UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR THE HELP DESK IMPLEMENTATION IN
SECRETARIAT OF EDUCATION DISTRICT OF BOGOTÁ, COLOMBIA

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DEDICATION

I dedicate this Project to my mother Dominga, who fought all her life, despite the limitations, to educate her children. To my father Saturnino, who taught me the value of integrity during his life. To my wife Ginette, who gave me her love and support. To my daughter Kamila, who teaches me every day the courage to fight alone since she was 17 years old. To my daughter Isabella, whose company makes me happy every day. And to God, whom I look for every day of my life.

ACKNOWLEDGMENTS

INDEX OF CONTENTS

INDEX OF FIGURES

INDEX OF CHARTS

ABBREVIATIONS AND ACRONYMS

AP	Access Point
ANLA	Agencia Nacional de Licencias Ambientales
BPO	Business Process Outsourcing
CCB	Change Control Board
COP	Colombian Pesos
D.C.	Distrito Capital
EV	Earned Value
ERP	Enterprise Resources Planning
FGP	Final Graduation Project
GDP	Gross Domestic Product
HHRR	Human Resources
HSEQ	Health Safety Environment and Quality
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ISO	International Standardization Organization
NPS	Net Promoter Score
OLA	Operating Level Agreement
PCC	Petitions, Complaints and Claims
PMBOK	Project Management Body of Knowledge
PMO	Project Management Office
PMP	Project Management Professional
PPI	Personal Protection Items
PMPlan	Project Management Plan
PMI	Project Management Institute
PMIS	Project Management Information System
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
RFI	Request for Information
RFP	Request for Proposal

RBS	Resource Breakdown Structure
RiBS	Risk Breakdown Structure
SED	Secretariat of Education of District
SECOP	Sistema Electrónico de Contratación Pública
ToR	Terms of Reference
US$	American Dollars
VAT	Value Add Tax

EXECUTIVE SUMMARY (ABSTRACT)

The District Department of Education (onwards SED), is an entity which belongs to the Bogotá City Hall responsible for the administration and support of public elementary and high schools of Bogotá City (Colombia´s Capital). Currently, there are 760 locations and 32.000 teachers at more than 800.000 students service. The management of physical and technological infrastructure were managed by SED officials. However, the Information Technology (onwards IT) services, such as Help Desk had been requested through public bids throughout last years. This year, the Help Desk bid was published in April and it had several changes in which SED requested IT services were delivered externally, and the IT infrastructure was 100% provided by bidders. As one of the main requirements, SED asked for the designing and developing of the Project Management Plan, alignet with the Project Management Institute guidelines (onwards PMI®).

COMWARE SAS is an IT company which has been present in Colombian industry for 30 years. Its services are related to IT industry such as; Help Desk services, Business Process Outsourcing (BPO), Unified Communications and IT integration. COMWARE SAS has a PMO with a basic maturity level and a staff of 20 project managers with different levels of knowledge. COMWARE SAS sent its response to the SED´s bid to be awarded with the contract. The tender for Help Desk IT services, continues at this moment and there are 9 bidders participating in the process.

The Secretariat of Education (SED), held its own IT infrastructure for Contact Center services in its own Datacenter, but the high obsolescence degree led them to request Contact Center (CC) services outside their facilities which are provided by third parties for first time in its history. One of the main requirements was the development of subsidiary management plans according to the PMI guidelines. The main enabler requirement was the preparation of project management plan aligned to PMBOK 6th edition and follow the PMI guidelines. The requirements published by SED to provide the IT support and technological services were met according to the entity. However, after the contract was signed, the project should not have started without a project management plan. Due to huge coverage, the large number of potential users and the amount of technological equipment (more than 200.000) which must be managed, it was necessary to advance the management plan with all subsidiary plans defined by the PMI to achieve compliance with the project objectives.

The Final Graduation Project (FGP) general objective was to create a Project Management Plan to manage the implementation of the Help Desk in the SED. The specific objectives were: To create a Scope Management Plan to ensure all the required work is carried out, to create a Time Management Plan to control the time spent on specific activities, to create a Cost Management Plan to handle properly the defined budget , to define a Quality Management Plan to meet the requirements of stakeholders, to develop a Resource Management Plan to warrant

the resources assignment to the project, to create a Communications Management Plan to control the communication with the stakeholders timely and adequately, to develop a Risks Management Plan to control the identified risks, to create a Procurement Management Plan to manage the purchases and the contracts, to define a Stakeholders Management Plan to promote their engagement.

The methodology used in this project was analytical, qualitative and quantitative approaches. The first step was the analysis of Request for Proposal and technical annexes published by SED. The expert judgment was the basic tool employed to define the questions and requirements with high degree of uncertainty. The second step was the questions and observations directed to SED officials, to clarify their requirements. At this point, SED accepted visits to review their infrastructure and Datacenters. After that, SED accepted more public observations and questions. Lastly, the qualitative and quantitative approaches were used to build and design the entire project with all subsidiary plans. In the last step multiple quotations of third parties to define budget and schedule were used.

In conclusion, the company has an operational PMO, but some of its practices still do not reflect compliance with the provisions of the PMI and it lacks methodology for some processes. The learned lessons and expert judgement are the fundamental tool to carry out the planning processes, but this knowledge is not available for the project managers. The decision to participate in public sector projects depends on the economic variable of the profitability of the project, therefore, contingency and management reserves must be very well supported.

An important recommendation is that the templates and procedures for creating the Project Management Plan shall be standardized to corporate level. The procedure for client characterization, must be included as part of Planning process. It´s recommended to PMI, include mention about projects of public sector which have specific characteristics like fixed time and budget established into Terms of Reference

1. INTRODUCTION

1.1. Background

"The Company" is an IT company located in Colombia, with more than 30 years providing IT services and technological solutions to Banking, Education, Telecommunications, Retail and public sector. The outsourcing IT services have been a big market with an exponential growth in the last decades in Colombia and "The Company" has been a big player in this market niche. Due to the geographical situation of Colombia, its population which is in third place in Latin America (49 Millions), the Gross Domestic Product (GDP) and the political and economical conditions, the most important players on this market such as IBM®, HP®, Unisys®, Sonda®, Tivit®, Synapsis®, Getronics®, Sutherland® and others have established their operations in this country. All of them have brought their best practices and became straightforward competition for the company in these types of projects. In this scenario, "The Company" established in 2016, a Project Management Office (onwards PMO), to promote the internal use of the guidelines of PMI®. Despite this, project managers have different skills and level of knowledge of PMI methodology. Less than half of them are certified Project Management Professionals (PMP).

Because of high complexity of the IT projects and the huge budgets of public sector, the PMI methodology is mandatory in all bids published. The company has been participating in the public bid Help Desk for SED IT services outsourcing, and one of the main objectives is the development of Project Management Plans.

The Secretariat of Education (SED) published a public bid to provide IT outsourcing services. Infrastructure to be managed and supported is compound by 760 elementary and high schools and serve more than 800.000 students by making use of more than 32.000 teachers. The project Management Plan must be designed to provide the appropriate service and support to computers rooms, desktops, laptops, tablets, routers, switches, cable rooms, access points (AP),

printers, scanners, video beams, uninterruptible power supplies (UPS), etc. with the service level agreements (SLA) compromised. The designed Project Management Plan covered all these requirements considering the triple constraint: time, cost and scope.

1.2. Statement of the problem

The Company participated in the SED public tender for the provision of technology services to offer support and the help desk designing the project management plan which allows achieving all the objectives defined by the client. The public bid demanded a new architecture for the IT services located 100% externally in the offeror facilities. This new design required a comprehensive and complete Project Management Plan as well as because it is an enabling requirement for the winning bidder.

1.3. Purpose

One of the reasons to demand the PMI methodology into the RFP´s of IT projects is the high failures rate in these sort of projects. According to Florentine (2016) "more than a half of IT projects fail" (title section). Because of this reason, in Colombia most of RFPs where the requirements for technological projects are defined, the PMI methodology is requested as mandatory. Even, most public tenders require the project manager is certified as PMP™. In order to accomplish all objectives and expectations of stakeholders, the project manager developed this Management Plan to control the triple extended contraint: time, cost, scope, quality, risk and customer satisfaction.

The RFP published by SED, considered the Project Management Plan as an enabler requirement to participate in the process and to develop the project. SED changed their operations model from inhouse infrastructure to an external infrastructure. However, there are not metrics and historical information based on this new model. This project developed the Project Management Plan so as to cover the 10 knowledge areas of PMBOK™ 6th edition requested by the public tender published by the SED.

The benefits of having a PM Plan for this project can be listed:

a. Establish the best budget, schedule and scope for this project.
b. Reduce the uncertainty for the external infrastructure model requirements.
c. Reduce the risks associated to the new operation model defined by SED.
d. Standardize the templates, formats and plans for Help Desk projects.
e. Cover the entire methodology for the 5 process groups: initiation, planning, execution, monitor and control, and closing.

1.4. General objective

To create a Project Management Plan to manage the implementation of the Help Desk in the SED, Bogotá D.C., Colombia.

1.5. Specific objectives

a. To create a Scope Management Plan to ensure all the required work is carried out.
b. To create a Time Management Plan to control the time spent on specific activities.
c. To create a Cost Management Plan to handle properly the defined budget .
d. To define a Quality Management Plan to meet the requirements of stakeholders.
e. To develop a Resource Management Plan to warrant the resources assignment to the project.
f. To create a Communications Management Plan to control the communications with the stakeholders timely and adequately
g. To develop a Risks Management Plan to control the identified risks.
h. To create a Procurement Management Plan to manage the purchases and the contracts.
i. To define a Stakeholders Management Plan to promote their engagement.

2. THEORETICAL FRAMEWORK

2.1. Company/Enterprise framework

2.1.1. Company/Enterprise background

"The Company" is a Colombian company with more than 30 years in the IT industry. In the 1990´s this company opened business offices in Venezuela and Ecuador, being these years the best ones for its growth. Its successful was due to the representation of IT multinational firms like HP®, Lucent®, Sun microsystems®, AVAYA®, IBM® and others in the Colombian market when these companies did not think about having local businesses. As these multinationals were established in the country, the company was losing those market niches and competition forced to become a company integrating technology services.

In this new business model, help desk contracts became in the core business and the public sector the principal began to contribute more than 80% of the income. The Secretariat of Education of District of Bogotá launched in April 2018, the biggest bid in Colombia, to provide the Help Desk services in the educational public service.

For this reason, the company establishes the need to design a more comprehensive Project Management Plan following the PMI methodology.

2.1.2. Mission and vision statements

Mission

Support the internal management of companies so that they continue in their conversion to companies focused on customer service.

Vision

"We know how to make things easier"

2.1.3. Organizational structure

COMWARE SAS is a large IT company. The staff is composed by more than 1.300 employees. Majority of its employees are part of the Vice-presidency of Operations, which manages and operates all the company's projects and contracts. The Project Management Office (PMO), manages and establishes the policies and methodologies which are used to control the projects. Nevertheless, this PMO was structured two years ago. The commercial Vice-presidency is the area in charge of getting the contracts.

In turn, the operations area is responsible for implementing, managing and controlling all projects and contracts of the company. It is the PMO and its project managers who manages the projects and contracts and it is this area the one which must design the Project Management Plan for the implementation of the Help Desk for SED. Figure 1 shows the Organizational Structure:
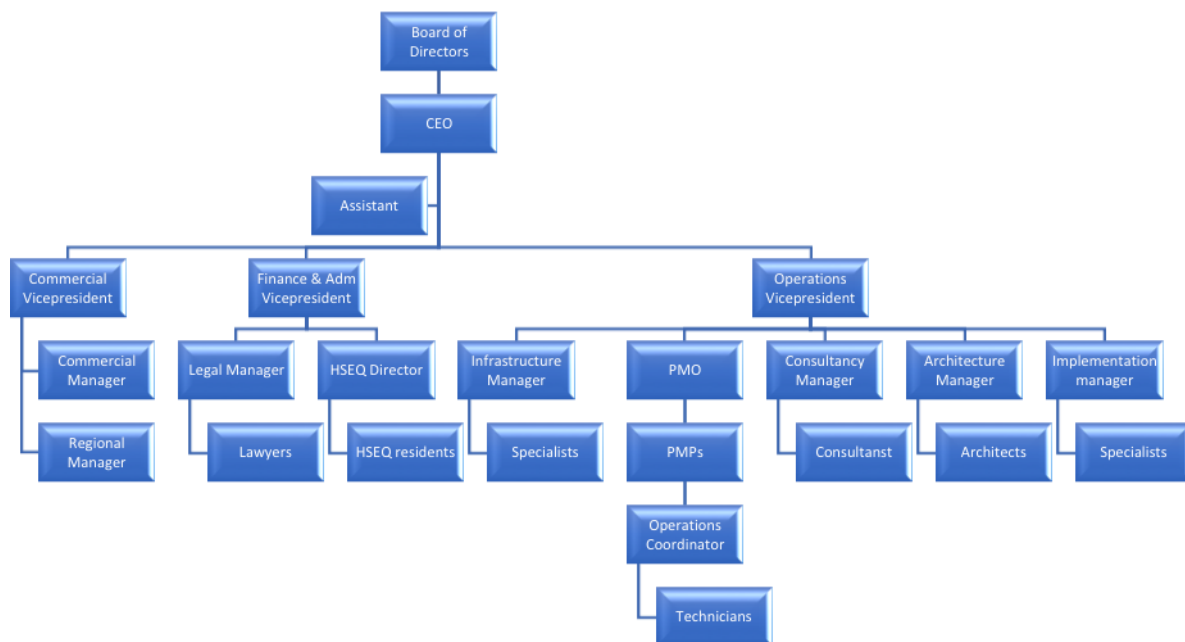
Figure 1 Organizational Structure

(Source: The company Archives, 2018)

2.1.4. Products offered

The company portfolio is 100% related to technology services. The company has been recognized by its support and technological services. The ICT Outsourcing Service is the most important service (Information and Communication Technology). Private and public sectors hire continuously outsourced Help Desk. The designed PM Plan belongs to this service and let the company manage the implementation of the Help Desk for SED. The ICT Outsourcing services have traditionally provided more than 80% of the company's income and more than 90% of the staff. Figure 2 shows the company´s portfolio (taken from website´s company).

Figure 2 Products and Services

(Source: The Company Archives, 2018)

2.2.1. Project

"A project is a temporary endeavor undertaken to create a unique product, service or result", PMI (2017). Due the company had a PMO based on PMI guidelines the project was defined according to the last version of PMBOK. It is well known that

one of the reasons for the creation of a body of knowledge for project management is intimately related to the development of IT projects.

2.2.2. Project management

The project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements, PMI (2017). The PMBOK establishes the guidelines and best practices to manage projects through their life cycle. According to Lledó (2018) "the first edition of PMBOK was an important milestone to manage projects covering the knowledge areas: scope, time, cost, quality, human resources, communications, risks, procurement and integration" (p.18).

2.2.3. Project life cycle
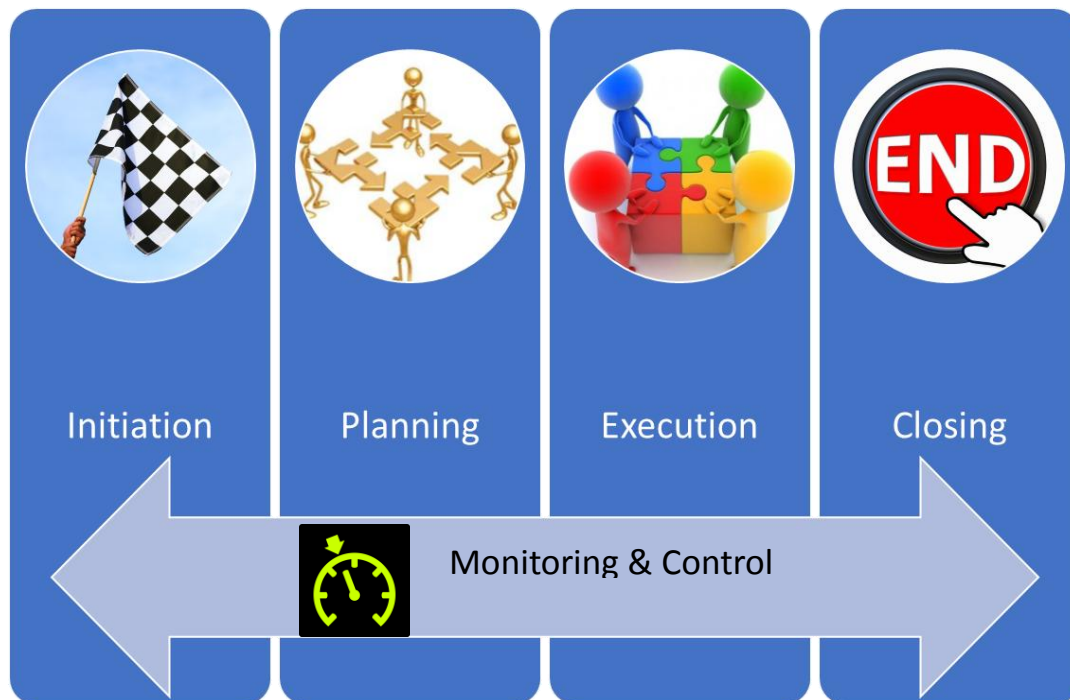
Figure 3. The Project Life cycle

(Source: Adapted from: PMOBK, PMII (2017))

The project life cycle is compound by five processes groups. In the figure 3, the processes are grouped into the initiation, planning, execution, closing and

monitoring and control cathegories or process groups. The last cathegory (monitoring and control) is a set of processes that cross transversally the whole project life cycle. The monitoring and control process group begins with the first initiation process group and finishes with the last closing process. These five (5) process groups are defined into the PMBOK, PMI (2017).

A project life cycle is a series of phases that a project passes through from its start to its completion, according to PMI (2017, 6th ed., p19). Each phase is composed by processes that are inputs for the next phase. A project phase is a collection of logically related project activities that culminates in the completion of one or more deliverables: PMI (2017, p20).

2.2.4. Project management processes

The project management processes are the set of necessary processes to complete and manage a project accomplishing the objectives and constraints. According to Oxford dictionary (2018) "a process is a series of actions or steps taken in order to achieve a particular end". However, the actions require tools and techniques in order to obtain the outcomes. In Figure 4 the process structure is showed.

Input | Tools and Techniques | Outputs
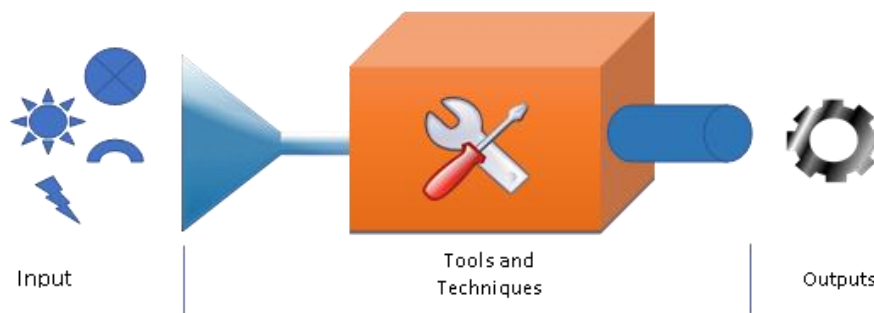
Figure 4. Process structure

(Source: The author, J. González, 2018)

The project management processes are the set of essential processes to complete and manage a project accomplishing the objectives and constraints. The project management processes can be developed iterative and progressively. Every process uses tools and techniques which can be used by other processes. And each process can be input by the others one.

For the Final Graduation Project, the Initiation and Planning process groups were used. Chart 1 shows the Initiation and processes groups according to PMI (2017).

Chart 1. *Initiation and Planning Processes*

KNOWLEDGE AREAS	Initiating process group	Planning process group
Project Integration management	Develop project charter	Develop Project Management Plan
Project Scope Management		Plan Scope Management Collect Requirements Define Scope Create WBS
Project Scehdule management		Plan Schedule Mgmt Define Activities Sequence Activities Estimate durations Develop schedule
Project Cost management		Plan Cost Mgtm Estimate costs Define budget
Project Quality management		Plan Quality Management
Project resources management		Plan Resources Management Estimate Activities Resources
Project Communications management		Plan communications Management
Project Risks Management		Plan Risks Mgtm Identify Risks Perform Qualitative Risks Analysis Perform Quantitative Risks Analysis Plan risks responses
Project Procurement management		Plan procurement management
Project stakeholders management	Identify stakeholders	Plan stakeholder engagement

(Source: PMBOK 6th ed., 2017)

2.2.5. Project management knowledge areas

The PMI (2017), defines a knowledge area as an identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices, inputs, outputs, tools and techniques. The PMBOK established (2017) ten (10) knowledge areas to group the processes into these:

- Project Integration management
- Project Scope management
- Project schedule management
- Project costs management
- Project quality management
- Project resources management
- Project communications management
- Project risks management
- Project procurement management
- Project stakeholder management

The following chart 2 shows the 49 processes grouped into these 10 knowledge areas, and the 5 process groups. For this Project Management Plan, the processes were labeled into the initiating and planning process groups.

Chart 2. *Project Management Process Groups*

KNOWLEDGE AREAS	PROJECT MANAGEMENT PROCESS GROUPS				
	Initiating process group	Planning process group	Execution process group	Monitoring and controlling process group	Closing process group
Project Integration management	Develop project charter	Develop Project Management Plan	Direct and manage project work	Monitor and control project work Perform integrated change	Close project or phase
Project Scope Management		Plan Scope Management Collect Requirements Define Scope Create WBS		Validate Scope Control Scope	
Project Scehdule management		Plan Schedule Mgmt Define Activities Sequence Activities Estimate durations Develop schedule		Control schedule	
Project Cost management		Plan Cost Mgtm Estimate costs Define budget		Control costs	
Project Quality management		Plan Quality Management	Manage Quality	Control quality	
Project resources management		Plan Resources Management Estimate Activities Resources	Adquire resources Develop team Manage team	Control resources	
Project Communications management		Plan communications Management	Manage communications	Monitor communications	
Project Risks Management		Plan Risks Mgtm Identify Risks Perform Qualitative Risks Analysis Perform Quantitative Risks Analysis Plan risks responses	Implement risk responses	Monitor risks	
Project Procurement management		Plan procurement management	Conduct procurements	Control procurements	
Project stakeholders management	Identify stakeholders	Plan stakeholder engagement	Manage stakeholder engagement	Monitor stakeholder engagement	

(Source: Adapted from PMBOK, 6th ed, 2017)

2.3.   Help Desk services

The IT industry is a complex and dynamic sector. Today, all companies worldwided use some technological services or equipment. The IT support requires skills and specialized knowledge. The companies prefer to contract those services externally. This is called Help Desk service or Help Desk department. The Help Desk services cover the following channels:

- Telephonic assistant
- Support on site
- Website Assistant
- Chat Assistant
- Email Assistant
- Others

Help Desk is "a place that a user of information technology can call to get help with a problem" (Rose, M. 2005). Typically, "the problem" has two main categories according to the methodology ITIL:

- Incidents: "*An unplanned interruption to an IT service or reduction in the quality of an IT service. Failure of a configuration item that has not yet affected service is also an incident – for example, failure of one disk from a mirror set*" (AXELOS, ITIL® glossary and abbreviations, 2011)
- Requests: When there is not unavailability of the services (For example: Change the password).

As the guideline of PMI, the IT Operations services have their own Bests Practices called "ITIL" Infrastructure Technology Information Library, developed by the Commerce Office of The United Kingdom. The rights to commercialize this methodology were given to AXELOS™. ITIL is defined as "*A set of best-practice publications for IT service management. Owned by the Cabinet Office (part of HM Government), ITIL gives guidance on the provision of quality IT services and the processes, functions and other capabilities needed to support them*" (AXELOS, ITIL® glossary and abbreviations, 2011).

Just, like the PMI, the ITIL methodology is composed by 28 processes distributed into 5 phases of lifecycle of IT services. The phases proposed by ITIL™, are the Strategy, Design, Transition, Operation and Continuously improvement.

In Help Desk projects or contracts, the provider focusses on the processes, Incidents and Requests management described above. A project of Help Desk services is oriented to provide the technical assistance to end-users to solve incidents and requests. Metrics are defined into this methodology and called Service Level Agreement "SLA".

In this type of service, it is fundamental the existence of an Information System called "The tool" or the Application for Help Desk, which must be used to measure automatically the SLA. In this project the tools are called DEXON. Worldwidely, these services are classified into the Business Process Outsourcing – BPO.

The first line of contact is called Level 1 Support. In this project the level 1 is the telephonical assistance. Level 2 is the people who assists on-site to provide the service.

3. METHODOLOGICAL FRAMEWORK

3.1. Information sources

According to Oxford dictionary (2018), source is "a place, person, or thing from which something originates or can be obtained". Information are "facts provided or learned about something or someone", Oxford Dictionary (2018)

3.1.1. Primary sources

"A primary source provides direct or firsthand evidence about an event, object, person, or work of art" Ithaca (2011).

The primary sources used for developing the FGP were the Request For Proposal (RFP) published by SED in the SECOP (by its initials in Spanish) website, the annexes, the observations (questions and answers), personal interviews and organizational assets.

3.1.2. Secondary sources

"Secondary sources describe, discuss, interpret, comment upon, analyze, evaluate, summarize, and process primary sources", Ithaca (2011).

The development of this FGP used the PMBOK 6th edition (PMI, 2017), the organizational process assets, personal interviews, statistics, reports and historical data. Chart 3 shows the Information sources.

Chart 3. *Information Sources*

Objectives	Primary	Secondary
1. To create a Scope Management Plan to ensure that all the required work is carried out.	Request for Proposal Commercial Offer	PMBOK 6th ed. Meetings Personal interviews Historical data
2. To create a Time Management Plan to control the time spent on specific activities.	Technical Annex	PMBOK 6th ed. Meetings Personal interviews Historical data
3. To create a Cost Management Plan to handle properly the defined budget	Technical Annex Organizational process assets	PMBOK 6th ed. Costs sheet Historical data
4. To define a Quality Management Plan to meet the requirements of stakeholders	Technical annex	PMBOK 6th ed. Meetings Personal interviews
5. To create a Resource Management Plan to warrant the resources assignment to the project	Technical annex Costs sheet	PMBOK 6th ed. Meetings Personal interviews Organizational process assets
6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately.	Commercial offer Organizational process assets	PMBOK 6th ed. Organizational process assets
7. To develop a Risks Management Plan to control the identified risks.	Historical data	PMBOK 6th ed. Organizational process assets
8. To create a Procurement Management Plan to manage the purchases and the contracts.	Costs Sheet	PMBOK 6th ed. Organizational process assets
9. To define a Stakeholders Management Plan to promote their engagement.	Technical annex	PMBOK 6th ed. Organizational process assets

(Source: Gonzalez, J. The author, 2018)

3.2. Research methods

According to Walliman, N (2011, p16) "research Methods are the tools and techniques for doing research". For the development of this PMPlan quantitative and qualitative methods were used.

3.2.1. Quantitative method

"Quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques", Babbie, E (2010).

For this FGP quotations, statistical data, organizational policies and historical data were used.

3.2.2. Qualitative method

According to DeFranzo, S (2011): "Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations".

The summary of research methods must be shown in chart 4.

Chart 4. *Research Methods*

Objectives	Quantitative Method	Qualitative Method
1. To create a Scope Management Plan to ensure that all the required work is carried out.	This method was used to build the Commitments Matrix to define and refine the scope of the project	This method let us describe the scope management plan.
2. To create a Time Management Plan to control the time spent on specific activities.	It was used to estimate activities, duration, resources and schedule	It was used to write the EDT dictionary
3. To create a Cost Management Plan to handle properly the defined budget	Using this method was built the costs sheet, estimate the budget and calculate the reserves	It served to ask the external quotations
4. To define a Quality Management Plan to meet the requirements of stakeholders	It was used to analize the historical data, in order to define metrics and indicators	This method let us define the objectives of the project and expectations of stakeholders
5. To create a Resource Management Plan to warrant the resources assignment to the project	It´s necesssary to analyze the costs, quotations, statistics, estimations, durations and activities	
6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately.		This method was necessary to identify stakeholders and planning the communications
7. To develop a Risks Management Plan to control the identified risks.	It was used to estimate the probability and impact matrix	It was necessary to identify risks using expert judgement, meetings
8. To create a Procurement Management Plan to manage the purchases and the contracts.	This method was used to create the costs sheet, purchases and quotations	

Objectives	Quantitative Method	Qualitative Method
9. To define a Stakeholders Management Plan to promote their engagement.		IT was necessary to identify stakeholders, influence and power.

(Source Gonzalez, J. The author, 2018)

3.3.   Tools

According to PMI (2017), a tool is "something tangible, such as template or software program, used in performing an activity to produce a product or result (p.725).

The FGP is oriented to Initiation and planning processes groups. In those phases, the most important tools are expert judgment, contracts, public bids, historical data, organizational process assets, quotations, data analysis, meetings and focus groups. Chart 5 shows the main tools used in this project:

Chart 5. *Tools*

Objectives	Tools
1. To create a Scope Management Plan to ensure that all the required work is carried out.	Expert Judgement Meetings Public documents SECOP
2. To create a Time Management Plan to control the time spent on specific activities.	Expert Judgement Meetings Decomposition Project MS
3. To create a Cost Management Plan to handle properly the defined budget	Public Documents SECOP Quotations Costs Sheet Template Microsoft excel 2016
4. To define a Quality Management Plan to meet the requirements of stakeholders	Organizational process assets Quality Management system Commitments Matrix
5. To create a Resource Management Plan to warrant the resources assignment to the project	Commercial offering Costs sheet Human resource template
6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately.	Expert judgement MSOffice
7. To develop a Risks Management Plan to control the identified risks.	Risks templates MS Excell 2016

Objectives	Tools
8. To create a Procurement Management Plan to manage the purchases and the contracts.	Public Documents SECOP Costs sheet
9. To define a Stakeholders Management Plan to promote their engagement.	Expert judgement

(Source: Gonzalez, J. The author, 2018)

3.4. Assumptions and constraints

Assumption is "a factor in the planning process that is considered to be true, real or certain, without proof or demonstration", PMI (2017, p.699).

