

# A Case of Technological Support for the ISO 9001:2015 Certification Process

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## Abstract

A quality certification process, when performed in the business context, requires a variety of organized and structured information, which should be used as evidence during audits. Therefore, the use of an information system as a support to the Quality Management System can be a crucial contribution to its efficiency and effectiveness. In order to meet this challenge, RPGSI has decided to start a certification process of ISO 9001: 2015, Furthermore, RPGSI intends to innovate its QMS using technology in order to replace all the paper support normally used. However, will be needed that RPGSI's information system, TeamPlanner, to be able to respond to the requirements of the standard. This process is very complex, since, it involves everything from modeling processes to specific developments in the application. We intend that this document be clear and objective by focusing the problem addressed in this thesis and in its solution.

**Keywords:** Quality, ISO 9000, ISO 9001, RPGSI, Certification, Information System, Quality Processes, TeamPlanner

## 1. Introduction

Able to recognize that a company's main focus resides in its customers, in order to meet their needs and expectations, and thereby achieving their preference and broadening its position in the market where it operates, the RPGSI's administration has decided to Implement a Quality Management System in accordance with the NP EN ISO 9001: 2015 standard supported by the TeamPlanner information system.

Therefore, the main challenge that resides in this work is to develop and parameterize an information system capable of supporting a Quality Management System and consequently be a decisive factor in the RPGSI certification.

During the reading of this document, it is expected and extremely important that the reader can understand the reasons that led to the certification process and the advantages that exist in the use of a technological support. Thereafter, the solution proposed for solving the problem is presented. For simplicity of understanding, a comparison is made between the current situation, pre-certification, and the ideal architecture. Finally, the results are presented where the actual state of the Quality Management System is included and in such a way the reader will be able to understand what were accomplished against the ideal plan.

## 2. Background

Quality is an essential and differentiating attribute in the global market. Whether for the delivered work, for the services provided or for the products sold and / or bought, the companies ambition for quality is always to level it with the demands of its clients. The evolution of technology over time is based on specific needs.

The definition of quality is vast in conceptual terms, it includes innumerable meanings and equally many interpretations. What is most important in understanding the concept of quality nowadays is to perceive the differences and establish relationships in the diversity of meanings and applicabilities to which this concept is associated. In this work, the concept of Quality is approached from a business viewpoint.

Perspectives that define quality according by [8] e complemented by [4, 5] are: Trasncendent Quality, Quality based on Production, Quality based on Product, Quality based on Client, Quality based on Value and Strategic Quality. Those Perspectives permutate in terms of scope, aplicability and if it is an internal or external company analysis.

### 2.1. Quality Management System

The adoption of a Quality Management System (QMS) is a strategic decision of an organization that

aims to create a window of opportunity to improve its overall performance. It also provides a solid and consistent structure to support the development initiatives inherent in the certification process of the company's management system.

## 2.2. Management System and ISO 9000 Family

An management system, by ISO <sup>1</sup> viewpoint, defines a set of necessary procedures in order to capacitate companies to achieve their goals.

ISO 9000 [5] is one of many standards families the provide companies quality certifications. The main purpose of ISO 9000 is to provide guidance to organizations in order to implemento and / or improve their management system and its performance. This family is composed by 4 distinct standard:

- ISO 9000 Fundamentals and Vocabulary [1];
- ISO 9001 - Requirements;
- ISO 9004 - Improve Performance Guidelines;
- ISO 19011 - Audit Management System Guidelines [2].

ISO 9001 is the standart that it will be on focus in this work, essentially its most recent version, ISO 9001:2015.

## 2.3. ISO 9001:2015 Overview

The ISO 9001:2015 [7] standard is the most recent update of ISO 9001 and it will be the primary element of the QMS described in this work.

The importance given to stakeholders together with a risk management approach to complement quality management are strategic points to take in consideration in this new standard version. Furthermore, this new update also grants a substantial attention to the role of processes definition.

The major objectives<sup>2</sup> of this standard are:

- Generation of oportunities in atual or future markets to be explored;
- Increase of external and internal confidence on the work methodology;
- Acquisition and improvement of business processes;
- Hierarchy definition e human resources management improvements ;
- Increase client's satisfaction.

