Methodology for a Practical Implementation of Management Standards in Concrete Service Provisioning Scenarios

A Master's Thesis
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To my parents, brothers, wife and daughter

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1 Introduction

1.1 Background

In a competitive world where organizations seek to optimize their services while minimize costs, IT[1] plays an important role. Although there is still a perception among organization's staff in which IT is only seen as a technology provider, there is no concept furthest of the reality that this. Nowadays, organizations have the opportunity to offer IT as an additional service, not just provide technology to their business units. This opportunity to offer IT like a "service" is one of the best reasons to develop and implement an ITSM[2] system within organizations. Studies such as those developed by Gartner [**1**] shows that an average of 80 percent of IT service breakdown are directly caused by people or process and the other 20 percent is caused by technology malfunction, unintentional failures or a disaster, that is to say, most of the failures come from causes that can be avoided through establishment of some management level. For this reason, ITSM discipline emerges to mitigate the problem like these. Actually, there are a set of ITSM frameworks on the current market designed to support the services management, some of them use a different perspective to define its concepts, but all of them have a unique goal; assist to organizations to provide value to customers efficiently and effectively in shape of high quality IT services. Implement an ITSM system cannot be only a collection of information and retain it just long enough to get a certification. Instead of this, the organizations need to take their awareness to the next level. Therefore, organizations need to understand the concept of service management and what value that process can bring to their daily activities on the service provision.

In competitive times, the organizations manage to excel in the market with some features that make them different from the others, taking into account user's needs as well as its service requirements; where the services could be defined in terms of deliver "value" to customers, without the customers bear the costs and risks of the service delivery. The value offered to customers can be created in different ways, according to the best practices on service management; the value is achieved through of "utility and warranty" [**2**]. Thereby, these two concepts are the base to create a service of quality.

Readers need to understand ITSM - Information Technology service management as an outstanding discipline that could be applied to a different kind of environments. Although, there are good books on IT service management, as well as standards and best practices on the market, , we could not find one that suit strictly to all practical needs of any service provider; this is due to the nature of the services. Frameworks as ITIL are either too bothersome or extensive for people without prior knowledge in service management. Other cases, the framework as ISO/IEC 20000 is simply very short, aimed to expert professionals with enough experience in service management. Most times personnel involved with ITSM take advantage of both frameworks, and they use a combination of methods, tools and concepts to develop its own ITSM approach.

Nevertheless, the key aspect is not whether a framework is comprehensive or not. In fact, ITSM frameworks should be used as a tool to improve service management within an organization seeking meet the service requirements established by the customers. Thereby, service management definition depends on which framework we are using. In order to provide a formal definition of reference, we use the definition provided by ITIL

[1] IT- Information Technology

[2] ITSM – Information Technology Service Management

within its framework books, “Service management is a set of specialized organizational capabilities for providing value to customers in the form of services. The capabilities take the form of functions and processes for managing services over a lifecycle, with specializations in strategy, design, transition, operation, and continual improvement. The capabilities represent a service organization's capacity, competency, and confidence for action. The act of transforming resources into valuable services is at the core of service management” [**2**]. So no matter what definition is used, only is important remember that they all have a same purpose.

Other important aspect to consider, ITSM traditional approaches are suitable when exists supplier- customer relationship well defined, For example, ITSM frameworks has a tendency of assume that the customer has a direct contact with the service provider, usually represented as a formal contract among interested parties (Service Level Agreements, Underpinning contracts, Operation Level Agreements, etc). Nevertheless, these suppositions are no valid or clearly defined in some complex environments as discussed below.

In a world of collaborative work addressed to save time and money on computational resources, both enterprises and general users want not spend money and resources to implement infrastructure that allow perform their own tasks. Hence, multi-cloud scenarios and large-scale federated e-infrastructures seem a good solution to solve any inconvenience in shortage of resources and lack of interest on implementing infrastructures. The limitations of the ITSM frameworks become evident on situations where the relationships between the parties are not well defined as customer - service provider relationship, such as indicated in the previous paragraph. Consequently, for overcome these disadvantages at this moment there are ongoing projects that are addressed to solve management problems in these situation, among them one of the most important is FedSM project [**3**].

Broadly, IT professionals must ensure that the systems under their management provide an acceptable quality of service to their users. They must avoid pitfalls related with processes and staff inside organization and meet user's performance expectations in a cost-effective manner, taking into account guidance offered by ITSM frameworks. Finally, we can say that although there are frameworks that help to service management, there is not one that suits to all possible environments. So that, the employees involved on service management should use frameworks and adapt it to the particular needs.

1.2 Relevance and contextualization of the problem addressed

Nowadays, the contribution of Information Technology to business strategy adopted by each one of the organizations has experienced a significant growth. Likewise, the offered services by organizations has more dependency of IT infrastructure. Because of this, the lack of a proper management of information technology may cause significant impacts that can determine the success or failure of the organization in the market. Nevertheless, the importance of IT management has not gone unnoticed by some organizations that have implemented an ITSMS[3], reporting benefits related with the management of processes on IT service delivery. While others organizations have not started the way for implementing an ITSMS, claiming that they can work properly

[3] ITSMS- Information Technology Service Management Systems

without implement a management system. However, organizations have a general awareness of the problem when a correct management of IT services is not performed.

Among standards and “best practices” used for IT service management, ITIL has become in the "facto" standard used to perform the service management. However, this approach does not allow evaluate its compliance within the organization. For other hand, ISO/IEC: 20000 have not reached the implementation level of ITIL, but it is the only auditable standard, where the main drawback is that it requires a complete implementation whether certification is sought. Nevertheless, other approaches like CMMI for services could have rivalled with ITIL, but are now practically unknown. The particular approaches described in each standard or methodology defines a set of minimum requirements that must be met by organizations in order to be aligned with what the standard establish. Organizations have the misconception that the implementation of any standard complicate the development of daily activities for the delivery of services and that the efforts expended for carry out any activity, will increase after implementation of a SMS.

The standards and best practices should be not confused with a methodology to implement IT management processes. The proposed approaches do not provide a unique way that can work for all environments. Generally, the standards can be viewed like a guide, always thinking about particular needs of organizations. At the moment of implement a SMS[4] is indispensable take into account all individual features of each organization. For those reasons, personnel involved in the SMS creation and implementation must take into account the recommendations and guidelines of the different ITSM framework and adapt it to own needs. Because all organizations are not equal, aspects such as size, staff, business targets, customers, services, etc. may vary from one organization to another. The key point to succeed in the creating of a SMS is interpret very well the guidelines provide by ITSM frameworks and apply the concepts to a concrete scenario.

1.3 Thesis Objective

The objective if this thesis is the specification of a minimum complexity service management system (SMS) for a wireless sensor network provider. This SMS will be aligned with the ISO 20000 standard, from which it will be inspired.

In order to achieve the thesis general objective, the following sub objectives are proposed:

- Specification of the IT services to be provided
- Specification of the minimum requirements to be fulfilled by the SMS
- Specification of management processes to cope and capabilities to be achieved
- Analysis of management tools that can support the SMS

[4] SMS- Service Management Systems

1.4 Thesis Methodology

The main objective of this master thesis will be achieved through the steps described below.

Step1. Understanding of Information Technology Service Management – ITSM Frameworks.

Overall information related with ITSM (ISO/IEC-20000 part 1 and part 2, ITIL books, maturity frameworks, etc.) was collected. After that, ITSM frameworks were analyzed in order to understand their purpose, useful ideas, limitations, advantages, etc, in general any information that could be useful to achieve the master thesis target. Finally, a comparative table was developed with the main features of each framework that can be useful to whatever person who wants use an ITSM framework.

Step2. Characterization of the company for which we propose a service management solution.

We did a study about the organization that will provide the services, the current market and potential customers to create a profitable organization that allows meet the customer's requirements. We established our potential customers as well as a market strategy to cover all their needs, to do this, two outstanding tools are used:

- Canvas Model: Allow develops of business model in an easy way.
- Empathy model: See a business model from the customer’s point of view.

At this stage, a business model for the wireless sensor network service provider was established using a canvas template as well as an empathy model. As the result of this stage, a catalogue of services was developed for a segment of customers in the market.

Step3. Design of Management Processes

This step presents a set of minimum requirements in service management to our particular case, taking into account information provided by ITSM frameworks analyzed in previous sections. Additionally, we established a desired maturity model for our particular case as well as a set of documents, procedures and activities to obtain an appointed maturity level.

Step4. Analysis of Service Management tools

Focuses on the search of current tools in the market that serve as support to processes previously explored. In particular, selecting the best ITSM tool has never been an easy task. Therefore, this market overview offers relevant information about the key functional criteria to assess a tool; a review of ITSM tools that lead the market; benefits and risks each one of them. Finally in the end when you read this section, you should have enough information to choose the best tool among available options.

1.5 Thesis Structure

This master thesis core has been organized into four main chapters:

Chapter 2 introduces the basic concepts of IT service management: its importance, definition and main features, as well as a brief description of the main ITSM frameworks. At the end of the chapter, we will make a benchmarking of the main features of each one of ITSM framework.

Chapter 3 is focused on the understanding of a service provider on its current market. It presents the requirements for service management in a particular situation as well as the desirable maturity model for the organization. The chapter also includes the development of documents and templates to obtain an appointed maturity level within the organization.

Chapter 4, Design of Management Processes, focuses on the management aspects of the service provider. Introduces the minimum management processes needed to establish a service management system within a concrete service provider, in order to achieve a predefined maturity level

Chapter 5, Service Management Tools, complements the former two by providing a review of some tools available on the market related with ITSM. Also includes an assessment of how the tool supports the processes seen in the above stage.

Each one of the principal chapters has an introduction and sub-chapters. The introduction is addressed to the contextualizing and unifying of the content of each part. Likewise, the chapters begin with a theoretical explanation of the topic in question which is complemented with practical examples resulting in the creation of ourselves as a service provider. At the end of this master's work, we will get a service management solution for a concrete situation, based on current guidelines offered by several ITSM frameworks as well as an analysis of the main tools on the market with appropriate features to be implemented within organization for which the service management system was developed.

2 Information Technology Service Management - ITSM Frameworks

ITSM is an essential aspect in business today. However, the concerns about IT services, both internal and outsourced grow because these services do not meet the needs of businesses and customers, to solve this problem every business needs use of standards and best practices to achieve its individual requirements at a fair cost of implementation, but also take into account the customer's needs. All standards/practices analyzed into this chapter can play a very useful role on proper service management. Properly analyzing the methodologies discussed within the frameworks is what really generates knowledge; this knowledge serves of guideline for governing and properly manages the information technology in your IT organization, also assists transforming technological resources in services.

2.1 Information Technology Infrastructure Library - ITIL v3

As we saw in the introduction of this document, the organizations depend of IT to meet their corporate goals, satisfy their business needs and deliver value to customers. For this to occur in a manageable, accountable and repeatable way, the organizations should ensure that the IT services provided are:

- Matched to business needs and customer requirements
- Comply with current legislation
- Effectively and efficiently delivered
- Constantly reviewed and improved

IT service management is related to the whole service life cycle, thus covering the planning, designing, implementing, operating, supporting and improving IT services that are appropriate to the business needs of a given organization. The Information Technology Infrastructure Library (ITIL) [**2**] covers the management of the whole service life cycle providing a comprehensive, consistent and coherent "best practice" framework for IT service management and related processes, encouraging a quality approach for achieving business effectiveness and efficiency in IT service management.

ITIL is suitable to underpin but not command the business processes of an organization. Therefore, the role of the ITIL framework is to describe approaches, functions, roles and processes, upon which organizations could base their own practices. The role of ITIL is to give guidance at the grained level “processes” that is applicable generally “ITSMS”. Summarizing, ITIL is a set of best practices related with service management, where specialized staff develop an analysis of the trends relating to service management. The best practices are not based in pure mathematical or analytical foundation; they were simply obtained from the real world and represent what "seems to be the best" so far.

The organizations can see service management structure as a “pyramid” with the international standard ISO/IEC 20000 at the top (Figure 1), this standard provide a globally recognized certification related with IT service management. ISO/IEC 20000 is a standard that any organization may use to seek an accreditation and demonstrate its compliance with the guidelines proposed within the standard. ITIL is placed below top layer. So that, ITIL helps to ensure and demonstrate that the provisions of the standard are being met. In a similar way, ITIL processes may be used to achieve and demonstrate compliance with CobiT control objectives. One thing that should be noted

is that the ITIL framework is a set of best practices; it should never be seen as a methodology for managing IT. However, the level of detail offered by ITIL to manage processes is one of the biggest attractions. Organizations can adapt its needs to the proposed approach in ITIL.

Figure 1 ITSM Pyramid

The practice of service management proposed by ITIL is carried out under the concept of "service lifecycle". The service lifecycle defines five stages: service strategy, service design, service transaction, service operation and continual service improvement. Accordingly, these service lifecycle stages are covered by ITIL within its framework defining one book for each stage. The level of detail offered by ITIL implies that the framework include a large amount of information. While, ISO/IEC 20000 standards is compound by roughly 200 pages. ITIL framework is compound by approximately 400 pages in each one of the stages that are part of the lifecycle. The difference of information between the frameworks is sizeable.

ITIL core books do not exists in isolation. They are designed to interact among them in order to manage a service during its lifecycle. The purpose of each volume is shown below:

- Service Strategy: This phase presents how to align the services provided by IT with the strategic business objectives. This stage provides an overall strategy for IT service management.

- Service Design: The key mission of the Service Design phase is to design new services or modify existing ones for incorporation into the service catalogue. Service design stage should follow the guidelines established in the strategy phase with the intention of create services with the following characteristics: appropriate to the needs of the market, cost efficient and profitable, meet with the quality standards adopted and provide value to customers and users.

- Service Transition: The mission of the Service Transition phase is ensure that the products and services defined within the Service Design phase are properly integrated into the production environment and can be accessible to customers.

- Service Operation: This stage demonstrates how to achieve effectiveness and efficiency in the service delivery and support to ensure value for both customer

and service provider. Service Operation is the stage where plans, designs and improvements are implemented and measured.

- Continual service improvement: This stage is responsible for promoting the improvement as a continual activity. Continual Service Improvement is also responsible to identify improvements that can be candidates to form part of SIP[5]. Each one of stages defined by ITIL is responsible to carry out a set of specific processes. The processes documented within stages are depicted in the following figure [**5**].

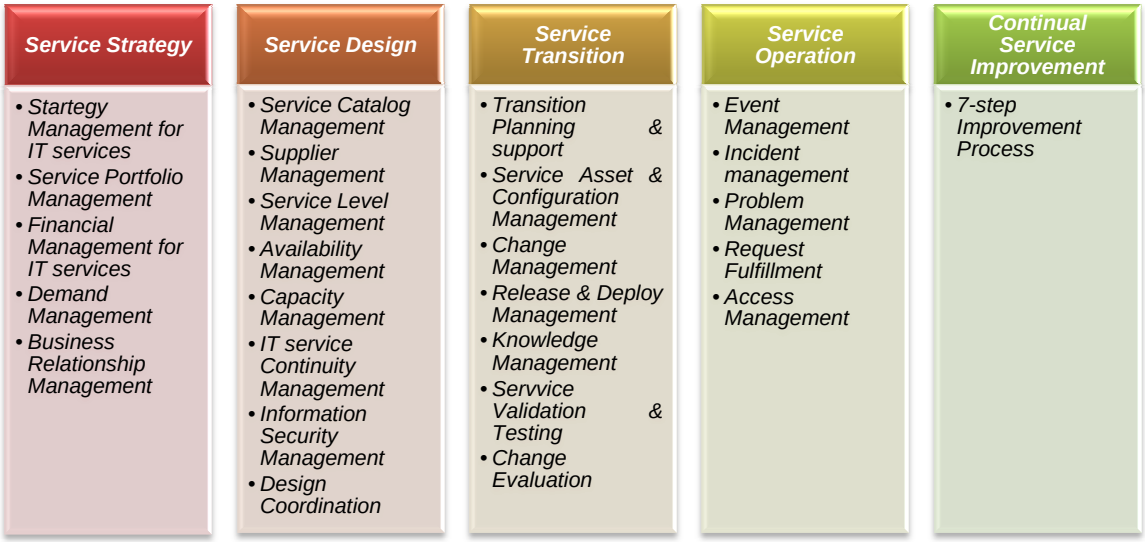


Figure 2 Service lifecycle and processes

2.2 Control Objectives for Information and Related Technology - CobiT

The assessment of business requirements, resources and IT processes are very important aspects for the proper performance of an organization; therefore a correct assessment guarantees their survival on current market. CobiT [**6**] is precisely a model to audit both management and control of IT systems, aimed at all sectors of an organization, for example, IT managers, customers, users and of course the auditors involved in the process assessments. CobiT is applied to information systems across the organization, including personal computers and networks. It is based on the philosophy that IT resources need to be managed by a set of naturally grouped processes to provide relevant and reliable information that requires an organization to achieve its goals.

The structure of the CobiT model proposes a framework which evaluates the information criteria, such as safety and quality, also are audited overall resources that are part of information technology, such as human resources, facilities, systems, etc. to make finally an assessment of the processes involved in the organization.

[5] SIP- Service Improvement Plan

The proper implementation of CobiT model within an organization provides an automated tool to assess swiftly and consistently meeting the control objectives and detailed controls, which ensure that the processes and information resources and technology contribute to the achievement of business objectives in a market increasingly demanding, complex and diversified.

CobiT has 34 - processes that cover 210 - control objectives, which in turn are classified into 4 domains as follow:

- Plan and Organize
- Acquire and Implement
- Deliver and Support
- Monitor and Evaluate

Finally, we can say that COBIT is a globally accepted framework for IT governance based on standards and best practices of the industry as well as provides best practices and tools for monitoring and management of IT activities. Maturity model is an important concept that we shall take from CobiT for our work. The maturity model for the management and control of IT processes is based on the method of process evaluation. At which point you are in management process within the organization and what activities you must develop to obtain a major degree of maturity. In the chapter dedicated to the design of management processes we will apply this concept.

2.3 ISO/IEC -20000 Information Technology Service Management

ISO/IEC 20000 [**7**] was published in December 2005, at the present time is the first worldwide standard specifically aimed at the management of IT services. ISO 20000/IEC was developed in response to the need to establish processes and procedures to minimize business risks due to a technical breakdown of the IT system within organizations. ISO/IEC 20000 describes an integrated set of processes that allow efficiently IT services delivering to organizations and their customers. This publication represents a major step towards international recognition and development of ITSM certification.

ISO/IEC 20000 consists of the following parts, under the general title Information technology — Service management:

- Part 1: Service management system requirement
- Part 2: Guidance on the application of service management systems
- Part 3: Guidance on scope definition and applicability of ISO/IEC 20000-1
- Part 4: Process reference model [Technical Report]
- Part 5: Exemplar implementation plan for ISO/IEC 20000-1

According to this thesis objective, we will take as starting point the part 1 and part 2 of the standard ISO/IEC 20000, as well as some references as needed related with ISO/IEC 9000 Quality Management standard. Below a brief explanation about the goals of each part:

Part 1 - Service Management System Requirements: This part of ISO / IEC 20000 establishes the overall requirements that organizations need to design implement and maintain for IT service management. ISO/IEC 20000 presents a process map that allows the offering of IT services with acceptable quality to interested parties.

Part 2 – Guidance on the application of service management systems: Describes the best practices adopted by the industry in relation to the processes of IT service management, which covers the customer's business needs, with agreed resources and takes an understood and acceptable risk. To achieve its goal this part of the standard takes foundations of the Part 1 - Service Management System without add extra requirements.

2.4 FitSM - Standards for Lightweight IT Service Management

FitSM – Standards for Lightweight IT Service Management is a standards family produced by FedSM project. The FitSM family is proposed for facilitating service management in IT service provision. Among the most important features of the standard is the possibility to be implemented in federated scenarios [**3**].

FitSM – Standards for Lightweight IT Service Management consists of the following parts:

- FitSM-0:2013: Overview and vocabulary
- FitSM-1:2013: Standard requirements for lightweight IT service management
- FitSM-2:2013: Recommended objectives and activities for lightweight IT service management.
- FitSM-3:2013: Recommended role model for lightweight IT service management.
- FitSM-4:2013: Recommended documents and selected templates for lightweight IT service management.
- FitSM-5:2013: Guidance on the application and implementation of lightweight IT service management.
- FitSM-6:2013: Maturity/ capability model and assessment scheme for lightweight IT service management.

FitSM – Standards for Lightweight IT Service is compatible with the international Standard ISO/IEC 20000-1 [**8**] as well as with the Information Technology Infrastructure Library – ITIL.

2.5 ISO/EIC 9000 – Quality Management

Complications relating to the effectiveness and quality are presented daily in business; a clear example is when an important document cannot be found. ISO/IEC arose to solve this kind of inconvenient. As regards standards, ISO/IEC 9000 [**9**] is one of the most recognized standards. ISO/IEC 9000 is a standard for quality management that presents guidelines with the purpose of increasing business efficiency and customer satisfaction. The goal of ISO/IEC 9000 is to embed a system of quality management within an organization, increasing productivity, avoid the unnecessary costs and guarantee the quality of processes and products.

ISO/EIC 9000 is a collection of guidelines that help to the company to establish, maintain and improve the system of quality management. Furthermore, it is important to emphasize that the standard is not a set of rigid requirements; therefore organizations have the flexibility of how they will implement their quality management system. This freedom allows the ISO/EIC9000 standard can be used in a wide variety of organizations without taking into account their size.

ISO 9000 is the standard for management systems that look like to many other management systems. These other systems based on health, safety, environment and business continuity can be integrated into a global business management. The benefits of this global system should consider at least: interest alignment, reduced costs, and improved efficiency. With one of these standards in place it could be relatively easy to extend the adoption of other standards. For instance, many documents are required for a different standard, but there are some already prepared by other currently implemented standards. Other important thing is that the staff is accustomed to the audit process. Using multiple standards will not only increase the efficiency of the organization, but also increase the integrity of its operations.

The ISO 9000 standard does not defined a methodology to implement a quality Management System. Nevertheless, whether sets a minimum requirements to be met by organizations that want built systems with a certain quality management. Inside this requirements, there are a wide range of options that allow to each organization define its own system of quality management according to their particular characteristics.

ISO/EIC standards related to quality are:

- ISO 9000:2005 "Quality management systems. Fundamentals and vocabulary"
- ISO 9004:2009 "Managing for the sustained success of an organization. A quality management approach"

Sometimes, certifications are, in fact, often based on customer contractual requirements rather than a desire to improve the quality. Also is important to highlight that the ISO/IEC standards are aligned among them. So, several standards could be implemented inside an organization.

2.6 ISO/EIC 27000- Information Security

Information is a vital asset to the success and continuity in the market for any organization. One of the most relevant objectives for the organization is the assurance both the information and information processing systems. Organizations seeking a proper management of information security, surely need establish a system to address this task in a methodical and documented way, taking into account the clear objectives of security and information risk assessment.

ISO / IEC 27001 [**10**] is the only auditable international standard that provides best practice recommendations on information security management, risks and controls within the context of an overall information security management system (ISMS). ISO/IEC standard encouraged all organizations to assess their information security risks as well as implement appropriate information security controls according to their needs, using the guidance and suggestions provided by standard

ISO/IEC 27000 consists of the following parts, under the general title Information security management system:

- ISO/IEC 27000 — Information security management systems — Overview and vocabulary
- ISO/IEC 27001 — Information security management systems — Requirements
- ISO/IEC 27002 — Code of practice for information security management
- ISO/IEC 27003 — Information security management system implementation guidance
- ISO/IEC 27004 — Information security management — Measurement
- ISO/IEC 27005 — Information security risk management
- ISO/IEC 27006 — Requirements for bodies providing audit and certification of information security management systems
- ISO/IEC 27007 — Guidelines for information security management systems auditing (focused on the management system)
- ISO/IEC 27014 — Information security governance

A correct implementation of ISMS ensures the basic controls necessary to guarantee: Confidentiality - ensuring that only those authorized can access the information, Integrity - ensuring that the information provided to business processes is accurate and complete and Availability ensuring that information is available at any time as required by business processes. As a conclusion, ISO/IEC27000 standard enables the organizations demonstrate that have controls and procedures implemented to ensure the safe treatment of the data and information.

2.7 Capability Maturity Model Integration - CMMI

CMMI stands for Capability Maturity Model Integration [**11**] and refers to the model that contains the best practices that help organizations improve their processes. They were developed by teams of experts from industry, government, and the Software Engineering Institute (SEI) but they transferred the rights to CMMI Institute for operation and marketing [**11**]. CMMI provides guidance for quality processes and provides a point of reference for the evaluation of the current processes, also provides a method to assess the capability and maturity of business processes.

The notion of Capability can be defined as the ability or level of effectiveness of a service provider in a specific aspect of service management. For example, we can say the capability to track changes in configuration items of a given service provider is at a determined level depending on how this service provider is dealing with these changes. On the other hand, the notion of Maturity is the ability of a service provider to manage their services made up by the combination of their capabilities in different specific areas. For example, we can assign a given maturity level to a service provider in the area of configuration management depending on the ranking of capabilities in all the aspects associated to configuration management.

This model is divided into five maturity levels, helping to define the priority of actions to increase the maturity and improve processes.

Maturity levels defined into CMMI Framework are:

- Level 1 - Initial: Processes are usually ad hoc and disorganized. The organization usually does not provide a stable environment.
- Level 2 - Managed: A process is referred to as “Managed" when the organization has ensured that requirements are managed and that processes are planned, performed, measured, and controlled.
- Level 3 - Defined: A process is referred to as "defined" when the processes are well characterized and understood, and are described in standards, procedures, tools, and methods.
- Level 4 – Quantitatively managed: A process is referred to as “Quantitatively managed “when are controlled using statistical techniques and other quantitative techniques. Quantitative objectives for quality and performance of the process is established and used as criteria in managing the process
- Level 5 - Optimizing: A process is referred to as “optimizing” when there is a set of optimizing process focuses on continuous improvement of the processing performed by using incremental improvements and technological innovation.

On the other hand, CMMI define also six capability levels as follows:

- 0 – Incomplete
- 1 – Performed
- 2 – Managed
- 3 – Defined
- 4 - Quantitatively Managed
- 5 - Optimizing

Applying a process improvement model like CMMI can provide great benefits. But we need to be aware that to get any level of maturity requires work and commitment from the company.

