

IT Service Management Model Based on ITIL for the Information Technology and Communications Unit of the Universidad de las Fuerzas Armadas ESPE Campus Latacunga

Alex Omar Zambrano Peñaherrera and Víctor Manuel Páliz Osorio

Abstract—The Universidad de las Fuerzas Armadas ESPE Campus Latacunga is a Higher Education institution that offers IT services through the Information and Communications Technology Unit to both internal and external customers. However, one of the problems identified in the study is the lack of management to deal with the incidents by not having defined processes of their activities and tasks, thus generating delays or partial problem-solving. In this research is developed an IT Service Management model based on ITIL for the optimization of UTIC services. The model is based on the methodology ITIL version 3, it is the main reference in the management of services for its flexibility and adaptability to any type of organization. The IT services management model promotes a better performance of the service desk through the generation of a dashboard with indicators that allows decision-making to improve processes and monitor and control for reduction time of care and meet needs with quality, effectiveness and efficiency.

Index Terms—Continuous process improvement, service levels, service strategy, service life cycle, IT organization.

I. INTRODUCTION

The Universidad de las Fuerzas Armadas ESPE Campus Latacunga is considered one of the most important educational institutions in the central region of Ecuador for its contribution to the generation of new knowledge through teaching, research and links with society. It has support units that contribute to these achievements, such as the Information and Communications Technology Unit (UTIC), which has technological tools used to bring improvements in the processing and exchange of information, automation of tasks, accessibility and service provision for the administrative and educational area. However, one of the weaknesses of the UTIC is that this area does not have established processes in which the activities, tasks and scaling of levels to be carried out in each of the sections comprising it are defined, resulting in delays in the resolution of problems presented in the services or the partial resolution of problems or incidents.

There are several case studies such as [1]-[4] that demonstrate that the adoption of ITIL good practices offers companies the possibility to improve their business models through IT processes focused on achieving institutional

objectives, thus facilitating the integration of a tool that allows proactive management of IT services; in [2] we have results that demonstrate what has been said as the reduction in the time of attention to requirements by more than 50% and the increase of the attention to petitions by 70%; and also in [3] it was observed that the average times of resolution of the incidences were reduced of 56,5 minutes to 26,5 minutes that represents 53,10% managing to answer to a greater number of requests without neglecting the

Due to the lack of management of IT services of the UTIC due to the absence of clear and documented processes, the response times before incidents and requirements have been delayed, thus reducing user satisfaction. It is for this reason that it becomes essential to have a management of services and processes based on the best practices of the ITIL framework [5], thus achieving a quality service that meets the demand of the users, generating acceptable attention and response times which will promote a culture of continuous improvement in the unit.

This research proposes an IT Service Management model based on ITIL Version 3 for the optimization of processes and activities in the areas of UTIC at the University of the Armed Forces ESPE Campus Latacunga, in this sense the writing is structured as follows: the analysis of the problem is described in Section II. Section III shows the ITIL methodology and its phases. The results of implementation the service management model in Section IV and finally the conclusions and discussion in Section V.

II. ANALYSIS OF THE PROBLEM

The UTIC of Campus Latacunga is a support area in which different IT services are offered to students, teachers, military, administrative and managerial personnel; these services must be available 24 hours 7 days a week with the best rate of availability, In order for this to be possible, it is necessary to have human talent trained and prepared to deal efficiently with any situation that may arise within the Institution.

Faced with this situation, it has become necessary to have clear and defined processes for the attention and resolution of the disadvantages presented at the University, being the area of supply with its service desk the space to receive each one of the requirements and incidents for its subsequent management of services that allows to establish the necessary procedures in case of complications that could occur in the normal use of the services, promoting the search for continuous improvements to the IT services

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offered to members of the university community.

The lack of a survey of information about the processes and management of IT services in the area of service provision means that the response times for incidents that may arise with some of the services offered are prolonged, therefore it is necessary to have an IT service management model through which quality services can be offered in acceptable times.