<sup>1</sup> www.iso.org/iso/home/standards/management-standards.htm - 24/05/2016 08:30 pm

<sup>2</sup> www.aeportugal.pt/inicio.asp?Pagina=/areas/qualidade/iso90012000 - 08/03/2016 10:33 pm

Those objectives are extremely important and they translate in principles that will support the QMS. This are: Focus on Client, Leadership, People Commitment, Process Approach, Improvement, Decision Making based on evidences and Relations Management.

As mention above, ISO 9001 was updated to a new version. The Figure 1 describes the evolution of ISO 9001. This changed allowed to introduce some interesting possibilities to the implementation process of a QMS.

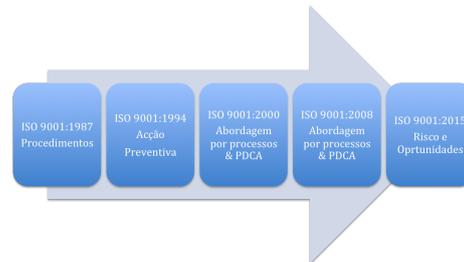


Figure 1: Informal Representation of ISO 9001 evolution

As follows, it is described the three major additions of ISO 9001:2015:

- **Evidences Dematerialization:** Is no longer mandatory of a documented procedures and its evidences. Furthermore, this modification is a crucial point of this work once that is pretended that all paper will be replaced by an information system.
- **Risk Managemtn:** [6] Risk assessment is obligatory in this new version, in other words, risks must be identified and classified. As well actions to prevent those risks should be planned. This procedure it will be integrated on verification process in order to allow an evaluation of its compliance.
- **Process Approach:** [3] In contrast to the previous version com a antiga norma, in which it was used an management approach based on system as a whole, ISO 9001:2015 applies a brand new approach: related business processes. Therefore, it is fudamental that processes are well defined and modulated as well its actors.

## 3. Problem Assessment

This section aims to analyze in detail the problem of implementing an information system capable of supporting the Quality Management System in the company RPGSI. This analysis will be divided into two distinct stages: Quality Contextualization with RPGSI and its Information Systems Architecture currently implemented. It is important to know the

main aspects of the entity that will have a direct or indirect influence in the implementation of the Quality Management System. In the first instance, a brief introduction will be made to RPGSI.

### 3.1. RPGSI and ISO 9001 Certification

RPGSI Business Solutions, SA was established in 2001 with the purpose of offer to its customers a wide set of services and products of IT Management. Nowadays, the implementation of this strategy is materialized through the direct colaboration with multiple companies in Portugal, Angola and Mozambique. Being a technologic based company, RPGSI relies its offer on in-house solutions.

The Quality Management System's scope to applies on all company's activities. Such as technical support, helpdesk, software support, project management and comercial activities. RPGSI's QMS will be suported by an information systems by implementing all processes on that system. Furthermore, the main objectives intended to be achieved by the QMS are:

- Consistently deliver products and services that meet both customer requirements and applicable statutory and regulatory requirements;
- Enhance the company's sustainable growth, based on internal and external processes, adaptable and close to the customer;
- Facilitar as oportuidades para aumentar a satisfao do cliente;
- Address risks and opportunities associated with their context and objectives;
- The ability to demonstrate compliance with specified requirements of the quality management system.

#### 3.1.1 TeamPlanner

TeamPlanner is a vertical solution that lets you registrar and monitor all the activity of your company. This is the basis of a whole complex information system that allows transversal management, in other words, Projects and resource management, asset management, order acquisition and registration, contact management and entity tracking are all monitored in TeamPlanner. In turn, all registered information can be analyzed at any time through the available dashboards.

There is a great plasticity in the application and its data structure which makes it a suitable tool to model processes that satisfy the needs of the ISO 9001: 2015 standard.

### 3.2. Information System Architecture - Current Situation

The current architecture is divided in three layers: Business Layer, Application Layer and Technological Layer. For each layer it was specified its current state with the purpose of understanding what changes, additions will be needed when during the implementation of the QMS. Following, there is a brief explanation of each layer.

#### 3.2.1 Business Layer

Composition of business processes that have repercussion on the information system is the base of the business layer. Its influence is crucial to the TeamPlanner's configuration and parameterization in order to customatize to the company's reality.

Processes are divided by company's department: Human Resources, Comercial, Software Development and IT Infrastrutres .

Presently, Human Resources only have one process that influences the future QMS that is Recruitment and Admission. This it is about stages since finding resources based on needs until all administrative procedures of hiring.

