of core ITIL components (adapted from OGC 2006)

| Service Delivery Domain – Tactical Level   |   |
|--|---|
| Service Level Management (SLM)             | Negotiates service level agreements (SLA) and ensures that these are met.   |
| Capacity Management                        | Ensures that the capacity of IT services and the IT infrastructure is able to deliver agreed service level targets in a cost effective and timely manner.   |
| IT Service Continuity Management (ITSCM)   | Manages risks that could seriously impact IT services. ITSCM ensures that the IT service provider can always provide minimum agreed service levels, by reducing the risk to an acceptable level and planning for the recovery of IT services. |
| Availability Management                    | Defines, analyses, plans, measures and improves all aspects of the availability of IT services.   |
| Financial Management                       | Manages an IT service provider's budgeting, accounting and charging requirements  |
| Service Support Domain – Operational Level |   |
| Service Desk                               | The single point of contact between the service provider and the users.   |
| Incident Management                        | Manages the lifecycle of all incidents. Its primary objective is to return the IT service to customers as quickly as possible.  |
| Problem Management                         | Manages the lifecycle of all problems. Its primary objectives are to prevent incidents from happening, and to minimize the impact of incidents that cannot be prevented.  |
| Change Management                          | Controls the lifecycle of all changes. The objective is to enable beneficial changes to   |

|                          |   |
|--------------------------|---|
|                          | be made with minimum disruption to IT services.   |
| Release Management       | A collection of hardware, software, documentation, processes or other components required to implement approved changes to IT services. |
| Configuration Management | Responsible for maintaining information about configuration items required to deliver an IT   |

### 3.1 Benefits of Applying ITIL Principles

IT is what drives business today. The fact is that the business profitability and customer service quality is dependent on a high availability, dependability, security and performance of IT services. ITIL provides the foundation for quality IT Service Management [21]. IT actively supports corporate aims by offering services which are based on efficient principles and adequately fulfill business requirements. It can become a profit generator instead of being seen as an inevitable cost burden.

The main benefits of applying the ITIL principles are [9]:

- Improved availability, reliability, and security of mission critical IT services
- Document and communicate roles and responsibilities in service provision
- Optimized IT infrastructure to provide for existing and anticipated business requirements.
- Permanently lowered Total Cost of IT Ownership (TCO) including service cost.

Many companies and government have made public the benefits they realized by implementing ITIL best practices for IT service management. An example of this is the Ontario Justice Enterprise Desk that cut support costs by 40% [14]. Another example Victorian State Revenue Office (Australia) completed full ITIL implementation in August 2005, resulting in cost savings of \$2 million per year while improving its overall capabilities and clarifying its IT vision [19]. The State Revenue Office also became the first government agency in the world to gain ITIL certification (BS15000/AS8018).

## 4. GOVERNMENT AGENCY AS A CASE STUDY

In 2005, a government agency started an initiative to turn slowly their face-to-face services to online services. It's a small step in the digital government pyramid, but it's a huge change to both of the civil servants and the citizens. In this holistic e-government initiative, a project was started between November 2008 and June 2009 to assess the level of the IT service management (ITSM) of the government agency as a case study of the application of ITIL for e-governments services and propose changes toward the usage of ITIL best practices and certification of ISO 20000-1:2005 [10][11].

The project involved mainly the IT department but it was also an opportunity to meet with key business stakeholders. We used both top-down and bottom-up approaches, where we were guided by the management in terms of vision strategy and objectives, but we were also guided by the day-to-day work done by the employees, which reflects the operational situation [1].

We surveyed the agency on its ITIL implementation and integration of service management, specifically on Service Delivery and Service Support. As we select the organization, the sampling is a non-probability sampling [7]. This form of sampling typically is only looking for the range of conditions or for examples of dramatic variations. The initial questions are sourced from the owners of ITIL OGC [16]. OGC developed these questions to get a feel for the maturity in the market related to their ITIL product. We adapted these questions and took them to the next level by consolidating the results and showing them to represent the maturity of the organization in graphical format. This enabled us to look at the whole implementation of service management rather than a process in isolation.

### 4.1 Gap analysis

This gap analysis strives to align the government agency organizational goals with its IT Service Management. Additionally the implementation of these ITIL Service Management processes will provide a better work environment and cater for building professionalism within each defined ITIL process. We followed the ITIL processes described in "Best Practices" framework defined by the Office of Government Commerce of the Treasury in the UK [20].