III. ITIL METHODOLOGY

ITIL is the abbreviation in English of the Information Technology Infrastructure Library, which provides a methodical approach to the provision of IT services [6], is also considered as a methodology that over the years has become a standard within the technology processes in several companies, being a set of good practices in the management of IT services that can be adapted to any type of institutions, public or private, which provides a continuous improvement of quality services in the design, transition and operation of IT services, by implementing processes that reduce the costs of procedures in different areas by facilitating better integration and relationships between IT and business.

ITIL V3 compiles each of the best practices from its previous versions, focuses on aligning IT services with business objectives and promotes their achievement in a shorter time by facilitating the acquisition of competitive advantages through better IT organization [8].

Organizations can use different guides to set goals and improve performance by prioritizing business objectives and customer satisfaction according to their IT services catalogue and, in the future, to implement an IT governance [9], thus, in order to better manage each of the processes in the technological areas, it is necessary to use standards, methodologies or frameworks of proven works [10], which are fully established, detailed and substantiated with success stories to assist companies active in the IT industry [11].

There are several case studies as detailed in [12] which show that the adoption of ITIL allows the transformation of IT management for the purpose of providing quality services, have documented and consistent management processes that provide greater information to those in charge of the technology area and allow continuous improvement of internal processes to provide fault-tolerable systems while maintaining fluent communication with clients by reference to service level agreements and by offering better services to external customers [13], [14].



Fig. 1. Phases of the service life cycle.

For an effective implementation of IT management it is

necessary to engage staff in the adoption of good practices and transform the approach to service-oriented management, This is achieved through continuous training of staff with the aim of developing clear and efficient processes; as well as the implementation of campaigns to decrease resistance to change and create the acceptance and understanding of new processes within the institution [15].

In order to establish the IT management model in the UTIC, several meetings are held, interviews with the Unit's staff in order to learn about the processes that take place within the Unit, identifying in this way the reasons that affect the efficiency of the service as being: lack of clear processes, few activities defined by each of the IT services, non-existent service level agreements, among others; for this reason the main ITIL processes were selected and good practices to be implemented for IT management were established.

The following figure provides that the ITIL-based IT Service Management Model provides a service desk with a single contact point from the University Community to the UTIC.

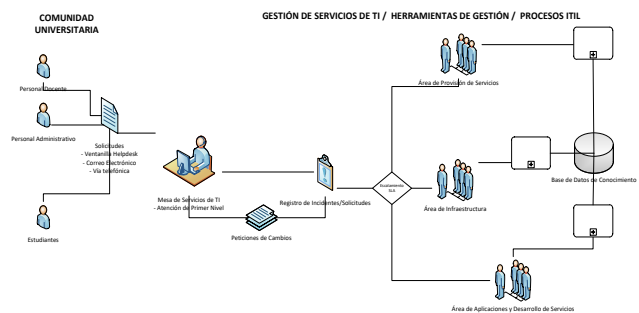


Fig. 2. Service desk model.

A. Service Catalog

For the generation of the service catalog information is collected about the requirements with the highest demand of the University Community, as well as the technological and human resources required for each of the services; this is developed jointly with all the staff of the Unit in order to obtain a consensus catalogue with all the necessary and up-to-date information of the operational and offered services.

With this information, the process of organizing service-level agreements is initiated, where meetings were held with the staff responsible for the services, the customer and the interested parties for the purpose of providing a valid metric to verify the performance of the services from the client's point of view; that is to say that there is now more precise information for both the customer, in how to manage its requirement, and the Unit's technicians on how they will respond to such requests.

B. Management of IT Configuration and Assets

This is one of the main processes that is implemented since it constitutes an added value to each of the services since it allows to obtain the information of all UTIC assets and their configuration. In order to have a better management, the technological inventory is reviewed and the Configuration and Assets database is structured through the OTRS computer tool, which makes it easier to have centralized information, through which there is better

control of IT elements, maintaining a format for each of the components in order to plan, classify, monitor and track each IT asset and to know which other elements relate to each other.