Comercial process deals with lead creation and consequently arrange meetings wiht potencial clients. If they demonstrate interest on RPGSI's products then it will be produced a formal proposal. Also conected with Comercial, the Logistic's process pertain to manage all customers demandings of licenses and hardware.

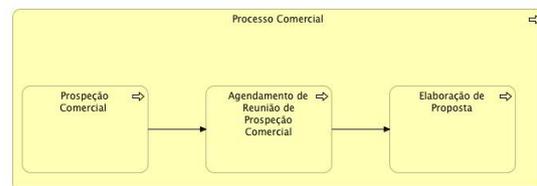


Figure 2: Example of process: Comercial - Archi-  
timate diagram

Software Development departement as well as IT Infrastrutture department have to major processes. They are: Support and Project Implementation. Support process is related with customers incidents about our systems, such as bugs, errors or request for clarification. On other hand, Project Implementation process involves project planning and execution.

#### 3.2.2 Application Layer

The application layer representation aims to differentiate the applications that currently exist in the RPGSI and that will influence the QMS. The applications are: TeamPlanner, Outlook and Primavera.

TeamPlanner will be the main target of interventions because it is the intended system that centralizes all the necessary information to the QMS. From records that prove compliance with the standard to the automation of business processes. The Outlook

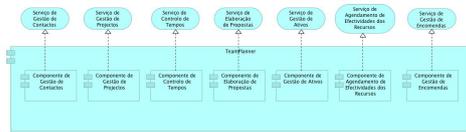


Figure 3: Example of System: TeamPlanner - Archimate diagram

system is important since it is the primary tool in the contact with the client and how to streamline work processes.

Finally, Primavera application, which, like the two systems mentioned above, is fundamental in the work processes.

### 3.2.3 Application usage

Each component of the application provides a service to which is established the connection to the business processes. The services can be used by several processes. These are entities that establish a relationship between the application layer and the business layer.

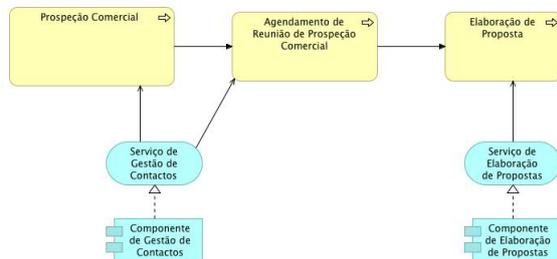


Figure 4: Example of relation between Comercial process and TeamPlanner - Archimate diagram

In the Commercial process, see Figure 4, you can verify that the Contact Management component is used in both of prospecting and meeting scheduling activities. For the proposal development activity, the TeamPlanner component responsible for creating proposals. In this context, it is necessary to create and / or edit contacts and then consult them. While the preparation of proposals, it is essential to register the items and values in question for its creation.

### 3.2.4 Technological Layer

The technological layer model developed in the context of the architecture under study aims to provide

the current state of the infrastructure that supports the current information system. A Figure?? represents the high-level model of the infrastructure. There are three physical servers, RPGSI-SQL1 supports the application databases that are in the RPGSI-TSHOST1 server. These servers communicate through a BD Connection because it indicates to the applications the server, instance and credentials of access to the database. Equally important in this connection, the Exchange server is dedicated to the e-mail system used in the enterprise.

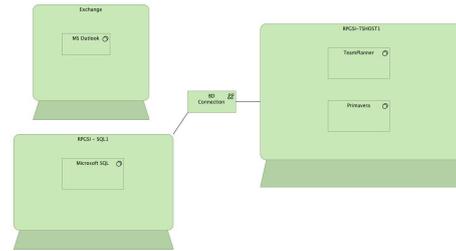


Figure 5: Example of the Technological Layer - Archimate diagram

In other hand, it is importante to establish the relation between the application layer and the technological Layer for that purpose the Figure 6 provides an example how TeamPlanner relates it self with the technological Layer.