2.8 Benchmarking among the ITSM Frameworks

Below, we present a comparative table with the main features of each framework:

ITSM Frameworks Benchmarking			
Name	**ITIL**	**ISO/IEC 20000**	**COBIT**
Logo			
Created by			
Web	*http://www.itil-officialsite.com/*	*www.iso.org*	*http://www.isaca.org*
Addressed to	*Anyone interested in learning best practices related with IT service management.*	*Organizations seeking certification to demonstrate that offered services are aligned with the best practices.*	*Top management, auditors, IT managers, staff, consultants, engineers and in general at all levels of an organization which is required to implement IT governance.*
Approach	*A set of best practices for service management, providing management guidelines for adopting roles, responsibilities and activities which must be performed by different processes described delivering services with both efficiency and quality.*	*Indicates the minimum requirements that must be met to establish a system for IT service management, these requirements, serves as the basis for certification audits.*	*Establishes a globally accepted framework for control functions of the areas of Information Technology. CobiT is used to plan, implement, monitor and evaluate the government on IT, through to incorporating control objectives, audit policies, performance measures and outcomes, critical success factor and maturity models.*
Fulfillment	***Voluntary*** *Organizations can adopt ITIL practices to implement within their organization, they can select the most valuable aspects that help to meet with strategy goals*	***Voluntary – binding*** *Organization can use the standard as a reference model without seeking any certification, but the relevance when the standard is applied is to obtain the certificate through the fulfillment of complete requirements within the standard.*	***Voluntary*** *Organizations use CobiT mainly to monitoring and controlling. CobiT provides both measurement parameters and maturity models for measuring target attainment and includes identification of the relevant responsibilities both in the technical area and IT.*

Frame	*ITIL includes five core volumes:* *1. ITIL Service Strategy* *2. ITIL Service design* *3. ITIL Service transition* *4. ITIL Service Operation* *5.ITIL Continual service improvement*	*Standard specified four key service management processes broken into 13 IT processes, as follows:* *1-Service delivery processes – Includes service level management, availability management and capacity management.* *2. Relationship processes – Involves interfaces between service provider, customers and suppliers.* *3. Resolution processes – focuses on incidents being resolved or prevented* *4. Control processes – Involves managing change, assets and configurations*	*CobiT has 34 processes that cover 210 control objectives classified into four domains as follow:* *- Plan and Organize* *- Acquire and Implement.* *- Deliver and support* *- monitor and Evaluate*
Advantages	*- Approach can be adopted in a partial manner* *- Suggest a continual improvement*	*- Set up a management system* *- Monitors their fulfillment* *Assure continual improvement* *- As a standard provide reliability to stakeholders*	*-Provides a common vocabulary for IT governance.* *-Offer a comprehensive vision for top management about what makes Information Technology* *- Results can be seen on indicators of efficiency and effectiveness* *- Alignment with other standards and best practices*
Disadvantages	*-Contemplates not a tracking scheme or fulfillment scheme* *- Cannot ensure compliance*	*- By itself not provide enough information for people without prior-knowledge*	*- A specialist method with a lot of criteria and it requires a certain degree of expertise to use the methodology effectively.* *-Control base primarily* *- It does not provide more details about how processes should be implemented to support internal control.*

Name	ISO/IEC 9000	ISO/IEC 27000	CMMI
Logo			
Created by			
Web	www.iso.org	www.iso.org	www.cmmiinstitute.com
Addressed to	*Any organizations wishing to establish Standardization of processes, Customer Satisfaction requirements, Demonstration of product quality and service to third parties, Strengthening corporate structure to internal changes or market.*	*Any organization that intends to implement an ISMS supported on the standard.* *Anyone who wants to understand and apply knowledge on service management information security*	*Serve as a basis for any organization that decides to acquire a consistent way based on continuous improvement of the establishment and institutionalization of a number of key process areas*
Approach	*Sets the requirements to be met by the management system to ensure the quality of service or product in any company regardless of the size of it or the complexity of the production process.*	*An ISMS is basically a systematic set of measures to protect the information, regardless of the medium in which they are placed, against any threat, so that we can ensure the continuity of business activities, minimize the damage that could cause and maximize return on investment.*	*CMMI is a reference maturity framework of organizations in the performance of its processes. Also provide a basis for the evaluation of maturity within the organizations and a guidance to implement a strategy of continual improvement*
Fulfillment	***Voluntary – binding*** *Organization can use the standard as a reference model without seeking any certification, but the importance when the standard is applied is to obtain the certificate through the fulfillment of full requirements within the standard.*	***Voluntary – binding*** *Organization can use the standard as a reference model without seeking any certification, but the importance when the standard is applied is to obtain the certificate through the fulfillment of complete requirements within the standard.*	***Voluntary*** *Organization can use the model as a reference model to increase efficiency of each process within organization*

Frame	*- ISO 9000:2005 "Quality management systems. Fundamentals and vocabulary"* *- ISO 9001: 2008 –sets out the requirements of the Quality management system.* *- ISO 9004:2009 "Managing for the sustained success of an organization. A quality management approach"* *- ISO 19011:2011 – sets out guidance on internal and external audits of quality management systems*	*27000: Information security management systems, Overview and vocabulary.* *27001: Information security management system Requirements* *27002: Code of practice for information security management* *27003: Information security management system implementation guidance* *27004: Information security management — Measurement* *27005: Information security risk management* *27006 : Requirements for bodies providing audit and certification of information security management systems* *27007:Guidelines for information security management systems auditing* *27014 : Information security governance*	*The latest version of Capability Maturity Model Integration -CMMI contains 22 Process Areas that describe the aspects of product development that are to be covered by organizational processes:* *- Causal Analysis and Resolution.* *- Configuration Management.* *- Decision Analysis and Resolution.* *- Integrated Project Management* *- Measurement and Analysis.* *- Organizational Process Definition* *- Organizational Process Focus* *-Organizational Performance Management.* *-Organizational Process Performance.* *- Organizational Training* *- Product Integration* *- Project Monitoring and Control* *- Project Planning* *- Process and Product Quality Assurance* *- Quantitative Project Management* *- Requirements Development* *- Requirements Management* *- Risk Management* *- Supplier Agreement Management* *TS- Technical Solution* *- Validation* *- Verification*
Advantages	*-Activities of staff working within the organization are standardized* *- Increases customer's satisfaction. Providing quality products and services.* *- Measure and monitor performance of processes* *- Reduce the negative impact in production or service delivery*	*-Provides reliable protection of information that the organization collected from their customers.* *- Preserves data confidentiality.* *-Preserves data integrity.* *-Allows easy availability of the protected information.*	*- Improved visibility on Projects* *-A Knowledge Base is generated* *-Improves quality of product or service* *- A shared vision of the organization's wishes, its objectives and how everyone participates and contributes to the achievement of these objectives.*
Disadvantages	*- The effort and cost for preparing the documentation and kept update.* *- The costs required to implement and maintain the necessary measures to comply with the standard*	*-By starting certification process, you can overload the usual place of work of the entire organization; therefore you must be aware of the additional effort.* *- Initiate the certification process does not mean that we get the certification*	*CMMI requires greater investment in resources for its implementation that ISO 9000 standard* *-In some cases, perhaps would be very detailed* *-Only focused on reaching the next level of maturity, forgetting to improve organization's goals.*

Table 1 Benchmarking of ITSM Frameworks

3 Characterization of the company for which we propose a service management solution

Among the new possible research fields, WSN – Wireless sensor Network had become one of the most promising technology for the near future due to the fact that have a set of features that differentiate them from other technologies. Some of the most important characteristics are lifetime of the sensors, hardware low cost, easy deployment of applications, low power consumption, response time and others. As the global trend is to place the sensors in as many places as possible, the importance of wireless sensor networks has grown to be considered part of the evolution of the Internet towards the "Internet of Things"- IoT [**12**].

Another important aspect that makes WSN technology attractive for researchers is its variety to be used in different applications. Actually, WSN is being implemented successfully in systems as environmental monitoring, structural monitoring, Industrial monitoring and control, smart utility, urban monitoring and control, telecommunications applications, etc. Additionally, WSN can be combined with others scientific areas to develop unthinkable applications, this diversity of applications opens up a range of possibilities for developing business over this technology.

At this point, it is necessary to define a general concept about WSN: In accordance with our vision, WSN is a network with a lot of small devices, which are autonomous, geographically distributed, and called sensor nodes, which are installed around a phenomenon to be monitored, with the ability of storing and communicating data wirelessly.

The WSN should include at least the following elements to support any application:

- SENSORS: Elements responsible of taking the information from the environment (monitoring any parameter) and converting the information into electrical signals to be transmitted, from different types and technologies.
- SENSOR NODES: Hardware/software devices, they get information from the sensors through their ports and send the information to the base station.
- BASE STATION: Data collector, it can be at the same time a Gateway.
- GATEWAY: Element for the interconnection between wireless sensor network and a TCP / IP network.

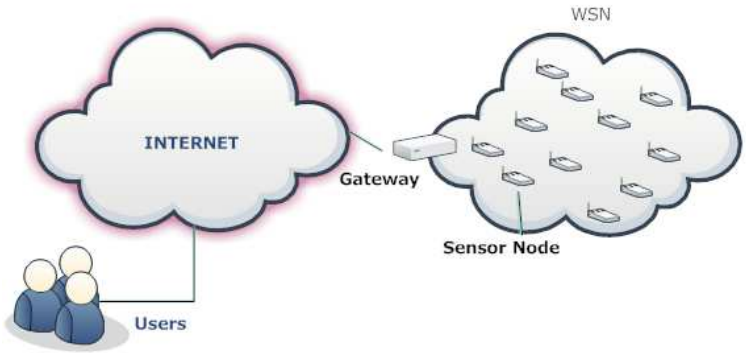


Figure 3 Wireless Sensor Network

Having defined a WSN network from the architectural point of view, it is of primary importance to define what services we can offer. Clearly, and as this domain of research is still quite young, there are differing opinions among business practitioners and researchers on what information is relevant, for the moment, let us pass over this discussion and start with the following premises to define our services:

- WSN is a technology that can be deployed on almost any environment, so practically any singularity could be monitoring.
- There is an interface called "gateway" or "base station" that allows the communication among wireless sensor network and its customers, nowadays there is not a platform that unifies and organizes all the information provided by WSN.
- At Gateway level there are many kind of information, from the information provided by internal sensor nodes to information collected by sensors that can be externally connected, this information is useful for researchers not only in the field of wireless sensor network.
- With access granted to information from various sensor networks, there is possible to do research on various fields such as topology control, routing, transport, security, energy consumption and harvesting, localization techniques, etc.

Our organization (company) is aimed to provide a single point of contact in which the customer can find information from all our sensors nodes to which he is subscribed. Although the sensor nodes in most cases not belong to the same wireless sensor network, the user can obtain information from any sensor. The proposed scenario is shown in Figure 4.

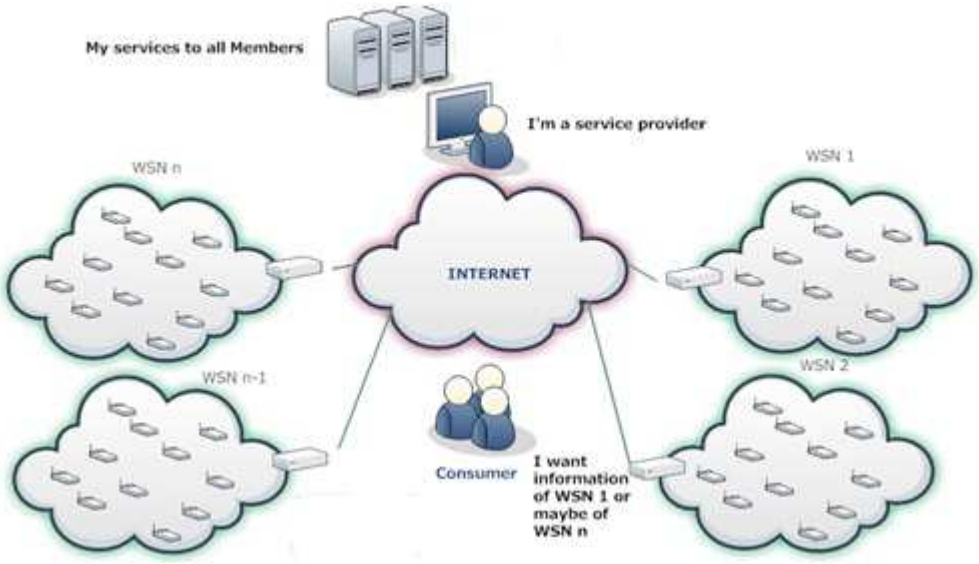


Figure 4 Overview of the service provider

As explained in several previous sections of this master thesis, the main goal of this work is to provide a service management solution in a particular case, through the development of models applied to real service defined by ourselves. In order to achieve this, we have identified one area of interest for the scientific community. In a second step, we will divide this area into a set of potential customers. Therefore, the following sections will be guiding us in the conformation of a service provider that offers WSN services to a selected group of customers.

3.1 Market definition

As a provider that wants to offer services using the advantages offered by WSN, we have several action fields as well as the different type of customers. For instance as a service provider we can cover customers of different class, from a farmer who wants to know if it will rain on their crops to a scientist who wants to analyze data to determine the behaviour of a hurricane. Also, we can't forget the scientific community related with WSN technology; they can use the sensors that are being used to measure physical quantities in order to perform simulations in some field of interest for them.

At this point we need to define our potential customers, from the point of view of our business; it is possible to classify our potential customers into three groups:

Researchers*:*

As we know WSN technology is cheaper that other technologies and in some cases the research groups have enough funding to deploy their own networks of sensors, but it would be exciting for them carry out simulations with large-scale and located elsewhere networks. Another advantage is the variety of applications in which researchers use wireless sensor networks, if we gather information from different fields of application; we can expand the range of users who would want to pay for the information. for example if we work together with sensor networks deployed in the military field, our group of customers who would want to pay for the service would increase substantially, the same premise applies to other fields of application.

Municipalities / Public entities*:*

A major advantage of wireless sensor network is its easy implementation in areas of difficult access, where deployment a conventional sensor wired networks is not possible. This advantage can be used to offer a sensing service of natural phenomena affecting citizens. The municipalities might have an interest (paying per information) in having information related with earthquakes, river flooding, environmental temperature, air pollution, etc. Additionally they want information about traffic congestion, vehicular speed, tolls, etc. That is to say, the cities want to implement any application that allows them advance to become a smart city.

General Public*:*

The information is not only relevant to people proprietress of the network. People with an interest or implicated in topics where the information collected by the sensors is relevant could pay for the information contained in the reports. Among potential customers that we can find in this group are the farmers, miners, event promoters etc. the main difference with municipalities/ public entities is that this kind of customers need information only sporadically, when their own applications or projects need information of the sensors placed over its coverage area. For example, a farmer that wants cultivate in a particular area (he wants know the relative humidity over a particular zone).

A common mistake in market definition is to try to sell to everyone and also try to create products and services that appeal to everyone, but in reality the most successful organizations are those that have found a customer segment "ideal" for its value proposition. Although we described three groups that in the end cover all the potential customers, our services will be defined based on the needs of the first group of customers "Researchers", trying to make it useful for the other two groups.

The key to success of any business is to build a product or offer a service that perfectly fits the needs of the customer, so it is essential to know very well our customer. Actually, there is an amazing tool for building a business model from the customer's point of view, called "Empathy map". Using an empathy map we get a solid knowledge of our customer, environment, concerns, behaviours, expectations and decisions. This tool allows us to understand:

- Expected value proposition
- What are the distribution channels to connect with them
- What kind of relationship they want to establish
- How much they are willing to pay for my services

Hence, we will develop a particular empathy model, which represents our target customers.

3.2 Empathy Map

Empathy map is a tool developed by XPLANE now Dachis Group [**13**]; the tool helps us better understand our customer, their environment, their vision and their own needs. Although this tool has long been used in the "design thinking", its popularity arose because it is a useful complement of “canvas model" in the business model definition.

The main goal is to understand what your customers want from your business. When you work with an empathy map, you take the perspective of your customers or business partners to examine strategically the desires and needs of those important to your company, and to uncover ways to improve your product or service. Therefore, we will apply the empathy map methodology to an environment where potential customers are those persons interested in information related with wireless sensor networks.

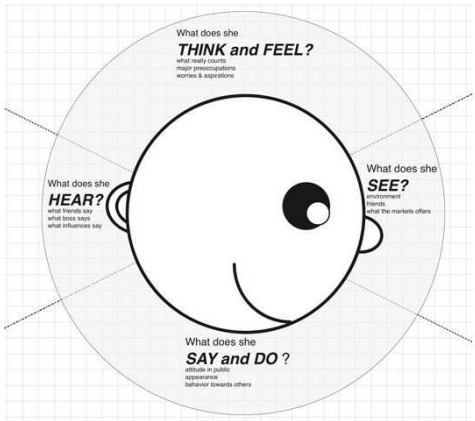


Figure 5 Empathy map

The real power of empathy map becomes evident when it is used for correctly define a company's customers. Empathy map is composed by six sections allowing us to better understand our customers. Sections of the empathy map are described as follow:

1. Think and Feel: This section seeks to know the customer at emotional level. Also "think and feel" section is dedicated to understanding about what really matters to the customer what are their feelings and expectations.
    - What is really important to the customer
    - Things that really motivates the customer

2. Hear: This section aims interpret all the information that the customer hear within the professional environment. Additionally, the people that can influence in the customer's decisions.
    - Persons that the customer listens
    - media that could influence the customer

3. See: this section aims understand the environment of the customers through topics such as: what kind of offers he is exposed, cases of success that has seen lately, etc
    - Products or services that try to solve the customer's problem
    - Where the customer can purchase the product or service
    - Options on the market

4. Say and Do: Describe what the customer sees in its surroundings taking into account the context of product or service offered.
    - The customer’s attitude
    - Things that can say other people

5. Pain: Understanding of the things that frustrates customers. Determining which obstacles the customer would find during the daily work.
    - Risks that the customer is afraid to take
    - Overall fears

6. Gain: Determine what are the motivations of customers at the moment of contract a product or service as well as the goals that the customers want to achieve.
    - Targets that the customer really need achieve
    - Manner to measure success
    - development of their daily tasks could be more easily

As the main idea is to have a point at which users can find information related to the sensor nodes, the key customers to develop our model of empathy will be the researcher community. However, for our empathy model we will include some features belonging to others customers such as municipalities / public entities and general public, because, from them, we will get monetary profit.

The empathy model can be represented in different formats. For our particular case, we use a graphical representation of different colours (colours are used only for visual representation, it has no relevance). Users of empathy model may create an individual representation that better fits to its needs. However, they should always keep the purpose of each of the fields that are part of the model.

The figure below shows information about the empathy map of our customers.

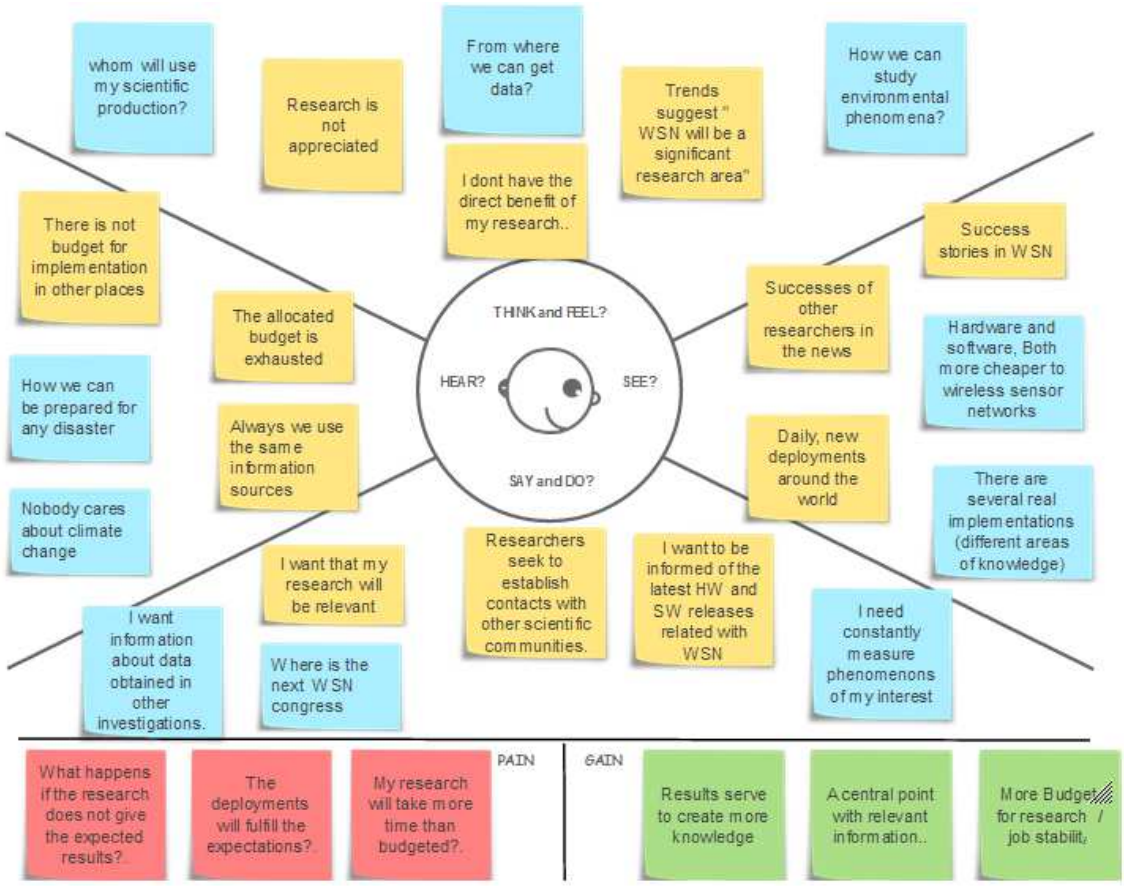


Figure 6 Specific empathy map

Using as base the information provided by the empathy map, we can deduce a general definition of the customers, accordingly the customers could be defined as follows:

*Customers Re*search groups formed by researchers and developer teams throughout all Europe, requiring information provided by wireless sensor networks. Additionally, we try to be a support to public entities and persons that have ideas about how to use data acquired by sensor networks, but they don't have the experience and budget required to deploy a WSN.

According to marketing strategies, the customers that we want attend could be classified as a customer by need, this kind of customers have a necessity or requirement that has to be satisfied by us as a service provider. The following steps to become service providers are to design a set of services that will satisfy customer's needs.

3.3 Service definition

Our business alternative has its origin in the current sensor node situation; the sensor node cannot store large amounts of information due to its limited processing and memory capacity. As value creation is based on understanding the problem and finding a solution, the principal aim is to create an information system, which allows the user get information of any sensor node through an internet access.

On the other hand, we cannot forget that one of the leading features of WSN is its deployment on remote places with difficult access as well as the huge amount of sensor nodes for real implementations. Taking into account these considerations is also important to design a service that allows simulations concerning to topology control, routing, transport, security energy consumption and harvesting, localization techniques, etc. Hence, as service strategy will define a set of services that will cover the basic needs of the scientific community involved to wireless sensor networks as well as any requirement of scientific communities working in other fields of research, the services defined are as follows:

- Sensor Information database - SID
- Supporting Research - SR
- Sensor Map - SM
- Application deployment- AD

The next section provides an overview of these services. Also, we will clarify the purpose, objectives and value to customers, as well as the key features of each offered service.

3.3.1 Sensor information database- SID

SID is a service that stores the entire information gathered by each one of the sensors belonging to the wireless sensor networks that form part of our organization, from its inception to disposal. That is to say that it is a service that offers information related with ambient light intensity, humidity; atmospheric pressure and temperature collect by sensors, from its deployment within the wireless sensor network until its withdrawal, therefore, if the sensor is active; the data that the user get is information sensed at the instant of time when user performs the query, on the other hand, if the sensor is not active the user gets a historical daily report of the following four variables; humidity, atmospheric pressure, Ambient light intensity and temperature since deployment until the last day worked.

Service Name	Service Group	What can be sensed?	Comments
Sensor Information Database	*Environmental Monitoring*	*-Temperature* *- Atmospheric pressure* *- Humidity* *- Ambient light intensity*	*Wide variety in the market of sensors (phidgets)*

Table 2 Sensor information Database – SID

Users of this service may also have, information charts that allows visually study the evolution of the variables considered in the historical period detecting cyclical behaviour, daily trend, seasonal trend and outliers.

3.3.2 Supporting research- SR

SR provides a mechanism to perform simulations using different wireless sensor networks. Customers can connect and perform simulations over the wireless sensor networks that belong to our company. Using this service, the user could schedule in advance when perform any simulation using the resources and devices in any wireless sensor network belonging to the organization. The user may perform simulations related with the following topics topology control, routing, security, energy consumption and harvesting, transport and localization techniques.

Service Name	Service Group	What can be simulated?	Comments
Supporting research	*Data Transaction*	*-Topology control* *- Routing* *- Transport* *- Security* *- Energy consumption and harvesting* *-Localization techniques*	*There are other important aspects such as network architectures , operating system, etc. (skipped in this service)*

Table 3 Supporting Research

3.3.3 Sensor map- SM

Sensor map is a service that allows a visualization of the information of sensor nodes placed inside a motor vehicle. The user can use any mobile device to access the following information:

- Information about location of the sensor (latitude and longitude) with a mismatch of not more than 1.5 meters.
- Route time control, speed, number of stops and downtime in stops.
- Planning, monitoring and ongoing advice in design and monitoring of routes and vehicle's condition
- Historical reports of alarms generated by the vehicles.
- Historical reports of routes taken by vehicles

The customers have a direct channel of consultation via internet. The customer can obtain information related with location, displacements and any relevant event related to the vehicle, goods or persons being monitored. The consultation is done through digitized maps of easy handling to the customer.

Service Name	Service Group	What can be obtained?	Comments
Sensor map	*Data Transaction*	*-Localization of any sensor (Latitude and Longitude)* *- Events monitoring* *- Routes information*	*This service does not allow communication with the competent authorities in case of incident*

Table 4 Sensor Map – SM

3.3.4 Application Deployment - AD

Application deployment is a service that allows the customer to decide the environment where to deploy the wireless sensor network. Additionally, the customer can choose which parameter will be monitored. The customer can select any sensor to monitor one of the following variables:

- Acceleration
- Displacement
- Humidity
- Pressure
- Strain
- Temperature
- Torque
- Vibration
- Inclination
- Load
- Orientation

The client hires the deployment of wireless sensor network and maintenance. The customers also determine where to deploy the wireless sensor network.

Service Name	Service Group	What can be obtained?	Comments
Application Deployment	*Real Applications*	*- Deployment of infrastructure anywhere* *- Information of the parameter selected by the customer*	*The customer is responsible for defining the exact position where the sensors will be located*

Table 5 Application Deployment – AD

3.4 CANVAS model

The CANVAS model is a way to capture the business model of a company. The methodology developed by Alexander Osterwalder has positioned it as a real alternative to add value to the business ideas.

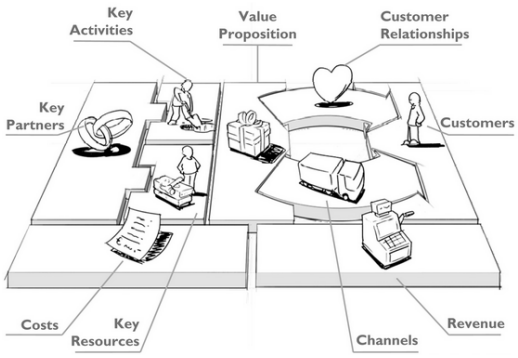


Figure 7 Canvas model template

Canvas model consists of nine stages or fields, through which the developer has to specify the key business aspects of an activity or initiative. Summarizing, the nine Canvas fields are:

1. Customers - This stage contains a description of the people that will use the product or services. Group of persons of which the service provider obtains benefits. The value generated by the service provider should be devoted for the people described at this stage.

2. Value proposition - Define a good value proposition, in other words is try to understand the main features of the service provider that make it different from other organization. In order to understand well the value proposition of each organization, respond the following topics is an useful way.

   - Innovations of the service provider
   - Aspects that set us apart from other service providers
   - Aspects of the service provider establish a strong link with the customers.

   A value proposition creates value for a customer segment through a mixture of different elements that resolve to the needs of that segment. Values can be quantitative or qualitative, for instance: cost, innovation, design, etc.

3. Channel - channel is simply a means by which an element is shipped. According to the canvas model, there are three kind of channel with the following functions:

   - Communication: Used to present products and services, so that the market can assess and quote them.
   - Distribution: Used to give out products or services to various destinations.
   - Information: Used to shorten the distances that the customer must travel to reach the company, either to purchase products or services or for personalized post sales service.

4. Customer Relationship - Organizations must identify the type of relationship that they want to build with their customer segments. Also try to identify the kind of relationship that the customers want establish with us as a service provider.

5. Revenue stream -Awareness about the price that the customer pay for purchasing a service, that is to say: The way a company makes income from each customer segment.