Procesador:	INTEL CORE I7
Velocidad:	2.99 GHZ
Memoria RAM:	8 GB
Disco Duro:	1 TB
Adaptador de Red:	Ethernet 10/100/1000
MAC Address:	0
Otro Componente:	INCLUYE MOCHILA, CANDADO Y MOUSE
Fecha De Adquisición:	12/12/2015
Fecha Expiración Garantía:	12/12/2018

ESTADO DEL INCIDENTE	DEPLOYMENT STATE	CONFIGITEM#	NOMBRE	DEPLOYMENT STATE	CREADO	ENLAZADO COMO	BORRAR
■	■	9029003478	10.8.1.123	Producción	27/01/2020 - 22:55:55 (America/Guayaquil)	Conectado a	🗑

ESTADO DEL INCIDENTE	DEPLOYMENT STATE	CONFIGITEM#	NOMBRE	DEPLOYMENT STATE	CREADO	ENLAZADO COMO	BORRAR
■	■	9029000010	DBMS MySQL 5.0 Windows	Producción	28/01/2020 - 11:42:39 (America/Guayaquil)	Incluye	🗑
■	■	9029000107	Microsoft Office Professional Plus 2013	Producción	28/01/2020 - 11:45:11 (America/Guayaquil)	Incluye	🗑
■	■	9029000118	Microsoft Windows 10	Producción	28/01/2020 - 11:45:27 (America/Guayaquil)	Incluye	🗑
■	■	9029000135	Software Base	Producción	28/01/2020 - 11:45:53 (America/Guayaquil)	Incluye	🗑

Fig. 3. Configuration of IT items.

In the above picture you can see that IT assets are registered in the OTRS computer tool and each of them is linked to the other technological components such as hardware, software, network connection among other fields, as well as for each of the Tickets that are generated according to the requirements.

C. Change Management

The purpose of change management is to maximize the number of successful IT changes by ensuring that risks have been assessed to minimize the impact they may have; these changes will provide greater efficiency and effectiveness for IT products or services.

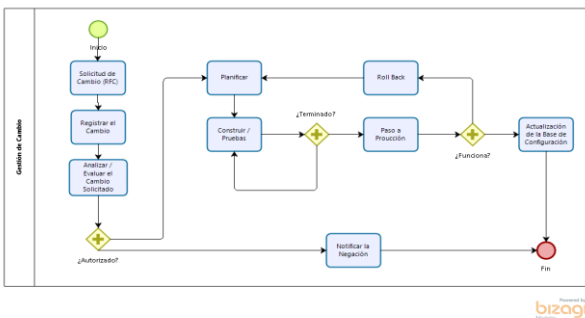


Fig. 4. Change management process.

As can be seen in the figure, the beginning of the change process begins with the request for change, which must be recorded, analyzed and evaluated by a committee that will be made up of IT staff, the user and the interested party, so that once an agreement has been reached with the staff of the committee, the request for each of the internal processes of the Unit for its deployment and transition to production is authorized and flowing, otherwise it must be notified of the refusal.

D. Incidente Management

This process allows to restore in the shortest possible time the normal operation of the service, minimizing the impact that this can have on operations. For this it is necessary to understand that an incident is an unplanned interruption; therefore incident management has a great

impact to improve customer satisfaction and how they perceive the service.

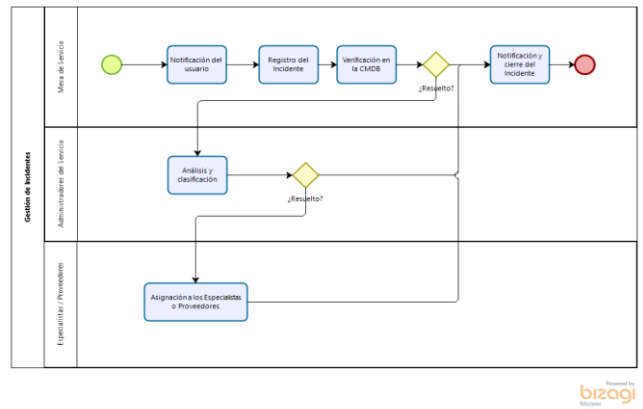


Fig. 5. Incident management process.