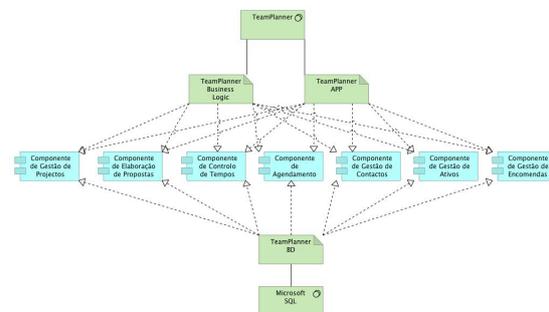


Figure 6: Relao entre a camada tecnologica e o TeamPlanner - Diagrama Archimate

When concluded the especification of the current situation of the information systems, it will be possible to understand what resources, mechanisms and infrastructures are available for expansion and adaptation.

Therefore, in terms of Primavera and Exchange is not accessible to make new developments since they are applications developed by third parties. Modifications to be made directly related to both systems should be merely procedural, that is, at the business layer level. In the case of TeamPlanner, since it is an in-house application, will be the main focus

on the changes to be made.

#### **4. Implementation**

The section dedicated to Implementation will be structured as follows: Preliminary Design of the solution, Quality Procedures, Operational Instructions and the Modeling of the ideal situation of the Information System Architecture.

##### **4.1. Preliminary Solution Design**

Preliminary Design of the solution aims to establish, in a succinct way, the stages defined as necessary for the implementation of the Quality Management System.

The solution intends that all information that would usually be recorded and maintained in physical files It will be registered in the application. Also, is pretended that processes defined in the Quality Manual, to be systematically executed in TeamPlanner and to make it possible to centralize the documentation related to them. Finally, TeamPlanner will produce structured information to feed the quality objectives indicators defined for each process. This proposal is divided in six stages:

- Process Modeling ;
- ISO 9001:2015 Requirements gathering and compliance with processes;
- Develop Quality Documentation;
- Information System Developments and Configurations;
- Overall Evaluation and Changes Management;
- QMS Go-Live.

##### **4.2. Quality Procedures**

The Quality Procedures detail how to conduct the proceedings, describing their control, details and responsibilities. Those procedures are composed by Opportunities for improvement, Corrective Actions, Compliance Control, Internal Audits, Record Control and Documents Control. For each procedure it will be made a brief explanation.

##### **4.2.1 Opportunities for improvement**

The aim of this procedure is to establish and regulate the methodology for proposal, identification, analysis, application and revision of improvement proposals. This procedure applies to all processes that constitute the company's business and that opportunities for improvement are identified.

##### **4.2.2 Corrective Actions**

The corrective action procedure aims to define and document the methodology to be used for the implementation of corrective actions that eliminate the

causes of nonconformities and prevent their future occurrence. It is the responsibility of the company managers to identify, in articulation with the Quality Manager, the corrective actions appropriate to the situations, proceeding to their implementation. It is the responsibility of the Quality Manager to verify, monitor and close corrective actions implemented.

##### **4.2.3 Nonconformities Control**

The methodology to be used in the control of purchased products, services rendered, in order to ensure that they comply with the requirements and with the commitments assumed with the clients and with the ISO 9001: 2015 standard. The responsibilities inherent to the control of nonconformities cover all employees, with intervention in the verification activities of the products purchased. They are intended to identify any anomalies. Regarding the services provided, the responsibility lies with those responsible for the area, since they must identify occurrences that are not in accordance with the methodologies established in the RPGSI, the defined processes or the commitments assumed with the client. It is the responsibility of the Quality Manager to monitor the resolution of occurrences, identifying situations that merit corrective and / or preventive actions.

##### **4.2.4 Internal Audits**

The procedure followed for internal audits aims to define the methodology used for the planning and its realization, in order to verify that the Quality Management System complies with the internal processes and also with the requirements of the reference standard and maintains the its correct functioning.

It is the responsibility of the Quality Manager to coordinate, implement and verify compliance of this procedure. The audited area managers have the duty to actively collaborate in carrying out the audit by providing the audit team with the requested data as well as any other people who participates in the internal audit.

##### **4.2.5 Record Control**

The records control procedure defines how the quality management system's compliance with the requirements and how its effectiveness is demonstrated. The records apply to all areas with responsibility and / or involvement in processes defined by the system.

It is the responsibility of all company personnel to use the TeamPlanner application and its appropriate models for register evidences that demonstrates

compliance. The application must ensure the maintenance of the records, identification so that, when necessary, the retrieval of information is carried out in an agile way. It is up to the Quality Manager to check compliance with what is established in this procedure.