Figure 2 shows the organizational transformation phases.

Vision and Business Objectives - *Where do we want to be?*

ITIL Process Assessment - *Where are we now?*

ITIL Implementation - *How do we get where we want to be?*

ITIL Process Review - *How do we know we have arrived?*

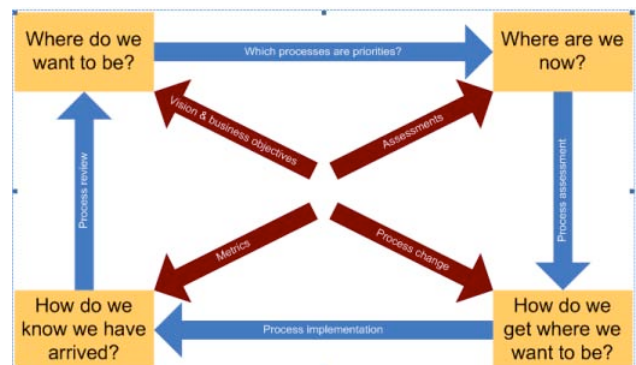


Figure 2. Organization's transformation phases

### 4.2 ITIL Contribution to agency business objectives

The numerous interviews that were conducted with the key people in the government's agency IT department resulted with the Figure 3 that gives an indication of the relative contribution of the ITIL processes within government agency which supports activities towards the business objectives. As we can see from Figure 3, Release, SLM, Change and Capacity management represent the majority of the contribution. The other processes are almost equally distributed.

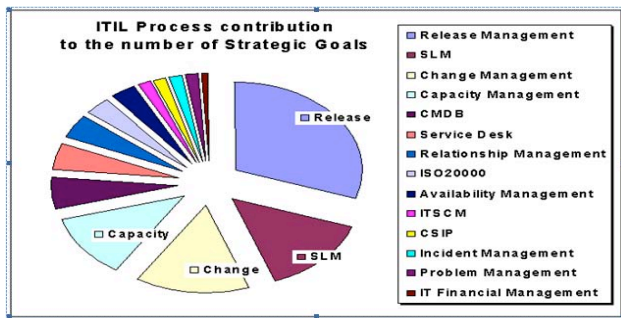


Figure 3. ITIL contribution to the agency strategy

### 4.3 ITIL service management self assessment

The aim of the assessment plan is to evaluate the level of service of the government agency and to find out how well it is performing compared to ITIL best practice.

Table 2. Assessment categories

| Category | Assessment Category    |
|----------|------------------------|
| 1        | Pre-requisites         |
| 1.5      | Management Intent      |
| 2        | Process Capability     |
| 2.5      | Internal Integration   |
| 3        | Products               |
| 3.5      | Quality Control        |
| 4        | Management Information |
| 4.5      | External Integration   |
| 5        | Customer Interface     |

The assessment plan also aims to create awareness of management and control issues that may be addressed to improve the overall process capability [13]. The self-assessment scheme is composed of a simple questionnaire which enables the government agency to ascertain which areas should be addressed next in order to improve the overall process capability. The assessment is based on a generic framework (Table 2) which recognizes that there are a number of structural elements which need to be in place for process management and for it to satisfy the overall intent and meet the needs of the customer.

#### 4.3.1 Rationale of the survey scoring system

The initial level of the framework [12], Level 1 and Level 1.5 providing both purpose and guidance in the transformation or use of the prerequisite items. At the lowest levels of the framework

model, the questions are written in generic terms regarding products and activities. At higher levels more specific ITIL terms are used, based on the assumption that organizations' achieving higher scores are more likely to use the ITIL vocabulary [16].

**Level 1: Pre-requisites** - Ascertains whether the minimum level of prerequisite items is available to support the process activities.

**Level 1.5: Management Intent** - Establishes whether there are organizational policy statements, business objectives (or similar evidence of intent) providing both purpose and guidance in the transformation or use of the prerequisite items.

**Level 2: Process Capability** - Examines the activities being carried out. The questions are aimed at identifying whether a minimum set of activities are being performed

**Level 2.5: Internal Integration** - Seeks to ascertain whether the activities are integrated sufficiently in order to fulfill the process intent.

**Level 3: Products** - Examines the actual output of the process to enquire whether all the relevant products are being produced. (Products is referring to an output results not software or a tools)

**Level 3.5: Quality Control** - Is concerned with the review and verification of the process output to ensure that it is in keeping with the quality intent.