According to PMI (2017), constraint is a limiting factor that affects the execution of a project, program, portfolio, or process (p.701), as shows Chart 6:

Chart 6. *Assumptions and Constraints*

Objectives	Assumptions	Constraints
1. To create a Scope Management Plan to ensure that all the required work is carried out.	The information published by EDS is enough to define the scope	The time to create the project charter is limited to 1 week
2. To create a Time Management Plan to control the time spent on specific activities.	The tools are available to create the plan (MSProject, EDT)	There is not information about estimation activities
3. To create a Cost Management Plan to handle properly the defined budget	There is a costs sheet	
4. To define a Quality Management Plan to meet the requirements of stakeholders	All requirements were included on commitments matrix	
5. To create a Resource Management Plan to warrant the resources assignment to the project	There is a budget to order pruchases and hiring people. The profiles are available in the market	

Objectives	Assumptions	Constraints
6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately.	All the stakeholders were identified	The stakeholders are in different places, theferore web meetings must be used on a weekly basis for project status meetings
7. To develop a Risks Management Plan to control the identified risks.	The risks are approved and validated	There is not a methodology to establish the probability and impact
8. To create a Procurement Management Plan to manage the purchases and the contracts.	The commercial offering included all purchases and providers	The costs depend on Dollar value
9. To define a Stakeholders Management Plan to promote their engagement.	The identification included all stakeholders	The EDS is highly dispersed, therefore web meetings must be used on a weekly basis

(Source: Gonzalez, J. The author, 2018)

3.5. Deliverables

The PMI (2017) defined deliverable as "any unique and verifiable product, result or capability to perform a service that is required to be produced to complete a process, phase or project" (p.704).

In the FGP it is included the whole subsidiary plans to make the PMPlan to implement the Service Desk of the SED. Chart 7 shows the Deliverables of the project.

Chart 7. *Deliverables*

Objectives	Deliverables
1. To create a Scope Management Plan to ensure that all the required work is carried out.	Scope Management Plan Commitments Matrix
2. To create a Time Management Plan to control the time spent on specific activities.	Time Management Plan Schedule EDT

Objectives	Deliverables
3. To create a Cost Management Plan to handle properly the defined budget	Cost Management Plan
4. To define a Quality Management Plan to meet the requirements of stakeholders	Quality Management Plan
5. To create a Resource Management Plan to warrant the resources assignment to the project	Resource Management Plan
6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately.	Communication Management Plan
7. To develop a Risks Management Plan to control the identified risks.	Risks Management Plan
8. To create a Procurement Management Plan to manage the purchases and the contracts.	Procurement Management Plan
9. To define a Stakeholders Management Plan to promote their engagement.	Stakeholders Management Plan

(Source: González, J. The Author. 2018)

4. RESULTS

4.1. Project Scope Management

The main reason for establishing a Scope Management Plan is to "include the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully" (PMI, 2017 6 ed p.129). The client called Secretary of Education District-SED, published the main requirements under the SECOP website, which could be read by the interested providers and analyze to build the proposal. The enterprise methodology followed by presales group consist of describing one by one requirement into a MS Excel datasheet named "Requirement Matrix". The tools used to do this are expert judgement and lessons learned belonging to corporate assets.

In the Figure 5 it is depicted the components and processes of Project Scope Management.

Figure 5. Mind map Project Scope Management

(Source: The Author, González, J, 2018)

4.1.1. Plan Scope Management

Into the organizational process assets, the company has the learned lessons uploaded into the PMIS called "Hydra" which is a cloud service of the company Also, there is a datasheet called "requirements matrix" and the datasheet Costs

(see Annex 1. Requirements Matrix). The company takes advantage of its know-how through the lessons learned and meetings with internal experts.

Once the requirements matrix has been built, these requirements are mapped to the standard costs datasheet to calculate the costs of the project and propose the final price and conditions to the client.

If the information provided by clients is not clear or complete, there is a stage called Observations, where questions are placed and resolved. These answers must be integrated to the requirements and final proposal.

The official document that contained the technical requirements, was published in the SECOP website (Sistema Electrónico de Contratación Pública). The document can be accessed through the website https://community.secop.gov.co/. The technical requirements are described in the Figure 6, below.

4.1.2. Collect Requirements

The technical requirements provided by the client "SED" are clearly defined into the public document published in the SECOP website. In general, seven groups of requirements exist wich are explained in the figure 6:
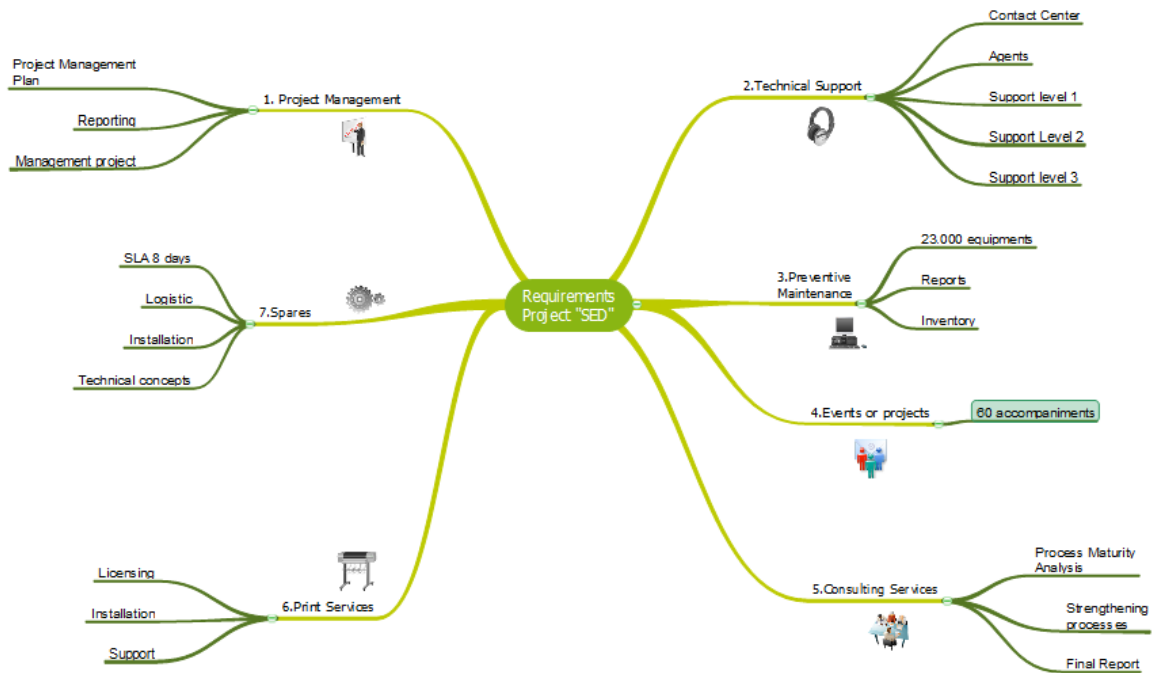
Figure 6. Mind map Requirements Project "SED"

(Source: The Author, González J, 2018)

4.1.2.1. Project Management

The first requirement groups the services and processes of the Project Management methodology, aligned to PMI guidelines. However, other needs are included, both internal and external. In the Figure 7 this requirement is depicted.
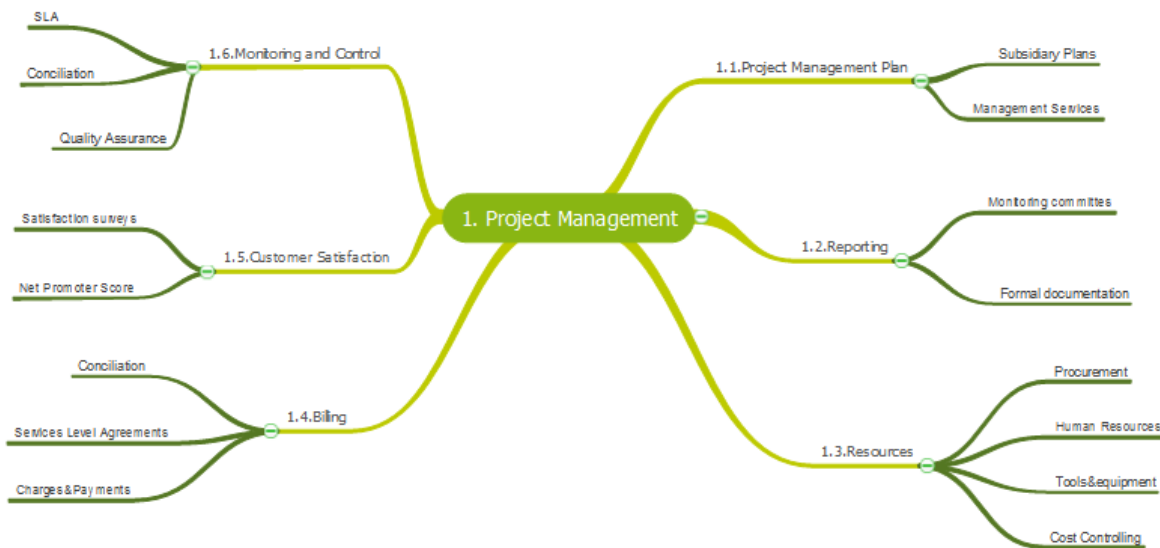
Figure 7. Mind map Project Management Services

(Source: The Author, 2018)

The project management deliverables are:

- Subsidiary Plans aligned to PMI methodology. Project Management Services, through the assignment of Project Manager full time, PMP™ certified.

The second group consists of two deliverables:

- Monitoring committees. Weekly frequency or on demand. The PM must present the problems, SLAs, compliance in time, scope and cost.
- Formal documentation: Committee minutes, monthly reports.

The third group of requirements has four deliverables:

- Procurement processes
- Human Resources: The recruitment, hiring, control and allocation.
- Tools and Equipment: Provisioning of tools and equipment for the project execution.
- Cost Controlling: Compliance with the cost datasheet.

The fourth requirement consist of the Billing processes:

- Conciliation: Review for calculation of the invoice and possible fines for non-compliance.
- Services Level Agreement: Review of metrics in the Management Tool – DEXON – for calculating the fines.
- Charges and Payments: According to SLA´s compliance.

The fifth requirement has an internal requirement and the other one is for customer satisfaction.

- NPS: Net Promoter Score is a survey that measure the customer satisfaction, applied to key stakeholders.
- Satisfaction surveys: The client demands periodical surveys to measure the customer satisfaction and promote the improvement of the service.

Finally, the monitoring and control requirement consists of three topics:

- Quality assurance: The necessary actions to detect and resolve issues and problems in the service provision.
- Conciliation: Report and exclude failures and problems that are not imputable to the company.
- Service Level Agreements: Monitoring a control of the metrics and indicators established into the proposal.

4.1.2.2. Technical Support

The technical support service has the following deliverables, which are depicted in the Figure 8:

Figure 8. Mind map Technical Support Service

(Source: The Author: Gonzalez, J, 2018)

- Contact Center: Provide the communications infrastructure to receive the phone calls, emails, and other customer requests. Register, categorize, resolve, escalate and close the requests.
- Agents: Provide the necessary agents for the service. These people can be technicians, engineers, consultants and other specialized profiles.
- Support level 1: The provision of the first level of support. This can be offered telephonically by the contact center agents.
- Support level 2: Technicians for on-site support, covering the 760 schools and buildings. They require moving around the city.
- Support level 3: Engineers, consultants and specialists to resolve the major incidents or the escalations of level 2.

4.1.2.3.   Preventive Maintenance

This requirement demands the preventive maintenance to 23.000 equipments of the SED. These can be PC´s, laptops, printers, routers, racks, switches, etc. For the provision of this service, the company must hire 24 technicians with tools and materials to accomplish this objective.

Periodically, the provider must prepare reports to inform the advance and schedule. The preventive maintenance must be done for software and hardware. Before doing this, an inventory of every device must be made. In Figure 9, this deliverable is depicted.
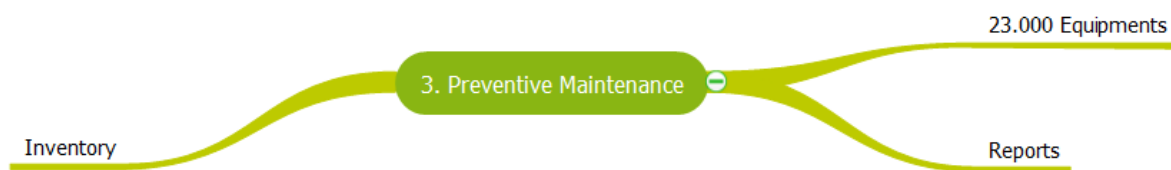
Figure 9. Mind map Preventive Maintenance Service

(Source: The Author: González, J. 2018)

4.1.2.4.   Events or projects

The SED performs events frequently. Therefore, the SED requests for human resources on demand, to accompany their employees to help or support them. There are 60 events during the contract. The people assigned to this event may be the same allocated to support services.

4.1.2.5.   Consulting Services

The SED requests an IT process specialist. He/she must be ITIL™ certified. The main objective is carrying out a process's maturity analysis, based on the ITIL™ methodology. During the contract, the consultant must promote the improvement of IT processes. At the end, a final report must be presented.

4.1.2.6.   Print Services

The provider will be responsible for licensing a Print Management Software for administering 77 printers. There will be 6 printing specialists providing support and installation services.

4.1.2.7.   Spares

To provide corrective maintenance, it is mandatory the procurement, installation, and logistic for spares. It´s defined an 8-day SLA to accomplish the process. Technical concepts must be done for replacing parts. Their components are depicted in the Figure 10.

Figure 10. Mind map Preventive Spare Service

(Source: The Author: González, J. 2018)

The spares services cover the procurement of parts, replacing them, its logistics and installation. To change parts a technical concept is mandatory.

4.1.3. Define Scope

"*The project scope statement is the description of the project scope, major deliverables, assumptions and constraints*" (PMI, 2017).

4.1.3.1. Scope Statement

"*Provide the service desk services, support and preventive and corrective maintenance with spare parts bag, for the technological platform of the SED*" (Secretaría de Educación del Distrito, Bogotá, 2018)

4.1.3.2. Client Characterization

The Secretariat of Education of Bogotá D.C. is an entity of the mayor´s office dedicated to promoting, control, manage and finance the public educational sector of the city. To understand better the geographic and political context of the city, the Figure 11 shows the main characteristics:
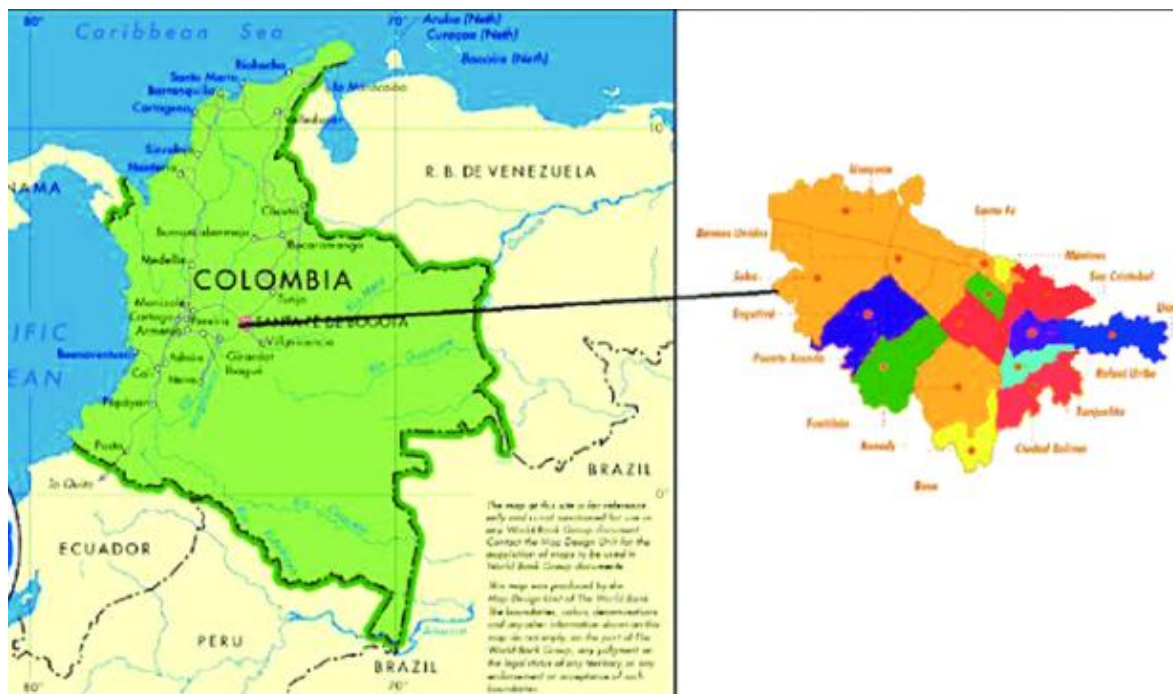
Figure 11. Bogotá D.C. Geographical context

(Source: Wikipedia)

Bogotá D.C. is the Colombia´s capital. It is located at the center of the country in the Andean region. It is the biggest city of the country. According to the political constitution, Bogotá is controlled by a Mayor elected by popular vote. In Chart 8 the statistics of the city:

Chart 8. *Statistics of Bogotá and SED*

Variable	Quantity
Area	1.776 km2
Population	7.363.782
Public schools	760
Headquarters	2
Students coverage	800.000
Teachers	32.000
Education functionaries	2.800
Localities	20
Computers rooms	2.000
PC´s and laptops	120.000
Tablets	60.000
Wiring Centers	1.500

Variable	Quantity
Internet Links	764
Datacenters	2
Budget IT Help Desk /year	COP $15.000.000.000

(Source: Adapted from bogota.gov.co, 2018)

The city has been divided into 20 localities due to its large size. The population was measured in the census of 2005 and it was about eight (8) million people. The public education system is managed by an entity called Secretariat of Education of District and it covers more than 800.000 students. The teacher's plant is the second highest staff plant in the country with more than 32.000 teachers, surpassed only by staff of national army and the police.

This coverage is possible with 760 schools. Every main school is managed by a Principal. The administrative staff and functionaries account for 2.800 employees. There are two headquarters. Every school can have one o more Computer room to serve the students´ needs, reaching more than 2.000 rooms.

The IT assets reach more than 120.000 Desktops and laptops, 60.000 tablets, 1.500 wiring centers and 764 internet links.

The IT services of Help Desk for these locations, people, teachers, rooms and wiring centers, have an annual budget of 15.000.000.000 COP (Colombian Pesos). In US Dollars the amount may be US$ 5.000.000 for each fiscal year. This budget only covers the Help Desk services, not the specialized service and Datacenter support.

The SED launches annually a public tender to select and contract the Help Desk service provider.

Political Division of Bogotá D.C.

The city has been divided geographical and politically into 20 areas called "Localities", every one of them is assigned a minor Mayor to facilitate the control. Figure 12 shows the areas and localities:

Figure 12. Political Division of Bogotá D.C.

(Source: Universidad Distrital, 2018)

In Chart 9 it is showed the name, area, population and density (Inhab/km2) and the number of schools per locality. Several of these locations are larger than many capitals of the world.

Chart 9. *Bogotá´s Localities*

Nº	Locality	Area km²	Population	Density Inhab/km²	Schools
1	Usaquén	65.31	501.999	7.686,4	26
2	Chapinero	38.15	139.701	3.661,88	7
3	Santa Fe	45.17	110.048	2.436.3	16
4	San Cristóbal	49.09	404.697	8.243,98	65
5	Usme	215.06	457.302	2 126.39	71
6	Tunjuelito	9.91	199.430	20.124,11	25

Nº	Locality	Area km²	Population	Density Inhab/km²	Schools
7	Bosa	23.93	673.077	28.126,91	53
8	Kennedy	38.59	1.088.443	28.205,31	75
9	Fontibón	33.28	394.648	11.858,41	20
10	Engativá	35.88	887.080	24.723,52	67
11	Suba	100.56	1.218.513	12.117,27	64
12	Barrios Unidos	11.9	243.465	20.459,24	23
13	Teusaquillo	14.19	153.025	10.784	3
14	Los Mártires	6.51	99.119	15.225,65	12
15	Antonio Nariño	4.88	109.176	22.372,12	10
16	Puente Aranda	17.31	258.287	14.921,25	32
17	La Candelaria	2.06	24.088	11.693,2	3
18	Rafael Uribe	13.83	374.246	27.060,44	53
19	Ciudad Bolívar	130	707.569	5.442,83	76
20	Sumapaz	780.96	6.531	8,36	27

(Source: Taken from wikipedia, 2018)

It is important to have in mind the characterization of these areas because the population is related to the numbers of students, teachers, IT assets, wiring rooms, Desktops, laptops and tablets etc. This has a direct impact on the personnel assignation and purchases.

Kennedy is the biggest locality, not only in terms of schools, it has 75 schools and 1.088.443 population.

4.1.3.3. Detailed Scope

In Chart 10 the main components of the project are showed:

Chart 10. *Requirements Traceability Matrix*

REQUIREMENTS TRACEABILITY MATRIX	
Project Name	Help Desk Implementation in Secretariat of Education of Districtof bogotá
Costs Center	S930A
Project Description	Provide help desk services, support and preventive and corrective maintenance with spare parts bag, for the technological platform of the SED

ID	Sub ID	Requirements Description	Business needs, Opportunities, Goals, Objectives	Project Objectives	WBS deliverables	Date/ Frequence
1	1.1.	Delivery the Project Management Plan	Control and Manage the project	Time, schedule, costs and quality	PMPlan	30th day
	1.2.	Weekly and monthly reports	Control performance, quality and SLAs	Accomplishment SLA and quality	Reports Word, PowerPoint	weekly, monthly
	1.3	Carry out the Blling of the project	Charge for services rendered with opportunity No fines	File invoices as quickly as possible Help with cash flow	Commercial invoices	Monthly
	1.4	Inform the accomplishment - resources	Audits, accomplishment and control costs	Bill resources provided Provide 100% resources	Delivery Minutes HHRR Report	weekly, monthly
	1.5	Customer satisfaction	Customer satisfied Surveys periodical	Evaluation < 4.5 NPS < 90%	Surveys NPS	90th day 180th day
	1.6.	Monitoring and control project	Audit performance Avoid deviations Control quality	SLA 100% Quality, cost, time	Reports	weekly, monthly

I D	Sub ID	Requirements Description	Business needs, Opportunities, Goals, Objectives	Project Objectives	WBS deliverables	Date/ Frequence
2	2.1.	Provide the contact center service	Attend 100% requets from customers	Accomplish SLA Provide quality service Customer Satisfaction	Attends emails, web, calls Infrastructure	Monthly
	2.2.	Recruitment and assign staff	12 agents for attend request	Recruitment Training Control and monitoring	Recruitment and assigning	Monthly
	2.3.	Provide IT service level 1 and remote control	Level 1 is the first line of attention for resolve incidents and requests	To resolve up from to 40% of incidents and requests in level 1	Implement process and procedures for Level 1	Monthly
	2.4.	Provide IT service level 2	Level 2 is the on-site support in the 760 schools	Provide the staff and resources SLA Quality Distribute resources	Recruitment Level 2 staff Tool & equipments Procedures for level 2	Monthly
	2.5.	Provide IT servive level 3	Level 3 is the specialized support in 760 schools	Provide the staff and resources SLA Quality Distribute resources	Recruitment L3 Tools & equipments Procedures	Monthly
3	3.1.	Provide preventive maintenance to 23.000 IT assets	Maintain IT assets with good conditions and avoid damages	Schedule for 23.000 Accomplishment Quality	Recruitment staff Tools, supplies Procedures	1rst day Monthly

ID	Sub ID	Requirements Description	Business needs, Opportunities, Goals, Objectives	Project Objectives	WBS deliverables	Date/ Frequence
	3.2.	Inform inconsistencies and advances	Correct deviations and control assets	Control and monitor schedule, costs, quality	23.000 equipments reports	Monthly
	3.3.	Update the inventory	To know the details of assets and update inventory	Deliver final inventory (23.000)	Datasheet inventory	Monthly
4	4.1.	Aid and support to events	Provide technical assistance to internal projects	Assign staff to events on demand	Report	On demand
5	5.1.	Provide Maturity Analysis for IT processes	To know the state of processes of IT area	Assign the specialist, surveys for analysis	Surveys Doc. Maturity level	30th day
	5.2.	Propose estrategies for improve processes	Improvement for IT processes	Allign operations to Best Practices	Improve processes	Continuous
	5.3.	Describe the final status of processes	Measure the improvement of processes	Implement and demostrate improvements	Final report	7th month
6	6.1.	Provide licensing for Print server	Centralized print services for EDS	Purchase of licenses	Doc. License	1rst month
	6.2.	Install and deliver the print services	Print services with authentication Monitor and control Paper savings	Mantain the services with availability and quality	Installation minute Reports monthly	Continuous

I D	Sub ID	Requirements Description	Business needs, Opportunities, Goals, Objectives	Project Objectives	WBS deliverables	Date/ Frequence
	6.3.	Technical support and troubleshooting	Keep the service availability	Recruitment Procedures for support	Procedures Reports	Continuous
7	7.1.	Keep 8 days for delivery spares	Repair the IT assets with a minimal time	Keep the 8 days for delivery	Purchases Deliveries	Continuous
	7.2.	Transport and delivery on site	Provide spares directly to customer in the schools	Implement logistic Accomplish SLA	Spares deliveries	Continuous
	7.3	Install spares and fix the equipments	Repair and deliver equipments 100% operative	Install and configure 100% spares	Repair 100%	Continuous
	7.4	Provide technical support and warranty	Spares with warranty and support	Purchases with warranty	Warranty	Continuous

(Source: González, J. The Author. 2018)

4.1.3.4. Channels for assistance and support

The channels or means authorized to request assistance are:

- Telephone: The 32.000 teachers and 3.000 functionaries of the SED can call to Help Desk agents through their telephones. The agents answer the calls and proceed to register, document, resolve or escalate the issue.

- Electronic mail. According to SED (2017), there are 34.889 teachers and 2.800 functionaries. They have an official email account with a specific domain: @educacionbogota.edu.co, which can be used to contact or send request related to IT services, issues, problems, incidents, etc.

- Web: The SED has implemented a Help Desk Information System – DEXON – to register on-line the incidents, requests, problems, etc. This application must be attended by project team, to register, document, resolve, escalate and close the request from customers.

- Face to face: In specific circumstances, the clients can look for personal assistance with staff of the project. In these cases, the technician must register the requests in the application for monitoring and controlling the tasks.

4.1.3.5. Deliverables and Acceptance criteria

The specific deliverables and their acceptance criteria were condensed into the chart 11:

Chart 11. *Specific Deliverables and Criteria*

#	General deliverables	ID	Specific Deliverables	Acceptance criteria
1	Project Management	1.1.	PMPlan	Include observations of Supervisor
		1.2.	Reporting	Revision and approval by the client
		1.3.	Resources	Cheklist for tools and human resources
		1.4.	Billing	Conciliation monthly and client´s approval
		1.5.	Customer satisfaction	Surveys and reports
		1.6.	Monitoring and control	SLA´s Compliance

#	General deliverables	ID	Specific Deliverables	Acceptance criteria
		2.1.	Contact Center	Telephonical assistant, Infrastructure
		2.2.	Agents	12 agents 6*11, SLA
2	Technical Support	2.3.	Support Level 1	Remote assistance, 12 agents
		2.4.	Support Level 2	Onsite asistance, 120 technicians
		2.5.	Support Level 3	Networking, electrical engineers
		3.1.	23.000 Equipments	Audits and reports
3	Preventive maintenance	3.2.	Reports	Formats
		3.3.	Inventory	Excel datasheet
4	Events	4.1.	60 events	On demand
		5.1.	Process maturity Analysis	Report maturity model ITIL
5	Consulting Services	5.2.	Strengthening processes	Changes proposals
		5.3.	Final Report	Final report approved
		6.1.	Licensing	Purchase 1-year server and agents
6	Print Services	6.2.	Installation	Installation and configuration
		6.3.	Support	Maintenance and support
		7.1.	SLA 8 days	8 days delivery
		7.2.	Logistic	Transportation
7	Spares	7.3	Installation	Configuration
		7.4	Technical Support	Warranty, delivery formats

(Source: González, J. The Author. 2018)

Exclusions

- Everything related to non-IT services.
- Purchases of technological assets (only included spares)
- Software development
- Testing software and hardware
- Prototypes

Constraints

- The official budget assigned to this contract will be COP$ 11.000.000.000 (the amount in US$ 4 MM)
- The provision of the service must comply with the established schedule in ToR
- The contract time will be 7 months

- The fines will be calculated according to SLA published into ToR
- The support services must be provided to the technological platform inventory published in SECOP II website.
- The services shall cover the 760 schools and buildings of the SED.