#### **4.2.6 Documents Control**

The document control procedure defines the methodology to be applied in the organization of internal and external documentation concerning the QMS. The Quality Manager has the responsibility to verify compliance with what is established in this procedure. Area managers must fully comply with the methodology defined herein, under the supervision of the Quality Manager.

#### **4.3. Operation Instructions**

Operational Instructions define how to act in a respective task, unlike the processes in which the assignment sequences are defined. All the information that allows the good performance of a task must be explicit in the Operational Instruction. Then, all the instructions implemented for the QMS will be presented. Those instructions are composed by Suppliers Evaluation, Supply Evaluation, Customer Satisfaction Evaluation, Complaint and Management. For each procedure it will be made a brief explanation.

##### **4.3.1 Suppliers Evaluation**

The purpose of the instruction is to define criteria to be used in the evaluation of suppliers and service providers. This evaluation will involve the maintenance or exclusion of a supplier. The procedure for accepting a new supplier is also established.

##### **4.3.2 Supply Evaluation**

The purpose of the instruction is to define criteria to be used in the evaluation of order supplies. It also complements the supplier evaluation instruction, since they are able to measure supplier behavior on a regular basis. Key Account have the responsibility for evaluating deliveries in articulation with the Quality Manager, taking into account the performance shown by the entity to make deliveries as required by RPGSI.

##### **4.3.3 Customer Satisfaction Evaluation**

The Customer Satisfaction Evaluation instruction consists of describing the methodology to be used to obtain customer satisfaction over time. This assessment assumes strategic relevance for RPGSI in the sense of retaining its clients, attracting new ones and, therefore, contributing to the success of the

organization. Equally important, it is the fact that customer focus is one of the pillars that underpins ISO 9001: 2015. All RPGSI employees who are directly related to the customer have the responsibility to ensure compliance with the Quality Policy associated with their duties. RPGSI monitors customer satisfaction in a number of ways: Informally, Support Inquiries and Project Implementation Surveys.

#### **4.3.4 Complaint and Management**

All written or verbal client complaints are subject to evaluation and analysis by RPGSI in order to determine the cause (s) that originate it and eventual responsibility of the company. In all cases, after the complaints have been analyzed, they will be answered in writing to customers regardless of their acceptance. Claims whose liability can not be attributed to the company regardless of subsequent commercial resolution shall be considered as not accepted.

#### **4.4. Information System Architecture - Ideal Situation**

The following section aims to describe briefly the idealized changes to the architecture of information systems to support the Quality Management System. The details described in the previous section will serve as a basis for describing the changes to be made so that they have the least possible impact on the essence of what currently exists. In this way, only slight modifications will be made that allow the processes and information systems to be able to support the quality system.

The idea architecture keeps the three layered structure. However, in order to simplify the explanation of the proposed changes, this section will not follow the same organization as the section with the current situation.

It is important to explain that in for the new architecture it will be necessary the formation of a new department of Quality and consequently new processes. They are:

- QMS Planning - In the planning process it is defined which processes are included in the quality system;
- QMS Implementation and Monitoring - The Implantation and Monitoring process will have the two function as it is specified by its nomenclature. This double mission is justified to the extent that in the implementation of the operation will be necessary a monitoring of the processes in order to verify the effectiveness of the developments. The same procedure is verified in normal periodic monitoring of the quality

system, in which it is necessary to verify compliance with the processes and the associated evidences;

- QMS Verification Control - The Verification process is applied when conducting internal audits;
- Suppliers Evaluation - This is intended to relate the operative instruction associated with the internal processes of the quality system

Others processes of all departments have been improved in order to meet QMS's requirements.

In the other hand, TeamPlanner will be improved by developing new modules that are mandatory to exist. Those modules are:

- Departments and Functions Management - The application will allow the creation, edition and elimination of Departments and Functions and associate them with existing TeamPlanner collaborators. The goal will be to generate a real-time and dynamic organization, according to the configurations between departments, functions and collaborators. Equally essential for QMS will be to obtain the information of each function and associated employees.;
- Workflow Management - It is intended that TeamPlanner allows the configuration of custom workflows associated with a generic structure (already existing) that is capable of adding the necessary evidence for the proper functioning of the Quality Management System. The generic structure called "Task" is supported by a workflow associated with a classification.;
- Email Notifications - The sending of notifications will be essential for the sending of satisfaction surveys both at the level of project implementation and support.;
- Dynamic Surveys - TeamPlanner will be able to manage surveys for a variety of purposes. Initially, this functionality will be used to centralize project satisfaction surveys, technical support, and evaluation of partnerships and suppliers. All analysis of results will also be possible in the application.
- Supply Evaluation - Currently, there is already an order management component. However, it is not possible to evaluate them. According to the new logistics process will be created a moment of evaluation of the orders in which the quality component is invoked for this purpose.
- Quality Dashboard - Statistic data of all processes will be provided by a dashboard.