**Level 4: Management Information** - Is concerned with the governance of the process and ensuring that there is adequate and timely information produced from the process in order to support necessary management decisions.

**Level 4.5: External Integration** - Examines whether all the external interfaces and relationships between the discrete process and other processes have been established within the organization. At this level, for IT service management, use of full ITIL terminology may be expected.

**Level 5: Customer Interface** - Is concerned with the on-going external review and validation of the process to ensure that it remains optimized towards meeting the needs of the customer.

#### 4.3.2 Assessment results

The processes that were assessed in this study are those related to service support and service delivery (cf. Table 1). What follow highlights and discusses the result assessments of each of these processes. Figures 4 to 13 show the results of the assessment derived from the scoring system explained above.

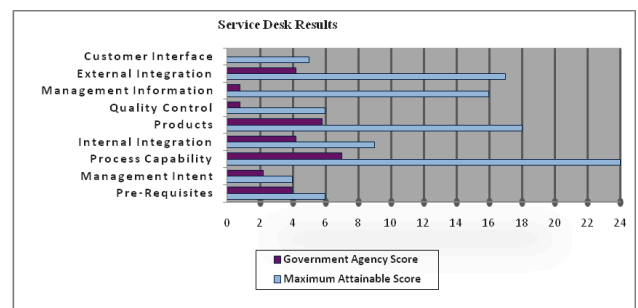


Figure 4. Service Desk Assessment

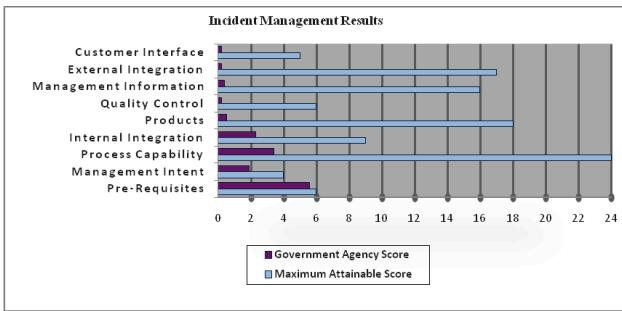


Figure 5. Incident Management Assessment

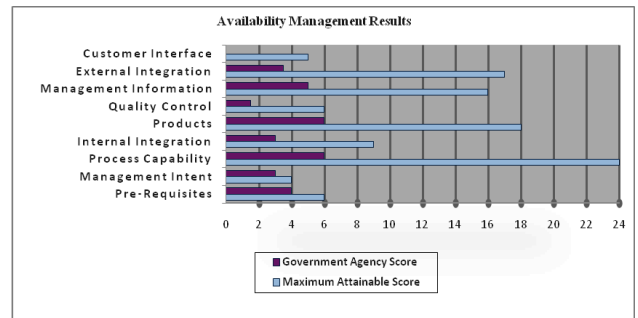


Figure 9. Availability Management Assessment

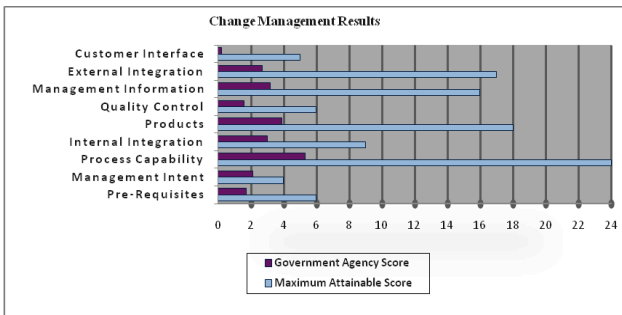


Figure 6. Change Management Assessment

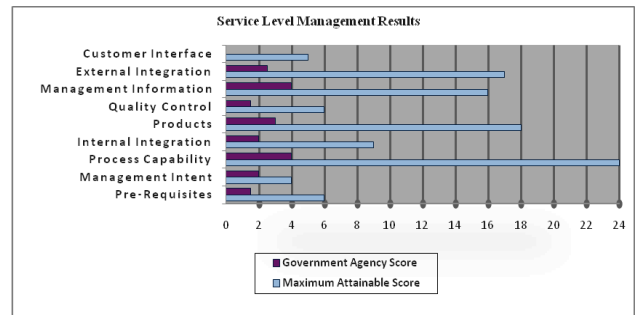


Figure 10. Service Level Management Assessment

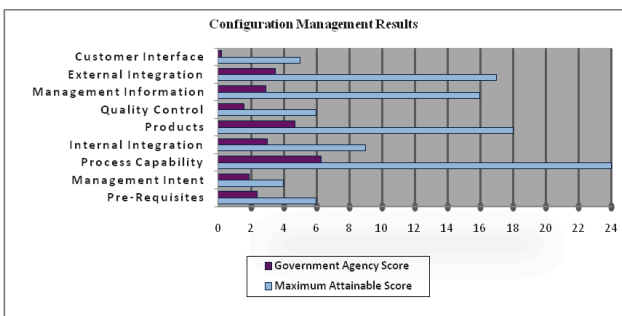


Figure 7. Configuration Management Assessment

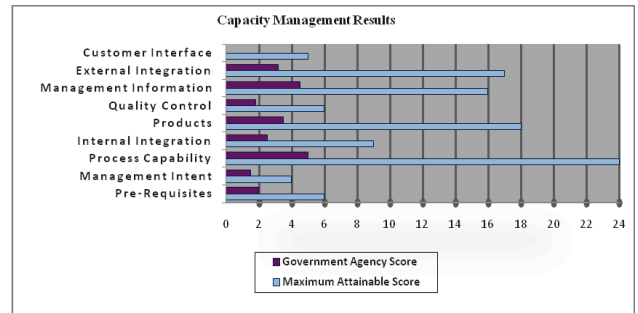


Figure 11. Capacity Management Assessment

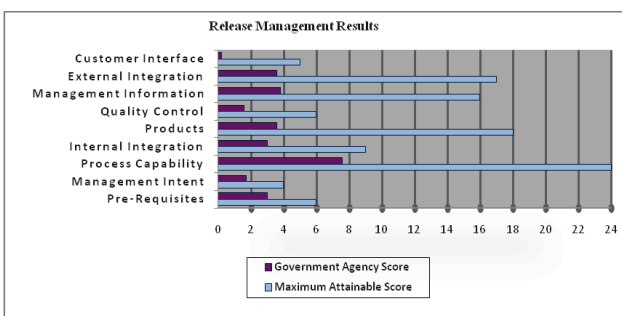


Figure 8. Release Management Assessment

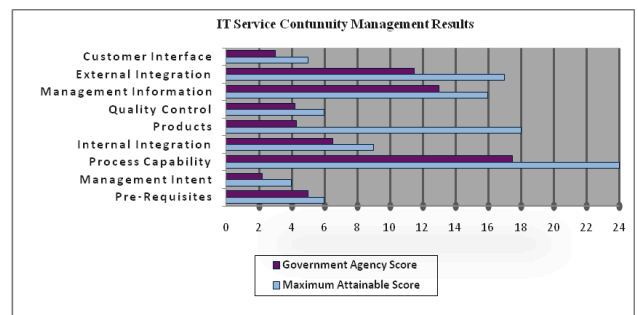


Figure 12. Continuity Management Assessment

### 4.4 Discussion

Table 3 summarizes the assessment of the IT service management for both of service support and service delivery processes. We divided the results of this assessment into three categories. The first category is related to the processes that are not available, and which need to be developed from scratch (service level management, problem management and configuration management). The second category is related to the processes that are functional and partially available, but they are still not following any ITIL best practices (availability management, capacity management, incident management, change management and release management). The third and last category is related to the processes that are implemented and available, but still lack ITIL best practices (IT service continuity management).

Table 3. Assessment analysis matrix

| Service management processes |                                      | Assessed state                  |
|------------------------------|--------------------------------------|---------------------------------|
| Service delivery             | Service level management             | Not available                   |
|                              | Availability management              | Functional, partially available |
|                              | IT service continuity management     | Implemented, available          |
|                              | Capacity management                  | Functional, partially available |
| Service Support              | Incident management and service desk | Functional, partially available |
|                              | Problem management                   | Not available                   |
|                              | Configuration management             | Not available                   |
|                              | Change management                    | Functional, partially available |
|                              | Release management                   | Functional, partially available |

|  |               |  |                                 |  |                        |
|--|---------------|--|---------------------------------|--|------------------------|
|  | Not available |  | Functional, partially available |  | Implemented, available |
|--|---------------|--|---------------------------------|--|------------------------|

After surveying the agency, it was found that the maturity level within the organization matches level 1.5. The survey highlighted varying levels of maturity across the various survey areas. Figure 13 depicts the totals of each area, averaged out against the maximum achievable score.