6. *Key Activities* - Knowing the key activities that add value to our brand, and learn the strategies needed to improve them. Overall activities that are critical to the service delivery. Activities are divided into three main classes:

    - Production: classifies those activities that are aimed at creating products in large quantities. The most important are design and manufacturing capacity.
    - Troubleshooting: As the name says are those activities that seek solutions for the customers. Usually, organizations that offer services are inside this category.
    - Platform / Network: Activities to consider by those companies whose main services are based on these resources. In this sense, the activities included in this category are those that deal with the proper operation of the platform such as maintenance, processes, data architecture, etc
      .

7. Key resources - The resources that are necessary to create value for the customer. They are considered an asset to the organization. According to the canvas model these resources are as follows:

    - Human
    - Financial
    - Physical
    - Intellectual

8. *Key partners* - All partnerships with the third-part to strengthen our business. Canvas model define four kinds of relationship:

    - Customer- provider relationship.
    - Relationship between non competitive organizations.
    - Relationship between competitive organizations.
    - Organizations working together in a new business

9. *Cost infrastructure* - This describes the most important monetary consequences while operating under different business models, a fundamental aspect whether we want get succeed. Determine the overall cost for provide service to the customer.

In this part of the memory, we will illustrate a business model of the service provider based on the concepts of canvas model. The template will be filled take as a base the services and customers defined in previous sections. So, the information written in green corresponds to the target customers and the information written in blue corresponds to potential customers who could benefit from the services offered by us as service providers.

Canvas Model		
Item	**Icon**	**Description**
1 Customer Segments		- *Communities of researchers organized as stable bodies (i.e. universities) or through virtual organizations (which set up for developing a given project and close once the project is finished* - *Public or private entities like municipalities (smart city paradigm), oil companies and others* - *Individuals (smart house paradigm)*
2 Value Propositions		- *We offer a distributed and fully configurable open platform of restricted computation and energy capabilities and state of the art OSs to deploy your own code in order to experiment new algorithms and protocols of WSNs. We deploy the infrastructure according to your needs- You don't need to invest and worry about infrastructure and its deployment* - *We install and maintain an efficient sensor network to facilitate your physical data needs like temperature, illumination, gasses in air, position and other physical measurements that you may need. Post-processing applications of rough data may be also designed and sold in addition* - *Don't worry if you forgot to switch on the alarm or to program putting water in the garden. We allow you to be away and have full control of all your home appliances and events inside and around from an easy to use application on your mobile phone and at an affordable and competitive price*
3 Channels		- *Advertising and promotion will be done through the web site of the organization. Once a potential customer has contacted the organization their agents can contact him to better understand his needs. Also we will use the magazines that this customer sector is most likely to read. Once the service is purchased, the contact with the client will be through on-line support* - *Advertising and promotion will be done through personal contacts with public and private corporations. The network will be deployed by technicians of the organization. A contact will be established for configuration setup* - *The main channel for advertising will be through TV. Once purchased, the product will be sent to the client by postal mail with self-installing instructions*
4 Customer Relationship		- *ON-LINE SUPPORT through all the service lifecycle* - *Dedicated personal assistance during the setup and tuning of the network. Later, the contact will be through on-line support* - *Self service. Eventually a technician can go to the house to supervise the installation*

5 Revenue Streams		- *Subscription fees and additional fees for the duration of the service depending of the magnitude and the complexity of the network to be deployed. A pricing model has to be specified* - *Subscription fees and additional fees for the duration of the service also depending of the complexity and extension of the network to be deployed. Additional revenue stream in case of deployment of data processing applications. A pricing model has to be specified* - *Subscription fees and additional fees for the duration of the service*
6 Key Activities		- *Deployment of heterogeneous WSN's* - *Maintenance of the deployed infrastructure* - *Consulting* - *Deployment of heterogeneous WSNs* - *Maintenance of the deployed infrastructure* - *Consulting* - *Development of on-demand data processing applications for smart cities* - *Development of a generic data processing application for smart houses*
7 Key Resources		*The following resources are the same to support the services to the three kinds of customers* - *Engineering team (would be worthy to describe qualitatively and quantitatively this engineering team)* - *Technicians team (or perhaps better to outsource this resource?)* - *Agent sellers and promoters* - *Administrative stuff* - *Financial resources. A financial plan would be needed to quantify these resources* - *Infrastructure. The organization will be hosted in offices. IT will be also needed. Quantification of this infrastructure would be also important*
8 Key Partners		*Common for the three types of customers* - *Initially it is foreseen to start the business without any partnership. The relation with the sensor manufacturers will be a conventional customer-supplier relationship but not a partnership relationship. In the future the organization may consider to establish such a relationship*
9 Cost Structure		*Common for the three types of customers* - *Staff salaries* - *Offices renting, Insurances* - *Car fleet maintenance* - *Financial costs* - *Buying of materials (sensors, others)* - *Advertising* - *Network access and utilities*

Figure 8 Business model of the organization for which we specify the SMS

The Canvas model is a useful tool for defining the business model of the service provider, as well as a starting point for building the service portfolio. As the main objective of this work is to set up a service management system using the service management frameworks, the service portfolio definition is an important document defined both by ITIL and ISO/IEC 20000. For this reason, the next step is to create a service portfolio for our organization.

3.5 Service portfolio

The service portfolio is the set of all the services that the service provider can use to manage a business. Service portfolio describes the customer needs through creating different value added services, ensuring that these services are clearly defined and can provide a good result in terms of value and profit. The service portfolio can be viewed as an instrument to handling the investments in IT services, considering the costs and risks to create business value, often determined by the return on investment and other financial models. The service portfolio includes three parts: the service pipeline, the service catalog and retired services [**2**] [**2**]. Hence, the description of each one of these three parts can provide a clearly understanding of the difference between service portfolio and service catalog.

Service pipeline includes all the services that are under construction or development but are not yet available for the customers. This part of the service portfolio provides a strategic vision of future services.

Service catalog contains services that are being executed by customers. In other words, the services that have been approved for its exploitation. Additionally, services that will be removed, but for business reasons are still available for the customers.

Retired services include services that were removed from the service catalog. Hence, these services are not available for customers, but remain in the service portfolio for various reasons. For instance; business strategy, service recovery, to support the continuity plans, etc.

Nowadays, there are a lot of methodologies and tools to build a service portfolio, starting from empirical templates created by employees up to commercial tools aligned with ITSM frameworks. So for that reason, defining a complete template for service portfolio management is relevant. At the moment of choosing or create the service portfolio template is relevant consider that meets a set of minimum requirements allowing its compatibility with the ITSM frameworks. Keeping all the above in mind we decided to adopt the service portfolio template provide by the FitSM standard [**3**] [**3**] [**3**].

The service portfolio template that we will use has the following structure:

- Basic information: this section of the service portfolio contains the basic information of the services. The basic information allows unambiguous identification of each one of the services within the group of options considered by the organization. Also basic information section considers aspects such as general description of the service and target customers.

- Service management information: Overall information related with service management information linked with the service. This section provides primary information such as service owner as well as relevant information such as SLA's.

- Detailed Makeup: This section is addressed to define the fundamental components needed to service delivery. Additionally, this section covers the service packages that could be used to offer the service as well as the dependencies with other services.

- Business case: this section describes a business case associated with each one of the services considered by the organization. This part of the service portfolio template also pretend justifies the resources spent in supporting the service in order to obtain some profit.

As we mentioned before, the service portfolio is a relevant aspect for any organization, a clearly definition of the service portfolio can be a key aspect to be considered at the moment of implement a Service Management System-SMS. Each one of the services considered as an option for our customers will be registered using the template provided by the FitSM project [**3**]. The fundamental concepts will be kept as they were originally defined. Nevertheless, the graphical representation will be changed.

Below, we present a set of tables with the main features of each service. The services considered are:

- Sensor Information database – SID
- Sensor Map – SM
- Supporting Research –SR
- Application Deployment - AD

Identifier	Document's Name		Approval date
ITSM_SSP_001_Serviceportfolio	*Service portfolio*		*dd/mm/yyyy*
Process name /description:	*Service Portfolio Management*		
Created on:	*dd/mm/yyyy*	*Revision:*	*dd/mm/yyyy*
Created by:	*Management Staff committee*		
Historical Reviews			
Review N°	*Date*	*Description of Modification*	
1	*dd/mm/yyyy*	*Development of the first Service portfolio*	
Next Review due date		*Version*	*1.0*
Approval By	*Management Staff committee*	Storage Location:	
Signatures		Wiki	
Service description			
Basic Information			
Service Name	*Sensor Information database – SID*		
General Description	*SID is a service that collects and stores the entire information gathered by each one of the sensors belonging to the deployed WSN, from its inception to disposal. That is to say that it is a service that offers information related with any variable that can be measured like ambient light intensity; humidity atmospheric pressure, temperature and others. The specific type of data needed as well as the time that these data as to be kept stored by the*		

	network is on request by the customer.
User of the service	*-Research community in general.* *-Meteorological agencies, Municipalities and private corporations*
Service Management Information	
Service Owner	*The company CTO*
Contact Information	*xxxxxxxx@xxxxxx.xxx* *Phone: XXXXXXX*
Service Status	*Active*
Service Area / category	*Environmental monitoring*
Service Agreements	*Basic SLA on a per customer (Availability and Response time)*
Detailed Makeup	
Service building blocks (components/ Functions needed)	*WSN components*
	Configuration platform
	Data processing servers
Additional service building blocks (Components, activities, etc.)	*SMS including a document repository, the CMDB, the service desk*
	Web-based user interface
Service Packages	*This service is offered through two packages, namely the Basic and the Advanced. In the first one data are delivered to the customer as they are collected. In the second one the data is post processed according to the needs of the customer*
Dependencies	*This service is the base-ground of the other services. Therefore there are not dependencies with other services*
Business case	
Cost to provide the service	*In addition of the general costs like for instance the salaries to pay, the company will incur in specific costs, which essentially consist in the acquisition of the components to build the network to be deployed. On the other hand it is assumed that the majority of the processing and storage systems will be reused or shared with other services*
Funding source	*The service will be sold for an amount that covers the investments in materials as well as the design of the customer tailored solution.* *Post-installation Consulting will be another important source that will extend the lifecycle of this service.*
Price	*Prices depend on the number of queries made by the customer for a period of time. Budgets will be performed on demand*
Value to customer	*Service offers information related with* temperature*, atmospheric pressure, Humidity and ambient light intensity collect by sensors, from its deployment within the WSN until its withdrawal.- If the sensor is active, the user get is information sensed at the instant of time when user performs the query.* *- If the sensor is not active the user gets a historical report daily of the four variables since its deployment until the last day worked.* *- Also the user can choose between a historical report and current information*
Risk	*The main risk of running this service is the lack of demand. For that reason we have to offer a very versatile service*
Competitors	Wikisensing, xively

Table 6. Service portfolio of Sensor Information database- SID

Service description	
Basic Information	
Service Name	*Supporting Research– SR*
General Description	*SR provides a mechanism to perform simulations using different wireless sensor networks. You can connect and perform simulations over the wireless sensor networks that belong to our organization. Using this service, you could program in advance a period of time in which you could perform any simulation using the resources and devices in any wireless sensor network belonging to our organization, you may perform simulations related with the following topics:* ▪ *Topology control* ▪ *Routing* ▪ *Security* ▪ *Energy consumption / harvesting* ▪ *Transport* ▪ *Localization techniques*
User of the service	*WSN Research community*
Service Management Information	
Service Owner	*The company CTO*
Contact Information	*xxxxxxxx@xxxxxx.xxx* *Phone: XXXXXXX*
Service Status	*Active*
Service Area / category	*Data Transaction*
Service Agreements	*Basic SLA*
Detailed Makeup	
Service building blocks (components/ Functions needed)	*Customer's software deployment platform* *Scheduling Application* *Portal user*
Additional service building blocks (Components, activities, etc.)	*SMS including a document repository, the CMDB, the service desk.* *Web-based user interface*
Service Packages	*Standard plan*
Dependencies	*This service is not depending in full of any other. Nevertheless it depends on the capability of the organization to deploy a WSN infrastructure.*
Business case	
Cost to provide the service	*In addition of the general costs like for instance the salaries to pay, the company will incur in specific costs, which essentially consist in the acquisition of the components to build the network to be deployed. On the other hand it is assumed that the majority of the processing and storage systems will be reused or shared with other services.*
Funding source	*The service will be sold for an amount that covers the investments in materials as well as the design of the customer tailored solution. Post-installation Consulting will be another important source that will extend the lifecycle of this service*

Price	*Prices depend on the size and nature of the WSN to be deployed. Budgets will be performed on demand*
Value to customer	*Using this service, you could schedule in advance period of time in which you could perform any simulation using the resources and devices in any wireless sensor network belonging to our organization without deploy any infrastructure.* *- Thousands of sensors on each operate wireless sensor network* *- Different geographic location, several* *-several scenarios set up in different places, we can find sensors nodes of the most remote areas.* *-We can use resources that do not belong to us*
Risk	*Shared simulation times*
Competitors	Wikisensing, xively, *particular applications*

Table 7 Service portfolio of Supporting Research-SR

Service description	
Basic Information	
Service Name	*Sensor Map– SM*
General Description	*Sensor map is a service that allows a visualization of the information of sensor nodes placed inside a motor vehicle. The user can use any mobile device to access the following information:* ▪ *Information about location of the sensor (latitude and longitude) with a mismatch of not more than 1.5 meters.* ▪ *Route time control, speed, number of stops and downtime in stops.* ▪ *Planning, monitoring and ongoing advice in design and monitoring of routes and vehicle's condition* ▪ *Historical reports of alarms generated by the vehicles.* ▪ *Historical reports of routes taken by vehicles* *The customers have a direct channel of consultation via internet. Additionally, customer can obtain information related with location, displacements and any relevant event related to the vehicle, goods or persons being monitored. The consultation is done through digitized maps of easy handling to the customer*
User of the service	*Research community, public entities and general public.*
Service Management Information	
Service Owner	*The company CTO*
Contact Information	*xxxxxxxx@xxxxxx.xxx* *Phone: XXXXXXX*
Service Status	*Active*
Service Area / category	*Data Transaction*
Service Agreements	*Basic SLA*

Detailed Makeup	
Service building blocks (components/ Functions needed)	*Central application*
	User application
	Hosting Application
Additional service building blocks (Components, activities, etc.)	*Continually update Location*
	Continually update latitude/longitude
Service Packages	*Continuous plan / sporadic plan*
Dependencies	*This service has a direct dependency with application deployment service, because the same technical staff is in charge of deployments*
Business case	
Cost to provide the service	*Principal costs to provide the service come from the acquisition of hardware needed for implement an application. however salaries of personnel who develop an implementation is also a considerable cost*
Funding source	*The service can be adapted to work in conjunction with security companies, these companies may want to perform continuous queries in order to continuously monitor the goods of interest. Municipalities can use this service as a support tool for the police force as well as public entities may pay to use this service*
Price	*Prices depend on the nature of application and the number of sensor nodes used in each application.*
Value to customer	*- Immediate location of goods, persons or transport fleet.* *- Increased security of property.* *- Trigger panic in an emergency event* *- Low-cost implementation*
Risk	*Number of staff to develop a high-scale application could be scarse.*
Competitors	Google maps, gps, Independent application

Table 8 Service portfolio of Sensor Map -SM

Service description	
Basic Information	
Service Name	*Application deployment – AD*
General Description	*Application deployment is a service that allows the customer to decide the environment where to deploy the wireless sensor network. Additionally, the customer can choose which parameter will be monitored. The customer can select any sensor to monitor one of the following variables:* ▪ *Acceleration* ▪ *Displacement* ▪ *Humidity* ▪ *Pressure* ▪ *Strain* ▪ *Temperature* ▪ *Torque* ▪ *Vibration* ▪ *Inclination* ▪ *Load*

	▪ *Orientation.*
User of the service	*Researchers related to wireless sensor network.* *-Meteorological Scientists* *-Municipalities, private companies, farmers, etc.*
Service Management Information	
Service Owner	*The company CTO*
Contact Information	*xxxxxxxx@xxxxxx.xxx* *Phone: XXXXXXX*
Service Status	*Active*
Service Area / category	*Real applications*
Service Agreements	*Basic SLA*
Detailed Makeup	
Service building blocks (components/ Functions needed)	*Hardware stock* *Programmers* *Technicians*
Additional service building blocks (Components, activities, etc.)	*Training technicians* *Search for new sensors on the market*
Service Packages	*Contracts*
Dependencies	*This service has direct relationship with Sensor Map –SM service, because the staff responsible of both tasks is the same.*
Business case	
Cost to provide the service	*Costs to provide the service include material for the implementation, responsible staff salary, transport of personnel and supplies to the place selected by the customers.*
Funding source	*Contracts and maintenance payments (The basic contract include the implementation of the real application at any place previously selected by the customer)* *Maintenance & repair is charged separately from the initial contract.*
Price	*The cost charged to the customer may vary depending on:* *- Scope of the application* *- Numbers of sensor used on the deployment* *- Distance between where the client wants the implementation and facilities of the service provider*
Value to customer	*The customer does not have to worry about the logistics for the implementation of applications. Further, the drawbacks found during the implementation will be treated by us. The overall price of an application with more than 100 sensor nodes is lowest that the offered by other organizations.*
Risk	
Competitors	Wikisensing, xively

Table 9 Service portfolio of Application Deployment – AD

3.6 Definition of the organization

In principle, before defining management processes within the organization is important to describe what kind of organization we want to be as well as the organizational structure. Companies can be classified depending on sales, size, number of staff or total assets. Our organization is meant to be a Short and Median Enterprise (SME) where the number of employees is less than 50 including managers and staff. Initially, this is the only aspect that we will take into account because there is not information about sales or assets within the company; we assume that the company is not operational yet.

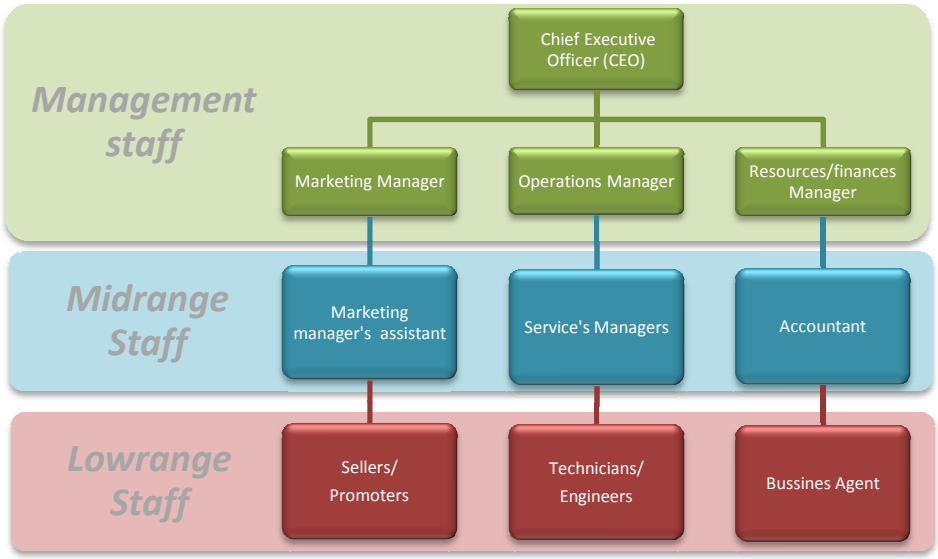


Figure 9 Organizational chart

As figure 9 shows, our organization is hierarchically structured and includes three levels; the top level is composed of persons belonging to the top management of the organization. This level has a fixed number of people (in this case four persons). There is a person who leads the organization called "chief executive officer" who is responsible for making the relevant decisions (in the section on definition of "roles" we can see the responsibilities of all staff). Additionally, this level also includes three more roles, namely Marketing Manager, Operations Manager and Resources/Financial manager. Functions at this level are the determination of the overall objectives of the organization as well as to take the strategic decisions of the organization.

The second level is also composed by four people (in this particular case) and has as aims to link the strategic decisions of top management with the operational decisions affecting the lower levels of the organization. Finally, the third level is composed by staff that has to perform more specific activities. The people who belong to this level have a closer relationship with customers and suppliers, because they perform activities that in most cases have direct contact with concerned parties. This level does not have a fixed number of members because staff will be hired depending on the demand of the service. The base amount of employees at this level will be seven persons in this particular case.

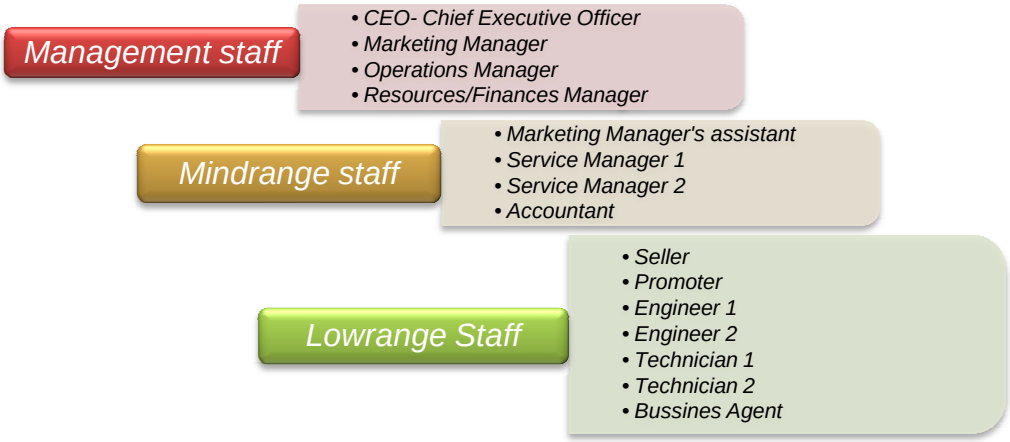


Figure 10 Detailed organization staff

The employees of our organization are depicted in figure 10. The total number of people working within the organization is fifteen. Therefore, at the moment of define roles of each one of them, there will persons with different roles. The information provided by the chart will be useful at the moment of assign responsibilities within design processes of the IT - service management. The number of members belonging to the two highest levels will be fixed, while the organization no change of category (remains still a SME). On the other hand, the lowest level of the organization may suffer changes in the amount of members, due to the nature of the services. For example, if a client hires a large-scale application through “application deployment “service, the number of technicians in charge of the deployment will not be enough.

4 Design of Management Processes

The first part of the work was dedicated to analyze different ITSM frameworks more widely used nowadays, and as a conclusion, we developed a benchmarking among these ITSM frameworks. We present their main features as well as relevant information that can be useful in this master's work. The second part was devoted in developing a service strategy; we settled as a service provider that offers services to a segment of customers, taking as a reference its needs and desires related with the services. At the end of the second chapter, we obtained three relevant documents: empathy map, canvas model and service portfolio. Now, the main objective of this part is the implementation of an SMS for our particular case. To do this, we will use as a reference the ISO/IEC 20000 standard. This standard provides us a set of minimum requirements that any service provider needs to meet for delivery of IT services with quality and aligned with business needs. The service management system inspired by the ISO/IEC 20000 standard is divided into three main levels according to Figure 11. The first level suggests the minimum requirements related with management at highest level within the organization, the standard recommends the basic requirements of any management system. The topics covered at this level are management responsibility, documentation management, resource management. Additionally, a part about processes operated by other parties and establishment and improvement of the SMS is included. The second level is under the title of "Design and transition of new or changed services", it contains a single process that aims to ensure that the creation, change and even the removal of a service can be managed and provided under the parameters of cost, quality and deadlines agreed. The last level is about the requirements to cover the provision of services that the client needs and also all necessary aspects in order to provide these services. There are thirteen processes grouped into four sets of processes, service delivery processes, relationship processes, resolution processes and control processes. Each one of these sets has a number of processes that allows meeting with the general goals of the level.

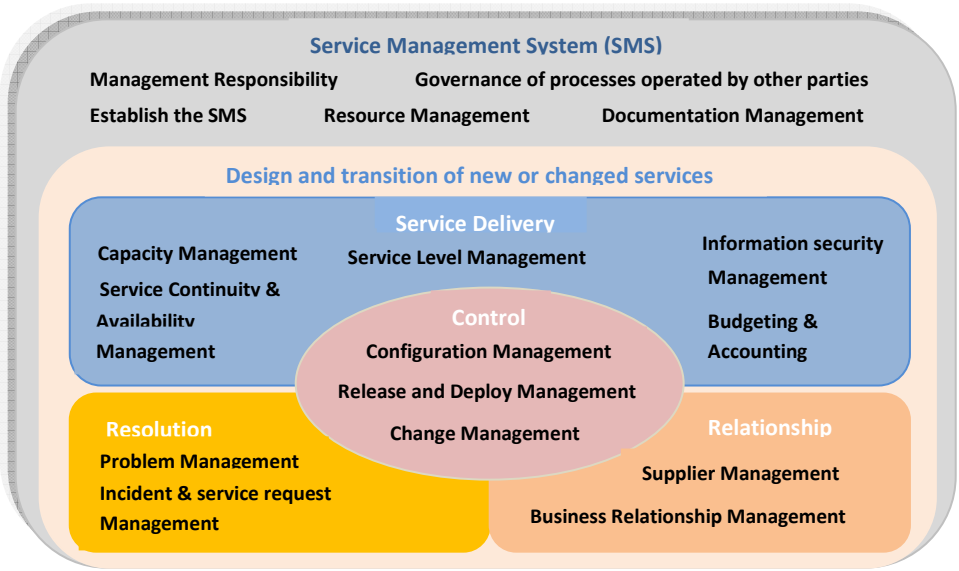


Figure 11 Service management system according to ISO/IEC 20000

In our organization, there is no information technology service management system or other quality system ongoing yet (ISO 9000, Itil, etc). When there is a management system in place it will be necessary to determine where the organization is in terms of its service management capabilities to determine a clear path to the target objectives. Hence, before starting with the design process of service management system based on the standard ISO / IEC 20000, there is essential to carry out a self-assessment about the maturity and capabilities of our organization. In this particular case, both the global maturity and all the capabilities are at level 0 because the organization is being formed from scratch.

This part of the work aims to determine a set of minimum requirements required to implement and manage the Service Management System (SMS). The minimum requirements are based mainly on ISO/IEC 20000 standard, although we will consider the guidelines proportionate by ITIL framework. However, the minimum requirements are deduced keeping in mind the kind of services that we want offer as a service provider. Also the relevant aspects included on the service delivery are taking into account. We must remember that the minimum requirements valid for some organizations could be not useful for other organizations. For our concrete scenario the service management system can be covered through the minimum requirements described below, because the IT infrastructure used to support the services offered is a simple makeup.

The following chart shows the minimum requirements for the implementation of the service management system (SMS) for our particular situation; this information also helps to have an overall vision of the system and how it fits our expectations The alignment with best practices and standards is a fundamental aspect for our concrete scenario. Thereby, ITSM frameworks were taken into account for defining the minimum requirements.