4.1.4. Create Work Breakdown Structure - WBS

Based on the Collect Requirements process outcome, the WBS was built resulting in 7 major work packages. This work packages are continuous activities that end with the completion of the contract. This project does not have phases since the provider must initiate the services from the very first day. Figure 13 shows the WBS:
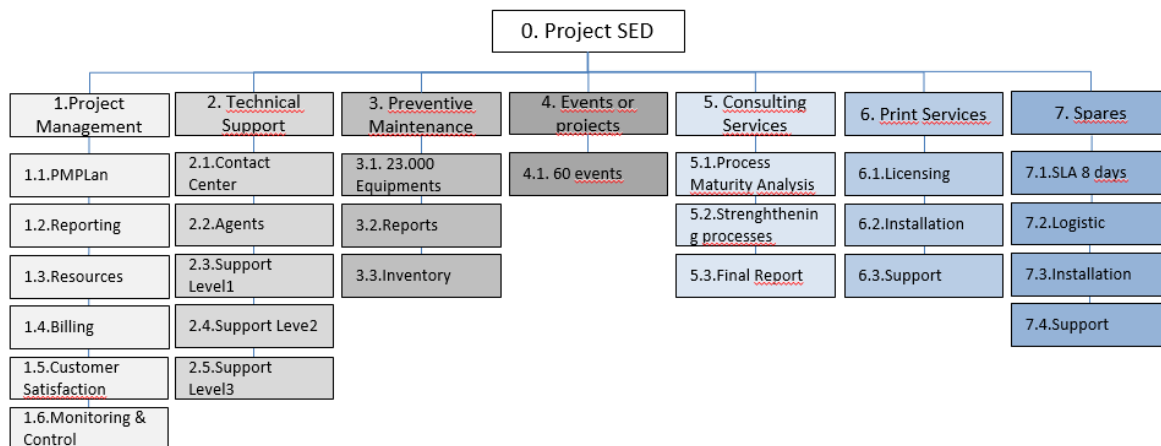
Figure 13. Work Breakdown Structure.

Source: The Author, González, J. 2018)

4.1.5. Validate Scope

"Validate scope is a process of formalizing acceptance of the completed project deliverables" (PMI, 2017).

The acceptance depends on the cycle of deliverables. There are periodic deliverables like the operation Help Desk.

- **Project Management**: The PMPlan is a deliverable with a deadline on the 30th day of the project. The acceptance depends on the supervisor's

revision. The registry for controlling the acceptance is the delivery of this document via email or physical channels. Deviations, corrections and changes are accepted, and the document can be modified once.

- **Technical Support**. This service is the telephonically and on-site assistance for resolving incidents and requests. The acceptance of this deliverable is automated in the Help Desk tool, which calculate the degree of compliance of the SLA´s. Due to this deliverable affects directly the monthly bill, it is necessary a meeting to conciliate the data extracted from the Information System. The deliverable is cyclical and periodic, this means every month begins again. The registry for acceptance is the meeting Minutes and the Bill and payments. Inspections by the client are accepted in the data of the system.

- **Preventive maintenance**: This deliverable must be completed throughout the duration of the project; however, the client demands a report weekly and monthly with the performance schedule. There are two factors of acceptance: The first is quality which can be reviewed and inspected in the schools, and the second is the quantity of maintained equipments. This deliverable does not affect the invoice, but the closing and satisfaction.

- **Events or accompaniments**: This deliverable establishes the minimum number of events or projects. The acceptance document for this deliverable is the service report for each one. This event does not affect the invoice, but the closing and satisfaction process.

- **Consulting Services**. There are three products or services in this deliverable. The document of Maturity Level, which is accepted by the supervisor and must be delivered on the 30th day of the project after the kickoff meeting. The quality and changes are defined by the Supervisor. The second is the strengthening of process and improvements of IT procedures, where the company justifies the changes and improvements applied to IT operation. The improvement process is a continuous task. The last is the final report where the maturity level of IT process needs to be improved

during the execution of the project. This document must be accepted or changed by supervisor.

- **Print Services**. This service has a document for the acceptance, this is the purchase licensing during the first month and its installation. The operation of printers and server is related to technical support because the clients report incidents and requests through the established channels.

- **Spares**: The purchase, transport, delivery and installation of spares are related to technical support deliverable, because the clients register the request through the established channels. The acceptance is a continuous process measured at the Help Desk information system. Consumables like tonners, tapes and others are included into this service with the same procedure and SLA.

Tools for validate scope

Monthly, the client´s supervisor and the company must conciliate the invoice to pay the monthly services. To have the legal support and calculate the amount to be paid, the client makes inspections to deliverables and services. The payments are cyclical and periodic, due to this the counters are reset each month.

On-site visits for reviewing the operation and customer satisfaction are carried out by inspectors and auditors.

A specialist from Help Desk Information System is dedicated to review and inspect the response time, SLA, documentation and quality of Incidents and requests. Deviations encountered are reported to supervisor and have direct impact in the penalties of the invoice.

To avoid penalties, the company must assign the QA Coordinator and analysts to detect deviations, problems and promote preventive and corrective actions aligned to Quality Management System.

Once the SLA conciliation minute has been signed, which establishes the fines or monthly penalties, it is considered that all monthly deliverables have been accepted and closed.

4.1.6. Control Scope

This project is a public tender. In Colombia, the legal framework for public tenders is rigid and it does not accept any subsequent modification. The changes or modifications in scope, time, costs after signing the contract, enable the contractors and companies to sue the nation or their public entities.

Once the scope is defined and agreed, the project cannot do any modifications. The kickoff and its meeting minute are very important to delimit the scope and minor modifications without modify the RFP or proposal documents. Thus, the control of changes for the scope is greatly limited to small modifications in terms of form and minor deviations of time.

A change or modification needs a contractual modification with the signing of legal client and company representants. For this, the public functionaries never accept modifications and changes, because of surveillance and control bodies existance.

The scope base line stays unmodifiable for most of public projects. However, the performance monitoring and control is agreed at the beginning of the project.

Due to the legal framework, any change which can modify the scope, time, costs and quality needs to be communicated to Steering Committee of the company and approved by Vice-president of Operations.

4.2. Project Schedule Time Management

"…*includes the processes required to manage the timely completion of the project*", (PMI, 2017. p.173). In the Figure 14 is depicted the set of processes of time management.

Figure 14. Mind Map Project Schedule Management

(Source: The Author, González, J. 2018)

Plan Schedule Management

The following policies are established internally by the company:

- The PM must register updates before the 9[Th] day every month to steering committee.
- Updates weekly to the PMO
- Deviations upper to 3% need PMO intervention
- Deviations upper to 10% need steering committee intervention
- The final date is linked to the contract duration – 7 months
- The measure unit will be business days

The client establishes the following policies and contractual obligations:

- No deviations policy
- The schedule must be accomplished to 100% at the end of the contract
- The formats will be provided by the client

- The first month will not have SLA´s.

- The first month will not have fines.

- The planning process will be developed during the first month

Define activities

Using meetings, expert judgment and decomposition as a tool for this process, allows defining activities. The milestones are mandatory and documented by client in the technical annex. The Chart 12 below shows the Define Activities and activity list.

Chart 12. *Define Activities*

ID	Activity List	Description
1.1.	Gathering information for PM Plan	Build the documents
1.2.	Register the incidents and requeriments in Dexon	Calculate the SLA for compliance and issues
1.3.	Make purchases and recruitment	Providing personnel and materials necessary
1.4.	Make Bills monthly	Facturation with conciliation approval
1.5.	Make 3 surveys	Evaluate the satisfaction
1.6.	Tasks for Monitoring and control	Daily report based on Dexon
2.1.	Answer calls	Provide Telephonical assistant 6*11
2.2.	Recruitmet Agents	Provide 12 agents
2.3.	Tasks for Remote assistance	Support Level 1, 6*11
2.4.	Tasks for On-site assistance	Onsite asistance, 120 technicians 6*11
2.5.	Tasks for Networking and electrical	Support level 36*11
3.1.	Tasks for preventive maintenance	Preventive Maintenance for 23.000 Equip
3.2.	Fill out the forms and formats	Registering services
3.3.	Fill out excel datasheet with information	Make inventory
4.1.	Assistance to 60 events	Service on-demand
5.1.	Presentation and Report maturity model ITIL	Process maturity Analysis
5.2.	Actions promoting possitive changes to IT processes	Strengthening the IT processes
5.3.	Deliver the Final Report	Doc for closure the contract

ID	Activity List	Description
6.1.	Purchase the Licensing	
6.2.	Install and configure the server	Print services delivery
6.3.	Provide Support	Maintenance and support printing machines
7.1.	Purchase of spares	On demand within 8 days of SLA
7.2.	Transport spares	Transportation spares on demand
7.3	Install spares	Configuration on demand
7.4	Provide Technical Support	Warranty

(Source: González, J. The Author. 2018)

Chart 13 shows the Milestones list.

Chart 13. *Milestones List*

ID	Milestones
1	PMPlan approved
2	Final report approved
3	Docs committees approved
4	Recruitment finished
5	Procurement finished
6	Monthly Payments done
7	Surveys Applied
8	Certificate of completion Contact center services
9	23.000 preventive maintenance finished
10	Inventory 23.000 equipments
11	Final report (60 events)
12	Consulting Certificate of completion
13	Certificate of License purchased
14	Print Services Certificate of completion
15	Spares Certificate of Completion
16	End and final report

(Source: González, J. The Author. 2018)

4.2.3. Sequence activities

The tool used in sequence activity procedure was the preceding diagramming method – PDM. The software used was the MSProject Professional and the Hydra Cloud service. According to methodology, "sequence activities is the process of identifing relationships among the project activities", (PMI, 2017. PMBOK, p.187).

The Figure 15 depicts the Network Diagram for the project.
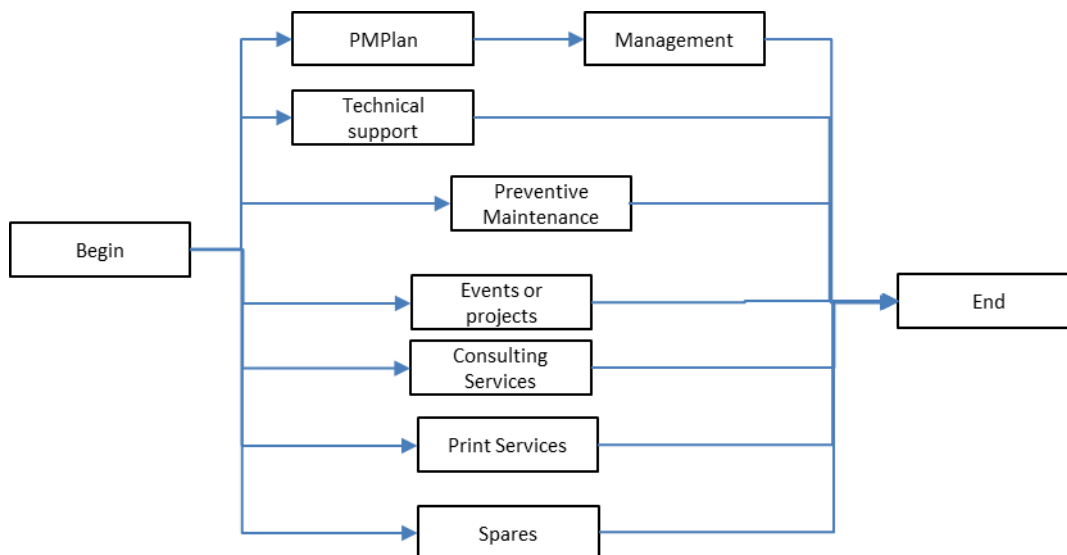
Figure 15. Network Diagram

(Source: The Author, González, J. 2018)

In the network diagram appears the major work packages. Because the services must begin on first day after signing the contract, all of these must be accomplished simultaneously.

4.2.4. Estimate durations

The RFP contains the mandatory duration for the most of activities covered by the contract. The company's own activities are estimated according to the effort required and the delivery times expected by the customer. For these activities, the Analogous estimation was used, taking the learned lessons and documented procedures of the company. Chart 14 shows the Estimates of durations.

Chart 14. *Estimate Durations*

Task name	Duration	Predecessors	Resources name
HELP DESK IMPLEMENTATION IN DISTRICT EDUCATION SECRETARY OF BOGOTÁ	**155 days**		
Signing of contract	0 days		
1. Project Management	**155 days**		
1.1. Project Management Plan	**151 days**		

Task name	Duration	Predecessors	Resources name
1.1.1.Subsidiary Plans	18 days	2	PM
Milestone: PMPlan approved	0 days	5	
1.1.2.Management services	133 days	6	PM
Milestone: Final report approved	0 days	7	
1.2. Reporting	**131 days**		
1.2.1. Monitoring committees	**131 days**		
Committee #1	1 day	6FC+5 days	PM
Committee #2	1 day	11FC+23 days	PM
Committee #3	1 day	12FC+20 days	PM
Committee #4	1 day	13FC+20 days	PM
Committee #5	1 day	14FC+21 days	PM
Committee #6	1 day	15FC+21 days	PM
Committee 7	1 day	16FC+19 days	PM
1.2.3. Formal documentation	3 days	17FC-4 days	PM
Milestone:Docs committees approved	0 days	18	
1.3. Resources	**30 days**		
1.3.1. Procurement	30 days	2	Procurement Dept.
1.3.2. Human Resources	5 days	2	HR dept
Milestone: recruitment finished	0 days	22	
1.3.3. Tools&Equipments	25 days	2	Procurement Dept.
1.3.4. Cost Controlling	25 days	2	PM
Milestone: Procurement finished	0 days	25_24_21_23	
1.4. Billing	**132 days**		
1.4.1.Conciliation	**5 days**		
First bill	5 days	11	Coordinator, PM
Second Bill	5 days	12	Coordinator, PM
Third Bill	5 days	13	Coordinator, PM
Fourth Bill	5 days	14	Coordinator, PM
Fifth Bill	5 days	15	Coordinator, PM
Six Bill	5 days	16	Coordinator, PM
Seventh Bill	3 days	17FC-3 days	Coordinator, PM
1.4.2.Services Level Agreements-Calculation	**131 days**		
SLA Month 1	1 day	11CC	Coordinator
SLA Month 2	1 day	12CC	Coordinator
SLA Month 3	1 day	13CC	Coordinator
SLA Month 4	1 day	14CC	Coordinator
SLA Month 5	1 day	15CC	Coordinator
SLA Month 6	1 day	16CC	Coordinator
SLA Month 7	1 day	17CC	Coordinator
1.4.3.Charges & Payments	1 day	37_38_39_40_41_42_43	Financial dept
Milestone: Payments done	0 days	44_29_30_31_32_33_34_35	
1.5.Customer Satisfaction	**45 days**		
1.5.1.Satisfaction surveys	45 days	6FC+45 days	Quality Coord.
1.5.2. Net Promoter Score	5 days	6FC+60 days	Quality Dept

Task name	Duration	Predecessors	Resources name
Milestone: Surveys Applied	0 days	47_48	
1.6. Monitoring and Control	**155 days**		
1.6.1. Review SLA´s DEXON	155 days	2	Coordinator
1.6.2. Report and documentaion	155 days	2	Coordinator
2. Technical Support	**154 days**		
2.1.Contact Center	154 days	2	12 Agents
2.2.Agents	2 days	23	HR dept
2.3.Support level 1	154 days	2	12 Agents
2.3.Support level 2	154 days	2	120 technicians
2.3.Support level 3	154 days	2	70 Specialists
Milestone: Certificate of completion Contact center services	0 days	51_52_53_54_55	
3. Preventive Maintenance	**143 days**		
3.1. Equipments Revised (23.000)	140 days	2	24 technicians
Milestone: 23.000 preventive maintenance finished	0 days	58	
3.2.Reports	3 days	58	24 technicians
3.3.Inventory	140 days	58CC	24 technicians
Milestone: Inventory 23.000 equipments	0 days	61_60	
4. Events or projects (On demand)	**140 days**		
4.1. 60 events	140 days	2	Coordinator
Milestone: Final report (60 events)	0 days	64	
5. Consulting Services	**130 days**		
5.1. Process maturity Analysis	15 days	2FC+15 days	Process Consultant
5.2.Strengthening processes	100 days	67	Process Consultant
5.3.Final Report	15 days	68	Process Consultant
Milestone: Consulting Certificate of completion	0 days	69	
6. Print Services	**150 days**		
6.1.Licensing	15 days	2	Procurement Dept.
Milestone: Certificate of License purchased	0 days	72	
6.2.Installation	5 days	72	6 Print Specialists
6.3.Support	130 days	74	6 Print Specialists
Milestone: Print Services Certificate of completion	0 days	75	
7. Spares	**100 days**		
7.1.SLA 8 days	100 days	2FC+30 days	Procurement Dept.
7.2.Logistic	100 days	2FC+30 days	Procurement Dept.
7.3.Installation	100 days	2FC+30 days	120 technicians
7.4.Technical Support	100 days	2FC+30 days	120 technicians
Milestone: Spares Certificate of Completion	0 days	78_79_80_81	
Milestone:End and final report	0 days	8_19_45_76_70_56_82	

(Source: González, J. The Author. 2018)

4.2.5. Develop Schedule

Once the durations of the activities and their relationships have been estimated, the schedule can be developed. There are several constraints imposed by the client, i.e. the 7 months of duration and the begining and end dates, which cannot be extended.

The client is a public entity; therefore, the duration must be exact and cannot be exceeded or even concluded a day apart. For this reason, there are not leads or lags in the schedule. Chart 15 shows the Schedule.

Chart 15. *Develope Schedule*

Task Name	Duration	Start	End	Predecessors
HELP DESK IMPLEMENTATION IN DISTRICT EDUCATION SECRETARY OF BOGOTÁ	**155 days**	**lun 02/07/18**	**lun 04/02/19**	
Signing of contract	0 days	lun 02/07/18	lun 02/07/18	
1. Project Management	**155 days**	**lun 02/07/18**	**vie 01/02/19**	
1.1. Project Management Plan	**151 days**	**lun 02/07/18**	**lun 28/01/19**	
1.1.1.Subsidiary Plans	18 days	lun 02/07/18	mié 25/07/18	2
Milestone: PMPlan approved	0 days	jue 26/07/18	jue 26/07/18	5
1.1.2.Management services	133 days	jue 26/07/18	lun 28/01/19	6
Milestone: Final report approved	0 days	lun 28/01/19	lun 28/01/19	7
1.2. Reporting	**131 days**	**jue 02/08/18**	**jue 31/01/19**	
1.2.1. Monitoring committees	**131 days**	**jue 02/08/18**	**jue 31/01/19**	
Committee #1	1 day	jue 02/08/18	jue 02/08/18	6FC+5 days
Committee #2	1 day	mié 05/09/18	mié 05/09/18	11FC+23 days
Committee #3	1 day	jue 04/10/18	jue 04/10/18	12FC+20 days
Committee #4	1 day	vie 02/11/18	vie 02/11/18	13FC+20 days
Committee #5	1 day	mar 04/12/18	mar 04/12/18	14FC+21 days
Committee #6	1 day	jue 03/01/19	jue 03/01/19	15FC+21 days
Committee 7	1 day	jue 31/01/19	jue 31/01/19	16FC+19 days
1.2.3. Formal documentation	3 days	lun 28/01/19	mié 30/01/19	17FC-4 days
Milestone:Docs committees approved	0 days	mié 30/01/19	mié 30/01/19	18
1.3. Resources	**30 days**	**lun 02/07/18**	**lun 13/08/18**	
1.3.1. Procurement	30 days	lun 02/07/18	vie 10/08/18	2
1.3.2. Human Resources	5 days	lun 02/07/18	vie 06/07/18	2
Milestone: recruitment finished	0 days	vie 06/07/18	vie 06/07/18	22
1.3.3. Tools&Equipments	25 days	lun 02/07/18	vie 03/08/18	2
1.3.4. Cost Controlling	25 days	lun 02/07/18	vie 03/08/18	2
Milestone: Procurement finished	0 days	lun 13/08/18	lun 13/08/18	25_24_21_23
1.4. Billing	**132 days**	**jue 02/08/18**	**vie 01/02/19**	
1.4.1. Conciliation	**130 days**	**vie 03/08/18**	**jue 31/01/19**	
First bill	5 days	vie 03/08/18	jue 09/08/18	11
Second Bill	5 days	jue 06/09/18	mié 12/09/18	12

Task Name	Duration	Start	End	Predecessors
Third Bill	5 days	vie 05/10/18	jue 11/10/18	13
Fourth Bill	5 days	lun 05/11/18	vie 09/11/18	14
Fifth Bill	5 days	mié 05/12/18	mar 11/12/18	15
Six Bill	5 days	vie 04/01/19	jue 10/01/19	16
Seventh Bill	3 days	mar 29/01/19	jue 31/01/19	17FC-3 days
1.4.2.Services Level Agreements-Calculation	**131 days**	**jue 02/08/18**	**jue 31/01/19**	
SLA Month 1	1 day	jue 02/08/18	jue 02/08/18	11CC
SLA Month 2	1 day	mié 05/09/18	mié 05/09/18	12CC
SLA Month 3	1 day	jue 04/10/18	jue 04/10/18	13CC
SLA Month 4	1 day	vie 02/11/18	vie 02/11/18	14CC
SLA Month 5	1 day	mar 04/12/18	mar 04/12/18	15CC
SLA Month 6	1 day	jue 03/01/19	jue 03/01/19	16CC
SLA Month 7	1 day	jue 31/01/19	jue 31/01/19	17CC
1.4.3. Charges & Payments	1 day	vie 01/02/19	vie 01/02/19	37_38_39_40_41_42_43
Milestone: Payments done	0 days	vie 01/02/19	vie 01/02/19	44_29_30_31_32_33_34_35
1.5. Customer Satisfaction	**45 days**	**jue 27/09/18**	**mié 28/11/18**	
1.5.1.Satisfaction surveys	45 days	jue 27/09/18	mié 28/11/18	6FC+45 days
1.5.2. Net Promoter Score	5 days	jue 18/10/18	mié 24/10/18	6FC+60 days
Milestone: Surveys Applied	0 days	mié 28/11/18	mié 28/11/18	47_48
1.6. Monitoring and Control	**155 days**			
1.6.1. Review SLA´s DEXON	155 days	lun 02/07/18	lun 04/02/19	2
1.6.2. Report and documentaion	155 days	lun 02/07/18	lun 04/02/19	2
2. Technical Support	**154 days**	**lun 02/07/18**	**jue 31/01/19**	
2.1. Contact Center	154 days	lun 02/07/18	jue 31/01/19	2
2.2. Agents	2 days	lun 09/07/18	mar 10/07/18	23
2.3. Support level 1	154 days	lun 02/07/18	jue 31/01/19	2
2.3. Support level 2	154 days	lun 02/07/18	jue 31/01/19	2
2.3. Support level 3	154 days	lun 02/07/18	jue 31/01/19	2
Milestone: Certificate of completion Contact center services	0 days	jue 31/01/19	jue 31/01/19	51_52_53_54_55
3. Preventive Maintenance	**143 days**	**lun 02/07/18**	**mié 16/01/19**	
3.1. Equipments Revised (23.000)	140 days	lun 02/07/18	vie 11/01/19	2
Milestone: 23.000 preventive maintenance finished	0 days	lun 14/01/19	lun 14/01/19	58
3.2.Reports	3 days	lun 14/01/19	mié 16/01/19	58
3.3.Inventory	140 days	lun 02/07/18	vie 11/01/19	58CC
Milestone: Inventory 23.000 equipments	0 days	mié 16/01/19	mié 16/01/19	61_60
4. Events or projects (On demand)	**140 days**	**lun 02/07/18**	**vie 11/01/19**	
4.1. 60 events	140 days	lun 02/07/18	vie 11/01/19	2
Milestone: Final report (60 events)	0 days	vie 11/01/19	vie 11/01/19	64
5. Consulting Services	**130 days**	**lun 23/07/18**	**vie 18/01/19**	
5.1. Process maturity Analysis	15 days	lun 23/07/18	vie 10/08/18	2FC+15 days
5.2.Strengthening processes	100 days	lun 13/08/18	vie 28/12/18	67
5.3.Final Report	15 days	lun 31/12/18	vie 18/01/19	68
Milestone: Consulting Certificate of completion	0 days	vie 18/01/19	vie 18/01/19	69
6. Print Services	**150 days**	**lun 02/07/18**	**vie 25/01/19**	
6.1.Licensing	15 days	lun 02/07/18	vie 20/07/18	2

Task Name	Duration	Start	End	Predecessors
Milestone: Certificate of License purchased	0 days	vie 20/07/18	vie 20/07/18	72
6.2.Installation	5 days	lun 23/07/18	vie 27/07/18	72
6.3.Support	130 days	lun 30/07/18	vie 25/01/19	74
Milestone: Print Services Certificate of completion	0 days	vie 25/01/19	vie 25/01/19	75
7. Spares	**100 days**	**lun 13/08/18**	**vie 28/12/18**	
7.1.SLA 8 days	100 days	lun 13/08/18	vie 28/12/18	2FC+30 days
7.2.Logistic	100 days	lun 13/08/18	vie 28/12/18	2FC+30 days
7.3.Installation	100 days	lun 13/08/18	vie 28/12/18	2FC+30 days
7.4.Technical Support	100 days	lun 13/08/18	vie 28/12/18	2FC+30 days
Milestone: Spares Certificate of Completion	0 days	vie 28/12/18	vie 28/12/18	78_79_80_81
Milestone:End and final report	0 days	lun 04/02/19	lun 04/02/19	8_19_45_76_70_56_82

(Source: González, J. The Author. 2018)

4.2.6. Control Schedule

As explained before, service contracts with the state, with periodic payments for services rendered, have an unchangeable duration. In this project, the services for IT support were estimated to 7 months, and the budget is fixed to cover the contract. However, in the execution period there are activities that need scheduling and tracking.

Work performance data

The project shall report the following metrics as showed in the Chart 16:

Chart 16. *Metrics*

Metric	Formule	Frequency
Schedule Performance	% Completed - % Planned	Weekly
Budget Performance	% spent - % Planned	Weekly
Preventive Maint. Performance	# Equip completed - # eq planned	Weekly
Customer Satisfaction	Average evaluation	3 months
Staff	# people of project team	Weekly
Accompaniments	# events	On demand
SLA´s	Incidents, Request, Spares	Weekly

(Source: Adapted from RFP-SED, .2018)

This performance data is demanded by client. The schedule performance is used to make decisions like hiring more people to eliminate deviations or risks. The

schedule changes can be agreed into the project committee but having into account that project cannot be extended not a single day.

The project manager is responsible for increasing the staff or resources if he considers that deliverables will not be accomplished, the PMO authorization is required. The services architecture of the project facilitates the control schedule because each deliverable is independent and can be crashed or fast tracked without impact in the others.

Preventive maintenance: The schedule was programmed dividing the 23,000 equipments into 7 months and 24 technicians. The last months were estimated with half the productivity, leaving a significant gap for possible delays. The staff for this deliverable is dedicated and has specific roles and tools.

Technical support: This is a cyclical deliverable and determines the invoice and penalties. Each month the Application resets the counters. The staff is dedicated to performing only this and it does not impact other deliverables.

4.3.   Project Cost Management

"*Project Cost Management includes the processes involved in planning, estimating, financing, funding, managing and controlling costs so that the project can be completed within the approved budget*" (PMI, 2017. PMBOK, p.231). The processes involved are four, showed below in the Figure 16.

Figure 16. Mind Map Cost Management

(Source: The Author, González. J, 2018)

The control costs process is not included into the document because this project only involves planning processes.

4.3.1. Plan Cost Management

The main tool used to develop this plan was the experience and lessons learned. The company has developed several projects, like this one. The formats and templates let us calculate and standardized the prices and costs.

A mature procurement department controls and manages the purchases and the Enterprise Resource Planning software (ERP), through its workflows establishes a strict authorization process for all purchases. Prices for equipments and tools can be obtained through quotations with partners, retailers and wholesalers. Thus, the estimations are precise. The margin error is less than 2%. The prices are held for a reasonable time (45 days).

For human resources the estimation is exact, since the wages are standard and can be estimated without error.

There is only one risk, and it is associated to the exchange rate of the dollar and Colombian peso. This can affect the price for imported equipments, which are not significative for this project and they are available in the country.

The costs reporting process is automated through SAP™/ERP, which consolidates the costs associated to purchases, insurances, financials, wages, etc. The project Manager receives the monthly costs for their justification.

For contingencies, the presales team assigns budget to unforeseen costs. The process for estimated costs and budget is already defined and documented. The outcome is called "Cost Datasheet".

Policies and procedures:

- The PM cannot change the costs established in the planning of the project
- The architectural team is responsible for establishing the costs
- The tool for documenting and formalizing the costs is "the Costs Datasheet".
- Once the Datasheet is signed by steering committee, it cannot be changed.
- The PM is responsible for maintaining the project under the costs established.
- The PM must report monthly the performance cost.
- The costs determine the company´s profit.
- Purchases need to be authorized by Vice-president through SAP™ /ERP.
- The cashflow must be controlled by PM´s project.
- The PM is responsible for requesting all purchases and justify them.
- The PM can request, only the purchases defined into the Cost Datasheet.
- The procurement department is the only one authorized to purchase.
- Exceptions must be managed by PMO.

Estimate Costs

The principal tool used is the analogous estimating, because the company has dozens of similar projects. The lessons learned and experience of the project managers, also contributed to do the estimations.