The graph above shows the flow through which an incident must go, so it starts the process by the contact point, the service desk, which is the first filter for care, who must register, classify and verify the incident so that it is resolved in the shortest time possible; if a solution cannot be found here, should move to the next area where the Service Administrator proceeds with the analysis and resolution of the problem or in turn coordinate with the service provider for the prompt restoration of the problem.

Finally, these incidents must be registered and managed to ensure that they would not presented again, and that the resolution times are timely and according to the service levels

E. Requirements Management

Requirement management is a process that is not related to service failures or service degradation as observed in incident management, but rather are predefined and previously agreed processes as part of service delivery, These procedures should be clear and standard in order to give attention to requests, which may range from obtaining information, enabling access and permissions as standard changes that do not involve modifying the functioning of IT systems/services.

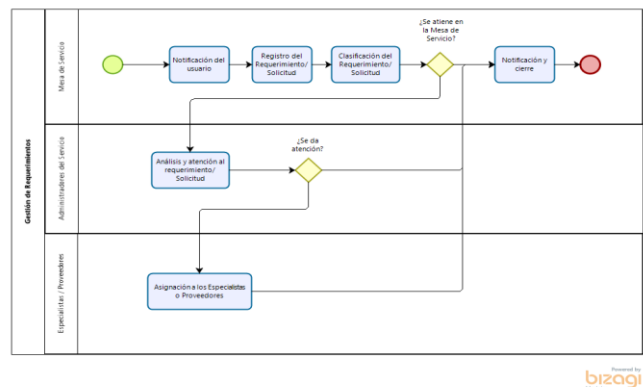


Fig. 6. Requirements management process.

F. Service Level Agreements

Service level agreements are established in conjunction with stakeholders, the IT Area and the Chief Administrative

Officer, to reach consensus among all those involved and be able to translate them into a document, is so that these agreements are drawn up for IT services where they detail the activities that are carried out by each service, how it should be requested (timetable, means or channels of communication) and the time agreed for their attention; then a service agreement is observed:

TABLE I: SERVICE LEVEL AGREEMENT

PREVENTIVE MAINTENANCE OF COMPUTER AND COMMUNICATIONS EQUIPMENT		
It refers to both physical and logical activities that seek to reduce the possibility of failures in technological equipment and even the correction of minor failures.		
Service covers: • Active Maintenance: Level 1: Internal and external cleaning of equipment. Level 2: Performs the deepest level 1 maintenance considering cleaning cards with circuit cleaner, cleaning optical drives, disassembling keyboards to clean keys, cleaning viruses and antivirus update, installing updates, hard disk defragmentation and OS error review, RAM optimization and swap. • Preparation of technical report (UTIC Personnel or Suppliers) of the maintenance service. Preparation of technical report (UTIC Personnel or Suppliers) of the maintenance service.		
Request to: Extension 4199 helpdesk-el@espe.edu.ec Delivering the equipment in UTIC	On schedule: Monday to Friday 07:00 to 16:00	Restricted to: Closing periods Weekends and holidays
Estimated time of care:	2 hours approximately	

Continuing the work, a policy manual is produced so that UTIC staff are aware of the activities to be carried out according to models, IT services and responsibilities, for the proper functioning of the Bureau of Services of the Unit, as well as for optimizing the provision of ICT services using the OTRS software tool as support.

Finally, the Control board is prepared according to the needs of the Unit, which establishes the need to have a counter for each of the Tickets that are in the process of attention, the Tickets closed according to the established times in the service agreements, Tickets that are not linked to the services, Total tickets and their statuses, it is as a result that the following scheme was obtained:



Fig. 7. Tickets by states.