SERVICE MANAGEMENT SYSTEM		
General Requirements	Management Responsibility	*A service management policy shall be created and kept updated*
		The authorities and responsibilities for all processes of the SMS shall be defined
	Documentation Management	*An effective format shall be established in order to control, record and change tracking all the documentation related with the service management system*
Process- specific requirements	Service Portfolio Management – SPM	*A Service Portfolio shall be created, reviewed and kept updated*
		Risk associated with services within service portfolio shall be identified and managed.
	Service level Management – SLM	*A Service catalog shall be created, reviewed and kept updated*
		SLAs for all services within service catalog shall be specified and maintained.
		A Set of Key Performance Indicators - KPI shall be defined for all services within catalog.
		Underpinning Contracts and Operational Level Agreements shall be specified, reviewed and kept updated to suit with SLA's
	Service Reporting – SR	*Reports related with service performance against service targets shall be produced*
		Regular reports shall be generated after internal audits about non-conformities with the standard
		Service availability and continuity plans shall be created and maintained to ensure the agreed requirements

	Service continuity & Availability Management – SCAM	*A business Impact analysis has to be realized and kept updated*
		Risk assessment shall be conducted and recorded periodically – (AMIS Availability Management Information System)
	Capacity Management – CapM	*A Capacity plan shall be created and kept updated, taking into account the current and the future needs of the business*
		Proactive measures shall be conducted in order to review the current capacity and apply improvements wherever it is needed
	Information Security Management – ISM	*A global security policy shall be defined, approved and enforced in order to preserve the security information assets.*
		Security controls shall be established in order to achieve the required security targets
		Security risk assessments shall be performed at regular intervals to identify security risks (proactive activity)
		Any security incident has to be processed, evaluated and recorded in order to review and improve the established security controls
	Customer Relationship Management – CRM	*A formal procedure shall be defined with the purpose of measure the customer's satisfaction*
		A formal service complaint procedure shall be established.
	Supplier relationship Management – SuppM	*All suppliers shall be identified and categorized into a defined template.*
		A procedure for managing disputes between service provider and supplier shall be agreed and communicated
		A supplier evaluation procedure shall be established
	Incident and service request Management – ISRM	*Incidents shall be recorded, classified and prioritized by means of predefined procedure*
		Defined procedure shall be created in order to escalate or closure incidents
		Service request shall be recorded, classified and prioritized by means of predefined procedure
		Defined procedure shall be created in order to scale/closure service request
	Problem Management - ProbM	*All the problems shall be prioritized and registered.*
		A plan to investigate the root causes of incidents shall be implemented. (RCA-Root Cause Analysis)
		A known error database shall be created and kept updated - (KEDB)
	Configuration Management – ConfM	*All assets under control of the organization shall be identified, controlled, registered and cared.*
		A configuration management system shall be specified and kept updated (CMS)
		A documented procedure shall be defined specifying frequency and testing of the CI within CMS
	Change management - ChM	*All changes shall be assigned with a priority*
		All changes shall be recorded, evaluated, scheduled and authorized before its deployment
		Emergency changes should be announce to the appropriate authorities as well as communicated to the interested parties
		All changes shall be measured, tested and reported after its deployed
	Release and deployment management - RDM	*Release and deployment management plans shall be defined and agreed with interested parties*
		Release package shall be tracked, installed, tested and verified after its launch
		Risk and issues related with release of new services shall be recorded and reported in order to take a corrective actions
	Continual Service improvement – CSI	*all the opportunities of improvement shall be identified, recorded and prioritized by means of predefined procedure*
		All the opportunities of improvement shall be evaluated and approved by means of a predefined procedure

Table 10 Minimum general and process-specific requirements

4.1 Maturity and Capability model

When a maturity and capability model is proposed, we try to establish a standardized assessment of the processes involved in the creating a product or service, this assessment consists in determining the level of adoption of the best practices for service management. Additionally, the assessment helps organizations to measure their current maturity level and provides elements for defining the strategy of implementation of service management processes. Once the target level of maturity is established we will identify the steps to reach it.

The concepts of "capability" and maturity were already introduced but now we will refine them a bit more in detail.

We start renaming and refining the six capability levels presented in the Introduction as follows. This capability naming is as proposed in the standard FitSM-6 [ref] and we adopt it because it makes a much more clear distinction between the naming in the capabilities and in the maturity levels.

- **0 Non Existent** In this capability level service, Management is non- existent. The service provider is not aware of the task necessary to provide the service. In a practical world, as soon as the process is defined this level is surpassed.
- **1 Ad hoc** The service provider is aware of the task needed to provide the service, but the execution is undocumented, uncontrolled and reactive. Success in accomplishing the task is not guaranteed and it is likely to depend on individual efforts
- **2 Repeatable**. The service provider has a solid understanding of activities to be performed and that, most of the time, will lead to repeatable results or outputs. Tasks are realized mostly intuitively since documentation and recording are poor.
- **3 Defined.** The service provider has clearly defined and documented procedures, roles and responsibilities, but process effectiveness and efficiency are not measured nor reported.
- **4 Managed and Measured**. The service provider clearly defined and documented procedure, roles and responsibilities. Process effectiveness and efficiency are measured and reported, although, this information isn't necessarily leading to process change and improvement.
- **5 Efficient/Optimal** For the regarded process service management system is fully implemented, meaning that capability level 5 (Managed & Measured) is enhanced by using information to systematically improve the regarded process". [**14**]

On the other hand we rename and refine the five maturity levels, also according to FitSM standard as follows:

- 0 Non Existent
- 1 Aware
- 2 In place
- 3 Effective
- 4 Advanced

The process implementation and the maturity baseline that will be proposed is supported on the premise that all processes must not have necessarily the same capability levels In other words, some processes may be seen as more relevant or important and therefore they corresponding capabilities will be set higher.

Working with different capabilities for the set of processes that have been considered means that in order to reach a given maturity level makes necessary to describe one by one the different maturity levels.

First of all, to reach a maturity level 1 for the SMS supported by the fourteen processes we have decided to set the capabilities of the *SLM, ISRM* and *ChM* at least at level 2 whereas all the other remaining processes should exhibit at least a capability level of 1. Figure 12 depicts the minimum capabilities for the SMS processes to reach maturity level 1.

To consider the SMS at maturity level 2 we have decided to establish the minimum capability level of the processes *SLM, ISRM* and *ChM at level 3.* On the other hand the processes *SR, ISM, CRM* and *CSI* have to be at least at level 2. Finally all the other remaining processes have to exhibit at least a capability level of 1. This is depicted in the Figure 13.

Finally, to consider that the SMS is at a maturity level 3 we have decided that all its fourteen processes have to be at a capability level of 3 as depicted in the Figure 14.

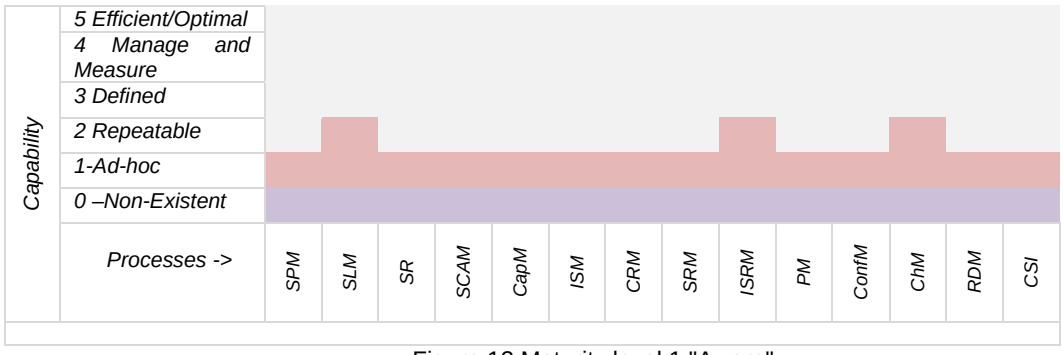


Figure 12 Maturity level 1 "Aware"

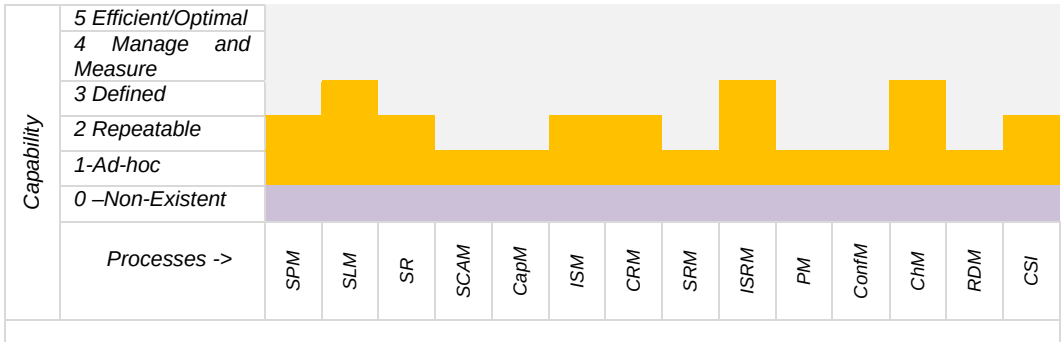


Figure 13 Maturity level 2 "in place"

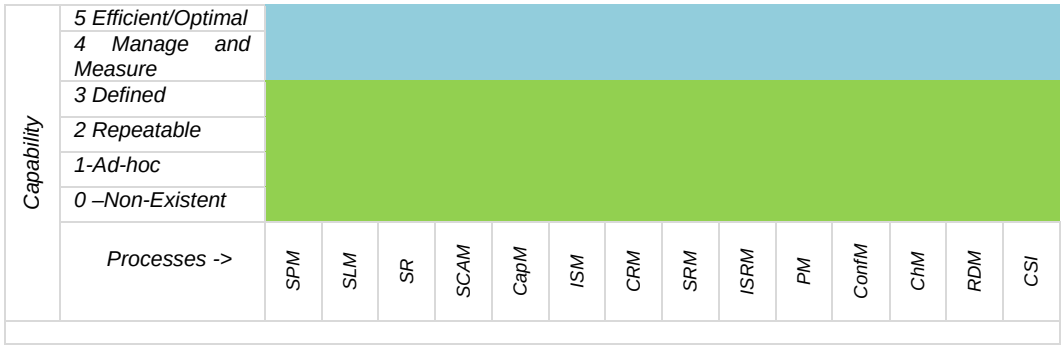


Figure 14 Maturity level 3 "Effective"

As we mentioned in a previous section, the service management system is based on ISO/IEC 20000, this standard can be seen as junction of set of processes, where each one of this set of processes has a particular target. From our point of view, there are three main groups of processes that stand out. These major groups of processes of the standard are Service management system general requirements, Design and transition of new or changed services and service delivery processes.

Although there is plenty of documentation, procedures, assignments in each one of these groups of processes, our efforts will focus in the group related with service delivery; this does not mean that the design is not conducted for other groups of the standard.

4.2 General requirements of SMS

4.2.1 Management Responsibility

- Introduction & Overview

Top management shall provide evidence of its commitment to the development and implementation of the service management system (SMS), additionally the top management should guarantee that will provide the resources and facilities in order to continually improve the SMS.

- Goals

  - Make evident the top management's commitment with the planning, implementing, operating, monitoring, reviewing, and improving Service Management System - SMS.
  - Lead with the establishment of the service management policy
  - Allocate the authorities and responsibilities for all aspects of the Service Management System – SMS
  - Generate a clear form and procedure in order to control, record and change tracking all documentation of the Service Management System – SMS

Documents to be produced

- A service management policy
- A form with information about roles, task, and functions of each one of the employees of the organization.

Identifier		*Document's Name*		*Approval date*
ITSMS-SSP_002_ServiceManagementPolicy		*Service Management Policy*		*dd/mm/yyyy*
Process Name / description:		*Service Management System General Requirements*		
Created On:		*dd/mm/yyyy*	*Revision:*	*dd/mm/yyyy*
Created by:		*Management Staff Committee*		
Historical Reviews				
Review Number	*Date*	*Description of Modification*		
1	*dd/mm/yyyy*	*Establishment of the service management policy*		
Next Review due date			*Version*	*1.0*
Approval By:		*Management Staff Committee*		*Storage Location*
Signatures				*Wiki*

Service Management Policy

Although [Organisation's name] recognizes that quality is the responsibility of overall stakeholders involved in the organization, also [Organisation's name] see the need of having a quality management system to ensure that the services are offered with a certain quality level. The management system defined by [Organisation's name] has to be aligned with the business strategy as well as it must be committed to creating services more innovative, efficient and with low risk for the customers.

[Organisation's name] not only has a commitment with the creation and implementation of the service management system, also have a commitment with accompanying of the activities for the maintenance and continuous improvement of the service management system. Senior management of [Organisation's name] organization offers both financial and personnel resources for the proper functioning of service management system. This service management policy intended to help with any necessary resources to achieve the following strategic objectives:

- *Allocate resources and facilities to develop services with quality level requested by customers, while maintaining an appropriate cost /benefit equilibrium.*
- *Accomplish with all legal and regulatory requirements applicable as well as with guidelines provided by the ISO/IEC 20000 standard.*
- *Periodically establish a set of objectives and indicators for the management of services that allow perform an adequate monitoring of the levels of service offered. Additionally schedule at least one semi-annual review of this policy.*
- *Establish continuous improvement and innovation as the fundamental principle of service management.*

This policy provides a framework for continuous improvement of the service management system; Hence this information will be communicated to the organization through the means defined by responsible staff; also it will be published on the website of the organization open to anyone who wants get this information.

Authorities and Responsibilities

Roles				
	Nº	**Position in the organization**	**Functions**	**Role within processes**
SRO	. 1	CEO-Chief executive officer	*The Senior Responsible Owner is defined as the role responsible for establishing and maintaining the service management system.*	*ITSMS Owner*
Process Owner	3	Marketing Manager Operation Manager Resource Manager	*The process owner is responsible for ensuring that the process is executed as agreed and also ensure that the objectives of the process are achieved* ***Task*** - *Define the strategy process.* - *Assist in the design process.* - *Ensure that the date is available and adequate documentation of the process.* - *Define policies and appropriate standards to be used across the process* - *Audit process periodically.* - *Review the strategy process periodically*	Marketing Manager (CRM, SuppM, SR, SPM, RDM) Operation Manager (SLM, ProbM, ISRM, ChM, CSI) Resource Manager (SCAM, CapM, ISM, ConfM)
Process Manager	4	Marketing Assistant Service Director 1 Service Director 2 Accountant	*The process Manager is responsible for the operational management of a process, among its features we can find:* - Manage the resources allocated to the process. - Working with the Process owners and other process managers to ensure correct implementation of services. - Monitor and report process performance. - Identify and register all the opportunities for improvement, - Ensure that all activities are carried out as required.	Marketing Assistant (CRM, SuppM, SR, SPM, RDM) Service Director 1-2 (SLM, ProbM, ISRM, ChM, CSI) Accountant (SCAM, CapM, ISM, ConfM)
Process Practitioner	7	Seller Promoter Engineer 1 Engineer 2 Technician 1 Technician 2 Business Agent	*The process practitioner is responsible for carrying out different activities of a specific process.* - *Carry out one or more activities of the process.* - *Ensure that their actions are effective.* - *Ensure that the inputs and outputs interfaces are correct.* - *Create or update records related to the process*	Seller and Promoter (CRM, SuppM, SR, SPM, RDM) Engineer1-2 /Technician1-2 (SLM, ProbM, ISRM, ChM, CSI) Business Agent (SCAM, CapM, ISM, ConfM)

Figure 15 ITSM Authorities and Responsibilities

4.2.2 Documentation Management

- Introduction & Overview

Ensure that all the documentation related to the service management system-SMS is established as well as guarantee that the documents and records can be controlled

- Goals
  - Establish and maintain all the documentation and records to ensure an effective planning, operation and control of the service management system

Documents to be produced

- A service Management policy (see above)
- A service management Plan

Identifier		*Document's Name*		*Approval date*
ITSMS-SSP_003_ServiceManagementPlan		*Service Management Plan*		*dd/mm/yyyy*
Process Name / description:		*Service Management System General Requirements*		
Created On:		*dd/mm/yyyy*	*Revision:*	*dd/mm/yyyy*
Created by:		*Management Staff Committee*		
Comments:				
Historical Reviews				
Review Number	*Date*	*Description of Modification*		
1	*dd/mm/yyyy*	*Establishment of the service management plan*		
2				
Next Review due date			*Version*	*1.0*
Approval By:		*Management Staff Committee*		*Storage Location*
Signatures				*Wiki*

Service Management Plan

Introduction

[Organization's name] is aware that a service management system is a set of process, procedures, activities and task focused on providing services with a certain level of quality. Also knows that the implementation of this kind of system inside the organization is an objective that is not achieved with isolated effort of some persons. At the moment of founding the enterprise, all the people involved in this organization was pledged to contribute with the planning, implementation, monitoring and continual improvement of the service management system as well as put all their efforts, competencies and skills in order that the service management system be a success. In order to reach the vision of this service management plan , the organization express openly their commitment with the implementation of the service management system- SMS as well as provide all the necessary resources for its continued maintenance and improvement.

Scope

The service management system developed by *[Organization's name]* will cover the following services:

- Sensor Information Database – SID
- Supporting Research- SR
- Sensor Maps – SM
- Application Deployment – AD

This service management plan initially considers the services listed above. But is mandatory adapting the service management system to any change determined by the business needs (Reflected in the service catalog).

Authorities and Responsibilities

[Organization's name] defines its organizational structure into three groups, as follows:

- Management Staff
- Mid-range Staff
- Low-range Staff

Each one of the previous personnel groups has a set of well-known responsibilities within the service management system. The roles and responsibilities relating to the management of the service management system are defined in a separate document (See ITSM Authorities and Responsibilities table)

Service Management objectives

Taking into account the overall requirements of our target market, *[Organization's name]* is aware that the continual improvements for the services offered by the organization are located within the following areas:

- Service Quality

The key performance indicators defined within SLA's are taken as a reference for setting objectives inside service management plan. Targets of each service are the following:

Service Availability

- Sensor Information Database – SID: Service Availability of 99%
- Supporting Research – SR: Service Availability of 99%
- Sensor Maps – SM: Service Availability of 99%

Response Time

- Application Deployment – AD: less than three days in any application.
- Response time for other services will be defined within SLA's

Incident Management

- Sensor Information Database – SID: percentage of low priority incidents resolved within 2 days - 80%
- Supporting Research – SR: percentage of low priority incidents resolved within 2 days - 80%
- Sensor Maps – SM: percentage of low priority incidents resolved within 2 days - 80%
- Application Deployment – AD: Number of incidents per year 6.

Information security

- Number of security incidents per year (counting all services) 5 incidents.

- Capability

  - Increase the percentage of procedure that are documented to 50 % in the following 6 months
  - Increase the best practices training by 50%
  - Increasing all the specific processes at a level more in the next 6 months

- Cost
  - Reduce the total cost spent for the provision of service (20%)

Governance of processes operated by other parties

Technical support related to the management tool used to manage the following processes will be responsibility of the tool's supplier.

Process	Third Party	External/Internal	Reference
Service Level management-SLM	*ITSM Tool Vendor*	*External*	*Contracts*
Change Management – ChM	*ITSM Tool Vendor*	*External*	*Contracts*
Incident & Service Request Management	*ITSM Tool Vendor*	*External*	*Contracts*

Resources

[Organization's name] can develop the service management system using the following facilities:

Building: *[Organization's name] has its main office in [Organization's address]. This office has an area of approximately 100 square meters for a capacity of 20 employees. Additionally, has reserved space in a datacenter with 2 square meters.*

Devices:

The organization has 12 workstations, equipped with internet connection, phone and access to a central printer. Also have four vehicles (transport of supplies or personnel)

Applications & Software:

In order to support all the processes within the service management system, the organization acquired an ITSM management tool called [Put the name of ITSM tool]; furthermore, each one of the workstations has installed a series of programs to facilitate the development of the daily tasks. Among the main software, we can find the following:

- Softphone: Program for making telephone calls.
- ITSM tool: Program to support the SMS
- Service Helpdesk: same tool used to support the SMS

Policies, Standards and Statutory Regulatory

The service management plan must act in accordance with following policies, standards and external requirements of entity regulatory

Standards

- ISO/IEC 20000-1 International Standard for IT service Management.

Policies

- Service Management Policy [ITSMS-SSP_002_ServiceManagementPolicy]

4.3 Process-specific requirements

The target of this work is establishing a service management system on a concrete environment. How we can plan, design, develop, deploy and operate service management systems that meet the ever increasing demands for availability, reliability, security, performance and cost. By breaking down the complexity of a service management system - SMS, one can analyze the overall system like a set of evolutional activities. In other words, the service management system- SMS can evolve from scratch until reach a desired maturity level. This part of the work presents the basic information that is needed to reach a maturity level 2 "in place".

In order to reach the established maturity level is need define and document procedures, roles and responsibilities. Responsibility assignment matrix [**15**] allows describe the roles and responsibilities involved on the processes of any activity.

Although exists a set of variations of the responsibility assignment matrix, we will use the typical chart. The responsibility assignment matrix defines its left column to write activities and the top row is dedicated to put the roles. The intercession between columns and rows is filled with the responsibilities most typically used:

Responsible, Accountable, Consulted, and Informed. The responsibility roles are described in following table:

Role	Abbreviation	Description
Responsible	*R*	*Person responsible to do the activity*
Accountable	*A*	*Person responsible of activities verification as well as is in charge of ensure that the activity is performed.*
Consulted	*C*	*Person who has information to perform the activity correctly*
Informed	*I*	*Person that should be informed about the performance of an activity*

Table 11 RACI chart roles

4.3.1 Service Portfolio Management

- Introduction and Overview

The main objective of SPM is ensuring that the organization has the correct collection of services that allows recover its investment with profits while manage risk. In other words, SPM is in charge of creating a strategy that will generate the maximum value, while managing risks and costs.

- Goals

  - SPM serves as a support in the selection of services, in order to choose the services that best fit with the needs of the business, services that provide better business prospects and provide greater value to customers.

- *Capability Level*

Target Capability = Level 2 ("Repeatable")

Description: Activities to be developed within the process to create, review and update the service portfolio are clearly understood, as well as the risks associated with the services portfolio are identified. However, there is no-controlled and documented procedure that allows the guarantee its success all times. Most of the times, the results depends on the knowledge and effort conducted by the person responsible of performing the activities.

- RACI Chart

SPM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	SPM-PO	SPM-PM	SPM-PP	O-PO
SPMA1	Identify			R	C	C
SPMA2	Define		R	C	C	C
SPMA3	Approve	A	R			
SPMA4	Evaluate		R	C	C	C
SPMA5	Charter	I	A	R		

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
SPM-PO	Service portfolio Management – Process Owner	Marketing Manager
SPM-PM	Service portfolio Management – Process Manager	Marketing Manager Assistant
SPM-PP	Service portfolio Management – Process practitioners	Seller – Promoter
O-PO	Other- Process Owner	Operations Manager –Resource and Financial Manager

- SPM- Activities

Service Portfolio Management Activities		
Inputs, required information	• Understanding of the resources and capabilities (service provider) • Definition of the market to which the service is directed • Understand the customer's needs	
Activities	SPMA1	Identify the business case; deduce all the services that can be useful for the defined market, regardless of resource limitations.
	SPMA2	Define a set of services that can be offered with the existing resources and capabilities
	SPMA3	Approve or reject the services analyzed. The committee should allocate the necessary resources to provide the service.
	SPMA4	Risks associated with the services analyzed should be identified and documented.
	SPMA5	The service should be included within the service portfolio template, where information must be clear, concise and unambiguous.
Outputs	• Service portfolio	
KPI's	• Numbers of services that are under "analyze" stage. • Number of services that are not yet available to customers	
Related processes	• Service Level Management	

- Documents to be produced

  - Service portfolio *[ITSM_SSP_001_Serviceportfolio]* (See section 3.5 service portfolio)

4.3.2 Service Level Management

- Introduction and Overview

SLM process is in charge of negotiating, agrees and document the services targets as well as also is responsible for maintaining and improving the agreed service quality, preserving a balance between customer requirements and costs spent to meet these requirements.

- Goals

  - Establishment of agreements with customers, internal units and suppliers to provide the required service quality (SLA, OLA, UC, etc.)
  - Encourage and improve the relationship among customers and business
  - Establish a set of measurable targets for all services (KPI - key performance indicators of the services) in order to monitor and measure the service quality.

- *Capability Level*

Target Capability = Level 3 ("Defined")

Description: The procedures for create review and kept updated the information within the service catalog are clearly defined. Additionally, the roles, responsibilities and procedures to develop SLA's for all the active services have been established. Finally, the development of Key performance indicators, Underpinning Contracts and Operational level Agreements have been assigned to the responsible personal and also exists an established procedure to carry out this activity.

- RACI Chart

SLM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*SLM-PO*	*SLM-PM*	*SLM-PP*	*O-PO*
SLMA1	*Making a service catalog*		*A*	*R*		*C*
SLMA2	*Agreeing SLA's*		*R*	*C*		
SLMA3	*Agreeing UC's & OLA's*		*A*	*R*		*C*
SLMA4	*Determining KPI's*		*R*	*C*		
SLMA5	*Revision and Approving*		*A*	*R*		
SLMA6	*Monitoring*		*I*	*A*	*R*	
SLMA7	*Maintenance*		*R*		*C*	

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
SLM-PO	*Service Level Management – Process Owner*	*Operation Manager*
SLM-PM	*Service Level Management – Process Manager*	*Service Manager 1*

SLM-PP	*Service Level Management – Process practitioners*	*Engineer 1-2 / Technician 1-2*
O-PO	*Other- Process Owner*	*Operations Manager –Resource and Financial Manager*

- SLM- Activities

Service Level Management Activities		
Inputs, required information	• *Service Monitoring System* • *Service catalog* • *Service portfolio*	
Activities	***SLMA1***	*Elaboration and approval of a service catalog*
	SLMA2	*Negotiation of the Service Level Agreements-SLA's for all services within the final document (Service Catalog).*
	SLMA3	*Develop OLA and UC that serves as a support to meet with the service targets defined within SLA*
	SLMA4	*Determine a set of Key performance Indicators – KPIs for all services within the service catalog*
	SLMA5	*Review and approve SLA's, OLA's & UC's.*
	SLMA6	*Monitoring all the agreements previously established*
	SLMA7	*Periodically review and updated the service catalog*
Outputs	• *Service Catalog* • *SLM KPI's* • *Procedures*	
KPI's	• *Customers satisfaction surveys* • *Number of SLA-s violations* • *Number services covered by existing UC and OLA*	
Related processes	• *Change Management –ChM* • *Configuration Management - ConfM* • *Customer Relationship management – CRM*	

- Documents to be produced

  - Documented procedure to create, review and keep updating the service catalogue. *[ITSM_SSP_004_ServiceCatalogPro]*
  - Service catalogue template. *[ITSM_SSS_005_ServiceCatalogTem]*
  - Documented procedure to create and keep updating the SLA's within the service catalogue. *[ITSM_SSP_006_SLAProcedure]*
  - SLA's template *[ITSM_SDP_007_SLA'sTemplate]*
  - Documented procedure to create and keep updates the KPI for all services within service catalog. *[ITSM_SSP_008_SLMKPIProcedure]*
  - Template with all KPI defined for all active services within service catalog *[ITSM_SSP_009_SLMKPITemplate]*
  - Documented procedure to create, review and update UC and OLA *[ITSM_SSP_010_UC&OLAProcedure]*
  - Template with all UC and OLA defined*[ITSM_SSP_011_UC&OLATemplate]*

Service Catalog procedure				
Identifier		Document's Name		Approval date
ITSM_SSP_004_ServiceCatalogPro		Service Catalog Procedure		*dd/mm/yyyy*
Process name /description:		Service Level Management /Service Catalogue Procedure		
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*
Created by:		*SLM-Process Owner*		
Comments:		*Skip the first steps of the procedure and please proceed with step 5 in case of review or update of a pre-existing service catalog.*		
Historical reviews				
Review Number	Date	Description of the modification		
1	*dd/mm/yyyy*	Establishment of the procedure to create, review and keep updated the service catalogue		
2				
-				
Next review due date	*dd/mm/yyyy*		Version	1.0
Approval By:	*Management Staff committee*			*Storage Location*
Signatures				*Wiki*

General overview of procedure

The Service Catalogue should offer a clear, concise and orderly information about the active services that the organization provides. Establishing a procedure to manage the information contained in service catalogue document is relevant. This procedure consists of a set of steps in order to create, review and/or modify the service catalogue

Triggers

- Change in the service portfolio (a service that goes to production stage)
- A request from top management (Request for Change to modify, eliminate or include any service)

Procedure

Step 1: The SLM-Process Manager Schedule a meeting with all relevant parties in order to discuss, what services must be included within service catalogue.