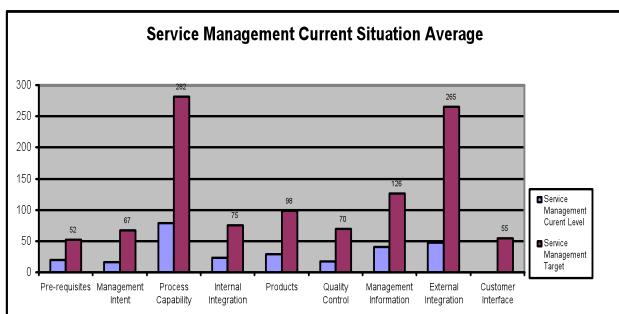


Figure 13. Service management current situation average

The survey highlights that most of the prerequisites for service management have not been adequately addressed. Management’s intent is low and should be vigorously driven to increase the awareness of IT Service Management within the organization. There is a strong need to begin setting objectives, creating an appropriate structure, defining and assigning roles &

responsibilities towards the provision of IT Service Management implementation. Process capability is weak in all areas e.g. Change Management – Changes that are being implemented to the IT infrastructure are logged but not assessed from an overall agency business impact point of view. Internal integration within the processes has not been established due to the non existence of some processes e.g. Service Level Management, and in others it is also far from adequate. Management information is not being provided due to the non existence of some of the processes, reports and report structures have not been defined and data is not being collected to produce reports. These MIS reports would be beneficial to the organization. Service Delivery processes are not always adequately supported by products or tools, and therefore, integration between the existing processes needs more attention. Interfaces, which establish the satisfaction of the customer, in terms of quality of service, do not exist.

The Service Support (operational) areas highlighted a typical “fire-fighting” reactive mode of operation. The initial contact for support, Service Desk and Incident Management are not functioning as per the required business needs. The processes which follow on in the life cycle of a reported event are lacking even in reactive mode (Problem, Change and Configuration Management).

The Service Delivery (tactical) areas of service level have not been setup. The processes involving capacity management and availability management have been bundled together and are addressed in an unstructured manner – this has led to the neglect of the performance of key tasks. IT Service Continuity is being achieved at a high level and it is addressed in the form of systems resilience & backups, which are covered under Capacity & Availability Management.

It is recommended that attention be given to the underperforming areas. Priorities should be based on business criticality of the missing functionality as well as the benefit and impact on the business.

Figure 14 represents the assessed maturity level average for each of the service management areas. We will notice that Problem Management is unavailable; Service Level Management (SLM) and Capacity Management conformance are almost zero. Service desk function does not reach even 30% conformance, and Incident Management which is its primary function is at around 14%. The remaining processes show an average conformance between 50% and 60%.

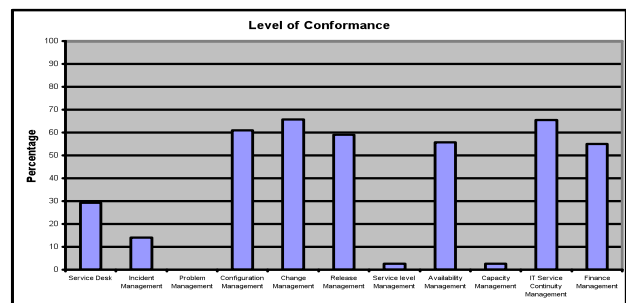


Figure 14. Level of conformance to processes

### 4.5 Lessons learned

The areas that need attention for ITIL to be adopted successfully are People, Process and Product. Organizations frequently focus on Process and Product, but the People aspect is often restricted to ITIL foundation training for IT staff, with little emphasis on the need to adopt a service code of conduct [2]. Without sufficient attention to People, some ‘quick wins’ can be missed entirely. As new processes are introduced, the customer may see this as ‘more unnecessary bureaucracy’ and the perception of the service provided by IT can degrade in the initial phase.

The process owners were not staffed at the right level but were instead arbitrarily allocated. A proper selection of the process owners would have saved time and effort in promoting and facilitating the process adoption.

The IT groups working under the umbrella of the IT department work in a silo mode; therefore efforts were spent in the beginning addressing this challenge before promoting the ITIL to the other business departments.

The gap between IT and the business need to be addressed before any process takes place, i.e. the Service Level Agreements (SLA) should be agreed upon according to the IT reality and not according to the business wishes – SLA baseline need be agreed upon. Process improvement will eventually happen down the road as the life cycle of the processes evolves.