According to procedures and formats, the costs are categorized into five categories. Figure 17 depicts these categories.
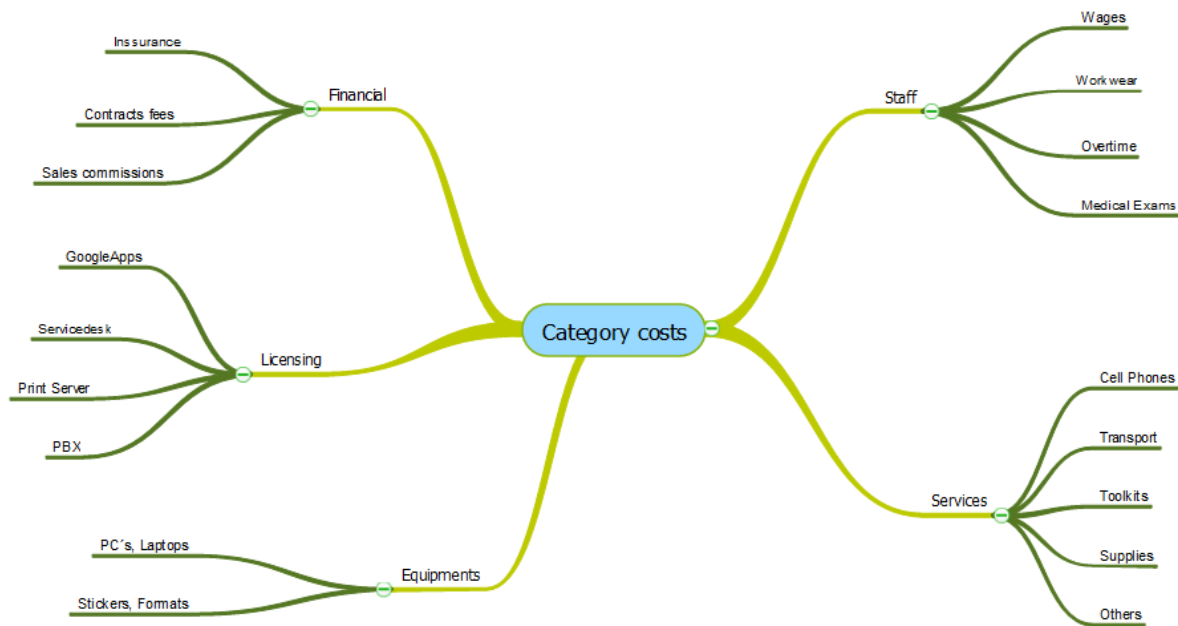
Figure 17. Mind Map Category Cost

(Source: The Author, González. J, 2018)

These categories cover the 100% of costs associated to IT Outsourcing projects. The Staff category includes the wages, workwear, overtime, medical exams for recruitment and legal obligations. An estimation costs can be observed in the chart 17:

Chart 17. *Project Costs Estimations*

PROJECT COSTS ESTIMATIONS				
Elaboration date		01/08/2018	Delivery Date	
Execution time (months)		7		
Project Costs	COP			
	MONTHLY COP		TOTAL COP	
Cost Project Outsourcing				%
Personel				
Wages and social benefits	$ 473.232.202		$ 3.312.625.415	
Contingency reserve wages	$ 9.464.644		$ 66.252.508	1%
Workwear	$ 6.949.996		$ 48.649.970	
Recriument Medical exams	$ 2.135.377		$ 14.947.638	
Security investigations	$ -		$ -	
Overtime	$ 4.000.000		$ 28.000.000	
Support additional services	$ -		$ -	

Cost of Personel			$	3.470.475.532	75,5%
Services					
Cellphones	$	12.305.700	$	86.139.900	
ToolKits	$	12.000.000	$	84.000.000	
Quality awareness	$	3.000.000	$	21.000.000	
Remote DelpDesk	$	-	$	-	
Laboratory - Warehouse	$	1.200.000	$	8.400.000	
Warehouse support equip.	$	500.000	$	3.500.000	
Spares budget	$	1.000.000	$	7.000.000	
Supplies Preventive Maintenance	$	1.200.000	$	8.400.000	
Corrective Maintenance	$	500.000	$	3.500.000	
Transport - taxi	$	25.600.000	$	179.200.000	
Ticket services	$	1.596.000	$	11.172.000	
Stationery	$	200.000	$	1.400.000	
Air Conditioned	$	40.000	$	280.000	
Cost of Services			$	413.991.900	9,0%
Contingency reserve services			$	20.699.595	0,5%
Equipments					
Sticker Preventive & corrective Mt.	$	1.920.000	$	13.440.000	
PC´s, Laptops	$	11.500.000	$	80.500.000	
Printers	$	8.000.000	$	56.000.000	
Spares	$	6.000.000	$	42.000.000	
Cost of Equipments			$	191.940.000	4,2%
Contigency reserve equipments	$	1.371.000	$	9.597.000	0,2%
Licensing					
SW Help Desk	$	10.000.000	$	70.000.000	
Professional services	$	500.000	$	3.500.000	
Print Server agents	$	590.000	$	4.130.000	
Comunication Manager (PBX)	$	1.000.000	$	7.000.000	
PaperCut server	$	12.500.000	$	87.500.000	
Licenciamiento Google Apps	$	184.900	$	1.294.301	
Cost of Licensing			$	173.424.301	3,8%
Financial					
Commission (1%)		$ 12.857.143	$	90.000.001	
Contingencies	$	6.000.000	$	42.000.000	
Inssurances & fees	$	12.000.000	$	84.000.000	
Financial Cost			$	216.000.001	4,7%
Management reserve			$	100.000.000	2,2%
SubTotal Costos sin IVA	$	656.589.761	$	4.596.128.329	100%

(Source: Adapted from "The Company Files". 2018)

As it can be observed, the personnel cost represents the 75,5% of the total cost of the project. This is real because the Help Desk services, in fact are personnel

delivering support services. The remaining costs are associated to the necessary infrastructure to provide the technical assistance and the client´s requirements, i.e. the software for Printing services, the supplies to deliver the preventive maintenance, etc.

Contingencies

The risky items in the estimation costs process are the personnel wages, the equipments and spares and the transport costs, logistic and communications. Therefore, contingency reserves are assigned to these resources and activities. The contingency management is estimated in 2,2% of the final cost. The detailing of monthly Personnel´s costs are below in Chart 18.

Chart 18. *Personnel Costs*

	Wage	Sub. Transp.	Factor K	Cost Company	Quant.	Cost / Month
Personnel Mandatory						
Coordinator tecnical adm. and Quality	$ 4.500.000	$ -	1,39	$ 6.274.899	1	$ 6.274.899
Coordinator - General Help Desk	$ 4.500.000	$ -	1,39	$ 6.274.899	1	$ 6.274.899
Coordinator - Nivel central	$ 3.701.250	$ -	1,45	$ 5.353.569	1	$ 5.353.569
Coordinator - Local	$ 2.500.000	$ -	1,39	$ 3.486.055	18	$ 62.748.990
Engineer - Conectivity level 3	$ 3.000.000	$ -	1,39	$ 4.183.266	5	$ 20.916.330
Engineer - Electrical Level 3	$ 2.961.000	$ -	1,39	$ 4.128.884	5	$ 20.644.418
Technologist- Structured Cabling	$ 1.459.350	$ 83.140	1,39	$ 2.118.090	18	$ 38.125.615
Technician - Electrical Level 3	$ 1.459.350	$ 83.140	1,39	$ 2.118.090	6	$ 12.708.538
Technician - Printer Specialist	$ 1.374.750	$ 83.140	1,39	$ 2.000.122	6	$ 12.000.730
Technician Support Level 1	$ 1.057.500	$ 83.140	1,39	$ 1.557.741	12	$18.692.895
Technician Support Level 2	$ 1.057.500	$ 83.140	1,39	$ 1.557.741	108	$168.236.057
Technician Ofimatic	$ 1.200.000	$ 83.140	1,39	$ 1.756.446	4	$ 7.025.786
Technician Preventive Maintenance	$ 1.057.500	$ 83.140	1,39	$ 1.557.741	24	$ 37.385.790
Project Manager	$ 9.590.321	$ -	1,40	$13.437.626	1	$ 13.437.626
Additional Personnel						
Technician Support Level 2	$ 1.057.500	$ 83.140	1,39	$ 1.557.741	10	$ 15.577.413
Consultant ITIL	$ 4.000.000	$ -	1,39	$ 5.577.688	1	$ 5.577.688

	Wage	Sub. Transp.	Factor K	Cost Company	Quant.	Cost / Month
Coordinator conectivity Services	$ 5.000.000	$ -	1,39	$ 6.972.110	1	$ 6.972.110
Personnel "NO Mandatory"						
Administrative Assistant	$ 1.000.000	$ 83.140	1,39	$ 1.477.562	1	$ 1.477.562
Human Resources Assistant	$ 1.500.000	$ -	1,39	$ 2.091.633	1	$ 2.091.633
Administrator - Inventory and warranty	$ 1.000.000	$ 83.140	1,39	$ 1.477.562	1	$ 1.477.562
Logistic Assistant	$ 1.374.750	$ 83.140	1,39	$ 2.000.122	1	$ 2.000.122
QA e ITIL	$ 4.000.000	$ -	1,39	$ 5.577.688	1	$ 5.577.688
Leader HD	$ 1.903.500	$ -	1,39	$ 2.654.282	1	$ 2.654.282
TOTAL					228	$ 473.232.202

(Source: González, J. The Author. 2018)

Note: The values are in Colombian pesos COP $

As a reference, the monthly minimum wage in Colombia is COP $781.242 (DANE, 2017) The equivalent amount in American Dollars is US $260.

The monthly cost represents the cashflow for the company. There are several costs that are prorated. This is a policy established by financial department. For instance, the purchase of equipments is done the first month, but the price is divided into the 7 months of the project.

The costs associated to purchases are taken from formal quotations.

Cost Baseline

The Cost Baseline is composed of Activity costs + Contigency reserces + Management reserve. In the Chart 19 is shown the Cost Baseline for this project.

Chart 19. *Cost Baseline*

Item	Value
Activities Cost	$ 4.399.579.226
Contigency reserves	$ 96.549.103
Management Reserves	$ 100.000.000
Cost Baseline	$ 4.596.128.329

(Source: The Company Files, 2018)

4.4.   Quality Management Plan

"*Project Quality Management includes the processes for incorporating the organization´s quality policy regarding planning, managing and controlling project and product quality requirements in order to meet stakeholders´ objectives*", (PMI, 2017. PMBOK, p.271). In Figure 18 it is depicted the set of processes for Quality Management,

Figure 18. Mind Map Quality Management

(Source: The Author, González. J, 2018)

The process covered in this document is Quality Management Plan.

4.4.1. Quality Management Plan

This process identifies quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements and/or standards, (PMI, 2017. PMBOK p.271).

The quality standards that will be used in the project are:

a. ISO9001:2015, The Quality Management Systems Standard.
b. HSEQ. The Health, Security, Environment and Quality Systems. In Colombia, the decree 1443 of 2014 established the Legal framework.
c. ITIL. The Information Technology Infrastructure Library.

According to PMI (2017, p.286), the Quality Management Plan may include the following components:

- Quality standards to be used in the project.
- Quality objectives of the project.
- Quality Roles and responsibilities.
- Project deliverables and processes
- Quality control and quality management activities
- Quality tools
- Major procedures used into the project

The Quality Plan in the Chart 20 shows the Plan documented into the format standardized by the ISO9001.

Chart 20. *Quality Plan*

QUALITY PLAN - PROJECT SECRETARIAT OF EDUCATION DICTRICT						
Project characterization						
Project characterization	Secretariat of Education Distric		Duration Months	7	Start date	01/07/2018
			ID Project	S930	End	31/01/2019
Project Objective	Provide incident resolution services and requirements related to information and communication technologies, support and preventive maintenance and corrective with spare parts bag for the technological platform of the EDS					
Scope Project	Telephonically assistant, on-site support, preventive and corrective maintenance with spares bag, ITIL strengthening processes.					
Budget Project	COP$=11'200.000.000 inciuded VAT					
Project Manager	José Adelmo González Rodríguez		Mobile		E-Mail	jose.gonzalez@bit-5.com
Client Information						
Client´s name	Secretariat of Education of District - EDS					
Contact´s name	Armando Alfonso Leyton González	Address	Cra 28a No. 62 -46		Teléphone fix	
		E-Mail	aleyton@educacionbogota. gov.co		Num mobile	N/A

WorkFlow process	Activity Description or document of reference	Variable to control	Responsible (Role)	Registry	Required resources	Date Planned
Start	Suscription and Contract signed, legalization and approval of inssurances	Contract clauses and insurances	Legal Representative	Contract signed, Insurance policy	Human Resource	28/06/2018
	Minute kickoff	Kickoff meeting	Legal Representative Legal/Commercial	Start minute	Human Resource	01/07/2018
	Start of Service Strategy Phase					
Service Strategy	Verify project team to develop project activities.	Human Resources	Human Resources Help Desk Manager	Staff requests and Employment contracts	Procedures: Recruitment, HR Induction, HSE and contractors.	01/07/2018
	Contract review, Verification of commitments, scope and SLA´s	Contractual commitments	PMO	Proposal of services	Contract and Technical annex	01/07/2018
	Transfer meeting	Contractual commitments	PMO y Account Manager	Transfer Minute	Service Architect / Manager	01/07/2018
	Start of Transition Service					

Service Transition	Handover and knowledge transfer and information, from the current service provider to new contractor	Transition period	Coordinator technical administrative and quality	Delivery of documentation	Previuos provider and currents Coordinators	01/03/2017
	Start Operations Service Phase					
	Project Management Plan	Scope Project / Strategy Project	Project Manager	Contract signed, Insurance policy	Project Documentatio n	15/07/2018

<div align="center">SO-S930-PC-01 / V 1.0</div>

Operation of service	Execute plans established in the Project Plan	Human Resources Information concerned to services	Project Manager	Divulge to project team	Project team	Meetings weekly of operation with the client
	Monitor and inform about the process	Events and indicators	Project Manager	Inform about management	Outcome management	Monthly
	Define initial processes (Incident Management, Request Management).	Procedures, guidelines and best practices	Project Manager, Coordinatior Technical adm. And quality	Procedures	Project Team and Client team	03/07/2018
	Matrix of Communications	Communication s project	Project Manager / Coordinator Tech, Admin and Quality	Matrix of Communication s	Tools defined in matrix	15/07/2018
	Matrix of Risks	Procedures, guidelines and best practices	Project Manager, Coordinatior Technical adm. And quality	Matrix of Risks	Tools defined in matrix	23/07/2018
	Meetings for tracing and control	Agenda	Project Manager	Meetings Minutes	Agenda Availability	Periodic
	Define initial processes (Incident Management, Request Management).	Procedures, guidelines and best practices	Project Manager, Coordinatior Technical adm. And quality	Procedures	Project Team and Client team	03/07/2018
	Reuniones de seguimiento y control a la gestión	Agenda	Project Manager	Meetings Minutes	Agenda Availability	Periodic
	Guarantee PPI to operational staff required	PPI	HSEQ	Delivery certificate of required items, On-site support	Human Resources	On demand
	Elaborate Matrix of indentification dangers, Riesks assessment and establish controls	HSE guidelines	HSEQ	Evaluation	HSEQ Team	01/07/2017
	Elaborate Emergency Plan	HSE guidelines	HSEQ	Evaluation	HSEQ Team	01/07/2017
	Operactional procedures and instructions	Documented procedures	Coordinator Tech, Admin and Quality / Project team	Documentation	Project team	On demand
	Start Continual improvements phase					
	SLA´s Management	Management Indicators, Improvement Plans	Project Manager / Coordinators	Monthly Reports / Imrpovement actions	Project team	Monthly
Improvement continual	Continuous divulgation	Calendar with issues to disclose to project team	Project Manager, Coordinatior Technical adm. And quality	Calendar Internal Operational Committee N. xxx EDS	Project team	Monitoring meetings with project team
	Continuous Improvement	Accomplishme nt contract through doc	Project Manager, Coordinatior Technical adm. And quality	Monthly Reports / Improvement	Project team	Periodic

		Project Plan		actions		
	Matrix of dangers identification, Assessment of risks and establishment of controls	HSE guidelines	HSEQ	Evaluation	HSEQ Team	Periodic
	Emergency plan	HSE guidelines	HSEQ	Evaluation	HSEQ Team	Periodic
Closing	**Start Closing Phase**					
	End contract	Accomplishme nt contract	Project Manager, Coordinatior Technical adm. And quality	Final Report / Minute Finalización	Internal Project team	31/01/2019

SO-S930-PC-01 / V 1.0

(Source: The Company Files, 2018)

Quality Policy: "Providing timely and professionally integrated solutions in information technology and telecommunications, aimed at customer satisfaction and achieving market confidence, supported by our experience, in the constant improvement of internal processes and in strategic alliances with our suppliers, complying with the Applicable regulatory, legal and contractual requirements" (Comware, 2018).

4.4.2. Quality Metrics

According to PMI (PMI, 2017. PMBOK, p.287), "*a Quality metric specifically a project or product attribute and how the Control Quality Process will verify control to it*".

Service Levels Agreements

The Service Levels Agreements are contractual commitments, which establish penalties if they are not accomplished. The metrics established by the client and accepted by company were showed in Chart 21.

Chart 21. *Metrics and Formulas*

Metric	Formula	Objective
% budget performance	(Monthly budget Estimated / Monthly budget Spent) * 100%	= < 100%
% schedule performance	(% executed Estimated / % Real executed) * 100%	2% deviation
% Incidents Resolution Level 1	Incidents solved 1st Level / Incidents registered) * 100	>=40%
% Calls answered	Waiting time Before 60 seconds	>= 95%
% Incidents solved into first 2 hours (Treasury Dept)	(# Incidents solved into the first 2 hours / # Incidents registered) *100%	>= 95%
% Incidents solved (solution time=6 hours)	(# Incidents solved t<6 hours / # Incidents solved) *100%	>=98%
% Requests solved (solution time = 16 hours)	(# Requests solved t<16 hours / # Requests solved) *100%	>=98%
Effectivity delivery spares	(# spares delivered t<8 days / total spares delivered) *100%	>95%

(Source: González, J. The Author. 2018)

The metrics are standardized for IT Help Desk projects in the industry. In this case, the SED has been responsible for this definition. The metrics are extracted from the Information System for IT Services. The metrics will be reported monthly and audited periodically by supervisor. The data is extracted directly from the Information System for IT services – Help Desk.

Customer satisfaction.

The customer satisfaction needs to be measured with two mechanisms:

- Evaluation through service formats completed by the client in each service provided (Annex 4. Report of Service). This report is signed by the client when the Help Desk employee attends the request. The satisfaction levels begin from 1 to 5, being 5 the best. In Figure 19 it is depicted the service format and the evaluation space.

Satisfacción del Usuario 1 2 3 4 5	
Si su calificación fue igual o menos que 3, indique la causa:	
	_____ Firma de Usuario

Figure 19. Service format and customer satisfaction evaluation

(Source: The Author, González. J, 2018)

- Surveys applied randomly to customers periodically. The questions will be established in conjunction to the client.

Enterprise metrics

The company has established the following metrics.

- **NPS - Net Promoter Score**

"NPS® is often held up as the gold standard customer experience metric. First developed in 2003 by Bain and Company, it is now used by millions of businesses to measure and track how they are perceived by their customers" (Qualtrics, 2017)

The methodology consists on a short survey applied to main stakeholders:

"¿How likely is it that you would recommend the Organization to a friend or colleague?". The scale of probability is scored from 0 to 100, where 100 is the best and desirable result.

The Operations department has established the following metrics for this and other projects:

Detractors: 0 – 60: The customer or stakeholder is considered unhappy who is unlike to buy from you again.

Passives: 70 – 80: These customers are considered happy, but not enough to promote your services with peers or friends.

Promoters: 90 – 100: Totally happy and satisfied with your services or products.

For the company, the NPS survey will be applied by Quality Department and shall be executed periodically every 6 months. It´s considered a metric for measuring the project´s manager job. The statistic result will be the average of stakeholder's responses.

The requirement demanded to the project manager is that NPS shall be major than 60, after six months the start of the project.

NPS = (Average´s promoters) – (Average´s detractors)

4.4.3. Manage Quality

The PMBOK™ states that Manage Quality is the process where the Quality Plan is converted into actions and activities. Lledó (2017, 6ed. Administración de Proyectos, p.250) states "Manage Quality: carries out the necessary activities to fulfill with the quality requirements of the project".

The Quality and HSEQ department of the company play a fundamental role into this process. Figure 20 shows the activities to manage quality and the quality assurance.

Figure 20. Mind Map Manage Quality

(Source: The Author, González. J, 2018)

a. **Internal audits**: The SGC ISO9001:2015 executes internal audits for the contracted projects, with external resources.

b. **Preventive and corrective actions**. The project must show compliance with the continuous improvement aligned to ISO9001 and register the preventive and corrective actions.

c. **HSEQ activities**. This department is key for success in the project. The costs associated considers a dedicated HSEQ full-time analyst on-site for the project. The specific activities carried out are depicted in Figure 21.

Figure 21. Mind Map HSEQ Activities

(Source: The Author, González, J. 2018)

- There are activities that represent a risk for human beings due to the height and conditions for the work realization. The Colombian legal framework defines the conditions and elements for protecting the workers.
- The cabling structured activities represents electrical risk that needs to be monitored and eliminated by protection items and procedures.
- The project generates electrical, electronic and chemical wastes. The Colombian Agency - ANLA (National Agency for Environmental Licenses), states that companies must dispose and report the wastes generated by the project execution (Minambiente, 2018)

- The HSEQ Analyst manages the on-site inspections monitoring and controlling the use of PPI (Personal Protection Items), the regular and accepted procedures for transport and logistics, the conformance and knowledge of the legal framework, etc.

- Normativity: HSEQ guidelines are included into the decree 1072 of 2015, which compiled and grouped all the legal requirements for companies to protect the employees, environment, etc. The project manager is responsible for the compliance inside the project.

- Work accidents: The HSEQ department and the project manager represents to the company and they are responsible for responses to all accidents occurred in the daily basis.

d. **Satisfaction surveys**: The client demands a three major surveys during the project, executed by company, which must cover a representative sample of teachers, employees and directives of the EDS. The questions must be agreed upon, and shall measure:

    a. Time response

    b. Technicians attitude

    c. Effectivity

    d. Final evaluation of the service

e. **Services formats**: Each on-site service and technical support must be registered through a service format. In figure 22 it is depicted:

Figure 22. Service Format

(Source: The Company archives, 2018)

Into this document, the team member registers all data concerning to client and service outcomes. This document is a formal report to future inspections and provide feedback for corrective and preventive actions. The document ends with the satisfaction survey and the signing of client. However, the main objective of this format, is to provide to client a legal proof against legal claims.

f. **Tracing and supervision SLA´s**: The most important activity to manage quality process, is the monitoring and control of Service Levels Agreements. The accomplishment of SLA´s, defined and showed in 4.4.2, are the cornerstone for both, the client and company. The project manager, General coordinator, Local Coordinators, Quality Coordinator, technicians and the whole team of the project are responsible for detecting issues and deviations in a daily basis. Weekly, the project manager shows the

compliance of these SLA´s to client´s supervisor. Monthly, the project manager shall conciliate the final SLA to negotiate the penalties and billing. The data is gathered directly from Information System of Help Desk provided by the client. The General Coordinator must review every day the dashboard and make operational decisions or escalate to project manager. The expected actions into this procedure are:

    a. Monitoring SLA´s daily

    b. Corrective actions when an Incident or request is detected out of the metric.

    c. Preventive actions when is detected a pattern in the technician activities that affect the fulfillment of SLA´s.

    d. Disciplinary processes: When is detected negligence, bad attitude, absences, etc.

    e. Audits and inspections: When a location or group present frequently failures, complaints from the client.

    f. Staff transfer.

These activities for Manage Quality are accompanied by enterprise staff of quality and PMO.

4.4.4. Control Quality

The PMI (2018, *PMBOK Guide 6ᵗʰ. Ed)* defines Control Quality as "the process of monitoring and recording results of executing the quality management activities in order to assess performance and ensure the project outputs are complete, correct and meet customer expectations".

Above were showed the quality activities that let us monitor the results of the project. The control quality is controlled by client´s supervisor weekly and monthly. The billing is accepted and conciliated according to the results of this process. The penalties are established as is showed below in Chart 22:

SLA´s Performance

Chart 22. *SLA and Penalties*

Sla	Ranges fulfillment	Penalty fees Billing
% Calls answered t < 60 seconds	94,9% - 90% 89,9% - 80% 79,9% - less	2% 3% 4%
% Incidents Resolution	89,9% - 80% 79,9% - 70% 69,9% - less	2% 3% 4%
% Incidents solved into first 2 hours	89,9% - 80% 79,9% - 70% 69,9% - less	2% 3% 4%
% Incidents Resolution Level 1	59,9% - 50% 49,9% - 30% 29,9% - less	2% 3% 4%
% Incidents solved into first 2 hours (Finance. Dept)	94,9% - 90% 89,9% - 80% 79,9% - less	4% 5% 6%
% Incidents solved (solution time=6 hours)	97,9% -90% 89,9% -80% 79,9% - less	4% 5% 6%
% Requests solved (solution time = 16 hours)	96,9% -90% 89,9% -80% 79,9% - less	3% 4% 5%
Effectivity delivery spares (t < 8 days)	94,9% -90% 89,9% -80% 79,9% - lesss	2% 4% 6%

(Source: The RFP-SED. 2018)

One of the most important task of project manager is prevent for the penalty fees, which result from non-compliance of SLA´s. The control quality activities provide the capacity of monitoring the SLA´s and making decisions to accomplish the SLA at the end of each period.

a. **Time performance and compliance**. The time performance serves for reporting the deliverables of Process IT and preventive maintenance. The deviation accepted in one period of report will be 2%, without escalate to steering committee. The tool used for this will be the Project Server provided by client, and the Hydra App for internal report. The goal of the preventive maintenance is the delivery of 23.000 equipments, with software and hardware maintenance. The time for accomplish this task is contract duration.

b. **Cost performance.** Due to the budget is fixed by time and deliverables, and the billing is calculated based on number of human resources working in the project each month, there is no way to exceed such budget. The budget assigned to Spares is fixed as well. However, the project manager will report the budget spent after each billing.

c. **Inspections.** The project has quality resources, HSEQ Analyst and the local coordinators. They must do inspections to the documentation and responses to clients into the Information System of Help Desk. The Incidents and requests that have not met the indicator, shall be inspected for making decisions.

d. **Customer Satisfaction:** The Services Report (formats) which have a rating less than 3, shall be reviewed and the technician needs to attend the citation to explain in order to avoid a disciplinary process.

e. **Audits.** The Quality department conducts internal audits for asking the compliance with continual improvement. This is mandatory considering that company is ISO9001 certified.

f. **PCC, Petitions, Complaints and Claims**: Any complaint or claim from customers shall be treated as a PCC. The procedure shall be documented and formalized.

g. **Continual Improvement**: The PCC; audits, SLA´s, inspections and others may be considered like an input to the continual improvement process. For this, it is mandatory to use the company´s procedure.

4.5.   Project Resources Management

The last version of PMBOK includes the human resources into the resources processes. In figure 23 the processes included in this chapter are depicted.

Figure 23. Mind Map Project Resource Management

(Source: The Author, González, J. 2018)

4.5.1. Plan Resources Management

"*The process of defining how to estimate, acquire, manage and utilize physical and team resources*" (PMI, 2017 p.307).

4.5.1.1.   Identify Resources

The categories are showed in Figure 24:
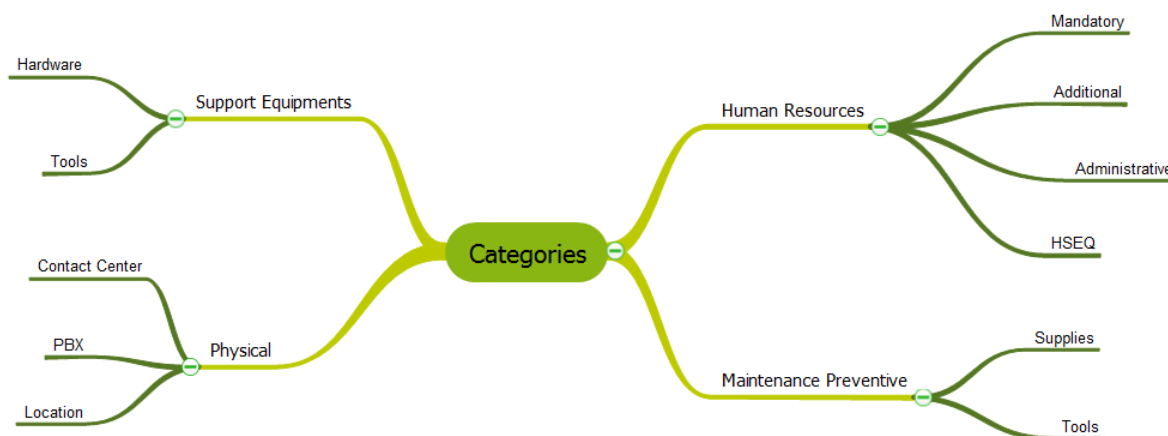
Figure 24. Mind Map Resource Categories

(Source: The Author, González, J. 2018)

In the Human Resources category, they were included the mandatory staff required for the client, the staff who is optional, but it favors the final score and the administrative staff defined by the project manager and the architecture department. The HSEQ is an important subcategory for the project due to the labor and legal framework.

4.5.1.1.1. Human Resources

The public bid published by SED establishes a minimal quantity of human resources, according to roles and responsibilities. In chart 23 the requirement is depicted:

Chart 23. *Personnel Mandatory and Additional*

Personnel Mandatory	Engineer	Technician	Q
Coordinator tecnical adm. and Quality	X		1
Coordinator - General Help Desk	X		1
Coordinator - Nivel central	X		1
Coordinator - Local	X		18
Engineer - Conectivity level 3	X		5
Engineer - Electrical Level 3	X		5
Technologist- Structured Cabling		X	18
Technician - Electrical Level 3		X	6
Technician - Printer Specialist		X	6
Technician Support Level 1		X	12
Technician Support Level 2		X	108
Technician Ofimatic		X	4
Technician Preventive Maintenance		X	24
Project Manager	X		1
TOTAL MANDATORY			210
Additional Personnel			
Technician Support Level 2		X	10
Consultant ITIL	X		1
Coordinator conectivity Services	X		1
TOTAL ADDITIONAL			12
Personnel Administrative			
Administrative Assistant		X	1
Human Resources Assistant	X		1
Administrator - Inventory and warranty		X	1

Personnel Mandatory	Engineer	Technician	Q
Logistic Assistant		X	1
QA e ITIL	X		1
Leader HD		X	1
TOTAL ADMINISTRATIVE			6
TOTAL RESOURCES			228

(Source: The RFP-SED. 2018)

Mandatory: The mandatory resources were defined by SED, and the winning provider must comply with this quantity. Failure to comply results in fines. The number of personnel is 210, distributed between professional and technicians.

Additional: These resources are free for client, and were asked like Value-Added, adding suplementary points if they are provided. The company offered 10 additional technicians, 1 Consultant ITIL and 1 Conectivity Coordinator.