Step 2: The SLM-Process Manager must verify attendance before starting the meeting. At least the people who should attend are:

- *SLM- Process Owner "Operation Manager"*
- *SLM-Process Managers "Service Director1"*

***Note:** Anyone can be invited to participate in the meeting. However, the meeting could be considered valid only if a legitimate representative of the two roles listed above take part of the meeting.*

Step 3: The persons participating in the meeting should use as a reference the information provided by the service portfolio [ITSM_SSP_001_Serviceportfolio]. This information should be used to identify the services that will become part of the service catalog.

Step 4: At this stage the feasibility of the service is studied and discussed, taking into account aspects as financing costs, required settings, the human factor, outsourcing, resources used, etc.

Step 5: Once identified all the services that the company would consider as a valid offer to its customers, the SLM-Process Manager must register the services using the template [ITSM_SSP_005_ServiceCatalogTem]

Step 6: The personnel involved in the review of the catalog of services must verify that:

a) *The information within [ITSM_SSP_005_ServiceCatalogTem] template is correct and clear.*

b) *The information is not written in a technical manner (understandable for all kinds of users)*

c) *Verify that the service catalog is aligned with the service portfolio (The service catalog should only contain information about operational services)*

Step 7: SLM-Process Manager should consult with the process owner of Customer Relationship Management" to ensure that the information within the template is aligned with the customer's needs.

Step 8: After performing all modifications and achieving an agreement, the service catalog should be approved and signed by the relevant parties, SLM-Process Owner and SLM-Process Manager.

Step 9: SLM-Process Owner should notify to the process-owner of Configuration Management and Senior Responsible Owner about the new catalogue of services. This process is responsible for storing the updated service catalog.

Step 10: Finally, the final catalogue of services should be delivered to the Configuration Management process owner.

Step 11: The final service catalogue should be stored in a place reachable for all interested parties

Service catalog					
Identifier		Document's Name		Approval date	
ITSM_SSP_005_ServiceCatalogTem		Service catalogue		*dd/mm/yyyy*	
Process name /description:	Service Level Management /Service Catalog				
Created on:	*dd/mm/yyyy*	Revision:		*dd/mm/yyyy*	
Created by:	*SLM-Process Owner*				
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Baseline version of service catalogue			
2					
-					
Next review due date:		*dd/mm/yyyy*	Version	1.0	
Approval By:		*SLM Process manager*	Storage Location:		
Signatures			*Wiki*		

ORGANIZATION'S NAME

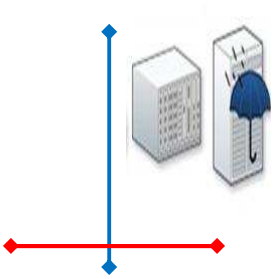
SERVICE CATALOG

SERVICE LIST

- ***Sensor Information Database –SID***
- ***Supporting Research – SR***
- **Sensor Map –SM**
- **Application Deployment –AD**

ORGANIZATION'S NAME

Sensor Information Database –SID



SID is a service that stores the entire information gathered by each one of the sensors belonging to the wireless sensor networks that form part of our federation, from its inception to disposal. That is to say that it is a service that offers information related with ambient light intensity, humidity; atmospheric pressure and temperature collect by sensors, from its deployment within the wireless sensor network until its withdrawal, therefore, if the sensor is active; the data that the user get is information sensed at the instant of time when user performs the query, on the other hand, if the sensor is not active the user gets a historical daily report of the four variables humidity, atmospheric pressure, Ambient light intensity and temperature since deployment until the last day worked .

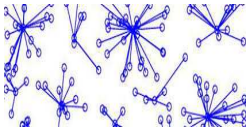
ORGANIZATION'S NAME

Supporting Research – SR

SR provides a mechanism to perform simulations using different wireless sensor networks. You can connect and perform simulations over the wireless sensor networks that belong to our federation. Using this service, you could schedule in advance period of time in which you could perform any simulation using the resources and devices in any wireless sensor network belonging to our organization, you may perform simulations related with the following topics topology control, routing, security, energy consumption and harvesting, transport and localization techniques.

Application Deployment –AD

AD is a service that allows to customer decide the environment where deploy the wireless sensor network. Additionally, the customer can choose which parameter will be monitored. The customer has the freedom of choosing the place where implement the sensor network as well as may choose which parameter will be sensed. The customer can use any sensor included in http://www.phidgets.com/ to develop their own applications. The client hires the deployment of wireless sensor network and maintenance.



ORGANIZATION'S NAME

Sensor Map –SM

Sensor map is a service that allows a visualization of the information of sensor nodes placed inside a motor vehicle. The user can use any mobile device to access the following information:

- Information about location of the sensor (latitude and longitude) with a mismatch of not more than 1.5 meters.
- Route time control, speed, number of stops and downtime in stops.
- Planning, monitoring and ongoing advice in design and monitoring of routes and vehicle's condition
- Historical reports of alarms generated by the vehicles.
- Historical reports of routes taken by vehicles

The customers have a direct channel of consultation via internet. The customer can obtain information related with location, displacements and any relevant event related to the vehicle, goods or persons being monitored. The consultation is done through digitized maps of easy handling to the customer.

Organizations Information

Phone:
Fax :
Web Page:
e-mail:
Address:

SLAs Procedure					
Identifier		Document's Name		Approval date	
ITSM_SSP_006_SLAProcedure		SLA's Procedure		*dd/mm/yyyy*	
Process name /description:		Service Level Management /SLA's procedure			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		SLM- Process Manager			
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to create, review and updated SLA's			
Next review due date		*dd/mm/yyyy*	Version		
Approval By		SLM- Process Owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

Procedure to establishing a consensus between customers and supplier in terms of service level. This procedure will indicate the steps to reach an agreement in terms of level of services that benefit to stakeholders.

Triggers

- Change in the service portfolio (a service that goes to production stage)
- Any compliant from customers and/or top management asking for a review of an SLA's
- A change or modification as a result of customer's satisfaction survey.

Procedure

Step 1: The SLM - Process Manager is aware of the need of creating or modify a Service level Agreement as a consequence of any of the triggers.

Step 2: The SLM - Process Manager must clearly know the services that will be subject to the creation or modification of the SLA (supported by catalogue of services)

Step 3: Set a day to perform a meeting between the SLM-Process Manager and the customer representative in order to create or modify any SLA.
NOTE: Agreement can be made through various channels (phone, email, letters, etc.). There is no need a personal meeting

Step 4: The SLM - Process Manager should create groups of customers to define the service level requirements of each group. The following information is essential to define service level requirements:

a) *Service description from the customer's perspective. ¿What is the customer expectation of the service provided?*

b) *Hours and days in which the service must be available*

c) *Service continuity requirements*

d) *Identify the SLA to modify/ replace*

Step 5: SLM-Process Manager and the customer representative must register the agreements using the template [ITSM_SSP_007_SLA's]

Step 6: Any disagreement regarding the requirements between SLM-Process Manager and the customer representative must be reported to SLM- process owner

a) *The process owner can cancel the negotiation (At this point, the SLA will be not signed)*

b) *The process owner persuades customer representative to accept the requirements and the negotiation continue.*

Step 8: The SLM-Process Manager should clearly explain to the customer, the service that will be hire using the information provided by the service catalog

Step 7: The document shall be signed by both parts and related processes should be informed

Step 8: The SLM - process Owner approves the document, puts the signature and delivery the final document to ConfM- Process Owner.

SLA's template					
Identifier		Document's Name		Approval date	
ITSM_SSP_007_SLA's		SLA's Template		*dd/mm/yyyy*	
Process name /description:		Service Level Management /SLAs			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		SLM –Process Owner			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a SLA's Template			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		SLM Process owner	Storage Location		
Signatures			*Wiki*		

SLA's template

Service provider's name:
XXXXXXXXXXXXXXXXXX
Address: XXXXXXXXXXXX
Phone: XXX-XXX-XXXXXXX
City: XXX-XXX-XXX XXXXX
Postal Code: XXX-XXX-XXX
Representative Agent:
XXXXXXXXXXXXXXXXXX
Identification Type: XXXXXX

Customer's name:
XXXXXXXXXXXXXXXX
Address: XXXXXXXXXX
Phone: XXX-XXX-XXXX
City: XXX-XXX-XXX XX
Postal Code: XXXXXXX
Customers agent:
XX-XXXXXXXXXXXX

City: XXXXXXX
Signed date:
dd/mm/yyyy
Document identifier:
XXX-XXX-XXX
Initiation date:
dd/mm/yyyy
Expiration date:
dd/mm/yyyy

Important Notice: *below you find the terms and conditions that governing the services offered by [Your Organization]. We advise you to read all the terms and conditions, especially those that limit the services chosen by you.*

In a meeting where Mr./Ms. [Organization's representative] authorized to agree contracts on behalf of [Organization's name] and Mr./Ms [Customer's representative] authorized to agree the contract on behalf of [Name of customer's Organization] and to recognize that both parties have competence and legal capacity to sign this contract representing their respective organizations. We agree to use this contract as support document to define all the SLA's of the service contracted by [Name of customer's Organization] acting as a customer and [Organization's name] acting as a service provider.
This contract is only valid for the [Service name as it appears in the service catalog] service, any other type of service contracted with our organization not specified in this document, will be governed by its corresponding SLA established in the documentation of the service description.
The service offered by [Organization's name] will fulfill a set of minimum specifications as specified below:

We offer 98% of service availability with premium service one minute after an outage. Also, we offer to the customers that select the basic SLA option a 95% of service availability. In relation with new orders, we offer a service availability of 90% during a predetermined timeframe (5 business days) after this time the service availability will be the contracted by the customers (basic/premium plans).

The [Service name as it appears in the service catalog] service will be available during [put the daily availability] as well as the days on which the user can use the service will be [put the days of service availability]. The service desk will only be available during

the working days; [Organization's name] has as working days [specify the working days of your business]. The service desk will be not available any holiday included in the national calendar that overlaps with one working day.
The service level forecast (SLF) include a time of thirty minutes to notify problems defined by [Organization's name] as level 1 and one hour for problems define by [Name of your organization] as level 2. In addition, [Organization's name] will solve any technical incident in time not exceeding 72 hours.

[Name of customer's Organization] may submit any requests, complaints and claims through the channels established by [Organization's name]. All requests regardless of the nature should be solved in time not exceeding 5 working days and should be communicated to the customers once they have been completed.

[Organization's name] produce reports at least once a semester related with the service performance, the reviews of this document will be performed annually. 15 days before the completion of this agreement, the user, can request a review or otherwise extend the agreement another year.

Signatures

_____ _____

[Organization's Representative] *[Customer's Representative]*

SLM KPI's Procedure					
Identifier		Document's Name		Approval date	
ITSM_SSP_008_SLMKPIProcedure		KPI's Procedure		*dd/mm/yyyy*	
Process name /description:		Service Level Management /KPI's procedure			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		SLM Owner			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to define KPI's			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		SLM -Process Owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

The KPI procedure allows determine a set of steps in order to define the performance indicators within SLM processes.

Triggers

- Any change in the services included within catalogue of Services (Service modification, a new service, changed services, etc.)
- Any complaint or non-conformity with the service level agreements
- A regular review established by organization within their policies.

Procedure

Step 1: The SLM-Process Manager is aware of the need of creating or modifying a Key performance indicator as a consequence of any of the triggers.

Step 2: The SLM-Process Manager must clearly know the services that will be subject to the creation or modification of the KPI (Using as support the catalogue of services)

Step 3: The SLM-Process Manager should collect overall information about SLA's, UC's and OLA's.

Step 4: The SLM-Process Manager should extract the following information that is relevant to define KPIs:

a) *Number of SLA's, OLA's and UC's modified in the last three months*
b) *Number of breaches of service level agreements*
c) *Number of services that need UC and OLA for their proper operation*
d) *Number of services that fulfill with the SLA agreed (without any failure during the reference period)*
e) *Numbers of SLA,UC,OLA that require renegotiation*
f) *Results of surveys on the user satisfaction, etc.*

Step 5: The SLM-Process Manager should conduct the evaluation to all services in the catalogue of services using as a support the information provide by [ITSM_SSP_009_SLMKPITemplate].

Step 6: The SLM-Process Manager must design a KPI, thinking in cover most aspects as possible

Step 7: The SLM-Process Manager must register the information using the template [TSM_SSP_009_SLMKPITemplate]

SLM KPIs Template				
Identifier		Document's Name		Approval date
ITSM_SSP_009_SLMKPITemplate		SLM KPI's		*dd/mm/yyyy*
Process name /description:		Service Level Management /KPI's		
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*
Created by:		SLM-Process Owner		
Comments:				
Historical reviews				
Review Number	Date	Description of the modification		
1	*dd/mm/yyyy*	Template to establish KPI's		
2				
-				
Next review due date		*dd/mm/yyyy*	Version	
Approval By		SLM-Process owner	Storage Location	
Signatures			*Wiki*	

Overview

This Key performance indicator is valid for [Service's name]. The metrics used in this template will be valid only for the dates stipulated in the document header.

KPI need

Briefly describe the need for the creation KPI and indicate the aspects that have been affected

Relevant Features

At the moment of create the Key Performance Indicators, the responsible person should document whether KPI are directly linked the following items

- *Direct relationship between KPI's and existing SLA's, OLA's and UC's*
- *Number of service level agreements that can be covered through proposed KPI's.*
- *Results of surveys on the user satisfaction, etc.*

Analyze

The proposed key performance indicator should be analyzed in order to identify whether the approach can be used to other service within service catalog

UC & OLA Procedure					
Identifier		Document's Name		Approval date	
ITSM_SSP_010_UC&OLAProcedure		UC and OLA Procedure		*dd/mm/yyyy*	
Process name /description:		Service Level Management /UC and OLA procedure			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		SLM-Process Manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to define UC's and OLA's			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		SLM-Process owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

The UC and OLA procedure allows determining a set of steps in order to define the agreements necessary to deliver a service. This procedure indicates the regular channels to agree a UC or OLA.

Triggers

- Failure related with the breach of a SLA, due to lack of resources or facilities by a supplier or business unit
- Non-compliance with the implementation delivery times and availability of a service due to lack of resources allocated

Procedure

Step 1: The SLM-Process Manager is aware of the need of creating or modifies a UC and/or OLA as a consequence of any of the triggers.

Step 2: The SLM-Process Manager must clearly know the services that will be affected with the creation or modification of the UC/OLA

Step 3: The SLM-Process Manager should determine the causes and processes involved in the non-conformities.

Step 4: The SLM-Process Manager should schedule a meeting with representatives of the processes involved in the non-conformity.

Step 5: The SLM-Process Manager should conduct an analysis of the requirements established within SLA's and propose an agreement to solve them (this agreement should be specified into UC & OLA template.

Step 6: The SLM-Process Manager should conduct the agreement using as a support the information provide by [ITSM_SDP_011_UC&OLATemplate].

Step 7: The information must be updated on historical records and delivered to ConfM-Process Owner

UC and OLA Template				
Identifier		Document's Name		Approval date
ITSM_SDP_011_ UC & OLA Template		UC's and OLA's		*dd/mm/yyyy*
Process name /description:		Service Level Management /UC's & OLA's		
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*
Created by:		SLM-Process Manager		
Comments:				
Historical reviews				
Review Number	Date	Description of the modification		
1	*dd/mm/yyyy*	Establishment of UC's & OLA's to support the current SLA's		
2				
-				
Next review due date		*dd/mm/yyyy*	Version	
Approval By		SLM-Process Owner	Storage Location	
Signatures			*Wiki*	
Service provider's name: *XXXXXXXXXXXXXXXXXX* *Address:* *XXXXXXXXXXXXX* *Phone:* *XXX-XXX-XXXXXXX* *City:* *XXX-XXX-XXX XXXXX* *Postal Code:* *XXX-XXX-XXX* *Representative Agent:* *XXXXXXXXXXXXXXXXXX* *Identification Type:* *XXXXXX*		*Unit's name:* *XXXXXXXXXXXXXXXX* *Address:* *XXXXXXXXXX* *Phone:* *XXX-XXX-XXXX* *City:* *XXX-XXX-XXX XX* *Postal Code:* *XXXXXXX* *Customers agent:* *XX-XXXXXXXXXXXXX*		*Document identifier:* *XXX-XXX-XXX* *Initiation date:* *dd/mm/yyyy* *Expiration date:* *dd/mm/yyyy*

The goal with this document is to establish an agreement between. [Process owner that requires support] and [Process owner that provides support], each one of them representing a unit of organization. The commitments of the unity of the organization represented by [process owner that provides support] are as follows:

For the services Sensor Map - SM, supporting research - SR and sensor information database- SID , [process owner that provides support shall guarantee at least a person that support to this services during the following periods of time:
Days: from Monday to Saturday
Hours: 8:00 am to 5:00 pm
Also, [process owner that provides support] shall guarantee at least a person for the service: application deployment – AD , during the following periods of time:

Days: from Friday and Saturday
Hours: 8 hours (depending on the event)

Furthermore, any incident related with the services: Sensor Map - SM, supporting research - SR and sensor information database- SID has priority over the other services. The response time to resolve any incident, problem or variation, to affect the normal operation of the service, must be less than indicated within the SLA's. Finally, [process owner that provides support] shall ensure that the application can meet with a throughput of 1000 requests per second as well as when the number of requests increases above thousand per second, the application does not collapse.

Signatures

[Process owner that requires support]	*[Process owner that gives support]*

4.3.3 Service Reporting

- Introduction and Overview

SR process is in charge of generating service performance reports. Overall information about service achievement must be generated within time intervals agreed with the customers or stakeholders. These reports must include at least information related with performance against service targets, workload characteristics, corrective and preventive actions concerning with service performance, etc.

- Goals

- Production of reliable and timely reports about service performance.
- Establish a policy to generate reports (ensure that all reports are homogeneous, useful and understandable by interested parties).

- *Capability Level*

Target Capability = Level 2 (“Repeatable”)

Description: The activities for generate reports about service performance against service targets are very well understood, but there is no a documented procedure that allows guarantees its success all times.

- RACI Chart

SR Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	SR-PO	SR-PM	SR-PP	O-PO
SPMA1	Information about service performance must be collected		R			
SPMA2	Analysis of the collected information		A	R	C	
SPMA3	Approval of the information contained in the report		C	R		
SPMA4	Generating and distribution of the report		A	R	C	

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
SR-PO	Service Reporting – Process Owner	Marketing Manager
SR-PM	Service Reporting – Process Manager	Marketing Manager Assistant
SR-PP	Service Reporting – Process practitioners	Seller – Promoter
O-PO	Other- Process Owner	Operations Manager –Resource and Financial Manager

- SR- Activities

Service Reporting Activities		
Inputs, required information	• Scheduling a report date • Request from a customer to review the performance of the contracted service • Direct request from top management	
Activities	SPMA1	Information about service performance must be collected
	SPMA2	Information collected must be analyzed in order to extract the relevant aspects.
	SPMA3	The kind of report must be identified
	SPMA4	Generation and distribution of the reports
Outputs	• Service performance reports • Audits report	
KPI's	• Number of audits per year. • Number of service performance reports per year	
Related processes	• Service Level Management- SLM • Customer Relationship Management – CRM	

4.3.4 Service continuity and availability management

- Introduction and Overview

SCAM is responsible for defining the overall approach to meet with the agreements of both service continuity and availability. Also, seeks to prevent or minimize the consequences of service interruptions as well as to ensure that services are available and work correctly whenever users want to use the services.

- Goals
  - Develop, establish and keep updated a BCP (Business Continuity Plan)
  - Carry out periodically a BIA (Business Impact Analysis) in order to determine whether continuity plans are aligned with changing business impacts.
  - Ensure that the organization has continuity options to meet the agreed business continuity targets.
  - Produce, establish and maintain an appropriate Availability Plan that takes into account the needs of the business.
  - Guarantee that availability of the service meets with the agreed service commitments.

- *Capability Level*

Target Capability = Level 1 ("Ad-Hoc")

Description: The activities related with the creation of the service availability and continuity plans are understood. Additionally, the organization is aware of the need of perform a risk assessment and Business impact analysis. But there is not a documented procedure to perform these activities that guarantees all the time the results.

- RACI Chart

SCAM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*SCAM-PO*	*SCAM-PM*	*SCAM-PP*	*O-PO*
SCAMA1	*Requirements*		*C*	*R*	*C*	*C*
SCAMA2	*Monitoring*			*I*	*R*	
SCAMA3	*Carry out a risk assessment*		*I*	*R*	*C*	
SCAMA4	*Create and evaluate an availability plan*		*R*	*C*		*C*
SCAMA5	*Create and evaluate a business continuity plan*		*R*	*C*		*C*

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
SCAM-PO	*Service continuity and availability Management – Process Owner*	*Resource and Financial Manager*
SCAM-PM	*Service Continuity and availability Management – Process Manager*	*Accountant*
SCAM-PP	*Service continuity and availability Management – Process practitioners*	*Business Agent*
O-PO	*Other- Process Owner*	*Operations - Marketing Managers*

- SCAM- Activities

Service Continuity and Availability Management Activities		
Inputs, required information	• *Existing Service Level Agreements* • *Negotiation of SLA's* • *Review Availability plan/Continuity plan*	
Activities	***SCAM1***	*Determine availability/continuity requirements*
	SCAM2	*Monitoring availability/continuity requirements*
	SCAM3	*Perform a risk assessment*
	SCAM4	*Create an availability plan*
	SCAM5	*Create a Business Continuity Plan*
Outputs	• *Availability Plan* • *Continuity Plan* • *Business Continuity plan* • *Identification of Vital Business Functions(VBF)* • *Business Impact Analysis (BIA) report* • *Updated Availability Management Information System(AMIS)*	
KPI's	• *Time to detect a failure* • *Response time to failure* • *Service repair time* • *Service recover time* • *Mean time between Failures –MTBF*	
Related processes	• *Service Level Management- SLM* • *Capacity Management – CapM*	

4.3.5 Capacity management

- Introduction and Overview

The CapM is responsible for ensuring that all services will be backed by enough resources in order to meet with any requirement in a timely and cost-effective manner.

- Goals

  - Ensure sufficient capacity for current and future needs of the customers
  - Develop a capacity plan that allows mitigate the impact of the changes presented on the service provision.
  - Reduce risks associated with services, through of efficient resource management.

- Capability Level

Target Capability = Level 1 ("Ad-Hoc")

Description: There is a general overview of the tasks and importance of having a capacity plan as well as the relevance of carry out some proactive measures in order to determine the current state of the organization regarding with capacity. However, there is not a documentation that supports these activities.

- RACI Chart

CapM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*CapM-PO*	*CapM-PM*	*CapM-PP*	*O-PO*
CapMA1	*Developing*		*R*	*C*		*C*
CapMA2	*Monitoring*		*I*	*R*	*C*	
CapMA3	*Documenting*		*I*	*R*		*C*
CapMA4	*Updating*		*R*			

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
CapM-PO	*Capacity Management – Process Owner*	*Resource and Financial Manager*
CapM-PM	*Capacity Management – Process Manager*	*Accountant*
CapM-PP	*Capacity Management – Process practitioners*	*Business Agent*
O-PO	*Other- Process Owner*	*Operations Manager – Marketing Manager*

- CapM- Activities

Capacity Management Activities		
Inputs, required information	• *Change of strategy and technologies* • *Service level Requirements –SLR* • *SLAs variations*	
Activities	***CapM1***	*Elaborate a capacity plan*
	CapM2	*Assessing and monitoring the designed capacity plan*
	CapM3	*Document new capacity requirements*
	CapM4	*Create and update the Capacity Management Information System*
Outputs	• *Capacity Plan* • *Reports About Overall performance and workload* • *Capacity forecast Reports*	
KPI's	• *Reduction of costs associated with capacity*	
Related processes	• *Service Level Management- SLM* • *Capacity Management – CapM*	

4.3.6 Information Security management

- Introduction and Overview

The ISM is responsible for aligning the information security of service with the business security as well as delivery security information assets with a certain agreed level of integrity, availability and confidentiality.

- Goals

  - Achieve the security requirements stipulated in the service level agreements
  - Meet with security requirements established through contracts, policies, legislation and commitments agreed with external entities to the organization
  - Mitigate the security risks that threaten the service continuity.

- Capability Level

Target Capability = Level 2 ("Repeatable")

Description: The relevant features as well as the activities to elaborate a general security policy are understood by the organization. Also, a security risk assessment is carrying out periodically. However, there is not a established procedure that allow handling any security incident.

- RACI Chart

ISM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*ISM-PO*	*ISM-PM*	*ISM-PP*	*O-PO*
ISMA1	*Security policy definition*	*A*	*R*			
ISMA2	*Risk assessment*		*A*	*R*		
ISMA3	*Implementing security controls*	*I*	*R*	*C*		*C*
ISMA4	*SMIS creation*	*A*	*R*	*I*		

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
ISM-PO	*Information Security Management – Process Owner*	*Resource and Financial Manager*
ISM-PM	*Information security Management – Process Manager*	*Accountant*
ISM-PP	*Information security Management – Process practitioners*	*Business Agent*
O-PO	*Other- Process Owner*	*Operations Manager – Marketing Manager*

- ISM- Activities

Information Security Management Activities		
Inputs, required information	• *Security policy of the organization* • *Security arrangements specified on SLA* • *Risk assessment*	
Activities	**ISMA1**	*Global security policy definition*
	ISMA2	*Perform a risk assessment*
	ISMA3	*Establish a set of security controls*
	ISMA4	*Creation Of Security Management Information System –SMIS*
Outputs	• *Security Policy* • *Risk treatment plan* • *Security control objectives*	
KPI's	• *Number of security incidents* • *Number of vulnerabilities found during audits*	
Related processes	• *Service Continuity and Availability Management- SCAM* • *Incident and service request management/ ISRM*	

4.3.7 Customer Relationship Management

- Introduction and Overview

CRM is responsible of establishing a close relationship with the customers, seeking the understanding of the customer needs and expectations as well as business needs

- Goals

  - Ensuring acceptable levels of customer satisfaction
  - Providing a regular channel whereby the customer has the opportunity to make known their complaints and unconformities

- Capability Level

Target Capability = Level 2 ("Repeatable")

Description: Exists a basic service compliant procedure, as well as a elemental survey in order to collect information about customer's satisfaction. However the activities performed in order to fulfil with the process objective are not documented and in most cases are made based on staff skills.

- RACI Chart

CRM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	CRM-PO	CRM-PM	CRM-PP	O-PO
CRMA1	Identification	A	R			C
CRMA2	Define a procedure			R	C	
CRMA3	Establishing a channel for complaints		R	I		I
CRMA4	Contrasting		A	R		C

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
CRM-PO	Customer relationship Management – Process Owner	Marketing Manager
CRM-PM	Customer relationship Management – Process Manager	Marketing Manager assistant
CRM-PP	Customer relationship Management – Process practitioners	Seller- Promoter
O-PO	Other- Process Owner	Operations Manager – Resource/Financial Manager

- CRM- Activities

Customer Relationship Management Activities		
Inputs, required information	• Disagreement aspect between customers and service provider • Service Catalog • Service Level Agreements-SLA	
Activities	CRMA1	Identification and classification of the customers depending their business expectations
	CRMA2	Define a procedure to measure the customer's satisfaction
	CRMA3	Establishment of a channel for complaints and unconformities
	CRMA4	Contrast customers needs against services offered within service catalog
Outputs	• Procedure to respond to any customer complaint • Reports about customers surveys • Reports about customer behaviour • Signed contracts	
KPI's	• Number of new services based on customer surveys	
Related processes	• Service level Management – SLM	

4.3.8 Supplier Relationship Management

- Introduction and Overview

SuppM has as a main objective to manage the relationships with suppliers to ensure uninterrupted provision of supplies to provide quality services; this process pursues to get value for money from suppliers.