IT can work to increase its status and humanize its approach. This doesn't require a radical change of the processes. Instead, IT simply needs to interact more with its customers, after all, it should not always be guided by KPIs (key Performance Indicators).

### 5. PROPOSED TO-BE PROCESSES

The assessment and the gap analysis conducted and discussed above, lead us to propose and design the TO-BE of both of the service support and service delivery processes with the exception of the service desk and financial management.

A TO-BE process can help understand the results of implementing these ITIL processes to meet business needs and customer demand. The processes are represented in a swim-lane diagrams style [15] (figure 15), which indicate associated processes as well as the roles identified for respective processes within the organization. If we take as an example the first process, which is Incident Management, we'll see that it has many links to other processes represented in the “Linked Process” swim lane. Among these processes, we will find Service Level Management, Change Management, Problem Management and Configuration Management. The Incident Management process is followed by different roles dependent on the priority and the complexity of the incident. We'll notice at the first level that we have Service Desk 1<sup>st</sup> and 2<sup>nd</sup> line, followed by Major Incident Manager and finally authorized specialist support, that corresponds to different expertise areas within the organization, such as network, security, legacy, databases, etc...The flow of the activities within the process is represented by the blue rectangles, and changes from one condition to another.

The other processes follow the same concept as the Incident Management process described above.

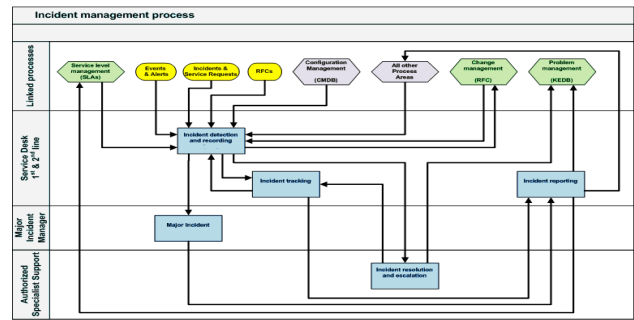


Figure 15. Incident Management Process

### 6. CONCLUSION

This work is aimed to set the bases for the integrity of the government agency e-Services. The above assessment and gap analysis enable the government agency to determine where their IT service operations on the ITIL continuum are, and how their current operating practices compare to ITIL best practices [16]. Once the agency is done with the analysis of where they are and where they want to be, they need to look at the cost in terms of time and effort that will take them to get there. At this point, they might decide to revise their vision or stay where they are.

The bulk of the work was devoted to draw a comprehensive self assessment plan that can be used to evaluate the government agency current and future e-services. This plan was carefully drawn after a thorough investigation of the quality standards of the e-services of e-governments and other IT services worldwide. This plan represents the core of government gap analysis. The output of the gap analysis is considered as an implementation plan that will shape up the entire government agency current and future e-services.

The assessment showed that the government agency lacks ITIL best practices in most of the processes. Both of the assessment and the gap analysis conducted showed that the processes could be categorized into three categories. The first category contains the processes that are not available and which need to be developed from scratch – these processes are: service level management and reporting, financial management, problem management and configuration management. The second category contains the processes that are functional and partially available – these processes are: availability management, capacity management, incident management, change management and release management. The third category contains the processes that are implemented and available – there is only one process which is IT service continuity management.

For all three categories ITIL coaching is needed and a methodology framework for ITSM could be used to enable the service, its delivery and management. A methodology framework such as SolutionMethod [12] enables organizations the ability to adaptively integrate best practices based on their specific maturity level and priorities. It employs a phased approach to ITSM that consists of assessment, architecture and design, planning, implementation, and support. With each phase, 5 perspectives of people, process, technology, organization, and integration are evaluated [1].

On the other hand, the assessment and the gap analysis helped us to develop the TO-BE processes which will be used by the government agency as the basis to develop and implement these processes based on ITIL best practices.

The lessons learned from this study, lead us to highlight some recommendations for a successful implementation, based upon agency aspirations and environment constraints:

- Full management commitment and involvement with the ITIL implementation.
- A phased approach. Start with a service desk function (Incident Management, Service Request, basic SLM and basic Configuration Management Database (CMDB))
- Most effective implementation strategy is to look for “quick wins” during the initial stage
- Consistent and thorough training of staff and management.
- Making ITIL improvements in service provision and cost reduction sufficiently visible.
- Sufficient investments in ITIL support tools.

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