Administrative: They are estimated by pre-sales and project manager, in order to support the administrative tasks and cover the Spares activities like logistic and procurement. They are not billed to the customer and represents a contingency reserve. The administrative personnel required by project manager accounts for 6 employees.

The HSEQ resources are described in Chart 24.

Chart 24. *HSEQ Resources*

Quantity	Unit.	Description
200	unity	particules respirator
200	unity	eye protector
50	pair	Dielectrical boots
50	unity	helmets
200	pair	safety gloves
6	3 mts	safety stair
3	6 mts	safety stair
2	12 mts	safety stair
6	rolls 100 mts	warning tapes
1	12 mts	scaffold certified
2	unity	slings certified
50	unity	workwear

(Source: The company archives. 2018)

These resources are included into the legal and labor safety, Items for Personal Protection PPI, which are mandatory in Colombia. Additionally, these items are part of the Quality Management Systems requirements of the company.

4.5.1.1.2. Preventive Maintenance Resources

One of the monitored and specific deliverables of the project is the execution of tasks for preventive maintenance to the IT hardware of SED, composed by desktops, laptops, printers, videobeams, racks, switches, routers, etc. The necessary items for this task are described below in chart 25:

Chart 25. *Preventive Maintenance Resources*

Quantity	Unity	Description
30	Gallon	Isopropyl Alcohol
26	Un.	Blower
26	Un.	Tester
100	Mts	Cotton
100	Tube	Silicone
100	Toothbrush	Toothbrush
26	Kit	Screwdrivers
26	Un.	Antistatic handle

(Source: The Company Archives. 2018)

These supplies and tools are standards for any project which executes cleaning activities and preventive tasks.

4.5.1.1.3. Physical Resources

There are three types of physical resources considered into this project. These subcategories are described in Chart 26 below:

Chart 26. *Contac Center & PBX Resources*

Quantity	Unit.	Description
9	Handset	IP Phones
15	Handset	headphones

Quantity	Unit.	Description
9	Desktops	core i5 RAM 8 GB
36	Spares kit	heardphones pad
9	desk	electricity, internet, chairs
1	Internet link	10 Mbps dedicated
1	PBX	PBX
9	licenses	IP Phones

(Source: The Company Archives. 2018)

The contact center services are provided by 8 agents and 1 Coordinator. They respond to the calls, emails, and web requests. The client asked for the infrastructure and personnel to be in the company locations. The internet link is the way to connect to the Information System Help Desk tool. The company must assign 9 work stations for these agents and coordinator, with the necessary elements for their job.

4.5.1.1.4. Support Equipments

The equipments described below in the Chart 27 were asked by SED into the RFP as necessary to provide support and contingencies.

Chart 27. *Support Equipments*

Quantity	Item	Description
35	Laptops	core i7 RAM 8GB DD 500GB
13	MultiFunctional Printer	Laser heavy duty, Ethernet
3	Scanner	medium
3	Switch	10/100/1000 BaseT
15	Access Point	Aruba

(Source: The RFP-SED. 2018)

Likewise, the client estimated and requested 1 laptop for every 3 technicians and engineers. The project team are 222 people. The estimation is 74 Laptops. Chart 28 shows the Hardware Resources:

Chart 28. *Hardware Resources*

Quantity	Un.	Description
74	Laptops (each 3 technician)	core i5 RAM 8 GB
16	Laptops (Admin staff)	core i5 RAM 8 GB
4	Desktops agents NVC	core i5 RAM 8 GB
20	Printers (zones)	Multifunctional
222	Cellphones	Low and medium
180	Toolkits	Screwdrivers, multimeter, etc
250	Vests	Workwear
250	ID Plastic	

(Source: The Company Archives. 2018)

Chart 29. *Software Resources*

Quantity	Unit.	Description
1	Papercut license	Print Server 1 year
70	PaperCut agents	For printers
10	Licenses email	Google Apps
1	License Project Professional	Stand Alone
1	Hydra App Cloud	PMIS

(Source: The Company Archives. 2018)

Chart 30. *Other Resources*

Quantity	Unit.	Description
2	VAN 4*4	Service with driver
1	Air Conditioning	
50000	Services format	
25000	Stickers	Label for equipments
100	Reams of paper	Reports, documents
40	Tonners	For replace
1	Coffee maker	

(Source: The Company Archives. 2018)

In addition to all these resources described above, the architecture department established a contingency reserve to cover the loss and theft of elements.

Acquiring Resources

The company has a strong procedure to acquire team and physical resources. The HHRR department is the responsible for the recruitment process. The project manager is the only authorized to ask the team resources according to profiles documented in the RFP by EDS.

Exists an Operating Level Agreement – OLA, which under ITIL methodology establishes the response time and delivery services between internal areas. The HHRR dept. has 5 labor days for recruitment and hiring processes. This process is designed and modeled into the HD tool called "Aranda" which is an IT Help Desk information system.

The procurement process for physical resources, included software and services, is responsibility of the Procurement Department. This area has automated the process of purchases and procurement under the Enterprise Resources Planning (SAP).

The quotations, orders, purchases, billing and payments is the procurement department. This includes the logistic, distribution, etc.

Roles and Responsibilities

The roles and responsibilities were defined in the RFP document and are mandatory for any provider, as characterized in Chart 31:

Chart 31. *Roles and Responsibilities*

Role	Responsibility	Skills
Project Manager	Manage the project, contract, budget, resources	Engineer, postgraduate, PMP certified, ITIL OSA, experience Project Manager
Coordinator tecnical adm. and Quality	QA/ QC	Engineer, ITIL, experience ITIL processes

Role	Responsibility	Skills
Coordinator - General Help Desk	Operational Manager, SLA, HHRR, Reports	Enginner, ITIL Intermediate, experience Operations Manager
Coordinator - Nivel central	Site Operations Manager, SLA; HHRR, Reports,	Enginner, ITIL Intermediate, experience Operations Manager
Coordinator - Local	Site Operations Manager, SLA; HHRR, Reports,	Engineer, ITIL Foundations, Experience IT operations
Engineer - Conectivity level 3	Networking, Telecoms, Cabling	Engineer, CCNA certified, Experience 2 years
Engineer - Electrical Level 3	Cabling, Electrical installations,	Engineer, Experience 2 years
Technologist- Structured Cabling	Cabling, Electrical installations,	Technologist, experience 2 years
Technician - Electrical Level 3	Cabling, Electrical installations,	Technologist, experience 2 years
Technician - Printer Specialist	Printer, troubleshooting, Hardware	Technician, experience 2 years
Technician Support Level 1	Contact Center, remote support,	Technician, experience 2 years
Technician Support Level 2	Desktop, Office, on-site support	Technician, experience 2 years
Technician Ofimatic	Desktop, Office, on-site support	Technician, experience 2 years
Technician Preventive Maintenance	Preventive Maintenance HW-SW	Technician, experience 2 years
Additional Personnel		
Technician Support Level 2	Desktop, Office, on-site support	Technician, experience 2 years
Consultant ITIL	IT Processes consultan, document	Engineer, ITIL Intermediate, experience
Coordinator conectivity Services	Networking, Telecoms, Cabling	Engineer, CCNA certified, Experience 2 years
Personnel Administrative		
Administrative Assistant	Documentation, Office support	Experience 2 years
Human Resources Assistant	HHRR control and management	Psycologist, Admin
Administrator - Inventory and warranty	Warehouse, inventory	Experience 2 years
Logistic Assistant	Warehouse, inventory	Experience 2 years

Role	Responsibility	Skills
QA e ITIL	QA/QC	Technician, experience 2 years
Leader HD	Report, Controllling	Technician, experience 2 years

(Adapted from RFP-SED. 2018)

The project organization chart is depicted in the Figure 25:
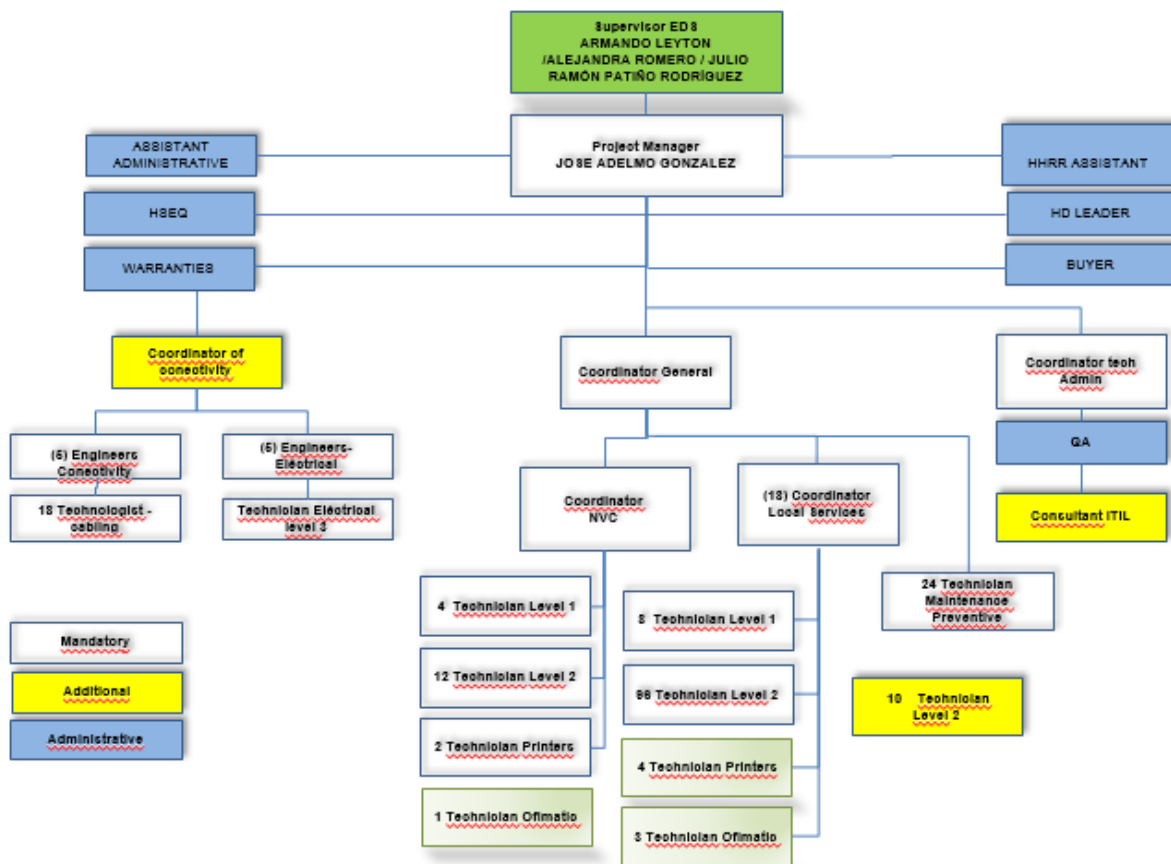
Figure 25. Organizational Chart

(Source: Archives of company, 2018)

The authority level is observed in the Figure 25. The technicians and engineers are managed by Coordinators. The distribution of the personnel is established accordingly to the size of location and number of users.

4.5.2. Estimate Activity Resources

The Colombia´s Capital is Bogotá D.C. It is the largest and most populated city in Colombia. According to "National Planning Department (DNP)" in the 2005 the census 7.878.783 habitants were registered (DNP, 2005). The SED controls and manages the public schools to cover this public service. The city has been divided into 1.200 neighborhoods which are grouped into 20 localities. In Figure 26 the 20 localities are described.
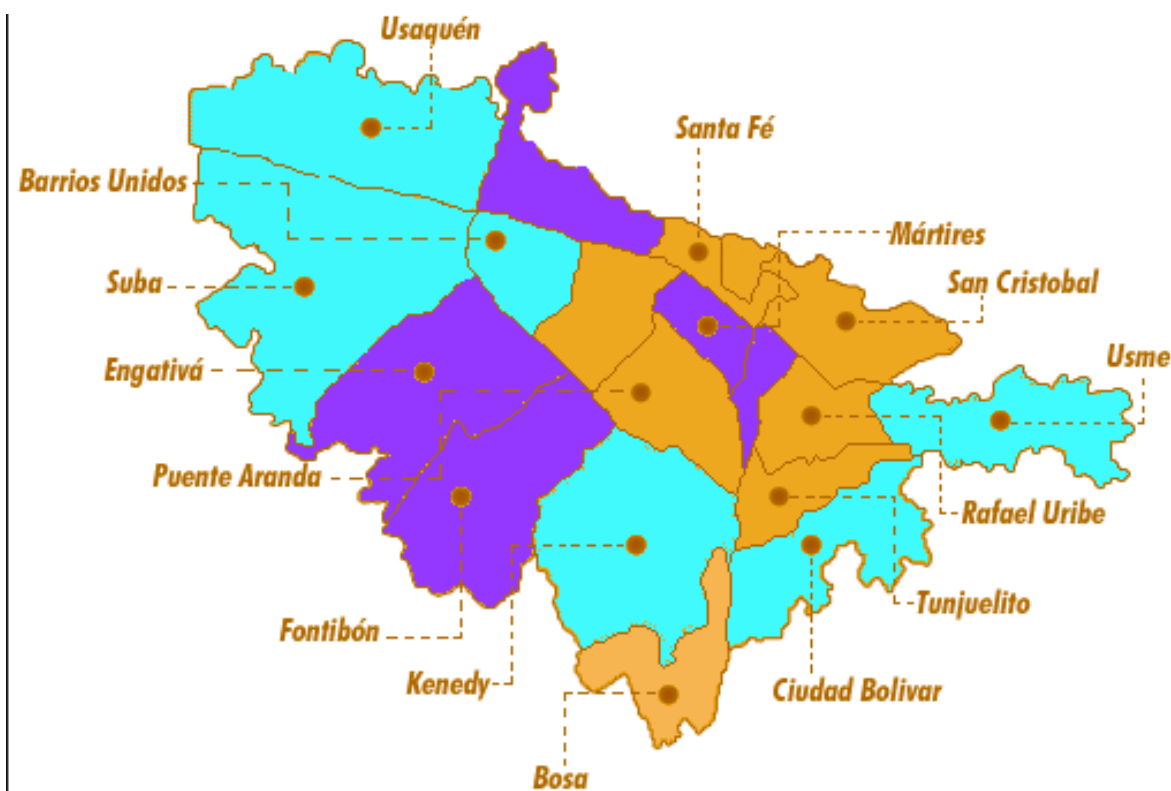
Figure 26. Localities of Bogotá

(Source: bogota.gov.co, 2018)

Below it can be seen the school's distribution per locality in Chart 32.

Chart 32. *Schools Distribution*

Location	Quantity schools	Coordinator	Technicians level2
Nivel central	NA	1	10
Ciudad bolivar	76	1	10

Location	Quantity schools	Coordinator	Technicians level2
Kennedy	75	1	10
Usme	71	1	10
Engativa	67	1	10
San cristobal	65	1	9
Suba	64	1	9
Bosa	53	1	8
Rafael uribe	53	1	8
Puente aranda	32	1	6
Sumapaz	27	0	1
Usaquen	26	1	4
Tunjuelito	25	1	4
Barrios unidos	23	1	4
Fontibon	20	1	5
Santafe	16	1	1
Los martires	12	0	3
Antonio nariño	10	1	2
Chapinero	7	1	2
Teusaquillo	3	1	1
La candelaria	3	0	1

(Adapted from The Company Archives. 2018)

The Nivel Central -NVC- location is the headquarter of the Secretary confined into a building and there are not schools associated to it. There are 2.400 employees in that building which need support and services.

The total number of schools reaches 728 main locations. There are schools composed by more than one location rising the number of sites to 760. The locations with more schools will have more level 2 technicians assigned. The smallest locations share coordinator.

The administrative staff stays in other location and it is not responsible for on-site support. The other staff like electrical engineers, connectivity, cabling technologists are floating personnel that will attend any incident in the 20 locations.

The staff for preventive maintenance consists of 24 technicians and 1 leader. The activities developed by this group are:

- Software updates, logs cleaning, temporary files erased.
- Inventory and register inconsistencies
- Hardware cleaning
- External cleaning
- Reports

The deliverable are 24.000 items distributed in 7 months covering the 20 localities. For this deliverable the schedule proposed is showed in chart 33.

Chart 33. *Schedule Preventive Maintenance*

Month	Planned	Technicians	Workload monthly Per technician	Workload daily per technician
July	3500	24	146	6
August	4000	24	167	7
September	4000	24	167	7
October	4000	24	167	7
November	3000	24	125	5
December	1500	24	63	2,6
January	3000	24	125	5
Total	23000	24		

(Source: González, J. The Author. 2018)

Note: The schedule was defined by project manager at the beginning of the project, having into account the vacation period when the schools stay closed. During this period the equipments maintained by technicians decrease at least to 50%.

The number of equipments according to RFP is 23.000 equipments. However, the client has vacations months which must be considered. The business day starts at 7:00 a.m. and finishes at 5:00 pm. On weekends the schools are closed and because of this, the businesses days can be estimated in 24 per month.

Work load monthly / technician = # equipments / 24 tech.

The maximal amount per technician daily is 7 equipments. This is a reasonable and small quantity, which reduces the risk of breaching this deliverable.

Resource Breakdown Structure - RBS

The RBS is depicted in Figure 27.
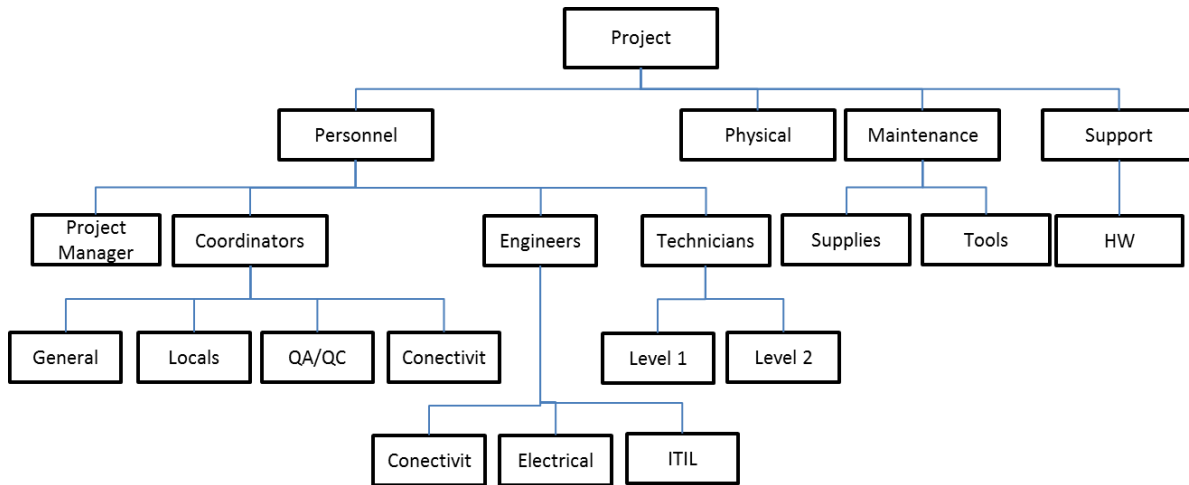
Figure 27. Resource Breakdown Structure RBS

(Source: The Author, González, J. 2018)

The profiles and roles described by the client into RFP are considered. Likewise, the physical resources and other categories.

Acquire Resources

The PMI (2017, PMBOK 6th. Ed.) states that "Acquire resources is the process of obtaining team members, facilities, equipment, materials, supplies and other resources necessary to complete project work". This process is described into the Plan resource management. The calendar for resources is shown in chart 34:

Chart 34. Calendars Resources

Roles	Monday-Friday	Saturdays	Weekends
Project Manager	8:00 - 5:00 pm		

Roles	Monday-Friday	Saturdays	Weekends
Coordinator General	8:00 - 5:00 pm		
Local Coordinators	7:00 - 5:00 pm		On demand
Engineers	7:00 - 5:00 pm	7:00 - 1:00 pm	On demand
Technologists cabling	7:00 - 5:00 pm	7:00 - 1:00 pm	On demand
Technician electrical	7:00 - 5:00 pm	7:00 - 1:00 pm	On demand
Technician Level 2	7:00 - 6:00 pm	7:00 - 1:00 pm	On demand
Technician Level 1	7:00 - 6:00 pm	7:00 - 1:00 pm	
Maintenance Preventive	7:00 - 5:00 pm		
Administratives	8:00 - 5:00 pm		

(Adapted from The Company Archives. 2018)

There are two calendars aligned to client´s activities. The business days the operations go from at 7:00 a.m. to 6:00 pm. However, the 760 schools can be closed from 4:00 pm. On Saturdays all schools close but the operations in headquarter can be extended from 7:00 a.m. to 1:00 pm.

4.5.2.1. Technicians Level 1

The Contact Center service offers the telephonic assistance, remote support and registering and documentation process. In Figure 28 it is depicted the level 1 functions.
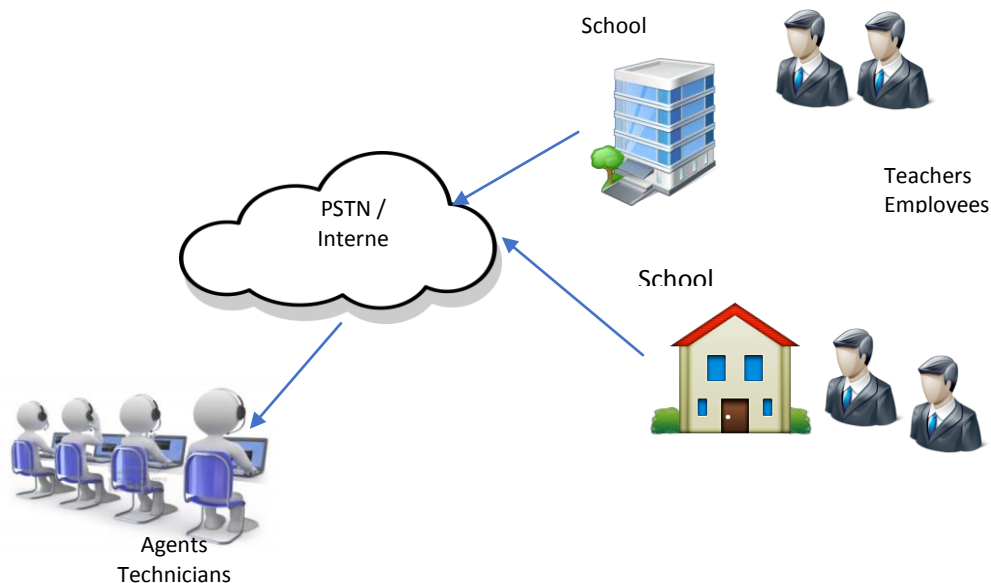
Figure 28. Functions of Technicians Level 1

(Source: The Author, González, J. 2018)

The customers population is estimated in 32.000 teachers distributed into 760 schools in different locations. The employees and functionaries are estimated in 2.800 persons. This is a great population and this project must cover the IT services by channels such as telephone, email, chat and web. The level 1 is the front office of the IT department of the SED.

The number of agents is 12 with a Coordinator. They are prepared to take remote control of the PCs and laptops to solve the issues and problems. If they are not capable of resolving the request it must be escalated to level 2 to offer the on-site support with the required tools and knowledge.

4.5.2.2. Physical locations:

The SED is responsible for assigning the physical locations internally, for the required staff to cover the IT services. The personnel assigned to the 20 localities (zones of service) has the place, electricity, chairs, desks, Internet service, toilettes, water, coffee, etc.

For the level 1, the SED provides the physical location and the PBX with the telephone lines to attend the requests. For the administrative staff the SED provides the physical locations with all services.

The company must provide the tools, equipments, IPP, spares, workwear, ID´s, etc. These elements were analyzed in the cost planning process.

4.5.2.3. Organizational assets and processes:

The procurement and recruitment processes are controlled and monitored through information systems and well-defined internal processes. The purchases need the

authorization and approval of the Vice-president of operations and are totally automated, supported with the ERP information system.

The human resources department has its own information system for controlling and managing the selection and recruitment needs.

The PMO, has the Hydra Application based on cloud services to monitor and control the project. In Figure 29 the relationships between areas and processes can be seen.
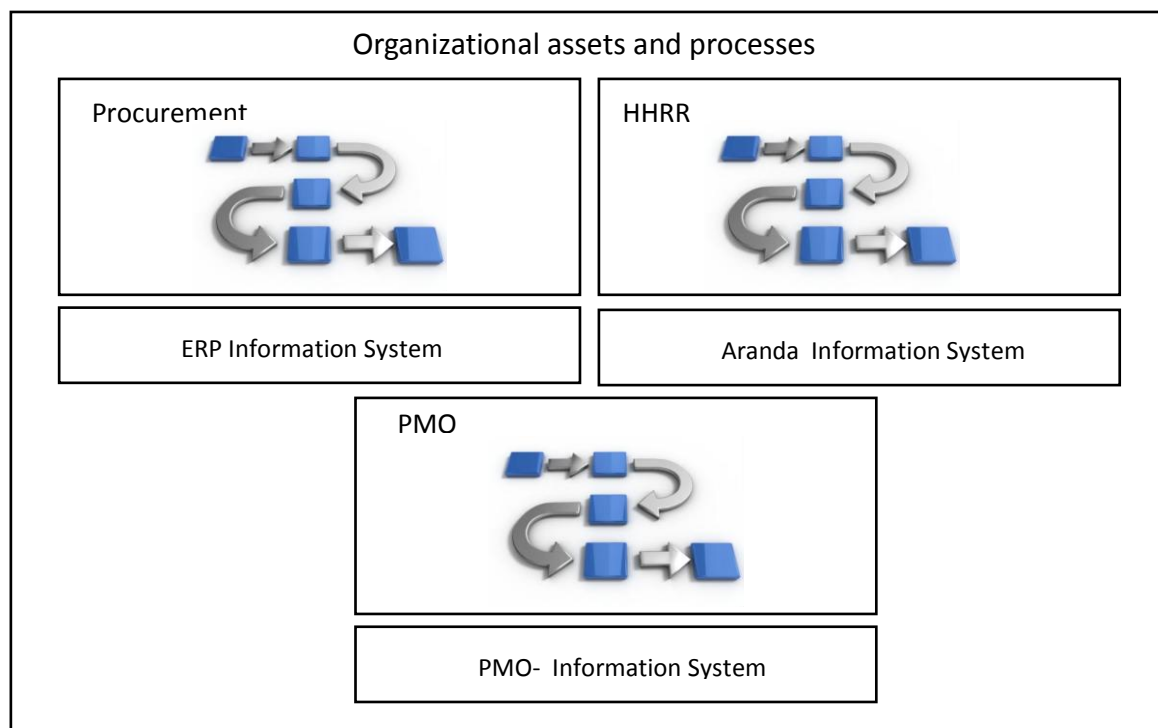
Figure 29. Relationships – Areas and processes

(Source: The Author, González, J. 2018)

4.5.3. Develop Team

The Quality Management System- QMS based on ISO9001, established the policies for training and developing team in the company. In general, it can be described as follows:

a. Induction course. The project needs to prepare an initial course for preparing the personnel to initiate activities into the project. The minimum elements required are:

- The objectives of the project.
- The processes of the client.
- The stakeholders
- The description of each deliverable
- The schedule
- The guidelines about calendars
- The functions for each role
- The SLA and the fines
- The client´s policies
- The Quality and HSEQ management systems
- Rewards and penalties

b. Re-induction course: The QMS demands the periodical re-induction course for aligning the objectives for each role and the objectives of the company and the project.

c. HSEQ: The HSEQ management system, requires its own training process due to specific risks:

- The personnel with participation in electrical activities is exposed to electrical risk which can cause death.
- Work in heights course. The technicians and engineers require and legal and specific certificate with a third party.
- Emergency Plan: Training for brigade members.

d. ITIL concepts: The project is based on the methodology ITIL and it is mandatory that everyone knows the concepts of it.

4.5.4. Manage and Control Team

In Chart 35 it is described the metrics and indicators used to control the team:

Chart 35. *Metrics and Indicators*

Client Metrics		Company metrics
Incidents resolved on time		Arrive on time
Request resolved on time		Documentation
Answered calls < 30 seconds		Compliance client´s policies
Spares installed on time		Customer satisfaction
Issues resolved in Level 1		NPS
Documentation		Internal regulations

(Source: Adapted from RFP-SED. 2018)

4.5.4.1. Client´s Metrics

The client´s metrics correspond to deliverables and contractual obligations. These are measured automatically in the Information System Help Desk. The Coordinators are responsible for monitoring and controlling in a basis daily. If the final SLA is not accomplished at the weekend, the QA area must analyze completely and decide to correct the deviation and so avoid the penalties at the end of month.

The procedure of QA area is the following:
- Review the documentation in the system and detect errors, issues, problems.
- Interview the technician, local coordinator and others to find the root cause.
- If necessary, interview the client to ask for information and apologize in cases of dissatisfaction.
- Appropriate additional resources to correct, prevent and resolve the request.
- Adjust procedures, policies and manuals.
- Adjust the induction course.
- Escalate to project manager o human resources department to make decisions like disciplinary process or dismissal with fair cause.

- Close and document

The first line of defense to avoid deviations and breaches of SLA are the coordinators and their daily activities. They have the complete information and feedback from the field workers and directly from clients. The way to communicate the daily accomplishment to project manager and QA area is an on-line repository. However, they can send emails, call or chat through skype.

The corporate policy is strict. If an incident or request was unattended and this causes a fine, the technician or the local coordinator can be dismissed.

The project manager is responsible for all the SLA´s. This forces him to maintain a permanent control.

4.5.4.2.   Internal Metrics

The company has internal metrics aligned to its quality policies and internal regulations. Because the project is oriented to services, the customer satisfaction is the most important. The project manager has established a Complaints and Claims Procedure under control of QA area. This procedure is activated when a client is dissatisfied or has a complaint. The company has no tolerance with failures associated to bad attitude. This can also generate layoffs.