- Goals

  - Manage the relationship between the service provider and its suppliers
  - Help in the creation of a Supplier and Contract Management Information system –SCIMS
  - Negotiate and manage the contracts with the suppliers

- *Capability level*

Target Capability = Level 1 ("Ad-Hoc")

Description: There is a general overview of the suppliers linked with the organization. But the suppliers don't have a classification according to their level of importance for the organization. Additionally all the disputes between suppliers and organization are treated in a reactive way.

- RACI Chart

SuppM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*SuppM-PO*	*SuppM-PM*	*SuppM-PP*	*O-PO*
SuppMA1	*Categorization*		*R*	*C*		*C*
SuppMA2	*Evaluation*		*R*			*C*
SuppMA3	*Establishment*		*A*	*R*		
SuppMA4	*Performance*			*R*		*C*
SuppMA5	*Creating*	*A*	*R*	*C*		*I*
SuppMA6	*Contracting*	*A*	*R*			*I*

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
SuppM-PO	*Supplier Relationship Management – Process Owner*	*Marketing Manager*
SuppM-PM	*Supplier Relationship Management – Process Manager*	*Marketing Manager assistant*
SuppM-PP	*Supplier Relationship Management – Process practitioners*	*Seller- Promoter*
O-PO	*Other- Process Owner*	*Operations Manager – Resource/Financial Manager*

- SuppM- Activities

Supplier Relationship Management Activities		
Inputs, required information	• *Requirements and specifications respect to purchases from supplier strategy and policy* • *Service Level Agreements-SLA* • *Request by SLM process*	
Activities	***SuppMA1***	*Categorization of all suppliers*
	SuppMA2	*Develop policies and strategies associated with the suppliers*
	SuppMA3	*Establishment of a mechanism to evaluate new suppliers*
	SuppMA4	*Create a Supplier and Contract Management Information System –SCMIS*
	SuppMA5	*Create a procedure to evaluate supplier performance*
	SuppMA6	*Contract renewal or cancelation*
Outputs	• *Signed Commercial contract* • *Supplier performance reports* • *Updated SCMIS*	
KPI's	• *Number of services that work well regardless of supplier* • *Number of suppliers that can be considered as a strategic suppliers* • *Number of suppliers that can be considered as a tactical suppliers* • *Number of suppliers that can be considered as a commodity suppliers*	
Related processes	• *Service Level management –SLM* • *Service portfolio Management – SPM*	

4.3.9 Incident and service request management

- Introduction and Overview

ISRM is responsible for handling events that cause degradation or loss of service as well as restoring service as soon as possible with a minimal impact for the customers.

- Goals

  - Develop standardized procedures for handling incidents
  - Identify record and classify any service-related alteration and additionally manage any service request.
  - Resolve any service-related alteration (incident) as well as any service request.

- Capability Level

Target Capability = Level 3 ("Defined")

Description: The organization has clearly defined and documented procedures in order to handling both service request and incidents. The roles and responsibilities are clearly defined for all the activities within this process.

- RACI Chart

ISRM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		CEO	ISRM-PO	ISRM-PM	ISRM-PP	O-PO
ISRMA1	Identification and logging			C	R	
ISRMA2	Categorization		A	C	R	
ISRMA3	Prioritization		A	C	R	
ISRMA4	Escalate		I	A/I	R	
ISRMA5	Resolve		A	C	C	
ISRMA6	Closure	C	A	R		

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
ISRM-PO	Incident and Service Request Management – Process Owner	Operations Manager
ISRM-PM	Incident and Service Request Management – Process Manager	Service Manager1 /Service Manager2
ISRM-PP	Incident and Service Request Management – Process practitioners	Engineer 1-2 /Technician 1-2
O-PO	Other- Process Owner	Marketing Manager – Resource/Financial Manager

- ISRM- Activities

Incident and Service Request Management Activities		
Inputs, required information	• Event Monitoring tools • Users Contact • Know Error Database (KEDB) • Service request from customers • Request For Change-RFC	
Activities	ISRMA1	Identification and logging of incident/Service request
	SRMA2	Categorization of incident/Service request
	SRMA3	Prioritization of incident/Service request
	ISRMA4	Escalate of incident/Service request
	ISRMA5	Resolve of incident/Service request
	ISRMA6	Closure of incident/Service request
Outputs	• Communication reporting that the incident was resolved (To user) • Form about the existence of a problem	
KPI's	• Total number of service request	

	• *Number and percent of service request fulfilled during the agreed time (SLA)* • *Average time in resolve the service request*
Related processes	• *Configuration Management – ConfM* • *Capacity Management - CapM* • *Change Management - ChM* • *Problem management – ProbM*

- *Documents to be produced*

  - Procedure to identify, login, classify and prioritize incidents *[ITSM_SOP_012_IncidentsPro]*
  - Procedure to resolve, escalate or close incidents *[ITSM_SOP_013_IncidentsEscClose]*
  - Procedure to identify, login, classify and prioritize service requests *[ITSM_SOP_014_ServiceReq]*
  - Procedure to resolve, escalate or close service requests *[ITSM_SOP_015_ServReqEscaClosu]*
  - Procedure to solve major incidents *[ITSM_SOP_016_MajorIncidents]*

Procedure to login, classify and prioritize incidents					
Identifier		Document's Name		Approval date	
ITSM_SOP_009_IncidentsPro		Procedure to record, classify and prioritize incidents		*dd/mm/yyyy*	
Process name /description:		Incident Management / Procedure to record, classify and prioritize incidents			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ISRM - Process Manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to record, classify and prioritize incidents			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		ISRM - Process Owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

The incidents procedure allows to determine a set of steps in order to record classify and prioritize any event that can be classified as an incident.

Triggers

- Any event detected through established channels (Web Interface, phone call, e-mail, fax report, event Monitoring)
- Event monitoring
- SLA's violation

Procedure

Step 1: The ISRM-Process practitioners (Incident support level 1) detect an event generated by any of the triggers defined.

Step 2: The ISRM-Process practitioners (Incident support level 1) settle on if the event is really an incident.

a) *if the event is an incident: continue with the step 3*
b) *if the event is not an incident: use the procedure [ITSM_S0P_014_ServReq]*

Step 3: The ISRM-Process practitioners (Incident support level 1) must logging the incident using the next sub-process.

a) *Firstly, the ISRM-Process practitioners (Incident support level 1) must be able to evaluate in the first instance whether the incident is included in the customer SLA. Otherwise forward it to a competent authority.*
b) *Checking that the incident has not yet been registered, because multiple users can report the same incident, generating duplicates in the system log.*
   NOTE: Whether the incident was already reported, the customer would obtain a number of register assigned.
c) *ISRM-Process practitioners (Incident support level 1) must assign a reference to identify the incident, for internal control or external reference.*
d) *ISRM-Process practitioners (Incident support level 1) must put the basic information needed to process the incident (time, description of the incident, affected systems ...) this information will be complete using the form [Online Form] and also register within the associated database.*
e) *The ISRM-Process practitioners (Incident support level 1) should include any information relevant to the resolution of the incident; this information can be requested from the customer through a specific form, or could be obtained from the CMDB itself.*
f) *ISRM-Process practitioners (Incident support level 1) should identify when the incident affect other customers. The customers should be notified so that they know how this incident can affect their normal work.*

Step 4: Once logged, the incident should be categorized within one of the following groups:

a. *Monitoring*
b. *Data transaction*
c. *Application & deployment*
d. *Organization & procedures*

NOTE: To solve any doubt with service categorization, use as a reference the A1 table of section of appendices.

Step 5: ISRM-Process practitioners (Incident support level 1), once categorized, should prioritize the incident using the next sub-process:

a) *The incident should be prioritized within one of the following groups:*
   a. *Critical*
   b. *High*
   c. *Medium*
   d. *Low.*

NOTE: To solve any doubt with service categorization, use as a reference the A1 table of section of appendices

Step 6: ISRM-Process practitioners (Incident support level 1), must determine whether the event is a major incident

a) *If the event is a major incident: the procedure [ITSM_S0P_017_MajorIncident] must be used and the activities in this procedure have to be stopped.*
b) *If the incident is not a major incident proceed to step 7*

Step 7: ISRM-Process practitioner (Incident support level 1) provides an initial diagnosis of the incident based on its knowledge. Also he performs a search of records of similar incidents to see if there is a workaround identified.

Once ISRM-Process practitioner (Incident support level 1) has performed the diagnosis of the incident, they must check the following:

a) *If the solution of the incident needs escalation, continue with the step 8*
b) *If the solution of the incident doesn't need escalation, continue with the step 10.*
c) *If the solution does not need escalation, but requires the implementation of change use the procedure [ITSM_S0P_018_ChangeManagement] and continues with step 11.*

Step 8: According to the analysis developed by ISRM-Process practitioners (Incident support level 1), ISRM-Process practitioners (Incident support level 2) must diagnose the incident and see if there is a solution for it. Once ISRM-Process practitioners (Incident support level 2) perform their own analysis of the incident, they must check the following:

a) *If the solution is not found or the incident requires a new escalation, continue in the step 9*
b) *If the solution of the incident is found and it does not require new escalation, continue in step 10.*
c) *If the solution does not need escalation, but requires the implementation of a change use the procedure ITSM_S0P_018_ChangeManagement] and continue with step 11.*

Step 9: According to the analysis developed by ISRM-Process practitioners (Incident support level 1 and 2), ISRM-Process practitioners (Incident support level 3) must diagnose the incident and see if there is a solution for it. Once ISRM-Process practitioners (Incident support level 3) perform their own analysis of incident, they must check the following:

a) *If the solution of the incident does not require the implementation of a change, continue in step 10.*
b) *If the solution requires the implementation of a change use the procedure [ITSM_S0P_018_ChangeManagement] and continue with step 11.*

Step 10: Carry out the activities necessary to solve the incident and recover the service. Before moving to the final step, the employee who is managing the incident must perform the following activities:

a) *Contact the client through preset channels (Phone, email) to verify that they are*

satisfied with the result.

b) *The incident will be considered closed after not receiving an answer by the customer 12 hours after sending the first notification.*

Step 11: The last stage is to close the incident. The incident can be closed following the next options

a) *Whether the service was restored, and the incident has been resolved, the employee that solves the incident should close the incident in the service management tools (after having a response about customer satisfaction).*

b) *When a workaround was implemented, the problem management procedure [ITSM_S0P_020_ProblemManagement] is in charge of closing the incident.*

Procedure to escalate/closure of incidents					
Identifier		Document's Name		Approval date	
ITSM_SOP_012_IncidentsEscClose		Procedure to escalate/closure incidents		*dd/mm/yyyy*	
Process name /description:		Incident Management / Procedure to escalate/closure incidents			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ISRM - Process Manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to escalate/closure incidents			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		ISRM-Process owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

This procedure allows demarcating the differences among hierarchy levels of the organization. Each level has a set of activities and responsibilities to fulfil before to escalate / Close the incident to the next level.

Triggers

- After performing the first incident diagnosis in each one of the support levels (incident support level 1, incident support level 2 and incident support level 3.). In each level the responsible may determine the need to escalate the incident after the first diagnosis

Procedure

Step 1: ISRM-Process practitioner (Incident support level 1) is aware that it has completed all the tasks described as follow:

"Tier 1: Customer support/Help desk & Technical support"

a) *ISRM-Process practitioners (Incident support level 1) did the registration, categorization and prioritization.*

b) *ISRM-Process practitioners (Incident support level 1) determined that the event is not a major incident.*

c) *Attempt to solve straightforward problems themselves (through knowledge management tool of incidents)*

d) *Attempt to find a solution to a customer's incident with their own knowledge or using other resources at their disposal*.
e) Record all activities performed in the form assigned to this activity
f) Whether the incident cannot be solved, communicates to the next level about the incident (phone call, using the registration tool, internal communication)
g) if the incident was solved, the staff should perform the corresponding records after finding the solution of the incident

Step 2: ISRM-Process practitioner (Incident support level 2) is aware that it has completed all the tasks described as follow:

"Tier 2: Technical support& System / Network administration"

a) *Attempt to find a solution to a customer's incident with their own knowledge or using other resources at their disposal*.
b) *The staff have more specialized skills that personal support level 1 and also access to information with more privileges*
c) Whether the incident cannot be solved, communicates to the next level about the incident (phone call, using the registration tool, internal communication)
h) if the incident was solved, the staff should perform the corresponding records after finding the solution of the incident

Step 3: ISRM-Process practitioner (Incident support level 3) is aware that it has completed all the tasks described as follow:

"Tier 3: Product Operations Engineering"
a) *Attempt to find a solution to a customer's incident with their own knowledge or through other resources at their disposal*.
b) the staff at this level of support can develop internal and external consultations
c) *Whether the incident cannot be solved, communicates to the top management*
i) if the incident was solved, the staff should perform the corresponding records after finding the solution of the incident

Procedure to record , classify and prioritise Service requests					
Identifier		Document's Name		Approval date	
ITSM_SOP_014_ServiceReq		Procedure to record, classify and prioritize service request		*dd/mm/yyyy*	
Process name /description:		Request fulfillment / Procedure to record, classify and prioritize service request			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ISRM – Process Manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to record, classify and prioritize service requests			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		ISRM - Process Owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

The service request procedure allows determine a set of steps in order to record classify and prioritize any event that can be classified as service request.

Triggers

- Any event detected through established channels (Web Interface, phone call, e-mail, fax, personally)

Procedure

Step 1: The ISRM-Process practitioners (Service request - Support level 1) detecting an event generated by any of the triggers previously described.

Step 2: The ISRM-Process practitioners (Service request - support level 1) must classify the request in one of the following groups:

1. *Request for information or advice*
2. *Request for access to service*
3. *Standard change requests*

Step 3: The ISRM-Process practitioners (Service request - support level 1) must logging the service request using the next sub-process.

a) *The ISRM-Process practitioners (Service request - support level 1) classifies the request in group 1, continues with the step 4.*
b) *The ISRM-Process practitioners (Service request - support level 2) classifies the request in group 2, continues with the step 5.*
c) *The ISRM-Process practitioners (Service request - support level 3) classifies the request in group 3, continues with the step 6*

Step 4: ISRM-Process practitioner (Service request support level 1) ,once logged, must develop the next activities:

a) *All the service requests assigned to "request for information or advice" group, must be fulfilled providing information to the users about the services described within the catalogue of services, characteristics of services, prices, delivery times, etc. Any general information about which the customer could have doubts.*
b) *If the client wishes to hire the service should be directed to step 5.*
c) *Whether the customer does not wish to make any other request, the staff should record the communication and describe the focus of the consultation.*
a) *After performing all the activities required by the customer, we execute the procedure to escalate*/closure *service request.*

Step 5: ISRM-Process practitioner (service request support level 2) ,once logged, must develop the next activities:

a) *All the service requests assigned from the" request for information or advice" group are treated as request of customers that want hire the service.*
b) *The customer should be informed of the commitments described within the*

document *[ITSM_SSP_006_SLAs]*

c) *After reaching an agreement with the client, we proceed to sign a commercial contract.*
d) *After performing all the activities required by the customer, we execute the procedure to escalate*/closure *service request.*

Step 6: ISRM-Process practitioners (service-request-support level 3) ,once logged, must develop the next activities:

a) *All the service requests assigned to "standard change request" group,* are to make any of the following changes to an active service
   - *Change of the password*
   - *Change of the plan*
   - *Any modification of the customer's information, etc.*
b) *After performing all the activities required by the customer, we execute the procedure to escalate*/closure *service request.* *[ITSM_SOP_015_ServReqEscaClosu]*

Procedure to escalate*/closure *service request.					
Identifier		Document's Name		Approval date	
ITSM_SOP_015_ServReqEscaClosu		Procedure to escalate/closure Service request		*dd/mm/yyyy*	
Process name /description:		Service request fulfillment / Procedure to escalate/closure Service request			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ISRM - Process manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to escalate/closure service request			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		ISRM - Process owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

This procedure allows demarcating the differences among hierarchy levels of the organization. Each level has a set of activities and responsibilities to fulfil before escalate / Closure the service request to the next level.

Triggers

- After performing the first service request analysis in each one of the support levels (Service request support level 1, service request support level 2 and service request support level 2). In each level, the responsible may determine the need to escalate or closure the service request.

Procedure

Step 1: ISRM-Process practitioners (Service request support level 1) is aware that it has completed all the tasks described as follow:

"Tier 1: Request for information or advice"

a) *ISRM-Process practitioners (Service request support level 1) did the registration, categorization and prioritization.*
b) *ISRM-Process practitioners (Service request support level 1) determined that the service request needs not be escalated.*
c) *Recording of all activities performed within the online form assigned to this activity*
d) *Close the service request in the management tool*

Step 2: ISRM-Process practitioners (Service request support level 2) is aware that it has completed all the tasks described as follow:

"Tier 2: Request for access to service"

a) *ISRM-Process practitioners (Service request support level 2) again should explain the service levels offered to the customer.*
b) *ISRM-Process practitioners (Service request support level 2) must complete the form of "new user" in management tool*
c) *Once understood the clauses of the commercial contract, it will be sent to the customer by the channel of their choice (fax, email, phone confirmation)*
d) *After receiving the confirmation from the customer, process practitioner will proceed to close the service request in the management tool*

Step 3: ISRM-Process practitioners (Incident support level 3) is aware that it has completed all the tasks described as follow:

"Tier 3: Standard change request"

a) *Attempt to find a solution to a customer's service request using the resources at their disposal.*
b) *The process practitioner will carry out the activities to achieve the service request (change password, change of plan, etc.)*
c) *After receiving the confirmation from the customer, process practitioner will proceed to close the service request in the management tool*

Procedure to Resolve Major Incidents					
Identifier		Document's Name		Approval date	
ITSM_SOP_016_MajorIncidents		Procedure to Solve Major Incidents		*dd/mm/yyyy*	
Process name /description:		Incident & Service request Management / Procedure in case of Major incidents			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ISRM - Process manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to resolve Major Incidents			
Next review due date		*dd/mm/yyyy*	Version		
Approval By		*Management Staff Committee*		Storage Location	
Signature				*Wiki*	

General overview of procedure

This procedure allows responding to an incident only when the event is considered as a major incident. The procedure described within this document should be used only as a guideline.

Triggers

- Any event notification that can be categorized as a major incident
- any alerts from monitoring tools that can be categorized as a major Incident

Procedure

Step 1: Any member of Management Staff Committee is aware that has been occurred a major incident

Step 2: the incident may be detected in several ways and through of different sources. Initially, the first member aware of a major incident should notify to the other committee members as soon as possible.

Step 3: the following team will act as initial responsible for a major incident. Each one of these members shall be notified of a major incident. The persons that need to be notified are described in the following table.

Member	Department	Phone	e-mail	Schedule
CEO-Chief executive Officer	*General Director*	*XXXXXXXXX*	*general.director@domain.xx*	*Out of hours*
Marketing Manger	*Marketing*	*XXXXXXXXX*	*market.director@domain.xx*	*Monday to Friday 8:30 am to 5:30 pm*
Operation Manager	*Service Operations*	*XXXXXXXXX*	*service.director@domain.xx*	*Monday to Friday 8:30 am to 5:30 pm*
Resource & Financial Manger	*Resources*	*XXXXXXXXX*	*assitant.director@domain.xx*	*Monday to Friday 8:30 am to 5:30 pm*

Table 12 Team for major incidents

Step 4: After receiving the notice, the committee should initially review information about the incident recording details (remember that the policy states that all incidents are recorded by the service desk)

Step 5 The incident committee leader must determine if the reported incident is certainly a major incident, in order to be sure; the following premises are useful:

- *The incident may bring more than a day without production*
- *incident affects over 30% of the customers*
- *The incident requires more than 6 employees in order to be solved.*

Step 6: The incident committee leader should perform an impact assessment in

order to determine the appropriate response

- *If the assessment shows that only one of the three premises is fulfilled, the incident committee leader should assign the resources needed to solve the incident. Continue with step 7.*
- *If the assessment shows that more than one premises is fulfilled, the incident committee leader shall activate the service continuity plan (developed in Service Continuity and Availability Management process)*

Step 7: In order to solve the incident, the employee of each one of the business units should join the team (see table 12). The team is in charge of performing all the activities for resolve the incident.

Step 8: When the solution of a major incident is found, this should be recorded and reported to their integration into the database

4.3.10 Problem management

- Introduction and Overview

ProbM is responsible for avoiding repetitive incidents and minimize the impact on the organization of the errors in the infrastructure, preventing in a proactively manner the recurrence of incidents related to these errors

- Goals

The goals of this process are:

- Identify, document and perform the tracking of long-term incidents.
- Try to avoid the recurring incidents
- Try to identify the root causes of incidents

- Capability level

Target Capability = Level 1 ("Ad-Hoc")

Description: The analysis of the root causes of incidents is carried out using only the background of the person that performs the analysis. Additionally, there is not a pre-established procedure to create and kept updated the Know error database- KEDB. Also, all the problems are handled in a reactive way.

- RACI Chart

ProbM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	ProbM-PO	ProbM-PM	ProbM-PP	O-PO
ProbMA1	Handling problems				R	
ProbMA2	Diagnosis		I	C	R	C
ProbMA3	Developing of workaround techniques		A	R		C
ProbMA4	Database creation		R			
ProbMA5	Major problem review		C	R	C	
ProbMA6	Resolution and closure		A	R	C	

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
ProbM-PO	Problem Management – Process Owner	Operations Manager
ProbM-PM	Problem Management – Process Manager	Service Manager 1 -Service Manager 2
ProbM-PP	Problem Management – Process practitioners	Engineer 1-2 / Technician 1-2
O-PO	Other- Process Owner	Marketing Manager – Resource/Financial Manager

- ProbM- Activities

Problem Management Activities		
Inputs, required information	• Service desk • Event Management • Incident management • Proactive problem management • Supplier or contractor	
Activities	ProbMA1	Detection, logging, categorization and prioritization of all problems
	ProbMA2	Problem investigation and diagnosis (RCA-Root Cause Analysis)
	ProbMA3	Develop of workaround techniques
	ProbMA4	Creation of Know Error Database- KEDB
	ProbMA5	Major problem review
	ProbMA6	Problem resolution and closure
Outputs	• Problems solved • Database of problems (permanent solutions and provisional solutions) • Tickets of problem solving • Root Cause Analysis reports	
KPI's	• Number of problems proactively detected	
Related processes	• Incident and Service request management –ISRM • Change management – ChM	

4.3.11 Configuration management

- Introduction and Overview

ConfM is responsible for ensuring that all assets and Configuration Items (CIs) of the organization necessary to deliver services are appropriately controlled. Also it should guarantee that the information about assets within the organization is accurate and reliable at any moment of time.

- Goals

  - Identify, document and control the entire of assets and CIs under the control of the organization with a suitable level of detail.
  - Supervise and protect the integrity of all CIs through the service lifecycle of both historical and current configurations

- Capability level

Target Capability = Level 1 ("Ad-Hoc")

Description: There is not implemented a defined procedure to control all the configuration items under control of the organization neither a procedure for testing these configuration items. The organization has not a procedure to identify its essential configuration items.

- RACI Chart

ConfM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*ConfM-PO*	*ConfM-PM*	*ConfM-PP*	*O-PO*
ConfMA1	*Planning*		*R*	*C*		*C*
ConfMA2	*Identification*		*I*		*R*	*C*
ConfMA3	*Establishment*			*I*	*R*	
ConfMA4	*Monitoring*		*I*	*R*	*C*	
ConfMA5	*Audits*	*A*	*R*	*C*		

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
ConfM-PO	*Configuration Management – Process Owner*	*Resource and Financial Manager*
ConfM-PM	*Configuration Management – Process Manager*	*Accountant*
ConfM-PP	*Configuration Management – Process practitioners*	*Business Agent*
O-PO	*Other- Process Owner*	*Marketing Manager – Operations Manager*

- ConfM- Activities

Configuration Management Activities		
Inputs, required information	• *Baseline of all configuration items* • *Configuration of systems and applications* • *Asset utilization and cost* • *Configuration Management Database monitoring*	
Activities	***ConfMA1***	*Design a configuration management plan*
	ConfMA2	*Identify, control and register all the CIs of the organization*
	ConfMA3	*Establishment of a Configuration Management System –CMS*
	ConfMA4	*Monitoring all the core CIs for providing the service*
	ConfMA5	*Develop audits in order to ensure that the information recorded in the CMDB match with the current configuration of the structure of the organization.*
Outputs	• *Report about the inconsistencies of the CI* • *Report audits*	
KPI's	• *Mismatches between Configuration management database-CMDB and result of the audits.* • *Total amount of CI outside of CMDB*	
Related processes	• *Release and Deployment Management-RDM* • *Change Management-ChM* • *Service continuity and availability management- SCAM* • *Capacity Management- CapM*	

4.3.12 Change Management

- Introduction and Overview

ChM is responsible for ensuring the use of standardized methods and procedures at the moment of carrying out changes, thus minimizing the impact on the quality of service. In other words, ChM is responsible for managing the lifecycle of all changes in order to minimize its impact within the organization.

- Goals

  - Ensure that all changes are recorded, evaluated, scheduled and authorized before its deployment.
  - Guarantee that all changes are measured, tested and reported after its deployment.
  - Guarantee that all changes performed to CIs are recorded in the Configuration Management System –CMS.
  - Allow the return to stable configurations in a simple and fast way.

- Capability Level

Target Capability = Level 3 ("Defined")

Description: Organization has clearly defined the activities and procedures to handling any change as well as exists a procedure to prioritize each one of these changes. Also, procedures, authorities and responsibilities to perform all the activities within the process are clearly defined.

- RACI Chart

ChM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	ChM-PO	ChM-PM	ChM-PP	O-PO
ChMA1	Submit RFC's		C/I	C/I	R	
ChMA2	Classification and Evaluation		I	I	R	
ChMA3	Approving and scheduling		C	R		
ChMA4	Monitoring		I	R		
ChMA5	Recording		R			

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
ChM-PO	Change Management – Process Owner	Operational Manager
ChM-PM	Change Management – Process Manager	Service manager 1 / Service manager2
ChM-PP	Change Management – Process practitioners	Engineer 1-2 / Technicians 1-2
O-PO	Other- Process Owner	Marketing Manager – Resource and financial Manager

- ChM- Activities

Change Management Activities		
Inputs, required information	• Request For Change from different sources • A emergency change	
Activities	ChMA1	Present a Request For Change – RFC
	ChMA2	Classify and evaluate the Request For Change
	ChMA3	Approve and coordinate the change implementation
	ChMA4	Change's monitoring after its implementation
	ChMA5	Recording and maintaining an accurate change database
Outputs	• Implemented change • Closed Request For Change-RFC	
KPI's	• Number of request for change – RFC • Number of emergency change implemented • Average of RFC approved	
Related processes	• Incident and service request management - ISRM • Configuration Management – ConfM • Problem Management - ProbM • Release and Deployment management – RDM • Service Level Management- SLM	

Documents to be produced

- General change management policy
- Procedure to handling any change.