This control panel allows you to have a general view of the Tickets that are generated at the Service Desk, the IT technicians to whom each of the Tickets was assigned and their status; that is to say, it allows a better understanding of the operation of the service desk and to be alert to requirements or incidents that are taking longer than required on the basis of service level agreements, In addition, it is possible to observe which services are most requested from the UTIC.

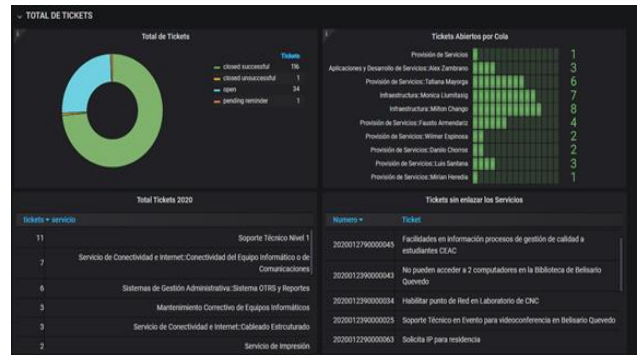


Fig. 8. Total ticket summary, by technician, without link and service.

IV. RESULTS OF IMPLEMENTATION

Once the Management Model of IT Services is implemented according to the ITIL processes and through the OTRS tool the attention times of each of the Tickets of requirements and incidences that are registered according to the catalogue of IT services for the period January to June and the period July to December 2019, Through this it is evident that, once the Services Board has become operational, it is responsible for establishing the corresponding service and providing care, whereas before without ITIL everything was taken care of in Technical Support 1 Level.

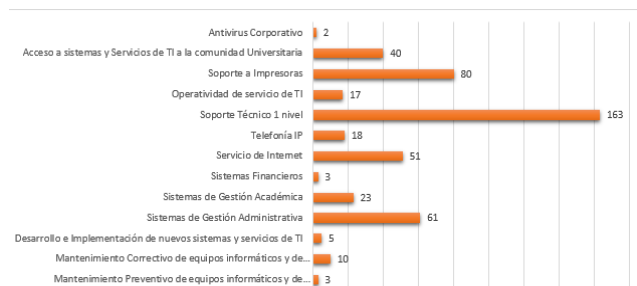


Fig. 9. Requests/Incidences of IT services without ITIL.



Fig. 10. Requests/Occurrences of IT services with ITIL.

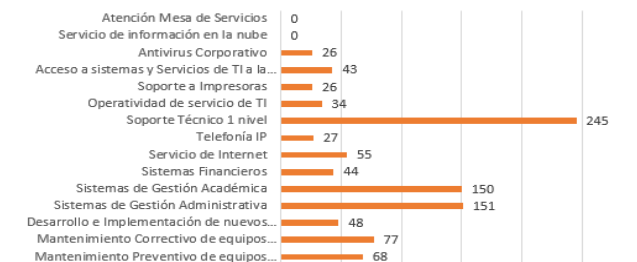


Fig. 11. Average ticket attendance times without ITIL.

The following picture shows the time frame of response to IT services requested during the period of January. June

2019 in which an average of 66.27 minutes was obtained by resolution of requests or incidents.

Once established the service desk and processes according to the methodology of ITIL it was possible to determine that the average Ticket resolution in the UTIC is 56.33 minutes.

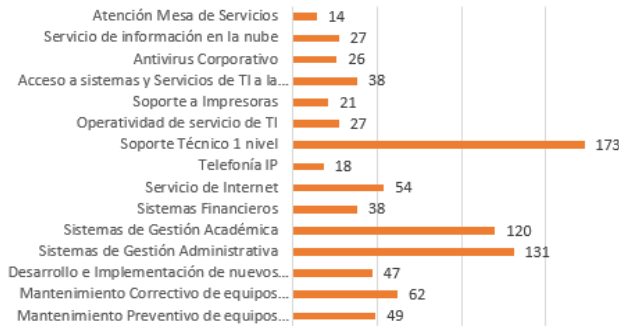


Fig. 12. Average ticket service time with ITIL.