## 5. Results

After implementation, it is possible to verify that the processes idealized were formally modulated in BPMN. For demonstration purpose, the Quality Implementation Process will be exemplified through Figure 7.

In this process we can observe that inputs and outputs have been defined as well as the activities and their sequence. This process is executed by the Quality Manager.

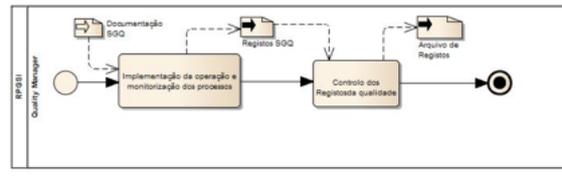


Figure 7: Example of BPMN process

Furthermore, new interfaces of TeamPlanner have been developed. As we can observe in Figure 8, it was developed an interface to manage workflows. Also it was not possible to implement surveys management module on TeamPlanner due technical issues and cost/benefit evaluation. And because of that, it was used an external application for survey purpose, TypeForm. Figure 9 shows an example of an interface of TypeForm with a configuration of a survey.

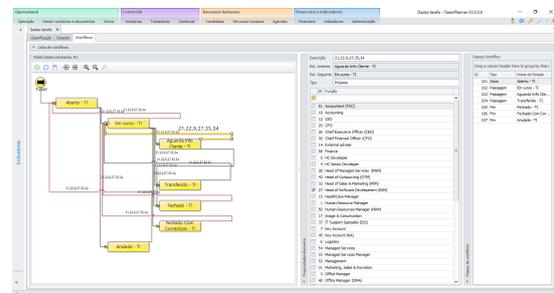


Figure 8: Example of TeamPlanner interface

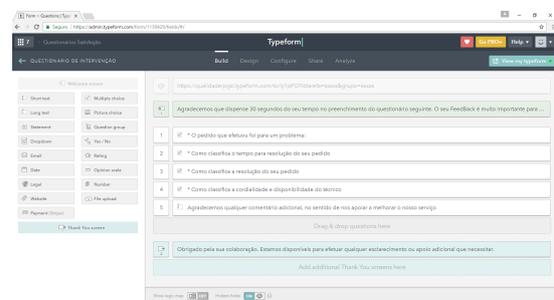


Figure 9: Example of TypeForm interface

Those results are brief demonstration of what have been developed and accomplished. Besides

most of the developments made are better demonstrated by other means such as videos of use cases.

## 6. Conclusions

The achievement of ISO 9001: 2015 certification supported by an information system as well as being an ambitious objective is also an added value for RPGSI. The goal was achieved. At this time RPGSI is certified and your Quality Management System is mostly supported in your TeamPlanner application. Another goal that was also achieved and of great importance was the improvement of the work processes and the inherent improvement of the services rendered to the clients. The most challenging project phase was the survey of work methodologies and the subsequent modeling of the processes. This phase was particularly difficult since there were no formally defined work processes, which led to divergences in the methodology of work within each department. In contrast, the acceptance by employees of the mechanisms developed in TeamPlanner was the simplest phase, once, that the system was already part of the daily work of all employees in what was their time record. The granting phase of the certification was something new for RPGSI, however, the balance is positive since there was no non-compliance in the concession audit and it should also be noted that TeamPlanner pleased the team of external auditors.

However, there are still situations that were not fully materialized in TeamPlanner and that need improvement work, namely Risk Management. Developments are planned to improve this factor. Another point of improvement to consider was the fact that the developments took longer than the expected schedule, which conditioned the rest of the project planning.

In the future, there may be the possibility of expanding the concept present in this thesis. The work done may be considered insufficient since it only focused on a specific case. However, it will serve as a working base for a more generic project in what is the role of Information Systems in ISO 9001: 2015. Drawing the ideal scenario with the development of a framework that allows to implement a System of Quality in technological support in a more rigorous and methodical way.

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