The NPS is a periodical survey to measure the satisfaction but oriented to principal stakeholders. This is a metric designed for the project manager.

The legal framework is included into the internal regulations. This cover the disciplinary processes, the committee of coexistence and general mandatory guidelines. A serious fault can lead to the dismissal of the company. A serious fault can be:
- More than three late arrivals. It can be more than 15 minutes.

- Do not use the Items of Personal Protection

- Consumption of liquor or psychoactive substances.

- Do not wear the workwear and ID in the client´s locations.

- Games of chance

- Break the functions manual

- Disobey direct orders

- Mistreatment of colleagues and bosses.

- Any attitude that goes against the law.

The responsible for immediate actions is the person who has direct control over resources. In the project, the coordinators have this role. The project manager is the last level in the power chain, but the disciplinary process is controlled by Human Resources department. For control and monitoring the project manager performance is the PMO Manager the responsible.

4.6.   Project Communications Management

In Figure 30 are depicted the processes for the project communications chapter:
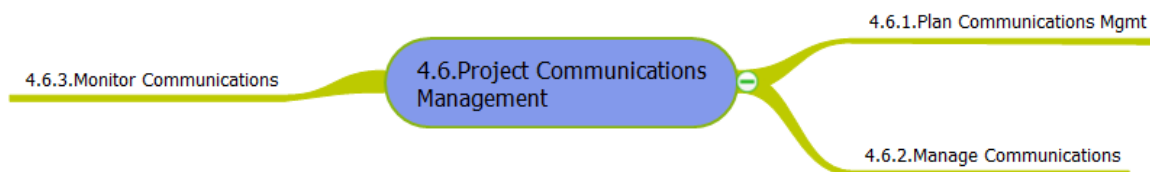
Figure 30. Mind Map Project Communications Management

(Source: The Author, González, J. 2018)

4.2.1. Plan Communications Management

The PMI (2017, PMBOK, 6th. Ed.)) defines it as "the process of developing an appropriate approach and plan for project communications activities based on the

information needs of each stakeholder or group, available organizational assets, and the needs of the project".

In Figure 31 the groups or communication categories analyzed for the project needs, are depicted.
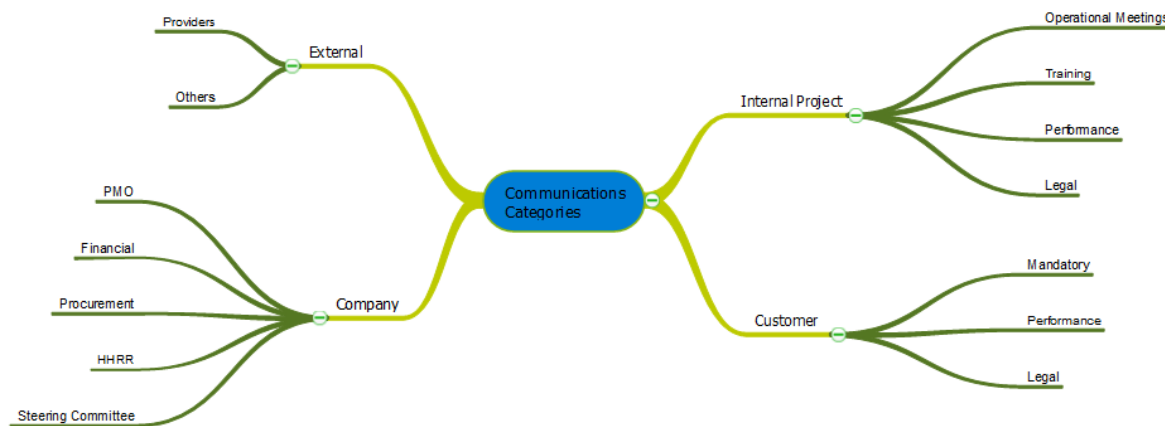
Figure 31. Mind Map Communications Categories

(Source: The Author, González, J. 2018)

4.2.1.1. Internal Communications of the Project

The internal communications of the project are established having into account the groups, team members and communication needs for measure performance and quality. In Figure 32 the Communications Strategy for the project internally is depicted.
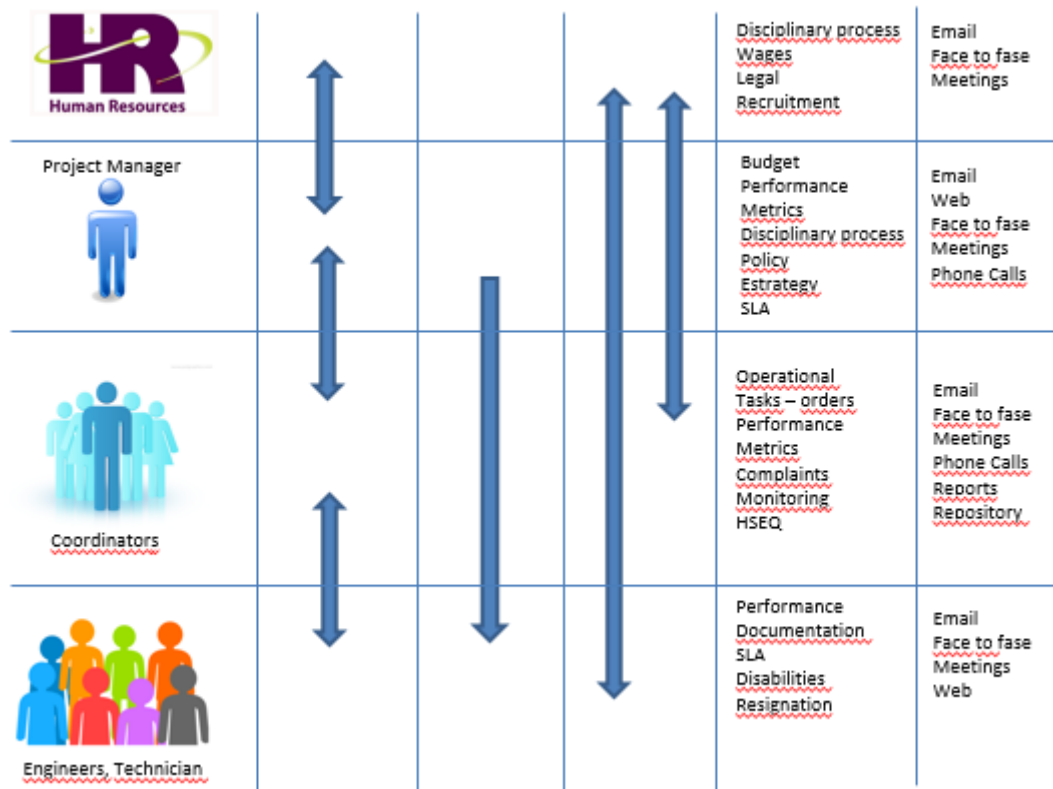
Figure 32. Internal Communications Strategy

(Source: The Author, González, J. 2018)

The Project Manager is the highest authority in the project. The project team is dispersed geographically in 20 locations around the city, but the operations daily covers 760 schools in whole the city. Each location is commanded by one Coordinator, who manage the staff assigned. The Coordinator is responsible for local metrics and performance team.

Communications Exchange Policies:

- **The team members** (Engineers, Technicians) must communicate issues, problems, complaints, disabilities, permissions, vacations, resignations and performance to their immediate boss (Local Coordinator). The escalation to project manager must be avoided and only it is permitted in exceptional cases. Due to legal issues, anybody can communicate directly to Human Resources department for certifications, errors in wages, affiliations and

responses to disciplinary processes. The formal requests must use written communications like emails, memos, letters, etc. The WhatsApp is not approved to register communications. The phone calls are approved to communicate with their boss. The meetings must be register on minutes and signing by assistants. The Web communications are the documentation process for register, resolve, document and close the requests of customers.

- **Coordinators**: The local coordinators control the communications of their localities and employees. They report the performance of local teams, issues, disabilities, vacations, HSEQ events and SLA directly to General Coordinator or project manager. The Coordinator has direct communication with HHRR department to resolve conflicts that involve disciplinary process. The formal communications must be written emails, memos, letters, reports, formats, etc. They are responsible of escalation of problems to the next level authority.

- **Project Manager**: He is the highest authority within the project. He is enabled to communicate to any team member anything related to performance, SLA, quality and administrative issues. The strategy is communicated to Coordinators in the weekly meetings. The Project Manager maintain a fluid communication with the Human Resources department for recruitment, vacations, disabilities, disciplinary process, wages, dismissals, labor accidents and others.

- **Human Resources**: This area can communicate directly o through the Project Manager, the corporate strategies, changes, salary increases, training, dismissals, disciplinary processes and procedures to team members.

4.2.1.2. Customer Communications

Figure 33 shows the authorized communications flows.
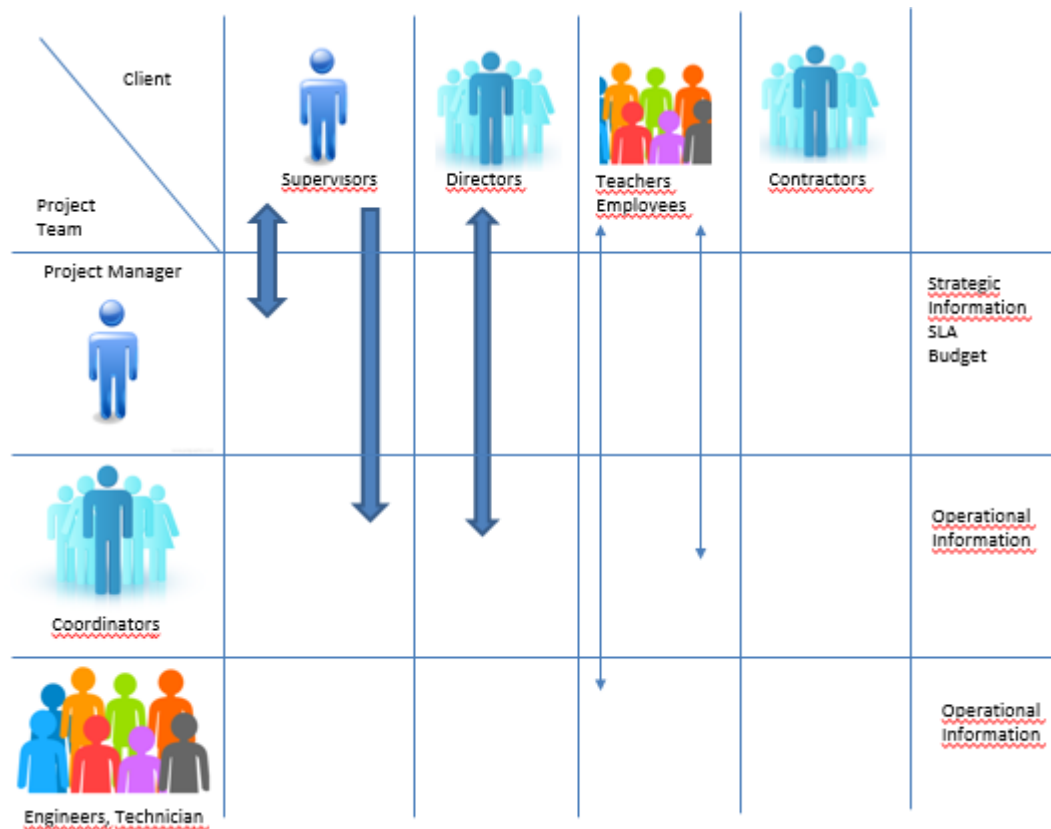
Figure 33. Authorized Communications Flows

(Source: The Author, González, J. 2018)

The population of the client is composed by 32.000 teachers, 2800 functionaries and other contractors. The IT department controls this project. Each locality has a Local Director for manage the educational system, but it´s not authorized to manage the service or staff of this project.

Communications Exchange Policies:

- **The team members** (Engineers, Technicians). The team members **cannot** communicate, send information or provide details about the project. The unique information authorized to communique is about the solution of incidents and requests to the customers (person who requested the service). This information is operational and specific.

- **Coordinators**: The local coordinators work directly in unique locality. Their stakeholder is the local Director, but there is not authority link. The information authorized to exchange with the Local Director and teachers or employees is operative, related to incidents and requests. Requests about other types of information need to be asked to project manager. The supervisors, auditors or inspectors can request operative information directly to Coordinator.

- **Project Manager**: Is the only person authorized to exchange information with Supervisors. However, the project manager doesn´t need communicate to customer, directors, employees or contractor. In complaints the Coordinator transmit the response to teachers, employees, etc. The project manager controls and manage strategic information, SLA, budget, performance, metrics, etc.

The client´s contractors need to ask the information through the supervisor or employees.

Mandatory

The client demands the following information, which will be formal documentation for closure and payments:

The mandatory reports are described in Chart 36:

Chart 36. *Mandatory Reports*

Report Description	Frequency
Historic requests registered/month, solutions	Monthly
Logs, open requests previous months (Backlog)	Monthly
Graphical trends, historical data about Incidents and Requests	Monthly
Percentage of solution (Metric SLA)	Monthly
Percentage of solution Level 2	Monthly
Percentage de solución de casos en tercer nivel	Monthly

Report Description	Frequency
Report fulfillment SLA	Monthly
Report conciliation	Monthly
Report non-fulfillment	Monthly
Report fine and penalites	Monthly
Metrics monthly	Monthly
Trends 3 pervious months	Monthly
Final report satisfaction survey #1.	3th month
Action Plan	6th month
Satisfaction survey headquarter (NVC)	3th Month
Action Plan	6th Month
Improvements – Information System	Monthly
Report Strengthening processes	Monthly
Improvements of the service	Monthly
Complaints – on demand	Monthly
Requests / day / week / Month / semester	weekly
Warranties	weekly
Report Preventive Maintenance	weekly
Monitoring report Preventive Maintenance	Monthly
File Inventory	Monthly
Report of inconsistencies	Monthly
Report Accompaniments	weekly
Report Budget Spares	weekly
Report Budget	Monthly
Delivery original service formats	Monthly
Final report Preventive Maintenance	At the end
Closure Report	At the end
Lessons Learned	At the end

(Source: Retrieved from RFP-SED. 2018)

The weekly reports must be presented to the monitoring committees programmed into the schedule of the project. To formalize these reports, the project manager shall to do minutes weekly. These documents are legal registries for the payments and closure of the project. The only person authorized to deliver these reports and minutes is the project manager.

The performance information is included in the reports above. The legal information is the base for invoices, payments, complaints, sues, etc.

4.2.1.3. Company Communications

The project manager is responsible for distribute the information to the areas of company. In the Chart 37 is showed the minimal information required.

Chart 37. *Company Communications*

Dept.	Descriptión	Frequency	Channel
PMO	Performance report (time, costs, budget, payments)	Monthly	Presentation Hydra APP
	Net Promoter Score	On demand	Survey
	Lessons Learned	On demand	Hydra App
	Risks performance	Monthly	Meetings, email
	Changes	On demand	Meetings, email
Procurement	Quotation Requests	Daily	ERP- email
	Purchase orders	Daily	ERP
	Complaints, Warranties	On demand	Meetings, email
	Supplier Evaluation	Annually	ERP
Financial	Invoice Authorization	Daily	ERP
	Monthly invoice	Monthly	Email
HHRR	Recruitment request	On demand	Aranda
	Disciplinary process	On demand	Email
	Disabilities, accidents, problems	On demand	written
	Vacations	On demand	written
Steering Committee	Profit and Loss report	Annually	ERP

(Source: González, J. The Author. 2018)

4.2.1.4. External Communications

The external communications are related to providers which execute tasks or provide items for the deliverables of the project. In some cases, the project must communicate with the families of the project team, in case of accidents or prolonged absences. The information exchanged with providers is:

- Quotation requests
- Receipt certificates
- Performance reports
- Warranties
- Invoices

4.2.2. Manage Communications

4.2.2.1. Technology Communications

In figure 34 is depicted the flow and technology approved for internal communications.
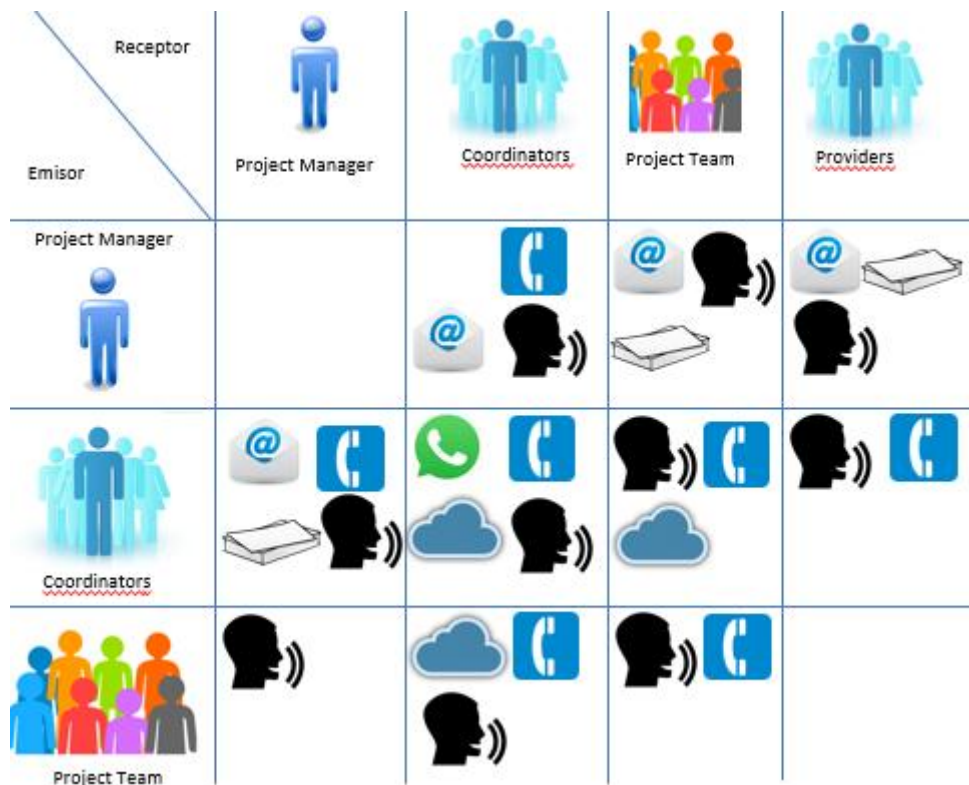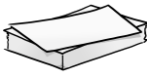
Figure 34. Technology and communication means.

(Source: The Author, González, J. 2018)

This project is under a public context, although the written communications are privileged to other means. The followings media and technology were accepted into the Communications Plan, as is depicted in Chart 38:

Chart 38. Media and Technology

	Oral communications through operative meetings, and committees. It´s the most important mean of communications for the project team.
	Phone calls. It´s the second means of communications for the project team. In the resources and purchases there is a budget to provide cell phone with paid plan for the 100% of the project team.
	E-mail: This communication means is important to maintain logs for legal issues. Due to high geographical dispersion, the project manager uses it for massive communication.
	Written communications: In some cases, the project manager use letters and memos for make decisions and to have legal support.
	Cloud Services: Due to huge information produced in the project, which is used to conciliate the invoice monthly, exists a repository in the cloud to register and update that information daily.
	WhatsApp: This social network is used to broadcast information to the 22 coordinators, update them about policies, crisis, issues, and change in the operation. Is considered informal.

(Source: González, J. The Author. 2018)

4.2.2.2. Security and Policy Communications

The project team (230 people) works directly in the client´s facilities (760 locations and 2 headquarters). They attend indirectly customers considered vulnerable (children between 5 years old to 17 years old), and teachers, rectors, functionaries and employees. In addition, they have unlimited access to everywhere considering that they resolve the IT problems, and they are authorized to manipulate the assets of the Education Secretary of the city.

As if that were not enough, they have access to all the information of the secretariat located on local servers, PCs, laptops, etc. This unlimited access let

them use the internet network and resources of the SED. Therefore, the project team, the project manager and the company are restricted and conditioned to several laws concerning to Information Security.

In Chart 39 the basic laws are compiled:

Chart 39. *Basic Laws for Information Security in Colombia*

Law	Topic	Description
527 /1999	Electronic commerce	Legal effects, validity or obligatory force for information that is in the form of data (emails and other)
1266 /2008	Habeas data	Personal Data Protection
1273 /2012	Computer Crimes	Non-authorized access, theft information, protect public information, trying to access, etc
679 /2001	Pornography	Protect Childs against pornography

(Source: González, J. The Author. 2018)

The project team shall obey completely these laws in order to create, divulgate, transmit, storage, erase, read and modify information concerning to the project and the client. Additionally, the team members shall keep rationale use of internet and assets.

4.2.2.3. Classification of Information

The company and the project manager have established four categories for classification of the information as showed in Chart 40.

Chart 40. *Classification of Information*

Category	Types	Access
Public	RFP Instructive docs Documentation requests	Everyone
Internal use	Manuals Reports Technical docs E-learning Induction courses Complaints	Project team

Category	Types	Access
	Meetings operative minutes CV	
Restricted	Minutes Contracts Evaluation staff Disciplinary process Fulfillment SLA Wages Reports Invoices	Coordinators Project Manager
Confidential	Corporate Strategy Profit and Loss reports NPS	Project Manager

(Source: González, J. The Author. 2018)

The information public is the only one which can be shared with customers.

4.2.3. Monitor Communications

Monitor Communications uses the surveys as the principal tool for verify that stakeholders' needs are met. The most important feedback for the company is the Net Promoter Score metric. This is a survey oriented to main stakeholders, which measure the satisfaction and interest to recommend the company internal and externally. Chart 41 contains the tools used to evaluate the satisfaction and perception of the service that end customers and key project stakeholders have.

Chart 41. *Tools and Techniques for Monitor Communications*

Tools&Techniques	Description	Target	Frequency
NPS	Net Promoter Score	Key Stakeholders	Semiannually
Survey #1	Satisfaction survey	Teachers, employees, users	Quaterly
Survey #2	Satisfaction survey	Teachers, employees, users	Quaterly
Evaluation format	Evaluate each one service	100% services	Daily
Complaints & Claims procedure	Personal attention to each complaint	100% Complaints	On-demad

(Source: Adapted from RFP-SED and Company Archives. 2018)

The surveys will be applied during the execution phase. In the NPS the questions were designed by Quality Department. The satisfaction surveys shall be agreed with the client. In the Figure 35 is depicted the proposal for the surveys 1 and 2.

PROPOSAL SURVEY MODEL 1

This survey has the purpose of knowing your opinion about the technical service provided by the service desk, for which we thank you for your collaboration in answering this brief survey.

Location (IED – DLE):_____ Date: _____

Name Functionarie: _____ Position: _____ Phone: _____

Please rate each item by marking 1 to 5 being (1) very bad and (5) very good.

Questions	Score	Observation
Attention given when requesting the service.		
Response time from the request to the solution.		
Service provided by the technician at the time of the visit.		
Solution provided by the Service Desk.		
Overall rating for the service provided.		

Figure 35. Satisfaction survey #1, proposal

(Source: The Author, González, J. 2018)

The results shall be presented in monthly committee and needed to be accompanied by corrective and preventive actions.

The service format is the document used to finalize and deliver to satisfaction all the services provided by the members of the project team. The historical data showed the ratio of services monthly may be 5.000, excluding the massive

interventions. The number of services is equal to the number of service formats and evaluations. In the figure 36 is depicted the format service.

Figure 36. Service Format

(Source: Archives of company, 2018)

Note: The red highlight shows the space where the users evaluate the services from 1 (bad satisfaction) until 5 (good satisfaction)

The satisfaction´s user is quantified and there is enough detail to review the possible failures and non-compliances. If a service is evaluated below 3, the QA area must review and, if necessary, visit the user to clarify the case.

These reports are delivered to the QA and project manager the Friday of each week.

4.7. Project Risks Management

"*Risk management is a process that, regardless of the project duration and the complexity of the project, will not just be executed once but again and again*" (Warner, Roland, p.22). In the Figure 37 are depicted the processes related to risks management.

Figure 37. Mind Map Project Risks Management

(Source: González, J. The Author, 2018)

Eeach one of those processes will be analyzed later.

4.7.1. Plan Risk Management

The general approach to manage risks is based on the lessons learned and comparison between the similar projects developed by the company.

Roles and responsibilities:

Pre-sales and architecture department: The responsible for defining the preliminary risks and contingencies of the project, with the advice of the assigned project manager.

The project manager is the responsible for managing the risks during the project. He is the responsible to report, manage, escalate, update and communicate to all stakeholders.

HSEQ department. The HSEQ is responsible for defining HSEQ risks and requests budget and resources. These risks are related to electrical, chemical, biological, waste disposal and work in heights.

The PMO, is the area that consolidate the portfolio of the company and the next level to authorize budget, changes in scope, time, quality. The PMO is the one in charge to communicate to steering committee the new impacts and risks that may affect the objectives of the project. The PMO manages the PMIS (Hydra), and lessons learned.

The project team is responsible to execute the activities and monitor the risks together with project manager.

Client´s Supervisor: The only one representative of the client who can asks for a change or report formally the impact derived from risks.

Customers: They can be affected by risks, but they cannot ask for changes concerning to project´s objectives.

Funding

The proposal delivered by Pre-sales are shall include one and all costs of the project from the beginning to the end. The budget approved shall include the contingency reserves and management to mitigate or eliminate risks. The accuracy of the budget is supported by the experience accumulated during 30 years of outsourcing IT projects.

The risks for IT industry, specifically BPO projects, are standardized and the deviations are minimal. However, the budget will have the necessary contingencies.

4.2.3.1. Risks Categories

The company though the PMO, HSEQ; Financial and architecture had defined the risks categories as depicted in the Chart 42:

Chart 42. *Risks Categories*

Categories	Description
HSEQ	Risks for non-compliance with Labor Laws and HSEQ standards
Technical	Risks associated with the architecture, assumptions, contraints
Commercial & Financial	Risks related to contractual terms, cash-flow, procurement, etc
External	Risks related to competence, environmental, wheater, etc
Management & Operational	Communications, management, interactions with client

(Source: González, J. The Author. 2018)

The company has the following policies about risks management:

- The architectural and presales department shall define and structure a preliminary list of risks and include the contingency reserves into the final budget.
- The project manager must participate in that definition.
- The project Manager uploads the risks information into PMIS (Hydra).
- The company provides a qualification and quantification matrix.
- The scales and values of risks are pre-defined into the matrix.
- The responsible of risks treatment is the project manager.
- The project manager shall notify to the PMO the materialization of the risks.
- The report of risks status shall be monthly basis.

- The contingency reserves shall be part of the initial budget.
- Additional budget for treat risks must be approved by Vice-President of Operations.
- The risks mapped shall be presented to the client in the Kick-Off meeting.
- In the execution of the project the risks need to be updated by project manager.
- The opportunities shall be handled by commercial department.

4.2.3.2.   Probability and Impact definitions

The definitions of probability and impact are showed In the Chart 43:

Chart 43. *Probability and Impact Definitions*

Scale	Probability	Impact on project objectives		
		Cost (COP MM)	Time	Quality
Very High (5)	> 70%	> 51 MM	> 21 days	Overall project deliverables will be affected; project fails to meet purpose
High (4)	51 - 70%	31 MM - 50MM	11 - 20 days	Quality reduction is unacceptable to sponsor
Medium (3)	31 - 50%	16MM - 30MM	6 - 10 days	Quality reduction of deliverables
Low (2)	11 - 30%	2MM - 15MM	3 - 6 days	Only VIP services are affected
Very Low (1)	1 - 10%	No significant cost increases/ < $2MM	No significant time increase/ < 3 days	Quality degradation is barely noticeable
Nil	< 1%	No Change	No Change	No Change

(Source: Adapted from PMBOK, 2017. p. 207)

The tolerance to deviations in cost and time is very low, because the client is a public entity, and the budget and time are fixed from the RFP.

4.2.3.3. Probability and Impact Matrix - PxI

The PxI matrix represents the seriousness of the risks, after multiplying the probability by the Impact for each risk. The positive risks represent opportunities for the company. The matrix defined for this project establishes the maximum score of 25 for risks with maximum probability of occurrence and maximum impact, as described in Chart 44:

Chart 44. *PxI Matrix*

			NEGATIVE IMPACT					POSSITIVE IMPACT				
			Very Low 1	Low 2	Moderate 3	High 4	Very High 5	Very High 5	High 4	Moderate 3	Low 2	Very Low 1
PROBA BILITY	Very High	5	5	10	15	20	25	25	20	15	10	5
	High	4	4	8	12	16	20	20	16	12	8	4
	Moderate	3	3	6	9	12	15	15	12	9	6	3
	Low	2	2	4	6	8	12	12	8	6	4	2
	Very Low	1	1	2	3	4	5	5	4	3	2	1

(Source: González, J. The Author. 2018)

This matrix let the project team and company assign a priority to take actions, as described in Chart 45.

Chart 45. *Priority for Risks*

Probability Impact Matrix Legend			Strategy
Red	High Priority	18-25	Act immediately. Escalate to PMO
Yellow	Medium priority	10-17	Appropriate resources- define action plan
Green	Low priority	1-9	Monitor

(Source: Adapted from Company Archives. 2018)

The risk with high priority must be communicated to the PMO and evaluate the communication to the client and supervisors. The opportunities must be communicated to the PMO and commercial department through monthly report.

4.7.2. Identify Risk

4.2.3.4. Risk Breakdown Structure - RiBS

The RiBS groups the risks into the categories defined by company, as depicted in Chart 46.

Chart 46. *Risk Breakdown Structure*

Risk Breakdown Structure		
RBS Level 0	RBS Level 1	RBS Level 2
0.All Sources	1.Technical Risk & HSEQ	1.1 Uncertainty in LAB requirement
		1.2 Complexity in the Spares procedure
		1.3. Electrical risk, work in heights
	2.Management & Operational	2.1 Unavailability of process consultants
		2.2 Staff Turnover
		2.3. Poor involvement of the customer
	3.Commercial & Financial	3.1 Fine for breach of SLA
		3.2. Delayed billing of Spares
		3.3. Upselling and Cross-selling
		3.4. Delays in purchases
	4.External Risk	4.1 Social and environmental

(Source: González, J. The Author. 2018)

The identify risk process shows 10 risks in the preliminary analysis. The HSEQ and Technical risks can be consolidated into one category. The lessons learned, and the expert judgment were the tools used for identifying these risks. One of them, the upselling and cross-selling risk has a positive impact, therefore is an opportunity. The meetings are the technique used for this.