Change Management Policy				
Identifier		*Document's Name*		*Approval date*
ITSMS-SOP_019_ChangeManagementPolicy		*Change Management Policy*		*dd/mm/yyyy*
Process Name / description:		*Change Management /Change Policy*		
Created On:		*dd/mm/yyyy*	*Revision:*	*dd/mm/yyyy*
Created by:		*Change Advisory Board-CAB*		
Comments:				
Historical Reviews				
Review Number	*Date*	*Description of Modification*		
1	*dd/mm/yyyy*	*Establishment of the change management policy*		
2				
-				
Next Review due date			*Version*	*1.0*
Approval By:		*Change Management-Process Manager*		*Storage Location*
Signatures				*Wiki*

Change Management Policy

[Organization's name] recognizes that increasing the rate of successful on change management is a vital target to our organization. [Organization's name] also recognizes that achieving this goal requires a commitment by the organization to implement a culture where staff involved in this process is able to minimize both unplanned work or unwise decisions

[Organization's name] defined as valid guidelines of change management the following premises:

- Provide monthly reports of indicators defined within [ITSMS-SOP_020_ChangeKPIs] to measure the performance and effectiveness of the process in order to make decisions about the management

- Establishment of assessments and impact analysis of all changes that allow adopt right approval decisions

- *[Organization's name] should* provide a single point of contact for receipt any RFC; in order to minimize, the probability that a conflicting change occurs.

- *[Organization's name] must* establish the roles and responsibilities needed to change management through service lifecycle.

- Should not make any changes without the authorization of the person responsible

The above premises are established to govern the change management process; particular policies are defined for each one of the activities inside the process. Additionally, the policies of each sub-processes will be aligned with the general policy of change established

.

Procedure for handling a change					
Identifier		Document's Name		Approval date	
ITSM_STP_018_ChangePriority		Procedure to handling a change		*dd/mm/yyyy*	
Process name /description:		Change Management / General Procedure to handling a change			
Created on:		*dd/mm/yyyy*	Revision:	*dd/mm/yyyy*	
Created by:		ChM – Process Manager			
Comments:					
Historical reviews					
Review Number	Date	Description of the modification			
1	*dd/mm/yyyy*	Establishment of a procedure to handling any change			
2					
-					
Next review due date		*dd/mm/yyyy*	Version		
Approval By		ChM - Process Owner		Storage Location	
Signature				*Wiki*	

General overview of procedure

This procedure allows manage any request for change - RFC

Triggers

- Any request for change - RFC from related dependencies.

Procedure

Step 1: ChM-Process practitioners are aware that a RFC has been created. Before follow with the next step, ChM-Process managers should register the RFC, using the next sub-process:

a) *ChM-Process practitioners must identify from where the request was originated as well as must locate the RFC within one of the following groups*
   - *Problem Management*
   - *Customers*
   - *Current legislation*
   - *Suppliers*
   - *New Projects*
   - *Other factors*

b) *ChM-Process practitioners must register the RFC using a online form (Also they can use CMDB form)*
c) *ChM-Process practitioners only records the RFC if they get permission from ChM-Process managers*
d) *if the request is not for an emergency change, ChM-Process practitioners must*

Escalate a RFCs for the authorization is a procedure hierarchical and has the following times:

- *ChM-Process practitioners: 8 hours*
- *ChM-Process managers: 24 hours*
- *ChM-Process owner: 24 Hours*

Note: Emergency change: [ITSM_SOP_022_EmergencyChange]

e) *Whether during the stipulated time the authorization is not received, the RFC is rejected, and the process is closed.*

NOTE: Each one of the activities performed during the registration process must be documented within tool designated to manage RFC's

Step 2: Assign a priority to RFCs. The kinds of priorities stipulated are High, medium and Low priority

Step 3: This part of stage is dedicated to assess and evaluate the change, where the ChM-process practitioner should evaluate at least:

- *Assess the impact of change*
- *Assess the risk of change*

Step 4: Approval of change depends on the priority and the classification made in the previous steps. Approval of change should include at least the following aspects:

a) *Review and agree on the classification of change*
b) *The ChM-Process managers is responsible for approving changes(except for urgent changes and critical changes)*
c) *The ChM-Process managers should generate the approved ticket.*

Step 5: Approved changes are communicated to release and deployment process manager in order to build and test the change.

Step 6: upon receipt the confirmation of the release and deployment management process , the CHM-process owner authorizes the deployment of the change through of a email-message

Step7: At the moment that the change has been implemented, process manager should be review that the change meets its targets.

Step 9: after receiving confirmation from the user on the correct operation of the system, the configuration Management System CMS is updated and the RFC's will be closed.

4.3.13 Release and deployment management

- Introduction and Overview

RDM is responsible of managing new releases while preserving the integrity of the current services. Among activities inside release and deploy management, we can find: planning, scheduling, building testing and deployment of new releases approved by the organization.

- Goals

  - Establishment of release and deployment management plans.
  - Ensure that the integrity of the services is preserved during the transition of release packages.

- Capability level

Target Capability = Level 1 ("Ad-Hoc")

Description: Organization is aware about the activities needed for scheduling, building, testing and deployment the releases. Nevertheless, there are not procedures in order to track, install, test and verify a new release package.

- RACI Chart

RDM Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		***Defined Roles (involved in the process)***				
		SRO	*RDM-PO*	*RDM-PM*	*RDM-PP*	*O-PO*
RDMA1	*Deployment*		*A*	*R*		
RDMA2	*Built and test*			*A/I*	*R*	*I*
RDMA3	*Supervise*		*R*	*I*		*C*
RDMA4	*Controlling*		*A*	*R*	*C*	*C*

Abbreviation	***Description***	***Position in the organization***
SRO	*Senior responsible Owner*	*CEO-Chief Executive Officer*
RDM-PO	*Release and deployment Management – Process Owner*	*Marketing Manager*
RDM-PM	*Release and deployment Management – Process Manager*	*Marketing Manager assistant*
RDM-PP	*Release and deployment Management – Process practitioners*	*seller / promoter*
O-PO	*Other- Process Owner*	*Resource and financial Manager – Operations Manager*

- RDM- Activities

Release and Deploy Management Activities		
Inputs, required information	• *Request for software Updates* • *Request for Hardware Updates*	
Activities	**RDMA1**	*Plan releases and deployments*
	RDMA2	*build and test releases*
	RDMA3	*oversee deployments*
	RDMA4	*Reviewing and closing deployments.*
Outputs	• *Incident and Service request management –ISRM*	
KPI's	• *Number of new versions released last month* • *Amount of incidents related with new versions* • *Compliance of times specified for each deployment*	
Related processes	• *Change Management –ChM*	

4.3.14 Continual Service Improvement

- Introduction and Overview

CSI is responsible of aligning continually the services with the business needs. In other words is to adapt better the services according to the changing needs of our customers through optimized internal processes in order to have higher returns on investment and increased customer satisfaction.

- Goals

  - Suggest improvements for all processes and activities involved in the management and delivery of services.
  - Support the strategy and design phase in order to define new services and process activities associated with them

- Capability level

Target Capability = Level 2 ("Repeatable")

Description: There is an overview of the procedures to be performed in order to identify, record and prioritize the opportunities of improvement. Further, organization recognizes that the opportunities of improvement must be evaluated and approved through a defined procedure.

- RACI Chart

CSI Process RACI Chart						
R= Responsible, A= Accountable, C= Consulted, I= Informed.						
Activities		Defined Roles (involved in the process)				
		SRO	CSI-PO	CSI-PM	CSI-PP	O-PO
CSIA1	Identifying		R	C	C	C
CSIA2	Prioritizing	A	R			
CSIA3	Evaluating		R			C
CSIA4	Approving	A	R	C	C	C

Abbreviation	Description	Position in the organization
SRO	Senior responsible Owner	CEO-Chief Executive Officer
CSI-C	Continual service Improvement – commitment	Management Staff

- CSI- Activities

Continual Service Improvement Activities		
Inputs, required information	• Reports about service performance • Reports about workload of th configuration items	
Activities	CSIA1	Identify and record all the opportunities of improvement
	CSIA2	Prioritize opportunities of improvement identified
	CSIA3	Evaluated all the opportunities of improvement
	CSIA4	Approve all the opportunities of improvement
Outputs	• Reports with aspects that can be subject of improvement	
KPI's	• Number of identified improvement on the main process • number of identified improvements that were implemented	
Related processes	• All the process of SMS	

This chapter shows how standards and best practices can be used as a reference in order to establish a service management system. Also, organizations can use the guidelines offered by these frameworks to suit a particular case. It has been observed that increase the maturity level within the organization requires of hard work related to the production of documents and assignation of responsibilities However, the work carried out through this chapter allows ensure that the preset maturity level is reached.

5 Service Management tools

At the moment of deciding to implement an ITSM system within an organization, the group of people leading this activity can choose among several options; from a manual creation of all documentation, procedures, activities, etc of the ITSM system, till choosing the option of employing a set of specialized tools supporting the system. Both options have their advantages and inconveniences.

The manual-based approach relies on the persons responsible of carrying out all the activities and documentation within ITSM system. Because of its fundament, a simple service request can trigger a series of activities. Thus, whenever an episode of any type occurs, a set of components of ITSM system are triggered. This interdependency between processes may make the manual-based approach difficult and error prone. For this reason, an ITSM system implemented only manually in most cases is not practical.

The approach to implement an ITSM system making use up to some degree of tools is indeed more reliable because the process and their interdependencies are supported by the tool. An appropriate selection of the tool plus the extensive knowledge about the management system to implement is the perfect combination for ensuring success in the implementation of the SMS. As will be seen in the next sections, the problem with this approach consists of choosing the best tool, which best suits with the specific needs of each organization

The simplest assessment of service management tools is solely based on aspects such as price or number of processes covered by each tool. However, it is also possible to make an assessment that doesn't take into account only these two aspects.

In order to be consistent with the work done so far, we can pull out a set of features of the earlier steps that can be useful for the evaluation of any tool, without forgetting the commercial features that in most cases are a decisive factor when choosing the ITSM support tool. keeping in mind these important features, we decided to analyze the ITSM tools from three different points of view; commercial characteristics, support to the general requirements adopted for our SMS as well as support to each one of the process-specific requirements emanated.

Once collected all the information used to evaluate ITSM tools, the evaluation chart should be created. The assessment involves comparing the minimum requirements deducted for our organization against those features offered by the ITSM tool. Although some ITSM tools offer their platforms ensuring that serve as support for processes posed by ITSM frameworks, the assessment will be performed taking into account only those features that serve as support for our concrete environment.

5.1 Tool assessment framework

The selected criteria to analyze tools are conditioned for the purpose of assessment; it isn't intended to be a value-based judgment. However, each of the criteria will be qualified with a subjective rating in order to determine the "best" tool from our point of view. The assessment will be conducted using solely the information provided by the suppliers of the selected ITSM tools.

5.1.1 Assessment based on commercial aspects

Breaking down the complexity of an ITSM tool, one can analyze the functionality of the tool from different perspectives. The commercial aspects have been a common point of reference to evaluate a tool. Although it is not recommended to use it as a single source of information when selecting a tool (tools selected only under this criterion will not meet the expected performance characteristics) it is undoubtedly a criterion that provides relevant information. The commercial assessment model will be applied to evaluate the tool is based in the following questions:

- The price of the software is affordable in line with what it offers
- Number of supported processes aligned with the ITSM frameworks
- The application can be used from different platforms
- There tools brings added value (purchases Management, scheduling, etc.)
- The vendor provides free support of the tool after it has been acquired
- Vendor offers free training
- The tool has a free trial period available
- Number of users who can use the tool is consistent with the requirements of the organization (paying a single license)
- The tool contains aspects related with service strategy such as decision trees, forecasting items, etc.
- Management reports may be generated without paying any additional fee.

5.1.2 Assessment based on general requirements

The second stage of assessment involves analyzing the alignment of the tool with the general requirements established for our concrete service management system. Obtain evidence that the tool is aligned with the general requirements deducted for our SMS is a key aspect, It allows one understand the authorities and responsibilities, also establish a connection between the management system activities and personal responsible of carry out them. The first step is to obtain a depth understanding of the software functionalities and conduct a functional-review with emphasis on those "things" that can serve as a reference in order to verify if the tool fulfil a minimum of conditions that make it useful for managing the general requirements. This means answering questions such

as: what are the documents produced on this part? Where the documents produced are stored? Etc. This analysis provides a reference point in order to establish a set of conditions that the tool needs to meet for it to assist in the activities in this stage. The relevant items to evaluate in this stage can be extracted by answering the following questions.

- The tool allows differentiating the organizational levels defined within the company.
- The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, Plans, Authorities, etc.)
- The tool provides information about the creation of documentation (Date, responsible, last review, etc.)
- The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.

5.1.3 Assessment based on process-specific requirements

The third stage aims at evaluate the tool under specific requirements of each one of the process-specific requirements established for our concrete environment. An assessment model is developed for each one of the process, due to the nature and purpose of each one of the process, it cannot be assessed under the same conditions. The assessment will be conducted supported on the following questions

- The tool allows storage a service portfolio
- The tool allows storage a service catalog (differentiating between service catalog and service portfolio)
- The tool allows clearly to identify all the operational services
- The tool allows creating SLA's and link them to appropriate services
- The tool allows the review of the relevant parameters included within SLA's
- The tool allows creating OLA's and linking them to appropriate SLAs
- The tool allows the review of the relevant parameters included within OLA's
- The tool allows creating UC's and link them to appropriate SLAs
- The tool allows the review of the relevant parameters included within UC's
- The tool provides a mechanism for tracking all reviews of SLA’s.
- The tool allows perform service performance reports
- The tool allows create an availability management information system
- The tool provides information about workload of each registered CI’s.
- The tool allows implement security controls.
- The tool generates reports about security incidents
- The tool allows perform customer satisfaction surveys
- The tool has a means to capture/log complaints and service requests.
- The tool allows identify and classify all suppliers linked with the organization
- The tool allows differentiate between an incident and a service request
- The tool provides a unique identifier to the incident or service request
- The tool allows categorize both incident / service request
- The tool allows prioritize both the incident and the service request

- The tool allows escalate both the incident and the service request
- The tool allows tracking both the incident and the service request during their lifecycle
- The tool allows mark incidents as major incidents
- The tool allows record actions taken to resolve a recurrent incidents (KEDB)
- The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)
- The tool allows create a configuration management system.
- The tool provides a unique identifier to all RFC's
- The tool allows choose the type of change
- The tool allows establish who is responsible of a change authorization
- The tool allows perform an assessment and scheduling for changes
- The tool allows perform a change monitoring
- The tool provides an indication when the change has been closed
- The tool allows track and test all the release packages

Recall that the main target in this section is determines the maximum number of aspects that can be used for produce a subjective assessment. Consequently, at the end of the assessment, we will give a score to each one of the analyzed tools. This score represents a personal rating in order to determine the best tool for our concrete organization. However, the aspects analyzed and the score obtained can vary depending of the viewpoint of the person performing the analysis.

Score	***Reference***	***Description***
from 9 to 10.0	*Suitable*	*Outstanding linkage of the tool with the process target. There are only minor deviations between what the tool offers and the process requirement.*
from 7 to 8.9	*Good*	*The tool provides support for most requirements within each process. Further, some activities within the process are supported by the features offered by the tool.*
from 5 to 6.9	*Acceptable*	*Support of activities with a number of notable deviations. The tool executes a set of activities but with significant shortcomings.*
from 4 to 4.9	*Poor*	*The tool meets with a set of minimum criteria, but the features offered by the tool aren't useful for the particular requirements.*

Table 13 Chart of reference for score

The information contained in Table 13 can be used as a reference to assign the punctuation to each one of the items described for the evaluation. There are two approaches for obtaining the final score for each tool. One approach uses an arithmetic average for representing an overall rating. However, there is a problem associated with this approach. Because all the processes supported by the tool does not have the same importance for the organization. The second approach is based on weighted arithmetic mean. This approach could be more effective and reliable, because each processes supported by the tool can be assigned with a "weight" depending of the organization needs.

5.2 Information technology service management -ITSM tools

Choosing the most appropriate ITSM tool that suits the particular interests of an organization is not an easy decision. The offer of ITSM tools on the market is abundant and diverse. Therefore, there is no formula to calculate the best tool for managing services. Although there are a lot of ITSM tools, we decided to initially select the tools with the best reputation on the environment of ITSM. Having this initially selected set, the second task is to enumerate all the possible features in which the tool might be useful for our like a service provider (how its product fits to customer's needs). Finally, the third task for our particular work is the evaluation of the tool through the form created to evaluate our options.

5.2.1 BMC Remedy IT Service Management Suite 8

The solution provided by BMC software [**16**] can be used in two different ways. The first alternative is sponsored under the name of "on-premise". Using this option, the customer gets the installation CD and passwords for all licensed users (the number or purchased licenses is on request). Besides, the customer is directly responsible for the computers where the tool is executed.

The second alternative is called "on-demand". With this option the customer relies on the level of service agreed with the vendor, because the application is installed on devices managed by the vendor. The provider gives to the customer the information needed to access the application (user, password) from anywhere. The main advantages of using the second option would be the flexibility on number of employees, because the application can be accessed from different devices with the same username and password (without taking into account security issues).

One of the most relevant aspects that BMC software offers is its interface that promotes the self-service, where the users can find updated information about service catalog. Additionally, there is a section that helps the user to get information about how to make service requests. This function can be performed using several manners such as: knowledge articles, chat, or request submittal. Other interesting aspect that BMC software offers is a full collection of mobile applications that can be used for updating asset information, approving change requests, managing major incidents and others. The application for smart phones and tables allows users to deliver, update, and track any kind of service requests. Using this functionality substantially reduces the number of calls to the service center, according to comments of users that utilize the tools. BMC Software offers its products through a set of packages that are focused on processes grouped into different functional areas. Among the most important packages, we can find the following:

- Request & support: The requirements, incidents and problems are centralized and automated. Any event from the customers is centralized by the tool. The BMC tool allows tracking all the events registered. The correct processing of requests is

achieved through of the constant communication between customers and user interface.

- Provision & configure: the tool helps IT to deliver service in a easy manner, using the service automation as a alternative to mitigate risk related with service provisioning. Additionally, the tool also helps to implement a correct IT infrastructure through the control of configuration items.

- Monitor & Operate: The tool focuses on managing the availability and proper functioning of technological resources, in order to identify potential problems in a proactive way and resolve them before they affect and impact the organization customers. The tool allows the monitoring and operation of the information technology infrastructure, also helps to understand the normal behaviour of the general configuration items. The improper behaviour of any configuration item (i.e. workload) can be detected early-time. The tool generates warnings of any anomaly in order to avoid impacts for the customer.

- Plan & Govern: Provides information related with the technology infrastructure in an integrated manner. The tool intended get prospects about resource utilization, budget overview, Costs, and maintain clear policies and management objectives of IT from a business vision.

- Integrate & Orchestrate: This stage is responsible for grouping all information provided by the above 4 stages. The objective is consolidating and integrating the general information related with the SMS in a central point.

In order to overhaul the final punctuation, see section A3 – annexes (BMC-Remedy IT Service Management Suite 8 assessment)

5.2.2 LANDesk Service Desk

LANDesk service Desk System [**17**] offers in one single interface to discover, manage, update and protect all IT assets within the organization. The most important features include: mobile management, operating system migration and overall remote control from a central point. There are also functionalities such as patch management, data coding and guidelines that help to protect the environment of information technology.

Another important functionality is the "Mobility Management" that allows manage all the IT components from different platforms, also provides the possibility of customize the user interface. The IT management staff can configure the view of the tool so that only authorized personnel can access certain features of the application; this function is targeted to preserve the security of IT assets. There is also a functionality called "Active directory" that allows delegation of functions to all employees of the organization. Carrying out the delegation of duties through the tool, guarantees that the employees

have only the privileges required to do their assigned activities. Consequently, the security and efficiency of the system will increase. LANDesk Management Suite allows escalate systems management solutions according to the specific requirements of each organization. Thus, the effectiveness and profitability are maintained, regardless of how many users and organization's units should be managed. Execution of overall tasks of the organization can be organized in a centrally way. Instead of having to perform the same task over and over again on different servers with different users or groups of users, a management rule can be created to be further disseminated and enforced using the tool.

LANDesk Management Suite meets all the requirements in order to manage the configuration items, eliminating errors that could arise when these assets are unknown- At this point is important to note that the tool makes the discovery of new configuration items automatically, removing thus the responsibility to the staff responsible of carrying out this activity.

Summarizing, LANDesk Management Suite is designed for all types of incidents, service requests and change requests needed, questions and problems from users for requirements of new software or software updates. Self-service tools allow end users to solve many of their own queries related to IT, among them, the first three top queries for the service desk for any organization: the restoration of passwords, searches of knowledge bases and applications service. In addition, the tool has a catalog of capabilities in order to increase the self-service with a hierarchical list of priorities with images and descriptions. In order to overhaul the final punctuation, see section A4 – annexes (LANDesk Management Suite assessment)

5.2.3 CA Service Desk Manager Suite

The CA Service Desk Software Technologies [**18**] offers an extensive variety of automated solutions for the organization. The tool allows automating processes such as: incident, problem, knowledge management, interactive support, self-service and advanced root cause analysis. CA Service Desk Software offers a common collaborative, self-service experience for employees and customers to access and make use of the resources of CA Service Desk Manager. Additionally, among the most important features of CA Service Desk Software is the possibility of using the tool from different devices (tablets, Smartphone), from which the users can manage incidents, requests, changes and being able to track any event. The CA Service Desk Software Technologies allows getting indicators and statistics, managing taxation, and subscribing to an electronic billing system. Also it allows differentiating the best product and worst product in relation with performance. Other features that we can with this tool are the management of suppliers, costs and values of overall products of the organization, forecast reports of accounting and so on. The CA Service Desk Software Technologies has on its individual packages the main disadvantage, because all packages are sold separately. The tool is sold in one main package, whether the

customer wants a specialized package that deepens in a specific process must pay an additional fee.

CA-Service desk manager tool provides an additional helpfulness. CA-IT-Client Manager is an extra-package which allows the user to automate activities associated with the management of central servers and remote hosts. Among the main features we can find a user interface that can be configured according to user preferences, discovering of new configuration items and self-register, remote control of the assets but with centralized security, robust inventory of assets, etc. In order to overhaul the final punctuation, see section A5 – annexes (Ca – Service desk manager tool assessment)

5.2.4 Hp IT Service Management Suite

HP IT Service Management (ITSM) [**19**] is a scalable enterprise solution that enables IT staff to manage and report on IT roles in the environment of the organization. The HP ITSM solution has two main components "HP Service Manager" and "HP Universal CMDB". Also is composed of several key modules that allow IT organizations to create an automated, personalized and integrated business solution. The HP Service Management modules include support services, change management, IT service catalog, knowledge management, applications management and service level management. HP ITSM service management usually can be integrated with existing internal systems (i.e. quality systems, security systems, etc.). HP Service Management also is directly aligned with ITIL.

One of the main features of the HP solution is the production of reports that in most cases are used to demonstrate compliance with any standard (in case of audits). The reports can be generated at different levels of the organization, from a simple query to a specific report to achieve any requirement of an audit. On the other hand in relation with management of incidents, HP IT Service Management enables the automatic generation of tickets and in some cases the tool is able of solve automatically some incidents. Furthermore, the system has an interface to detect problems, archives incidents and in many cases can act and solve problems automatically.

Among the aspects that can be automated using the HP solution, we can find:

- Solving common incidents - cost reduction (less personal to handle incidents)
- Implementation of standard changes -The tool perform standard changes (minimizes risk from manual error on repetitive changes)
- Delivery of IT services from simple access requests to the provisioning of new complex services – tool allows automate some requests through “self-service”.
- Compliance to make sure that corporate license and security policies are followed - enables tracking to ensure that the policies established by the organization are met.

In order to overhaul the final punctuation, see section A6 – annexes (Hp IT Service Management Suite assessment)

5.2.5 GLPI Free IT and asset management software

Although the analysis performed so far has been made over licensed tools, there are several applications based on open source. A new help desk application is being designed by GLPI project [**20**]. The target of the project is creating a tool based on open source in order to provide some level of management over information technology. Some management features considered by the tool have the same functionality and alignment required by the ITSM frameworks. Although there is no a document certifying that the tool meets with the minimum requirements established by the ITSM framework, whether we can deduce that the features described within product brochure are acceptable to support part of a service management system.

Among the important features offered by the tool we can enumerate the following:

The tools allows create a database to maintain updated information about configuration items within the organization, besides the customer can get a historical report with all the changes made on the assets since its implementation. On the other hand, the management activities can be performed in a easy manner, because the tool has a set of complements that admit scheduling repetitive activities, monitoring complaints and service request, etc.

Notwithstanding, the use of an open source tool not only have advantages. Most of the open source tools analyzed do not have enough documentation that allows resolve any questions or problem with the use of the tool and GLPI project is not an exception. Additionally another drawback that we can stand out is the lack of a centralized point of support, when the customer does not find information to resolve a problem, only the personal leading the project can provide support in specific cases. As we can see in the product specifications, this software is not only a basic tool to make inventory, so we can use this tool within large organizations in which not only an inventory of equipment is required. The customer is also able to create tickets in order to report and track any incident related with the configuration items registered in the tool. Another additional advantage is the generation of reports related with general cost of each configuration item. In order to overhaul the final punctuation, see section A7 – annexes (GLPI free IT and asset management Software assessment)

5.3 Selecting of the tool that best fits to the proposed environment

Considering the features of each one of the tools described through this chapter. The initial step in evaluating the usefulness of a tool is to construct a contextual environment of the organization for which is being considered. The focus within this initial step is establishing a set of requirements of the organization that the tool need supporting. However, other manners to assess are also viable, including commercial aspects, experience in the market of the supplier, number of organizations that recommend the

tool, etc. In this case, tools such as BMC Remedy IT Service Management Suite [**16**] and Hp IT Service Management suite [**19**] are strong candidates to serve as support for our approach. Because from our perspective these two organizations have more experience in the market of ITSM tools. However we cannot overlook the CA Service Desk Manager Suite [**18**] tool, although this approach has not the same trajectory of the previous suppliers whether have a very good market position.

In this paragraph monetary aspects will be analyzed. These aspects are appropriate for describing the overall cost incurred at the moment of choose a tool. Usually, packages offered by suppliers of ITSM tools are sold separately. That is to say, whether a tool is purchased at a low cost in comparison with others alternatives (basic packages). The overall cost of individual packages needed to reach the same benefits of the others alternatives could be higher. The discussion is concentrate on the cost of tools with the basic packages needed to cover our requirements. Considering the aspects mentioned above, Glpi free IT and Asset Management Software [**20**] tool could be an option, because the application is distributed free. However, this tool has not the suitable properties needed to support the critical processes defined within our organization. Another option that can be taken into account is LANDesk Service Desk [**17**] tool. This application is the second cheaper option. Additionally, all the processes are covered by one single package. In a hypothetical situation where the conditions to consider were price and number of covered processes, LANDesk Service Desk tool could be selected among the tools analyzed.

Finally, to let customers directly access the service, organization wants to make sure that the tools allows service automation. For our organization is essential automates some activities and procedures within the SMS processes. In our approach, the automates activities within service operation stage is important. Organization wants minimize the risks associated with the activities of service delivery. Thus, our priority is choosing a tool that allows automate as many activities needed to fulfil with the designed minimum requirements. All the commercial tools analyzed within this document allow automate activities within service lifecycle, however, free distribution tool lacks these possibilities. Thus, Glpi free IT and Asset Management Software [**20**] will be excluded from the final choice. Among remaining tools, the subjective assessment obtained from the tables made for each tool will be used to choose the tool. From our point of view and considering the relationship between cost and benefits, the ITSM tool for support the particular service management system is CA Service Desk Manager Suite [**18**].