In the figure below, the comparison is detailed in the times of solving requirements and incidents without the management model and with the model based on ITIL obtaining a reduction of approximately 15%.

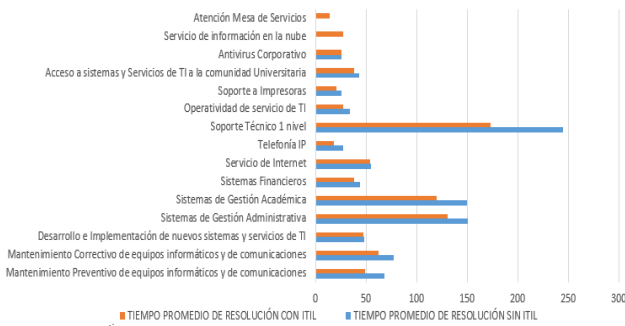


Fig. 13. Comparison of ticket resolution times.

The implementation of the Dashboard contributes to obtaining first-hand information, since this data supported by the reports of the OTRS computer tool makes it easier for the staff as well as the head of the Information and Communications Technology Unit to have a better knowledge of each of the activities carried out inside, know which services are most requested by the university community and the status of each one of the requirements, in order to plan in a medium term to optimize the provision of IT services.

In order to know the impact of the implementation of this system on the end user, a survey was carried out to measure the degree of customer satisfaction through the computer tool, which yielded the following results.

TABLE II: SERVICE QUALITY SURVEY STATISTICS

Surveys Answered	451
Excellent	361 [80.04%]
Very good	70 [15.52%]
Good	16 [3.55%]
Regular	3 [0.67%]
Bad	1 [0.22%]

According to the tabulation of the surveys formulated through the computer tool, 80% of the respondents said they had received excellent attention from the staff in the resolution of incidents or requirements about the services provided by the UTIC.

V. CONCLUSIONS

This investigation was initiated by determining the main processes of the UTIC according to the framework of work, being these the catalogue of services, configuration of IT assets, change management, incidents, service level agreements, requirements and service desk, which, through the help of the OTRS computer tool and the dashboard, allowed each of the indicators recorded in the system to be visualized, which provided a quantity of data for the decision-making of the person in charge of the Unit

Once the research at the Technology Unit of Universidad de las Fuerzas Armadas ESPE is finished, the evidence allows to distinguish that the average times of attention to the Requests/Incidents on the IT services that the UTIC offers have been reduced from 66.27 minutes in the beginning of the year 2019 January June to 56.33 minutes between July and December of same year, which represents approximately 15% time reduction and is consistent with studies of [2] where a 53.10% reduction in response times to Incident resolution was achieved, as was the case with the study of [1], where the average resolution went from 36 minutes to 24 minutes, representing 33.33% and finally with [3] where it was possible to reduce the time required by more than 52%. It is expected that the reduction in response times will be greater in the future. Similarly, the number of requests and incidents is being resolved at the service desk due to the centralization of attention at a point of contact, which is in line with the study of [3] in which a 70% increase in the number of requests was obtained, managing to meet a greater number of requests without neglecting the quality of service delivery.

Finally, based on the results achieved, it can be seen that through the ITIL-based IT Management Model for the UTIC of Campus Latacunga achieved the reduction in the time taken to deal with requests and incidents, thus being able to provide a quality service and efficient communication between the areas that make up the unit, however there are still challenges to be faced, with staff being trained on the ITIL methodology, have a catalogue of responses to the most common incidents and to generate a management of unidentified problems which can become a future investigation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization, analyzed the data, research and wrote the article AOZP; supervision, review and editing VMPO; all authors had approved the final version.

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