4.2.3.5. Risk Register

The risk register is chart with more detail of the risks identified. It contains information such as risk owner, risks responses, triggers, ID, description and identification of the causes. In Chart 47 is detailed the risk register.

Chart 47. *Risk Register*

RSB Code	Cause	Risk	Consequence	Pro babi lity	Imp act	Pxl	Trigger	Owner	Risk Response Strategy	Cost - COP MM
1.1.	Poor description of requirement	Uncertainty in LAB requirement	Complaints, customer satisfaction– which can affect the metrics and NPS survey.	4	2	8	Client Complaints	Architectu re Dept.	**Mitigate -** Asks for clarifications and response to the client	10
1.2.	Spares procedure not documented	Complexity in the Spares procedure	Delays and breach of the SLA (8 days)	4	3	12	Expired cases	Spares Leader	**Mitigate** - Document and formalize the procedure at the first month	20
1.3.	IPP not available and unknowed procedures	Electrical, work in heights	Deaths, accidents and disabilities	2	5	10	Accidents	HSEQ Dept.	**Avoid** - Course about work in heights, purchase of IPP	20
2.1.	Lack of involvement of customer	Unavailabilit y of process consultants	Delays in the process deliverable	4	3	12	5% delay in schedule	Project Manager	**Escalate** - Report to supervisor and document the situation	0
2.2.	Type of contract and duration of project	Staff Turnover	Delays, rework, SLA lost	4	4	16	Resignatio ns	HHRR	**Mitigate** - Recruitment of backup staff	40
2.3.	Ineffective Communicat ion plan	Poor involvement of the customer	Lack of support and delays	3	3	9	Absences	Project Manager	**Mitigate** - Kick-Off, Schedule meetings,	0

RSB Code	Cause	Risk	Consequence	Pro babi lity	Imp act	Pxl	Trigger	Owner	Risk Response Strategy	Cost - COP MM
3.1.	Increase of requests, lack of resources	Fine for breach of SLA	Reductions of profit	5	5	25	Weekly metrics	Project Manager	**Mitigate -** Monitoring daily and backup staff and reallocations	40
3.2.	High demand of Spares	Delayed billing of Spares	Affects cash flow and payments	2	4	8	Spares without invoice	Spares Leader	**Accept** - Additional resources on-demand for billing process	12
3.3.	knowledge of client and internal processes	Upselling and Cross-selling	New contracts, more purchases and additional services	4	5	20	Needs and news expectation s	Commerc ial Dept.	**Exploit** - Report to Commercial Dept. the new opportunities	1.100
3.4.	Imports	Delays in purchases	Fines for breach in delivery of Spares	3	3	9	SLA expired	Procurem ent Dept	**Avoid** - Agreement for imports without SLA	0
4.1.	Insecurity and use of public transport	Social and environment al	Accidents, robberies, disabilities	3	2	6	Report of accidents or thefts	HSEQ Dept.	**Transfer** - Training about Labor Law and regulations	4

(Source: González, J. The Author. 2018)

4.7.3. Qualitative Risk Analysis

"*Perform Qualitative Risk Analysis is the process of prioritizing individual project risks for further analysis or action by assessing their probability of occurrence and impact as well as other characteristics*" (PMI; 2017. PMBOK, p. 419). The main objective is focus on high-priority risks. The qualitative assessment of the risks are internal definitions using the lessons learned, the experience, the historical data and expert judgment. In the execution process group, the client needs to approve this qualification of risks according to its expectations and appetite of risk.

4.2.3.6. Probability and Impact Matrix

According to the criteria defined above, the PxI matrix is depicted in Chart 48:

Chart 48. *PxI Matrix*

PxI Matrix									
NEGATIVE IMPACT					POSSITIVE IMPACT				
Very Low 1	Low 2	Moderate 3	High 4	Very High 5	Very High 5	High 4	Moderate 3	Low 2	Very Low 1
				3.1.					
	1.1.	1.2 2.1.	2.2.		3.3.				
	4.1.	2.3. 3.4.							
			3.2.	1.3.					

(Source: González, J. The Author. 2018)

4.2.3.7. Priority Risks

The priority and description of risks is depicted in Chart 49:

Chart 49. *Priority Risks*

RBS Code	Risks	P	I	PxI	Impact	Priority
1.1.	Uncertainty in LAB requirement	4	2	8	Negative	Low
1.2.	Complexity in the Spares procedure	4	3	12	Negative	Medium
1.3.	Electrical, work in heights	2	5	10	Negative	Medium
2.1.	Unavailability of process consultants	4	3	12	Negative	Medium
2.2.	Staff Turnover	4	4	16	Negative	Medium
2.3.	Poor involvement of the customer	3	3	9	Negative	Low
3.1.	Fine for breach of SLA	5	5	25	Negative	High
3.2.	Delayed billing of Spares	2	4	8	Negative	Low
3.3.	Upselling and Cross-selling	4	5	20	Positive	High
3.4.	Delays in purchases	3	3	9	Negative	Low
4.1.	Social and environmental	3	2	6	Negative	Low

(Source: González, J. The Author. 2018)

In the chart above appeared an opportunity with positive impact which shall be exploit redirecting to commercial department.

4.7.4. Quantitative Risk Analysis

The business plan established by the company defines the net profitability variable as the most important when accepting this project. In general, the industry accepts a minimal net profitability of 12%, after costs, taxes and expenses. In exceptional cases, the corporate strategy can accept net profitability like 5% for positioning and entry to new markets.

For the quantitative Risk analysis, the scenarios approach has been selected. The rules for this analysis, due to the industry and client, are that time variable is fixed by law. The price is fixed too and unmodifiable. The scope, deliverables and objectives are fiexd into the ToR. The variables which can be modified are incomes, costs and expenses.

4.2.3.8. Best Scenario

The best scenario es shown in Chart 50. in this scenario it is assumed that there will be no fines for non-compliance of any of the ANS and it will not be necessary to use the contingencies, because the risks are not expected to materialize.

Chart 50. *Best Scenario for Quantitative Analysis*

Best Scenario	Monthly	Annual
Commercial offer	$ 1.026.275.040	$ 7.183.925.280
Value Added Tax (19%)	$ 194.992.258	$ 1.364.945.803
Costs & expenses (budget)	$ 656.589.761	$ 4.596.128.329
Costs & expenses (Without use of reserves)	$ 628.511.318	$ 4.399.579.226
Maximal income	$ 831.282.782	$ 5.818.979.477
Fine for non-compliance	$ 0	$ 0
Use of Contigency reserve	$ 0	$ 0
Use of Management reserve	$ 0	$ 0
Net Profitability	$ 202.771.464	$ 1.419.400.251
% Profitability	32%	32%

(Source: The Company Files. 2018)

The Final Net Profitability will be 32%, which represents an ideal outcome for the company. The incomes are presented by the project team working for the project in the 20 localities of the client. For this scenario, is considered that all time the 100% of staff is working and hired.

4.2.3.9. Most likely Scenario

The most likely scenario is analyzed taking the historical data and learned lessons of the company. Chart 51 shows the lessons for this scenario.

Chart 51. *Learned Lessons for Most Likely Scenario*

Learned Lessons	Item	Estimated
Staff	The staff for large projects never remains at 100%.	95%
Additional staff	For large projects are necessary additional staff	2%

Learned Lessons	Item	Estimated
Fines	Large projects can be fined	at least once
Materials	Large projects can need more materials that planned	10%
Services	Large projects can need more materials that planned	10%
Management	Large projects have financial & insurances addit. costs	10%

(Source: The Company Files - PMIS. 2018)

In this case, the historical data shows that the income received by the company from the hired employees is diminished due to medical disabilities, vacations, resignations, etc. The average for large project can be estimated in 95%. Additional staff represents people who must enter the project in an extraordinary way to fulfill tasks that suffer some delay or activities that were not considered in the planning of the project. For large projects are considered 2% of the complete staff. The largest projects can be fined due to complexity and uncertainty. It can be considered a fine during the execution of the project. For materials, services and management can be considered an increase of 10% in the original budget, wich can be covered by reserves. The critical variable for this scenario can be analyzed in Chart 52:

Chart 52. *Most Likely Scenario for Quantitative Analysis*

Most Likely Scenario	Worst Month	Most Likely Result
Commercial offer	$ 1.026.275.040	$ 7.183.925.280
Value Added Tax (19%)	$ 194.992.258	$ 1.364.945.803
Costs & expenses	$ 628.511.318	$ 4.399.579.226
Most likey Income	$ 789.718.643	$ 5.528.030.503
Fine for non-compliance (10%)	$ 78.971.864	$ 78.971.864
Use of Contigency reserve	$ 13.792.729	$ 96.549.103
Use of Management reserve	$ 1.428.571	$ 10.000.000
Costs & expenses using reserves	$ 722.704.483	$ 4.585.100.193
Net Profitability	$ 67.014.161	$ 942.930.310
% Profitability	9%	21%

(Source: The company Files. 2018)

For this scenario is considered a 95% of incomes due to reduction of staff. The costs and Expenses are increased due to use of contingency reserves and the management reserve up to 10% through the whole project. In this case, the historical data and lessons learned let us assume that at least one month the company will be fined due to non-compliance of SLA´s established in ToR.

The fine is a percentage of the monthly income. In this case is considered a 10% for one month. The result for that month is a net profit of 9%. However, the accumulated profit for this scenario is the 21%, which is acceptable for the company.

4.2.3.10. Worst Scenario

For this scenario is considered that reserves are used at 100%. Project staff will decrease up to 90% during the duration of the contract, which is a **pretty pessimistic** metric considering that the country has unemployment rates over 10%, which facilities the hiring of new staff. The fines for the project increase to two months (of 7) and to 15%. This is the worst scenario and it doesn´t have precedents into the lessons learned of the company. The chart 53 shows the results.

Chart 53. *The Worst Scenario for Quantitative Analysis*

Worst Scenario	Worsts Two Months	Worst Result
Commercial offer	$ 1.026.275.040	$7.183.925.280
Value Added Tax (19%)	$ 194.992.258	$1.364.945.803
Costs & expenses	$ 628.511.318	$4.399.579.226
Worst Income (90%)	$ 748.154.504	$5.237.081.529
Fine for non-compliance (10%)	$ 74.815.450	$ 149.630.901
Use of Contigency reserve (100%)	$ 13.792.729	$ 96.549.103
Use of Management reserve (100%)	$ 14.285.714	$ 100.000.000
Costs & expenses, reserves &Fines	$ 731.405.212	$4.745.759.230
Net Profitability	$ 16.749.292	$ 491.322.299
% Profitability	2%	10%

(Adapted from: The Company Files. 2018)

For the worst scenario, there are two months with fines for the company of 10% of the total income. The reserves are used at 100% and the income through the whole project is 90%. In the two worsts months with fines the net profit decreases to 2%. However, the accumulated net profititability for the whole project in this scenario is 10%. Considering the three results in Chart 54:

Chart 54. *Results for Scenarios*

Scenarios	% Net Profit
Optimistic	32%
Most Likely	21%
Worst	10%

(Source: Adapted from: The Company Files. 2018)

The corporate strategy let us to participate in the project and sign the contract.

4.7.5. Plan Risk Responses

The chart 55 describes the risk responses necessary to outcome the needs of the project:

Chart 55. *Risk Responses*

RBS Code	Risks	Response
1.1.	Uncertainty in LAB requirement	**Mitigate -** Asks for clarifications and response for the client
1.2.	Complexity in the Spares procedure	**Mitigate** - Document and formalize the procedure at the first month
1.3.	Electrical, work in heights	**Avoid** - Course about work in heights, purchase of IPP
2.1.	Unavailability of process consultants	**Escalate** - Report to supervisor and document the situation
2.2.	Staff Turnover	**Mitigate** - Recruitment of backup staff
2.3.	Poor involvement of the customer	**Mitigate** - Kick-Off, Schedule meetings,
3.1.	Fine for breach of SLA	**Mitigate -** Monitoring daily and backup staff and reallocations
3.2.	Delayed billing of Spares	**Accept** - Additional resources on-demand for billing

RBS Code	Risks	Response
		process
3.3.	Upselling and Cross-selling	**Exploit** - Report to Commercial Dept. the new opportunities
3.4.	Delays in purchases	**Avoid** - Agreement for imports without SLA
4.1.	Social and environmental	**Transfer** - Training about Labor Law and regulations

(Source: González, J. The Author. 2018)

The high priority risks (3.1.) and (3.3.) requires immediate actions and report to PMO, according to Plan Risk Management defined.

The (3.1.) risk may cause fines for breach of SLA decreasing the profits and affecting the satisfaction customers. There are several causes for this risk, from the increase in user requests to the lack of resources due to staff resignations.

This means a capacity problem, which can be treated with more resources or a contingency process. The contingency plan is considered into the budget as a contingency reserve for the wages of personnel. With this increasing can be recruit 4 resources for backup.

4.7.6. Implement Risk Responses

Implement risk responses means act. The responses must be implemented through the lifecycle project. The costs policies and risks management policies establish the guidelines for appropriate resources and budget. In the budget, the contingency reserves for the implementation of risk responses are authorized and the project manager has the adequate level of authority to spend these resources to implement risk responses.

The actions implemented for risks responses are depicted in the Chart 56:

Chart 56. *Risk Responses*

Responses	Risks treated	Budget	Date
Recruitment of backup staff	(3.1) (2.2)	Contingency	Start of project
Purchase of IPP	(1.3)	Budget	Start of project
Reallocations (Backup Staff)	(3.1)	Contingency	On-demand
Additional resources	(3.2)	Budget	Start of project
Training Labor Laws and HSEQ	(4.1)	Contingency	Start, execution of project
Monitoring SLA daily procedure	(3.1)	Budget	Start of the project
Kick-Off and meetings	(2.3)	Budget	Start, execution of project

(Source: González, J. The Author. 2018)

The budget assigned was defined like cost for those activities, and the contingency are additional budget to use when the project manager estimates.

4.7.7. Monitor Risks

The monitor risks process uses the PMIS (Hydra) of the company to monitor the risks status. The project manager shall update weekly the risks status making the assessment if necessary and evaluating the pertinency of them.

The client has the MSProject Server™ to control the schedule and deliverables. The weekly committee is the scenario to report the risks status and update them. The monthly report consolidates the risks and their impact to SLA´s and deliverables.

The financial department monitor and control the economical metrics like these:
- Loss and Profits:
- Costs
- Deviations of costs
- Deviations of profitability
- Cost of personnel

Any deviation in the metrics established by the architecture department shall be considered risky for the company. The project manager must monitor these metrics in a monthly basis and update the risk register if necessary. The Information Systems to monitor risks are depicted in Figure 38:
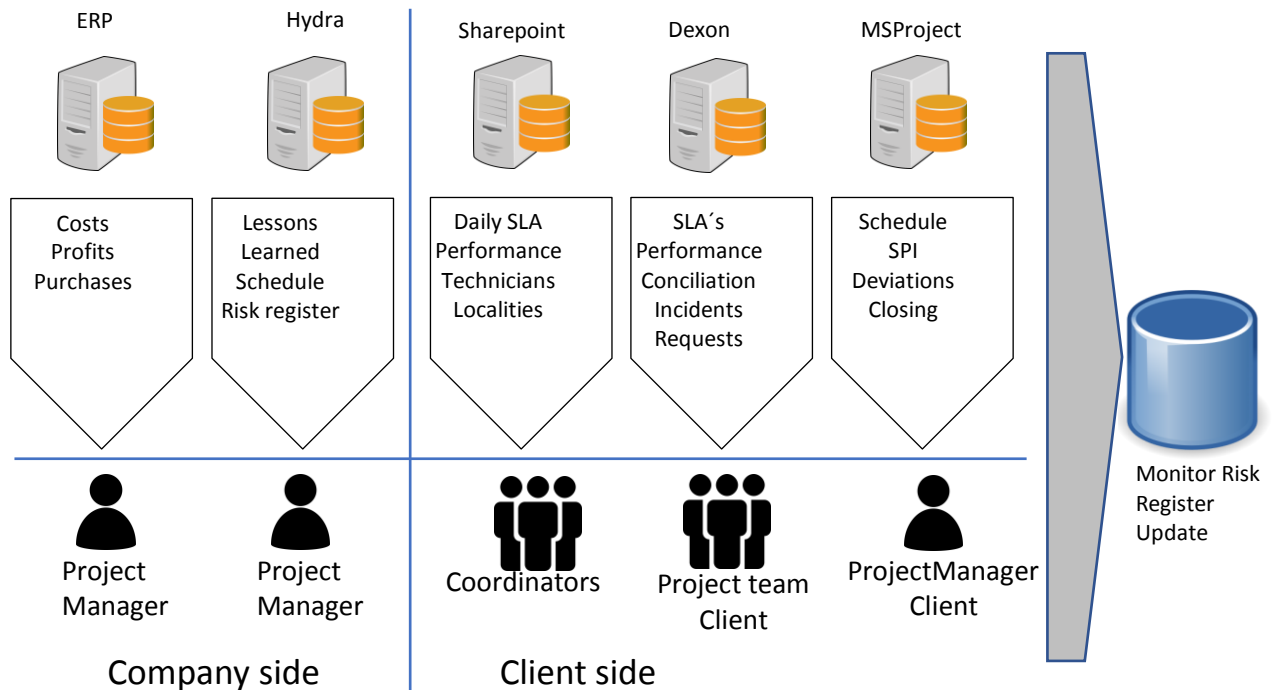
Figure 38. Information Systems for monitor Risks

(Source: González, J. The Author. 2018)

- First, the ERP with financial status and the thresholds established at the beginning of the project. Each month the Financial department release the indicators to project manager to review the metrics and update the risks.

- Second, the PMIS – Hydra- which contains the information about schedule, SPI, Lessons Learned and risks register. The project manager shall update the information weekly and present the status in a monthly basis to the PMO. The risks need to be updated according to performance and other factors.

The company side information systems and the information are reserved and the only one person who has access and can divulgate is the project manager.

In the client side, there are three Information Systems:

- The SharePoint is a site dedicated to the project operations. It´s available anywhere, anytime and the information that contains is the operative performance, issues and problems, technician's performance, SLA per locality, etc. This information is on real time and let the project manager and the QA area react to risks immediately when the SLA is lost. The SharePoint is the most important source of information with a real and daily snapshot of the project. The 22 Coordinators and the project manager have access to this source.
- The Information System for HelpDesk services is DEXON. The owner of this Application is the client. However, the 222 people of staff need to access to register, document, escalate, solve and close the incidents and requests of the SED. DEXON, is the responsible for generating the metrics and KPI´s to conciliate the Billing and penalties monthly. The information of DEXON™ can be accessed daily and it is the source to analyze risks and update them.
- MSProject™, is the PMIS from the client´s side. The project manager has access to update the schedule performance, deliverables status, etc. The report base on this Information System must be updated weekly.

The project manager must maintain updated the dashboard of risks and communicate to company and customer the changes in it. Each responsible must report the actions and status of its risk. The dashboard is showed in the Chart 57.

Chart 57. *Dashboard of Risks*

DASHBOARD RISKS										
ID	Risks	Prob	Impac	Px	Priority	Actions	Responsible	Date	Control	Status
1.1.	Uncertainty in LAB requirement	4	2	8	Low	**Mitigate**	Architecture Dept.	01/07/2018	Semanal	Mitigated
1.2.	Complexity in the Spares procedure	4	3	12	Medium	**Mitigate**	Spares Leader	01/08/2018	Semanal	Mitigated
1.3.	Electrical, work in heights	2	5	10	Medium	**Avoid**	HSEQ Dept.	01/07/2018	Semanal	Avoided
2.1.	Unavailability of process consultants	4	3	12	Medium	**Escalate**	Project Manager	01/09/2018	Semanal	Pending
2.2.	Staff Turnover	4	4	16	Medium	**Mitigate**	HHRR	01/07/2018	Semanal	Mitigated
2.3.	Poor involvement of the customer	3	3	9	Low	**Mitigate**	Project Manager	01/08/2018	Semanal	Pending
3.1.	Fine for breach of SLA	5	5	25	High	**Mitigate**	Project Manager	01/07/2018	Semanal	Mitigated
3.2.	Delayed billing of Spares	2	4	8	Low	**Accept**	Spares Leader	01/07/2018	Semanal	Accepted
3.3.	Upselling and Cross-selling	4	5	20	High	**Exploit**	Commercial Dept.	01/08/2018	Semanal	Pending
3.4.	Delays in purchases	3	3	9	Low	**Avoid**	Procurement Dept	01/08/2018	Semanal	Pending
4.1.	Social and environmental	3	2	6	Low	**Transfer**	HSEQ Dept.	01/07/2018	Semanal	Transferred

(Source: González, J. The Author. 2018)

4.8. Project Procurement Management

According to definition of PMI, "*Project Procurement Management includes the processes necessary to purchase or acquire products, services or results needed from the outside the project team*" (PMI, 2017. *PMBOK* p.459).

In Figure 39, the processes of the Project Procurement Management are depicted:

Figure 39. Mind Map Project Procurement Management

(Source: González, J. The Author. 2018)

The procurement department oversees policies and procedures, including the quotations.

4.8.1. Plan Procurement Management

The company has a centralized Procurement department. The policies about lifecycle of purchases are designed and controlled by Director of purchases.

4.2.3.11. Procurement Strategy

The project has two components to be provided to the client (SED). The services of technical support, preventive maintenance and processes consultancy. These services will be delivered internally by company. The staff need to be recruited once the contract is signed. The strategy and responsibility have been outlined in the Resources Management and the HHRR department oversees the process.

The second component is the equipment required to provide the service of technical support and the Spares requested on-demand by customers. All of them will be purchased externally to local providers. The Procurement department controls and manages the process.

The only one authorized in the project to request items or purchases is the project manager, and he has the access to Information System (ERP) to register the purchase requests.

The Financial area has a strict policy for period payments of 30 days. This let the company control the cash flow.

The Project Manager and the procurement department will agree an internal SLA, for each phase of purchases. Response to quotations has an SLA of 3 labor days. The purchase process and delivery have an SLA of 5 days labor days.

In figure 40 the phases of procurement process can be seen:
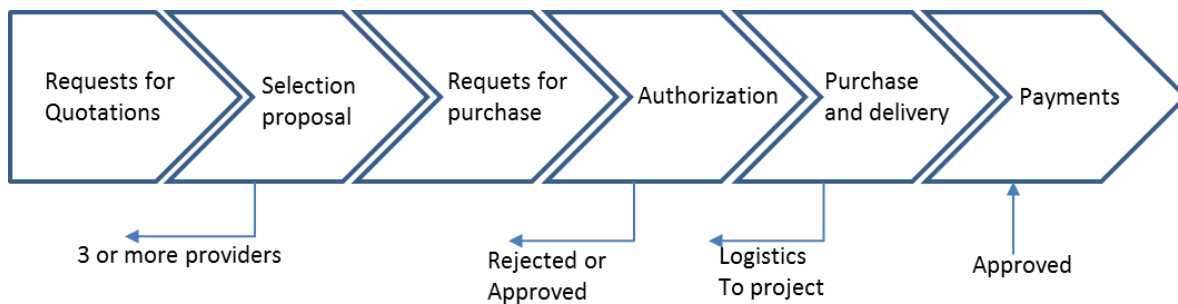
Figure 40. Procurement Phases

(Source: González, J. The Author. 2018)

The process begins with a request for quotation sent by the project manager to purchases agents, via email. They look for local providers and return three or more quotations from different providers. The project manager can select the best solution for the project. Knowing the prices and the provider, the project manager accesses the ERP, purchases module to requests the purchase. It´s important knowing the details, price, quantity, units and provider to register the request. In addition, it is mandatory the cost center and the justification to inform the reason of that order. Attach the quotation as a file in the ERP is required.

The only one authorizer for all purchases is the Vice-president of Operations. He accesses the ERP and proceeds with authorizations. The request become into an order of purchases for the agent in charge.

The system sends an email to provider automatically with the order and the information for delivery. The equipments or elements are received by the project team in the client´s locations and signs the order. With this order, the provider can bill to the company. The last step in the purchase process is the authorization for payments. The project Manager has that activity between his daily tasks.

There is one more step scheduled to the end of the year: the evaluation of providers. Once again, the project manager is the owner of this task. However, at any time the project manager can veto or ask for a change of provider.

4.2.3.12. Prequalified Sellers

The ERP have a module call "Providers master database". This database has been populated through years of experience in purchases and contracts. In it there are a lot of qualified providers that were subscribed in the past to provide goods and services to the company. When a new service or product is not included, the purchase agents proceed to subscribe the third party. The company prefers the distributors or wholesalers because of discounts and lower prices.

4.2.3.13. Types of agreements

The procurement policy and the Information System accepts only one type of contract. This is the Fixed Price agreement. If the price or conditions changes, it is necessary to erase the requests in the information systems and create a new. This case is exceptional and cannot be frequently used.

4.2.3.14. Delivery Dates

The conditions described in the RFP by the client let the team define the following dates for delivery in Chart 58.

Chart 58. *Delivery Dates ANS Strategy*

Quantity	Item	Delivery	Strategy
35	Laptops	15 july 2018	Buy
13	MultiFunctional Printer	15 july 2018	Buy
3	Scanner	15 july 2018	Buy
3	Switch	15 july 2018	Buy

Quantity	Item	Delivery	Strategy
15	Access Point	15 july 2018	Buy
Preventive Maintenance resources			
30	Gallon	5 july 2018	Buy
26	Blower	5 july 2018	Buy
26	tester	5 july 2018	Buy
100	mts	5 july 2018	Buy
100	spray tube	5 july 2018	Buy
100	toothbrush	5 july 2018	Buy
26	kit	5 july 2018	Buy
26	antistatic handle	5 july 2018	Buy
HSEQ resources			
Quantity	Un.	Delivery	Strategy
200	particules respirator	5 july 2018	Buy
200	eye protector	5 july 2018	Buy
50	Dielectrical boots	5 july 2018	Buy
50	helmets	5 july 2018	Buy
200	safety gloves	5 july 2018	Buy
6	safety stair	5 july 2018	Buy
3	safety stair	5 july 2018	Buy
2	safety stair	5 july 2018	Buy
6	warning tapes	5 july 2018	Buy
1	scaffold certified	5 july 2018	Buy
2	slings certified	5 july 2018	Buy
50	workwear	5 july 2018	Buy
Contact Center Resources			
Quantity	item	Delivery	Strategy
9	IP Phones	1 july 2018	Reallocation
15	headphones	1 july 2018	Reallocation
9	core i5 RAM 8 GB	1 july 2018	Leasing
36	heardphones pad	1 july 2018	Reallocation
9	electricity, internet, chairs	1 july 2018	Reallocation
1	10 Mbps dedicated	1 july 2018	Shared
9	IP Phones	1 july 2018	Reallocation
Hardware			
Quantity	Un.	Description	Strategy
74	Laptops (each 3 technician)	1 july 2018	Leasing
16	Laptops (Admin staff)	1 july 2018	Leasing
4	Desktops agents NVC	1 july 2018	Leasing

Quantity	Item	Delivery	Strategy
20	Printers (zones)	15 july 2018	Buy
222	Cellphones	15 july 2018	Buy
180	Toolkits	15 july 2018	Buy
250	Vests	15 july 2018	Buy
250	ID Plastic	15 july 2018	Buy
6	Kits for cabling structured	15 july 2018	Buy
Software			
Quantity	Item	Description	Strategy
1	Papercut license	15 july 2018	Buy
70	PaperCut agents	15 july 2018	Buy
10	Licenses email	15 july 2018	Buy
1	License Project Professional	15 july 2018	Buy
1	Hydra App Cloud	15 july 2018	Leasing
Others			
Quantity	Item	Delivery	Strategy
2	VAN 4*4	1 july 2018	Service
1	Air Conditioned	30 July 2018	Buy
50000	Services format	5 july 2018	Buy
25000	Stickers	5 july 2018	Buy
100	Reams of paper	1 july 2018	Buy
40	Tonners	30 July 2018	Buy
1	Coffee maker	30 July 2018	Buy

(Source: Adapted from The Company Files. 2018)

The reason for different date is related to the function of equipment and the waiting time from the client:

- 1 July: The service and operations begin, and the staff need those resources to operate the project. Delays are not accepted. To accomplish the SLAs, the company selects the Leasing strategy for immediate delivery.
- 5 July: The IT services and operations can fluid normally and the client accepts 5 days of delay.
- 15 July: The manufacturing process takes time to deliver products like vests, IDs, etc. The client accepts this delay and the operations are not affected.
- 30 July: The products are good for internal use of the project team.

The strategies have to do with the availability of the equipment and the delivery time:

- Buy: The company has not available these resources and need third parties to provide them.
- Reallocation: The company has the resources from previous projects and purchases.
- Leasing: The multiple assets for short periods of time are not convenient financially to buy. It´s better lease them.
- Shared: Resources that are used for other projects and can be shared with this project.
- Service: Contract of service with especial clauses.

4.8.2. Conduct Procurement

The legal context of the company is circumscribed into the private law, for hiring goods and services to third parties. This is an advantage and reduces the bureaucracy and delays. The purchases are implemented through direct and simplified purchases orders.

The project manager spends a lot of time to register the requests of purchases and ask the quotations. Each request is tied to a cost center and must be covered in the architectural design.

Unfortunately, the project manager cannot register a massive order request into the system, unless the elements are equals.

The centralized procurement department controls and monitors the sellers and agreements. The elements for this project are basic goods like Desktops, Laptops, wire, printers, tonners, routers, switches, etc. For this reason, it is not necessary to define technical specifications and elaborate inspections and audits. The equipments are easily reviewed and tested.