6 Concluding remarks

Through the execution of this Master Thesis we have learnt a set of lessons that we try to summarise in the following paragraphs. First of all, ITSM frameworks are key best practices for handling problems related with IT. ITSM Systems must be designed and implemented with a concrete application domain goal in mind. In other words, a designer of an ITSM system must know the relevant aspects of the organization for which he/she is proposing a solution. Through this work, we established a service management system always with this in mind, from the definition of the service for a specific market, until the preparation of the documentation to reach a defined maturity level. In order to achieve the main objective of this work, we proceeded through a series of chronological stages that helped us to achieve the goal. Therefore, from every stage we can provide several lessons learned.

The analysis of the frameworks and methodologies capture the fundamental aspects of the current information associated with IT service management. Basically, analysis provides constructive information in relation to accepted best practices in the world. There is no general framework that fits to all organizations. The ITIL framework describes a set of best practices and recommendations for the management of IT services, making use of a process-based approach. ISO/IEC 20000 is a standard oriented to provide a set of requirements for a service management system also process-based but much light than ITIL. Additionally, there are other frameworks that help to governance and audit such as CobiT. The critical goal of analyzing IT frameworks is guaranteeing that concepts and best practices are understood. IT frameworks are complex and can be an arduous task its implementation from scratch by non-ITSM experts. So, it is important to reduce the amount of speculations when it comes to designing, implementing and operating the ITSM system. IT frameworks are a suitable source of information and guidance.

Nowadays, companies or organizations recognize that they cannot appeal to all the buyers in the market, or at least, they cannot attract all buyers in the same way. Because, the buyers are too numerous, too scattered and too varied in their business needs and buying habits. For other hand, the organizations don't always have the same capabilities to supply different segments of the market. Then, instead of contending in a market that will surely lose against other high-ranking organizations, the definition of the target market is the only way. While an organization does not clearly determine its the target market, they cannot make consistent decisions about the products offered, the distribution channels that will use, promotional tools used and the price on the market, the above aspects are essential for a organization in order to make an "attractive offer ". Although, there are different manners to define the market, the CANVAS model is a tool that allows describing the business model of any organization in an easy way. Through this template, both customers and service provider can have a clear overview of the organization and its principal relationships. Also a crucial point, when an organization begins to create an IT service management system is to understand clearly the services offered and the target customers for these services.

Topics relating with the IT management are increasingly important for organizations, the spent time and monetary investment made by the organizations is more significant in recent times, also have emerged numerous frameworks for governance and management of IT that help organizations to provide quality services. When the organizations seek specify its minimum requirements to plan, establish, implement, operate, monitor, review, maintain and improve a service management system, the organization must adapt overall information offered by the frameworks to its individuals requirements. In order to fulfil these minimum requirements, a set of activities, procedures and documentation must be specified. Besides, a mechanism is needed to evaluate all components within the process. Organizations must be aware of the amount of processes within a service management system as well as the capability level that has in each of them. Because any increase of the capacity level in a given process may involve a strenuous work. Additionally an increase of the capability level does not mean that the maturity level also increases.

Tools are an important aspect in the implementation of a service management system. Nevertheless, tools are used to support processes, never to define processes. Although, there are a lot of tools in the market, all of them are based under the same concept; to remove responsibilities of the staff, and to allow the tool to carry out the functions. Among the reasons to trust in ITSM tools to assist with the processes is the number of relationships between processes, documentation, tracking, etc. that a service management system contains. The tools can assist with all the relevant activities, because can process more information than people. Finally, as a final remark it is important to highlight that tools are not designed to a specific process as well as are not mandatory to establish a service management system. A service management system can be implemented supported on a simple spreadsheet. However, in some cases is important to seek for tools that help to automate routine activities, procedures and requirements.

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8 Annex

A.1 Service categorization

Service	Class of Service	Priority / Time		Impact: High	Impact: Medium	Impact: Low
Sensor Information Database-SID	*Monitoring*	Urgency	High	Critical < 1 hour	High <4 hour	Medium <12hour
Supporting Research –SR	*Data transaction*		High	Critical < 1 hour	High <4 hours	Medium <12 hours
Sensor Maps – SM	*Organization & procedures*		Medium	High <8 hours	Medium <8 hours	Low <2 days
Application deployment – AD	*Application & deployment*		Low	Low 24 hours	Low <12 hour	Low <1 day

A.2 Current metrics

- Customer's survey
  Target: *Reach a level of satisfaction of at least 3 points, where 1 is the lowest level of satisfaction, and 5 the highest level*

  The survey consists of 10 questions, where the user categorizes each response among a range of 1-5. The average score of the questions allows classifies the customer's satisfaction as follows:

  - *Low satisfaction: 1.0 to 2.0*
  - *Medium Satisfaction: 2.1 to 3.5*
  - *High Satisfaction: 3.6 to 5.0*

- Tracking SLA's
  Target: *Ensure that less than 10% of services breach the SLAs agreed*

  X = N*umber of services that violate the SLA*
  Y = Number of total services

$$\frac{\sum X}{Y} * 100 \leq 10$$

- Number of SLA's supported by existing UC's and OLA's

  - *Determine the number services covered by existing UC's and OLA's*
  - *Review in detail the requirements of each SLA's and compare it with existing UC's and OLA's*

A.3 BMC Remedy IT Service Management Suite 8

Product's Name		***BMC Remedy IT Service Management Suite 8***		
Company		***Bmcsoftware***		*Logo*
Web		*http://www.bmc.com*		
Price		*Number of Users*	*0-500*	

N°	*Description*	*Score*									
		Low			***Medium***				***High***		
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	*The price of the software is in line with what it offers*							X			
2	*Number of processes aligned with the ITSM frameworks*									X	
3	*The application can be used from different platforms*										X
4	*There tools brings added value through purchases Management, scheduling, etc.*									X	
5	*The vendor provides free support of the tool after it has been acquired*								X		
6	*Vendor offers free training*						X				
7	*The tool has a free period available*							X			
8	*Number of users who can use the tool is consistent with the requirements of the organization (Paying a single license)*									X	
9	*The tool contain aspects related with service strategy such as decision trees, forecasting items, etc.*									X	
10	*Management reports may be generated without paying any additional fee*									X	
Assessment based on commercial aspects		*Subtotal*							***8.3***		
11	*The tool allows differentiating the organizational levels defined within the company.*									X	
12	*The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, plans, Authorities, etc.)*						X				
13	*The tool provides information about the creation of documentation (Date, responsible, last review, etc.)*									X	
14	*The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.*									X	
Assessment based on general requirements		*Subtotal*							***8.2***		
15	*The tool allows storage a service portfolio*										X
16	*The tool allows a service catalog (differentiating between service portfolio and service catalog)*									X	
17	*The tool allows clearly to identify all the operational services*									X	
18	*The tool allows creating SLA's and linking them to appropriate services*							X			
19	*The tool allows review the relevant parameters included within SLA's*							X			
20	*The tool allows creating OLA's and linking them to appropriate SLA's*							X			
21	*The tool allows the review of the relevant parameters included within OLA's*							X			
22	*The tool allows creating UC's and linking them to appropriate SLA's*								X		
23	*The tool allows review of the relevant parameters included within UC's.*									X	

24	The tool provides a mechanism of the review of SLA's	1	2	3	4	5	6	7	8	X	10
25	The tool Allows perform service performance reports	1	2	3	4	5	6	7	8	9	X
26	The tool allows create and availability management system	1	2	3	4	5	6	7	8	9	X
27	The tool provides information about workload of each registered configuration item.	1	2	3	4	5	6	7	8	X	10
28	The tool allows implement security controls	1	2	3	4	5	6	7	8	9	X
29	The tool generates reports about security incidents	1	2	3	4	5	6	7	8	9	X
30	The tool allows perform customer satisfaction surveys	1	2	3	4	5	6	7	8	X	10
31	The tool allows identify and classify all suppliers linked with the organization	1	2	3	4	5	6	7	8	X	10
32	The tool allows differentiate between an incident and a service request	1	2	3	4	5	6	7	X	9	10
33	The tool provides a unique identifier to the incident or service request	1	2	3	4	5	6	7	8	X	10
34	The tool allows categorize both incident / service request	1	2	3	4	5	6	7	8	X	10
35	The tool allows prioritize both the incident and the service request	1	2	3	4	5	6	7	8	X	10
36	The tool allows escalate both the incident and the service request	1	2	3	4	5	6	7	8	X	10
37	The tool allows tracking both the incident and the service request during their lifecycle	1	2	3	4	5	6	7	X	9	10
38	The tool allows mark incidents as major incidents	1	2	3	4	5	6	7	8	9	X
39	The tool allows record actions taken to resolve a recurrent incidents (KEDB)	1	2	3	4	5	6	7	8	X	10
40	The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)	1	2	3	4	5	6	7	8	9	X
41	The tool allows create a configuration management system	1	2	3	4	5	6	7	8	X	10
42	The tool provides a unique identifier to all RFC's	1	2	3	4	5	6	7	8	X	10
43	The tool allows choose the type of change	1	2	3	4	5	6	7	X	9	10
44	The tool allows establish who is responsible of a change authorization	1	2	3	4	5	6	X	8	9	10
45	The tool allows perform an assessment and scheduling for changes	1	2	3	4	5	6	7	X	9	10
46	The tool allows perform a change monitoring	1	2	3	4	5	6	7	X	9	10
47	The tool provides an indication when the change has been closed	1	2	3	4	5	6	7	8	X	10
48	The tool allows track and test all the release packages	1	2	3	4	5	6	7	8	X	10
Assessment based on process-specific requirements		Subtotal							8.73		
		Total score							**8.4**		

A.4 LANDesk Software

Product's Name		***LAN Service Desk***		
Company		***LANDESK***		*Logo*
Web		*http://www.landesk.com*		
Price		*Number of Users*	*0-500*	

N°	*Description*	*Score*									
		Low			***Medium***				***High***		
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	*The price of the software is in line with what it offers*							X			
2	*Number of processes aligned with the ITSM frameworks*								X		
3	*The application can be used from different platforms*							X			
4	*There tools brings added value through purchases Management, scheduling, etc.*								X		
5	*The vendor provides free support of the tool after it has been acquired*								X		
6	*Vendor offers free training*								X		
7	*The tool has a free period available*									X	
8	*Number of users who can use the tool is consistent with the requirements of the organization (Paying a single license)*						X				
9	*The tool contain aspects related with service strategy such as decision trees, forecasting items, etc.*							X			
10	*Management reports may be generated without paying any additional fee*									X	
Assessment based on commercial aspects		*Subtotal*					***7.7***				
11	*The tool allows differentiating the organizational levels defined within the company.*						X				
12	*The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, plans, Authorities, etc.)*						X				
13	*The tool provides information about the creation of documentation (Date, responsible, last review, etc.)*									X	
14	*The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.*					X					
Assessment based on general requirements		*Subtotal*					***6.5***				
15	*The tool allows storage a service portfolio*							X			
16	*The tool allows a service catalog (differentiating between service portfolio and service catalog)*						X				
17	*The tool allows clearly to identify all the operational services*								X		
18	*The tool allows creating SLA's and linking them to appropriate services*								X		
19	*The tool allows review the relevant parameters included within SLA's*						X				
20	*The tool allows creating OLA's and linking them to appropriate SLA's*					X					
21	*The tool allows the review of the relevant parameters included within OLA's*					X					
22	*The tool allows creating UC's and linking them to appropriate SLA's*					X					
23	*The tool allows review of the relevant parameters included*				X						

	within UC's.										
24	*The tool provides a mechanism of the review of SLA's*	1	2	3	X	5	6	7	8	9	10
25	*The tool Allows perform service performance reports*	1	2	3	4	5	6	X	8	9	10
26	*The tool allows create and availability management system*	1	2	3	4	5	6	7	X	9	10
27	*The tool provides information about workload of each registered configuration item.*	1	2	3	4	5	6	7	8	X	10
28	*The tool allows implement security controls*	1	2	3	4	5	6	7	8	X	10
29	*The tool generates reports about security incidents*	1	2	3	4	5	6	7	X	9	10
30	*The tool allows perform customer satisfaction surveys*	1	2	3	4	5	X	7	8	9	10
31	*The tool allows identify and classify all suppliers linked with the organization*	1	2	3	X	5	6	7	8	9	10
32	*The tool allows differentiate between an incident and a service request*	1	2	3	4	5	6	7	X	9	10
33	*The tool provides a unique identifier to the incident or service request*	1	2	3	4	5	6	7	X	9	10
34	*The tool allows categorize both incident / service request*	1	2	3	4	5	6	7	X	9	10
35	*The tool allows prioritize both the incident and the service request*	1	2	3	4	5	6	7	8	X	10
36	*The tool allows escalate both the incident and the service request*	1	2	3	4	5	6	X	8	9	10
37	*The tool allows tracking both the incident and the service request during their lifecycle*	1	2	3	4	5	6	X	8	9	10
38	*The tool allows mark incidents as major incidents*	1	2	3	4	5	X	7	8	9	10
39	*The tool allows record actions taken to resolve a recurrent incidents (KEDB)*	1	2	3	4	5	X	7	8	9	10
40	*The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)*	1	2	3	4	X	6	7	8	9	10
41	*The tool allows create a configuration management system*	1	2	3	4	5	6	7	X	9	10
42	*The tool provides a unique identifier to all RFC's*	1	2	3	4	5	6	7	X	9	10
43	*The tool allows choose the type of change*	1	2	3	4	5	6	X		9	10
44	*The tool allows establish who is responsible of a change authorization*	1	2	3	4	5	6	X	8	9	10
45	*The tool allows perform an assessment and scheduling for changes*	1	2	3	X	5	6	7	8	9	10
46	*The tool allows perform a change monitoring*	1	2	3	4	X	6	7	8	9	10
47	*The tool provides an indication when the change has been closed*	1	2	3	4	X	6	7	8	9	10
48	*The tool allows track and test all the release packages*	1	2	3	4	X	6	7	8	9	10
Assessment based on process-specific requirements		*Subtotal*						***6.5***			
		Total score						***6.9***			

A.5 CA Service Desk Manager Suite

Product's Name		***Ca Service Desk Manager Suite8***		
Company		***Ca technologies***		*Logo*
Web		*http://www.ca.com*		
Price		*Number of Users*	*0-500*	

N°	*Description*	*Score*									
		Low			***Medium***				***High***		
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	*The price of the software is in line with what it offers*							X			
2	*Number of processes aligned with the ITSM frameworks*						X				
3	*The application can be used from different platforms*							X			
4	*There tools brings added value through purchases Management, scheduling, etc.*				X						
5	*The vendor provides free support of the tool after it has been acquired*				X						
6	*Vendor offers free training*			X							
7	*The tool has a free period available*							X			
8	*Number of users who can use the tool is consistent with the requirements of the organization (Paying a single license)*					X					
9	*The tool contain aspects related with service strategy such as decision trees, forecasting items, etc.*			X							
10	*Management reports may be generated without paying any additional fee*			X							
Assessment based on commercial aspects		*Subtotal*						***4.9***			
11	*The tool allows differentiating the organizational levels defined within the company.*							X			
12	*The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, plans, Authorities, etc.)*					X					
13	*The tool provides information about the creation of documentation (Date, responsible, last review, etc.)*									X	
14	*The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.*							X			
Assessment based on general requirements		*Subtotal*						***7***			
15	*The tool allows storage a service portfolio*							X			
16	*The tool allows a service catalog (differentiating between service portfolio and service catalog)*							X			
17	*The tool allows clearly to identify all the operational services*									X	
18	*The tool allows creating SLA's and linking them to appropriate services*					X					
19	*The tool allows review the relevant parameters included within SLA's*						X				
20	*The tool allows creating OLA's and linking them to appropriate SLA's*						X				
21	*The tool allows the review of the relevant parameters included within OLA's*				X						
22	*The tool allows creating UC's and linking them to appropriate SLA's*				X						
23	*The tool allows review of the relevant parameters included within UC's.*		X								

24	The tool provides a mechanism of the review of SLA's	1	2	3	4	5	6	X	8		10
25	The tool Allows perform service performance reports	1	2	3	4	5	6	X	8	9	
26	The tool allows create and availability management system	1	2	3	4	5	X	7	8	9	
27	The tool provides information about workload of each registered configuration item.	1	2	3	4	5	6	7	X		10
28	The tool allows implement security controls	1	2	3	4	5	6	7	X	9	
29	The tool generates reports about security incidents	1	2	3	4	5	6	X	8	9	
30	The tool allows perform customer satisfaction surveys	1	X	3	4	5	6	7	8		10
31	The tool allows identify and classify all suppliers linked with the organization	1	2	X	4	5	6	7	8		10
32	The tool allows differentiate between an incident and a service request	1	2	3	4	5	6	7	X	9	10
33	The tool provides a unique identifier to the incident or service request	1	2	3	4	5	6	7	8	X	10
34	The tool allows categorize both incident / service request	1	2	3	4	5	6	7	8	X	10
35	The tool allows prioritize both the incident and the service request	1	2	3	4	5	6	7	8	X	10
36	The tool allows escalate both the incident and the service request	1	2	3	4	5	6	7	8	X	10
37	The tool allows tracking both the incident and the service request during their lifecycle	1	2	3	4	5	X	7		9	10
38	The tool allows mark incidents as major incidents	1	2	3	4	X	6	7	8	9	10
39	The tool allows record actions taken to resolve a recurrent incidents (KEDB)	1	2	3	4	5	X	7	8	9	10
40	The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)	1	2	3	4	X	6	7	8	9	10
41	The tool allows create a configuration management system	1	2	3	4	X	6	7	8	9	10
42	The tool provides a unique identifier to all RFC's	1	2	3	4	5	6	X	8	9	10
43	The tool allows choose the type of change	1	2	3	4	5	6	X	8	9	10
44	The tool allows establish who is responsible of a change authorization	1	2	3	4	5	6	7	X	9	10
45	The tool allows perform an assessment and scheduling for changes	1	2	3	4	X	6	7	8	9	10
46	The tool allows perform a change monitoring	1	2	3	4	X	6	7	8	9	10
47	The tool provides an indication when the change has been closed	1	2	3	4	X	6	7	8	9	10
48	The tool allows track and test all the release packages	1	2	3	X	5	6	7	8	9	10
Assessment based on process-specific requirements			Subtotal					**6.1**			
		Total score						**6.0**			

A.6 Hp IT Service Management Suite 8

Product's Name		***Hp IT Service Management Suite 8***		
Company		***Hewlett Packard***		*Logo*
Web		*http://www8.hp.com/us/en/software-solutions/service-manager-service-desk/index.html*		
Price		*Number of Users*	*0-500*	

N°	*Description*	*Score*									
		Low			***Medium***				***High***		
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	*The price of the software is in line with what it offers*									X	
2	*Number of processes aligned with the ITSM frameworks*									X	
3	*The application can be used from different platforms*								X		
4	*There tools brings added value through purchases Management, scheduling, etc.*							X			
5	*The vendor provides free support of the tool after it has been acquired*									X	
6	*Vendor offers free training*						X				
7	*The tool has a free period available*								X		
8	*Number of users who can use the tool is consistent with the requirements of the organization (Paying a single license)*							X			
9	*The tool contain aspects related with service strategy such as decision trees, forecasting items, etc.*						X				
10	*Management reports may be generated without paying any additional fee*									X	
Assessment based on commercial aspects		*Subtotal*							***7.7***		
11	*The tool allows differentiating the organizational levels defined within the company.*							X			
12	*The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, plans, Authorities, etc.)*						X				
13	*The tool provides information about the creation of documentation (Date, responsible, last review, etc.)*									X	
14	*The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.*						X				
Assessment based on general requirements		*Subtotal*							***6.75***		
15	*The tool allows storage a service portfolio*						X				
16	*The tool allows a service catalog (differentiating between service portfolio and service catalog)*						X				
17	*The tool allows clearly to identify all the operational services*									X	
18	*The tool allows creating SLA's and linking them to appropriate services*					X					
19	*The tool allows review the relevant parameters included within SLA's*						X				
20	*The tool allows creating OLA's and linking them to appropriate SLA's*						X				
21	*The tool allows the review of the relevant parameters included within OLA's*					X					
22	*The tool allows creating UC's and linking them to appropriate SLA's*							X			
23	*The tool allows review of the relevant parameters included*						X				

	within UC's.										
24	*The tool provides a mechanism of the review of SLA's*	*1*	*2*	*3*	*4*	*5*	***X***	*7*	*8*	*9*	*10*
25	*The tool Allows perform service performance reports*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
26	*The tool allows create and availability management system*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
27	*The tool provides information about workload of each registered configuration item.*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	***X***
28	*The tool allows implement security controls*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	***X***	*10*
29	*The tool generates reports about security incidents*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
30	*The tool allows perform customer satisfaction surveys*	*1*	*2*	*3*	***X***	*5*	*6*	*7*	*8*	*9*	*10*
31	*The tool allows identify and classify all suppliers linked with the organization*	*1*	*2*	*3*	***X***	*5*	*6*	*7*	*8*	*9*	*10*
32	*The tool allows differentiate between an incident and a service request*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
33	*The tool provides a unique identifier to the incident or service request*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	***X***	*10*
34	*The tool allows categorize both incident / service request*	*1*	*2*	*3*	*4*	*5*	*6*	***X***	*8*	*9*	*10*
35	*The tool allows prioritize both the incident and the service request*	*1*	*2*	*3*	*4*	*5*	*6*	***X***	*8*	*9*	*10*
36	*The tool allows escalate both the incident and the service request*	*1*	*2*	*3*	*4*	*5*	***X***	*7*	*8*	*9*	*10*
37	*The tool allows tracking both the incident and the service request during their lifecycle*	*1*	*2*	*3*	*4*	*5*	***X***	*7*	*8*	*9*	*10*
38	*The tool allows mark incidents as major incidents*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
39	*The tool allows record actions taken to resolve a recurrent incidents (KEDB)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	***X***	*9*	*10*
40	*The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)*	*1*	*2*	*3*	*4*	***X***	*6*	*7*	*8*	*9*	*10*
41	*The tool allows create a configuration management system*	*1*	*2*	*3*	*4*	*5*	*6*	***X***	*8*	*9*	*10*
42	*The tool provides a unique identifier to all RFC's*	*1*	*2*	*3*	*4*	*5*	***X***	*7*	*8*	*9*	*10*
43	*The tool allows choose the type of change*	*1*	*2*	*3*	*4*	*5*	***X***	*7*		*9*	*10*
44	*The tool allows establish who is responsible of a change authorization*	*1*	*2*	*3*	*4*	*5*	*6*	***X***	*8*	*9*	*10*
45	*The tool allows perform an assessment and scheduling for changes*	*1*	*2*	*3*	*4*	*5*	*6*	***X***	*8*	*9*	*10*
46	*The tool allows perform a change monitoring*	*1*	*2*	*3*	*4*	***X***	*6*	*7*	*8*	*9*	*10*
47	*The tool provides an indication when the change has been closed*	*1*	*2*	*3*	*4*	*5*	***X***	*7*	*8*	*9*	*10*
48	*The tool allows track and test all the release packages*	*1*	*2*	*3*	*4*	***X***	*6*	*7*	*8*	*9*	*10*
Assessment based on process-specific requirements		*Subtotal*					***6.4***				
	Total score						***6.9***				

A.7 GLPI free IT and Asset Management Software

Product's Name		**Glpi free IT and Asset Management Software**		
Company		**Glpi Project**		Logo
Web		http://www.glpi-project.org		
Price		Number of Users	0-500	

N°	Description	Score									
		Low			Medium				High		
		1	2	3	4	5	6	7	8	9	10
1	The price of the software is in line with what it offers							X			
2	Number of processes aligned with the ITSM frameworks				X						
3	The application can be used from different platforms			X							
4	There tools brings added value through purchases Management, scheduling, etc.			X							
5	The vendor provides free support of the tool after it has been acquired		X								
6	Vendor offers free training			X							
7	The tool has a free period available										X
8	Number of users who can use the tool is consistent with the requirements of the organization (Paying a single license)									X	
9	The tool contain aspects related with service strategy such as decision trees, forecasting items, etc.		X								
10	Management reports may be generated without paying any additional fee		X								
Assessment based on commercial aspects		Subtotal							4.5		
11	The tool allows differentiating the organizational levels defined within the company.			X							
12	The tool provides a means to store the general documentation concerning to SMS- Service Management System (Policies, plans, Authorities, etc.)			X							
13	The tool provides information about the creation of documentation (Date, responsible, last review, etc.)				X						
14	The tool provides a mechanism to communicate and distribute information generated by the responsible personnel.			X							
Assessment based on general requirements		Subtotal							3.2		
15	The tool allows storage a service portfolio				X						
16	The tool allows a service catalog (differentiating between service portfolio and service catalog)					X					
17	The tool allows clearly to identify all the operational services					X					
18	The tool allows creating SLA's and linking them to appropriate services			X							
19	The tool allows review the relevant parameters included within SLA's		X								
20	The tool allows creating OLA's and linking them to appropriate SLA's		X								
21	The tool allows the review of the relevant parameters included within OLA's		X								
22	The tool allows creating UC's and linking them to appropriate SLA's		X								
23	The tool allows review of the relevant parameters included within UC's.		X								

24	The tool provides a mechanism of the review of SLA's	1	X	3	4	5	6	7	8	9	10
25	The tool Allows perform service performance reports	1	X	3	4	5	6	7	8	9	10
26	The tool allows create and availability management system	1	X	3	4	5	6	7	8	9	10
27	The tool provides information about workload of each registered configuration item.	1	2	3	4	5	X	7	8	9	10
28	The tool allows implement security controls	1	2	3	4	X	6	7	8	9	10
29	The tool generates reports about security incidents	1	X	3	4	5	6	7	8	9	10
30	The tool allows perform customer satisfaction surveys	X	2	3	4	5	6	7	8	9	10
31	The tool allows identify and classify all suppliers linked with the organization	X	2	3	4	5	6	7	8	9	10
32	The tool allows differentiate between an incident and a service request	1	X	3	4	5	6	7	8	9	10
33	The tool provides a unique identifier to the incident or service request	X	2	3	4	5	6	7	8	9	10
34	The tool allows categorize both incident / service request	1	2	X	4	5	6	7	8	9	10
35	The tool allows prioritize both the incident and the service request	1	X	3	4	5	6	7	8	9	10
36	The tool allows escalate both the incident and the service request	1	X	3	4	5	6	7	8	9	10
37	The tool allows tracking both the incident and the service request during their lifecycle	1	X	3	4	5	6	7	8	9	10
38	The tool allows mark incidents as major incidents	X	2	3	4	5	6	7	8	9	
39	The tool allows record actions taken to resolve a recurrent incidents (KEDB)	1	X	3	4	5	6	7	8	9	10
40	The tool has defined channels to communicate with the customer (about the status of resolution of the incident or service request)	1	X	3	4	5	6	7	8	9	10
41	The tool allows create a configuration management system	1	2	X	4	5	6	7	8	9	10
42	The tool provides a unique identifier to all RFC's	1	X	3	4	5	6	7	8	9	10
43	The tool allows choose the type of change	1	X	3	4	5	6	7		9	10
44	The tool allows establish who is responsible of a change authorization	1	2	3	X	5	6	7	8	9	10
45	The tool allows perform an assessment and scheduling for changes	1	2	X	4	5	6	7	8	9	10
46	The tool allows perform a change monitoring	1	2	X	4	5	6	7		9	10
47	The tool provides an indication when the change has been closed	1	X	3	4	5	6	7	8	9	10
48	The tool allows track and test all the release packages	1	2	X	4	5	6	7	8	9	10
Assessment based on process-specific requirements		Subtotal						**2.4**			
		Total score						**3.4****			

** Aspects not considered by the Glpi tool were assigned with a low score.