The warranty is a standard condition for these basic goods, and the period covered is 1 year.

Criteria for sellers selection

The lessons learned for basic goods and materials told that the lower price "is not the best criteria" to select and purchase these items. The criteria approved for this project is the medium price or best quality and warranty if necessary. The purchase agents are instructed to get at least three quotations before selecting the seller.

In the past, the project manager was responsible to select the best offer and seller. But, in projects where there are many purchases, the project manager doesn´t add value to the process doing this.

4.8.3. Control Procurement

The cost centers are used to monitor and control the procurements. These are parametrized into the ERP for monthly reporting the amount of resources spent in the purchases. The project manager selects one of them for requesting purchases. Chart 59 shows the Cost Centers configured into the ERP system.

Chart 59. *Cost Centers*

Código	Description
PROY-01	**Technology Equipments**
	Repuestos
	Stock Spares
	Bag Spares
	Support Equipments
	Equipments staff (Computers - scanners- printers - TV - Telephones)
	Switches
	Cards WIFI
	Fee Leasing
PROY-02	**Services, support and maintenance**

Código	Description
	Feeding
	Leases
	Cellphones
	Storage
	Quality HSEQ
	Quality and awareness
	Comunicación channels
	Data Center
	Courses, trainings client staff
	Development tools
	cleaning items
	Toolkits
	Logistic
	Corrective Maintenance
	Preventive Maintenance
	Helpdesk Remote - Services
	Stationery
	Parking
	Print Services
	Postal Services
	Taxis
	Air tickets / landed etc
	Transports
	Office furniture
	Escort Service
	Toners
PROY-03	**Licensing**
	Aranda Licensing
	Professional Services Aranda
	Sql Standar por Core
	Extenssion comunication Manager
	Bcms view
	Google Apps
	Other licenses
	Renovations
PROY-04	**Other Costs - "Unexpected"**
	Unexpected
	Sinister
	Purchases and services not included in the project
PROY-05	**Staff Costs**
	Wages y Benefits
	Compensation for results

Código	Description
	Endowments
	Medical Exams for entering
	Periodic Medical Exams
	Security Study
	Work overtime HelpDesk
	Work overtime Support
	Travel expenses
	Staff trainings
	Bonuses
	Other
PROY-06	**Projects Expenses**
	Ica
	Inssurances
	Administrative expenses
	Financial expenses
	Stamps
	District Taxes
	SOAT

(Source: The Company Files. 2018)

Profit and Loss Report

The monthly report Profit and Loss sent by financial area to projects manager, let him control the purchases through the exhaustive analysis of indicators. The Figure 41 shows the report extracted from ERP automatically.

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alez
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ESTADO DE RESULTADOS FINANCIERO POR PROYECTO
A 31 DE DICIEMBRE DE 2017
SECRETARIA EDUCACION
Proyecto: S930

CONCEPTO			Saldo Anterior	%	Diciembre	%	Saldo Final	%
INGRESO	EQUIPOS DE TECNOLOGIA **		$0	0.00%			$0	0.00%
	PENDIENTES POR FACTURAR **		$1,013,962,755	13.44%	-$967,062,904	-100.00%	$46,899,851	0.57%
	SERVICIOS SOPORTE Y MANTTO **		$6,529,895,170	86.56%	$1,666,764,534	100.00%	$8,196,659,704	99.43%
		Total :	$7,543,857,925	100.00%	$699,701,630	0.00%	$8,243,559,555	100.00%
COSTOS	COSTOS DE PERSONAL **		$3,958,351,544	52.47%	$458,603,959	65.54%	$4,416,955,503	53.58%
	COSTOS ESTIMADOS **		$254,845,453	3.38%	-$254,845,453	-36.42%	$0	0.00%
	EQUIPOS DE TECNOLOGIA **		$461,460,390	6.12%	$138,744,937	19.83%	$600,205,327	7.28%
	LICENCIAMIENTO **		$8,619,303	0.11%	$6,409,474	0.92%	$15,028,777	0.18%
	OTROS COSTOS **		$12,881,482	0.17%	$2,461,828	0.35%	$15,343,310	0.19%
	SERVICIOS SOPORTE Y MANTTO **		$223,909,099	2.97%	$103,953,603	14.86%	$327,862,702	3.98%
		Total :	$4,920,067,271	65.22%	$455,328,348	65.08%	$5,375,395,619	65.21%
UTILIDAD BRUTA	**		$2,623,721,862	34.78%	$244,373,282	34.93%	$2,868,095,144	34.79%
		Total :	$2,623,721,862	34.78%	$244,373,282	34.93%	$2,868,095,144	34.79%
GASTOS	DEFINIR CONCEPTO **				$46,837,451	6.69%	$46,837,451	0.57%
	ESTIMADO GASTO FINANCIERO **		$39,361,088	0.52%	$3,642,627	0.52%	$43,003,715	0.52%
	ESTIMADO GMF 4X1000 **		$35,003,501	0.46%	$3,246,616	0.46%	$38,250,116	0.46%
	GASTOS PROYECTOS **		$172,044,193	2.28%	$103,199,593	14.75%	$275,243,786	3.34%
	SERVICIOS SOPORTE Y MANTTO **				-$93,037,000	-13.30%	-$93,037,000	-1.13%
		Total :	$246,408,782	3.26%	$63,889,286	9.12%	$310,298,068	3.76%
UTILIDAD PRE-OPERATIVA	**		$2,377,313,080	31.51%	$180,483,996	25.79%	$2,557,797,075	31.03%
		Total :	$2,377,313,080	31.51%	$180,483,996	25.79%	$2,557,797,075	31.03%

Codigo Proyecto	Nombre Proyecto	Fecha Inicial	Fecha Final	Total Meses	Meses Faltantes	Meses Ejecutados
S930	SECRETARIA EDUCACION	2017-04-01	2018-01-31	9	1	8

Figure 41. Profit and Loss Report

(Source: The Company Archives. 2018)

In this report the cost centers are displayed in the second column. The values for the last month appear in the third column. The current period is the fifth column and the accumulated is the last column. The control procurement process is performed by project manager comparing the cost sheet designed in architecture area and the current period. In this way, the purchases and costs are controlled, and the report is useful for this task.

4.9. Project Stakeholder Management

Manage the stakeholder expectations represents one of the most important knowledge are in the project management. The PMI (2017, PMBOK) states "*Project Stakeholder Management includes the processes required to identify the people, groups or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact in the project, and to develop appropriate management strategies for effectively for engaging stakeholders in project decision and execution*"

The processes involved in stakeholder management are depicted in figure 42.

Figure 42. Mind Map Project Stakeholder Management

(Source: González, J. The Author. 2018)

4.9.1. Identify Stakeholders

The tool used for identifying stakeholders at the beginning of the project was the expert judgement and lessons learned. In chart 60 there is an initial list:

Chart 60. *List of Stakeholders*

ID	Stakeholder	Role	Quantity
1	Secretary of education	Control the budget and policy of SED	1
2	Administrative Director	Functional Manager of IT dept.	1
3	IT department	Director of IT	1
4	Supervisor	Control the project	1
5	IT Group	IT Specialists and administrators	30
6	DEXON Specialist	Extract SLA and manage DEXON	1
7	Warehouseman	Receive spares and sign the docs	500
8	Local Directors	Functional manager of Localities	20
9	Rectors	Manage schools	500
10	Teachers	Requests services	32.000
11	SED´s employees	Requests services and use IT	2.800
12	Contractors	Use the IT services	400
13	Students	Use the computing rooms and IT	800.000
14	Providers, sellers	Delivery goods and services	50
15	Team members	Execute the project	232
16	Procurement dept.	Procurement tasks	4
17	Financial Dept.	Budget and payments	10
18	PMO	Control the project and objectives	1
19	HSEQ	Monitor and audit HSEQ	4

(Source: Adapted from Company´s Files. 2018)

4.9.1.1. Diversity

This project has a huge population impacted with the IT services. The interests and complexity of relations mean a challenge to the team members:

- The students conform a group with more than 800.000 members. They are the primary users of the technology supported by the team members. Their ages range from 6 years to 18. Their power in the project is null.

- The teachers: They are more than 32.000 users. They manage the computers rooms, and IT assets. They are responsible to request the services to the project and give access to the assets. Theirs ages range

from 24 to 65 years old. Their education level is university degree to master's degree. All computer rooms are managed by a teacher with a University degree in Computer Systems. They receive directly the services and sign the format and satisfaction survey. The interest in the project is high.

- The Rectors: They are more than 500 functionaries. They are considered VIP clients. However, they are not aware of their power degree and they are not very interested in the project.

- Local Directors. They are Functional Managers for the Secretariat of Education. They have a high-power degree and their interest comes to the surface when they require a service that affects their performance. The Local Coordinators of the project are located into the facilities managed by the Local Director.

- The warehousemen: Manages and controls the warehouse, where the spares are received. They affect directly the SLA of the project.

- Employees: They are 2.800 persons. Some of them are VIP users. Due to their location in the headquarters, they are extremely "noisy" and can affect the satisfaction level.

- IT Group: They are specialists who manage the Information Systems and applications of SED. They are noisy too. They request service of level 1, level 2 and 3.

- Process Consultants: They have a specific involvement in the project: the process deliverable. Their profile is IT specialist.

- VIP Users: They are rectors, Directors and Functional managers who require special response time, it means a time response lower than the time response established in the SLA chart.

4.9.1.2. Location

The users and stakeholders are geographically dispersed in the city in more than 760 different sites. The sites are the following:

- 760 schools

- 2 headquarters

- 20 localities

- The company

- The providers offices

4.9.2. Plan Stakeholders Engagement

4.9.2.1. Communication Technology

The customers are distributed in 760 schools and two headquarters. The project manager must prioritize who to communicate and what mean is viable without affecting the financial indicators. Chart 61 shows the types of technology available for establish communications with the stakeholders.

Chart 61. *Types of Technology*

ID	Stakeholder	Technology or media
1	Secretary of education	Written documents
2	Administrative Director	Written documents
3	IT department	Written, emails, memos, meetings, calls
4	Supervisor	Written, emails, memos, meetings, calls
5	IT Group	Emails, meetings
6	DEXON Specialist	Meetings, emails, calls
7	Warehouseman	Minutes
8	Local Directors	Minutes, meetings
9	Rectors	Minutes, meetings
10	Teachers	Format services, face to face, flyers
11	SED´s employees	Format services, face to face, flyers
12	Contractors	Format services, face to face
13	Students	Face to face
14	Providers, sellers	Minutes, calls, emails
15	Team members	Meetings, chat, emails, memos
16	Procurement dept.	Web, emails, calls
17	Financial Dept.	Meetings, memos, emails,
18	PMO	Meetings, web, memos, calls,
19	HSEQ	Meetings, memos, emails, calls
20	Account Manager	Meetings, emails

ID	Stakeholder	Technology or media
21	Vice-president	Meetings, emails, calls, Web

(Source: González, J. The Author. 2018)

4.9.2.2. Type of engagement

For the communications matrix and resources needed, the following types of engagement are considered to this project:

H: HIGH. The role, activities and objectives are related to the project outcomes. The project activities daily affect the job of these stakeholders. The power is high.

M: MEDIUM: The role may be affected by project activities. They have medium power.

L. LOW: They are users who requests services from the project.

4.9.2.3. Policy

The following guidelines shall be observed by team members:

- The technician, engineers and Coordinators only can distribute information classified like "public" and operative to end users.
- The coordinator is the only one person allowed to communicate tactical information to Rectors and Local Directors. This means information concerned to requests or IT technical support.
- The Project Manager is the authorized to respond complaints and claims.
- The project Manager is the only one who can publish or distribute information about SLA; contractual, performance or strategic information.
- The project Manager is the only one authorized to exchange, publish or distribute information to company´s members.

- The reports, schedule, costs, SLA; billing, invoices, etc, is information reserved and the project manager is the only one authorized to distribute and publish.
- The team members can exchange information daily about the operation, local SLA, technician´s performance to improve their indicators.
- The media considered formal, is the written communications.

4.9.3. Manage Stakeholder Engagement

4.9.3.1. Stakeholders Engagement Matrix

The stakeholders have different engagement levels in the project or its impact. In Chart 62 is showed the type of interest for each one.

Chart 62. *Stakeholders Engagement Matrix*.

Name	Area	Role	Information of contact	Requeriments of service	Engagement PHASES					Type of Interest
					I	P	E	M&C	C	
Armando Leyton	IT	Supervisor	aleyton@educacionbogota.edu.co	SLA, Objetives, Quality	H	H	H	H	H	Contractual Compliance
Supervisors	IT	Supervisor ad-hoc	maromero@educacionbogota.gov.co	SLA, Objetives, Quality		H	H	H	H	SLA, Reports, Quality
Warehouse mans	Schools	Receive Spares	Schools	Requests			M			Spares
Julio Ramón Patiño	IT	DEXON	jpatino@educacionbogota.gov.co	SLA, Spares,		H	H		H	SLA, Reports, Quality
VIP	SED	Directors, Rectors	Schools	Requests, Quality			H	L		Service
Orlando Rodríguez	Vicepresident	Vice-president	orlando.rodriguez@comware.com.co	Profit, NPS, SLA	H	H	H	H	H	Profit, Contractual Compliance
Luis Alfonso Castaño	Account Manager	Account Manager	luis.castano@comware.com.co	Profit, NPS, SLA	H		L		M	Billing, Customer Satisfaction
Process Consultant	IT	Process Consultan	Headuarters	Processes		H	H		L	Strengthening processes
Maria Victoria Angulo	Secretary	Secretary of Education	Headuarters	Customer Satisfaction				L		Objetivos e indicadores
Employees	All	SED	NA	Service			M			Service

Name	Area	Role	Information of contact	Requeriments of service	Engagement PHASES					Type of Interest
					I	P	E	M&C	C	
Students	Schools	SED	NA	Service			L			Service
Teachers	Schools	SED	NA	Service			H			Service
Providers, Sellers	Sales	Providers	NA	Procurement			M			Procurement
Team members	Project	Executors	NA	NA	H	H	H	H	H	Objectives
PMO	Company	Monitor &control	jorge.riviera@comware.com.co	Reports, Quality	H	H	H	H	H	SLA, Reports, Quality
Financial	Fin&Procurement	Control Costs, cash-flow	NA	Orders, Profit, costs, cash-flow	H	H	M	M	L	Profit, Contractual Compliance
HSEQ	Quality	HSEQ	NA	HSEQ Risks, Quality	M	M	M	M	M	HSEQ Risks, Quality

(Source: González, J. The Author. 2018)

The stakeholder's engagement matrix shows the different roles and their engagement in the 5 phases of the project. The decision to design this engagement matrix is based on the utility for considering these roles in the decision-making process.

4.9.3.2. Power/Interest Grid

The power is represented by the position and the ability to influence the project and the objectives, as depicted in Figure 43:
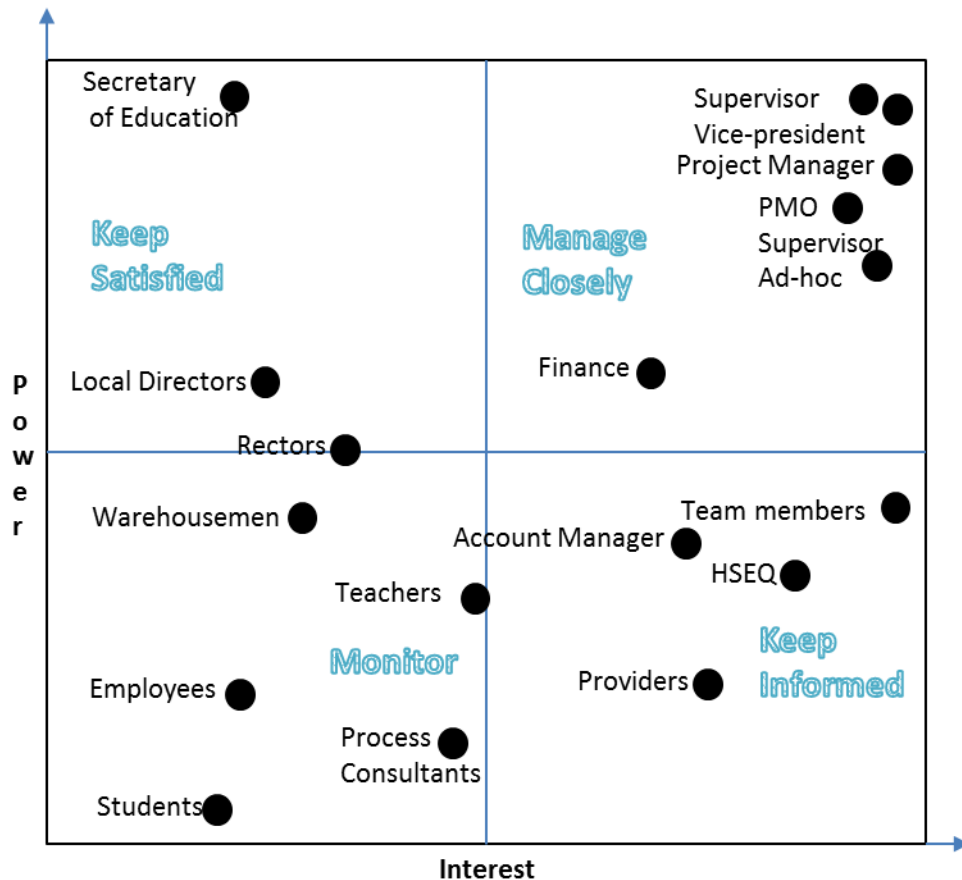
Figure 43. Interest/Power Grid

(Source: Adapted from: PMBOK, 6th. ed.)

4.9.3.3. Channels

There are several channels to manage the communications and the stakeholder's engagement. However, considering the type of contract and the client, the authorized channels are the following:

- Written documents: This is the main channel to maintain the engagement, especially for the stakeholders with high power and interest. The type of communications are reports, presentations, minutes, SLA, billing, conciliations and technical concepts. This strategy applies to internal stakeholders like Vice-president, finances and PMO.

- Emails: This is the most used channel and efficient to communicate operative information. For critical information the project manager must avoid it. For providers and team members this is ideal.

- Meetings: The meetings are the most formal channel of communication. The interaction with the client is critical. The scope can be modified if the assistants don´t have the deep knowledge about the requirements. Due to this, the project manager must know the agenda, participants and control this type of interactions. The team members are limited to operational meetings with end users.

- Chat. It´s considered informal channel. It must be used internally.

- Calls: It´s approved to exchange operational information with the client or its representatives. Internally, it is considered 100% formal to give orders to team members, having into account the geographical dispersion.

- Posters: If necessary, use to communicate to teachers and students masivelly.

4.9.4. Control Stakeholders Engagement

4.9.4.1. Stakeholder Engagement Assessment

The PMI proposed the stakeholder engagement assessment as a technique to control the engagement level of stakeholders.

The five categories extracted from PMBOK are:

- *Unaware: Unaware of the project and potential impacts.*
- *Resistant: Aware of the project and potential impacts, but resistant to any changes that may occur…*
- *Neutral: Aware of the project, but neither supportive nor unsupportive.*
- *Supportive: Aware of the project and potential impacts and supportive of the work and its outcomes.*

- *Leading: Aware of the project and potential impacts and actively engaged in ensuring that the project is a success*

In Figure 44 is depicted an engagement assessment for the stakeholders:
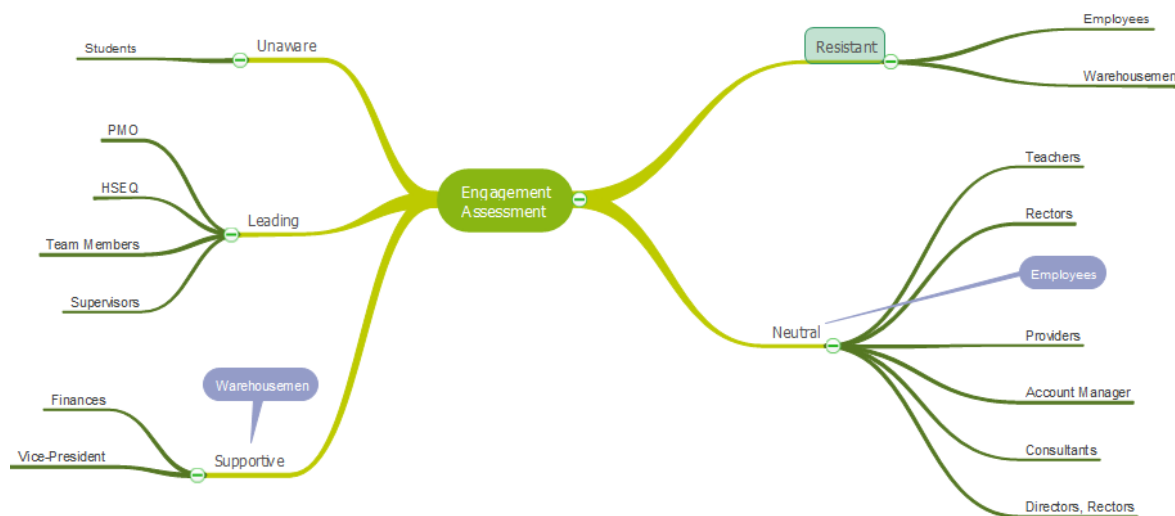
Figure 44. Mind Map Stakeholder Engagement Assessment

(Source: The Author, adapted from PMBOK, Engagement assessment matrix, 2018)

The resistant group is the most critical, because the warehouse group is related to spares delivery SLA. The desire status for the warehousemen is the supportive category. The desired status for employees is the neutral.

4.9.4.2. Feedback

The control stakeholder engagement has several tools for gathering feedback from the stakeholder groups. In Figure 45 these tools and techniques are outlined.
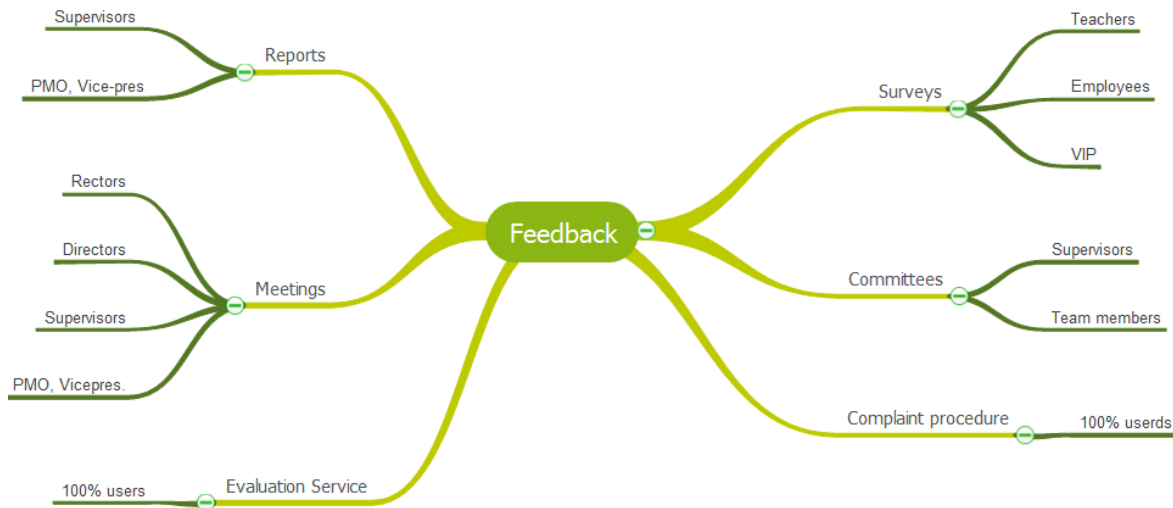
Figure 45. Mind Map Feedback Stakeholders

(Source: González, J. The Author. 2018)

- Satisfaction Surveys: Full coverage, are scheduled every three months.
- Committees: Entire performance report about schedule deviations, costs, issues, SLA, etc. Oriented to Supervisors, only.
- Complaint procedure: Full coverage. Anyone can register a complaint and receive attention from the QA area.
- Evaluation service: Full coverage. Everyone has to evaluate the service criteria and sign the format.
- Meetings: Scheduled for specific purposes including feedback about the entire project, only for internal use or the supervisors.
- Reports: Oriented to report the performance and legal aspects.

The feedback is a continuously process and the project can take actions about it.

4.10. Change Control

The Change Control process for this project has a strict legal framework. The reason is that the client is a public entity of a governmental nature. With the purpose of shielding the processes against demands to the state, what is established as scope, time, budget and quality in the ToR is unchangeable by the parties. The legal mechanism for change requests and approval them is an

additional agreement called "Contractual Modification", which needs to be accepted by the provider and the client. This is a critical process, since by accepting changes in scope, time, budget or quality, public officials are accepting that they were wrong to define the project's objectives, being exposed to disciplinary, criminal or fiscal processes.

It is an accepted practice among government entities to avoid contractual modifications as much as possible, especially if the money amounts of the projects are high. From the contractor's point of view, he is not obliged to accept the changes proposed by the entity and he is protected by law through a mechanism called "economic imbalance" if he considers that the cost change or his income decreases. However, minor changes that do not impact the scope, cost, time or quality and that the project manager decides to accept without putting the company at risk can be carried out without elevating it to "contractual modification". In exceptional cases, where the Project Manager considers that the risk may negatively affect the company, it must be escalated to the PMO or the steering committee.

4.10.1. Change Control Board - CCB

The Change Control Board is composed by Steering Committee of the company and the Client´s Supervisor, as showed in Figure 46.
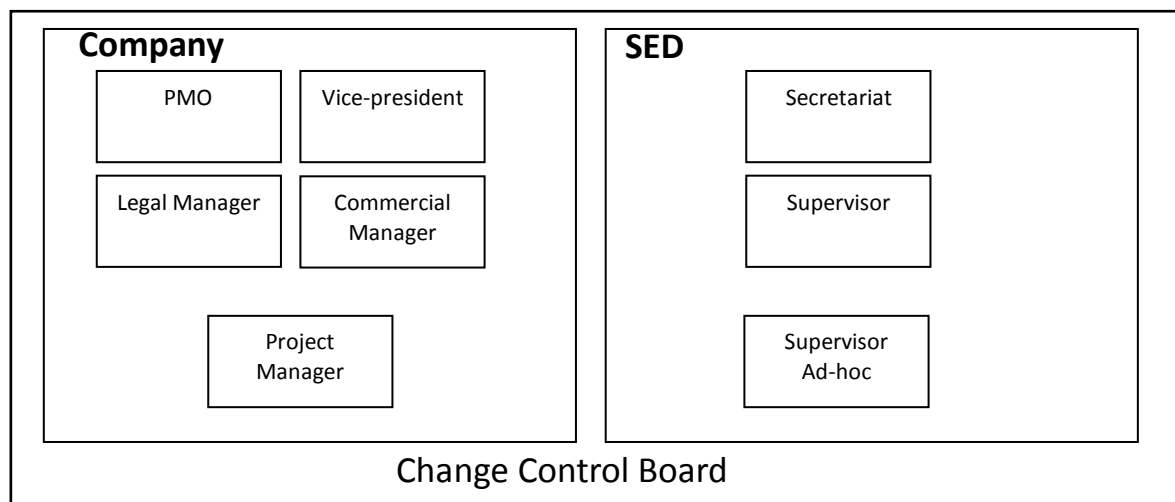
Figure 46. Change Control Board Structure

(Source: González, J. The Author, 2018)

The CCB is convened exclusively by the project manager, when the change requests are considered to have high impact to the company. These requests are considered risky, especially if they generate costs that were not foreseen or that for their amount require approval of the steering committee. Those requests are considered "Major Changes" and require the CCB intervention.

4.10.2. Major Changes

The company´s policy about the change requests is clear and documented by PMO:

- The costs are fixed and cannot be modified by project manager or the client.
- The Contingency and Management reserves require previous authorization from Vice-President before used them to procurement or staff recruitment.
- The time, scope, budget and quality requirements are defined in ToR, thus requests for modification of them, require contractual modification.
- The PM is not the legal representative of the company, so he cannot decide about these kinds of requests for change.
- When in doubt, the PM should escalate immediately to PMO or Vice-President.
- The PM can register or report these requests through risks register and PMIS.
- The Steering Committee can approve these changes through contractual modifications. The exceptions must be approved according to corporate strategy.
- Major changes are requests for doing additional tasks, deliverables or procurements that require investments not foreseen.

The following process flow shown in Figure 47 is used to major requests change.

	Description	Responsible	Document
Start			
Register and analize the impact	Registration and analysis.	Project Manager	Memo, email, Minutes
Major change? — No → (1) — Yes	Major Change? Yes: Escalate to PMO or steering committee	Project Manager	Email Risk register
Escalate Steering Committee	Approved? Yes: Proceed to Legal Manager to contractual modification No:Communicate to client	Legal Manager	Memo
Approved? — No → (2) — Yes			
Contractual Modification	New Contract or modificafication	Legal Manager	Contract
Publish and document	Implement, publish and monitor the change.	Project Manager	Minutes Lessons Learned
Implementation			
Monitor & Control			
End	(1) Minor Change	(2) Commercial Offer	

Figure 47. Flow Process for Major Changes

(Source: González, J. The Author, 2018)

The PM receives from project team, clients, supervisors or other stakeholders a change request. The knowledge of ToR´s requirements and deliverables let him decide if this is a major change or not. A major change must be escalated to CCB from the company side. The PM can filter the requests before the escalation process. The PM can decide if the change does not proceed according to a previous analysis. If the request is a minor change, the PM can decide the strategy for its implementation. The Steering Committee evaluates the request and can refuse it. If this request is an additional scope, the commercial department proceeds to build a commercial offering and quotation.

The approval of a major change is approved for implementation after signing contractual modification.

4.10.3. Minor Changes

The requests for minor changes are considered operative tasks and the PM is the responsible for their approval. These requests are not critical for time, budget, scope and quality. These changes shall be implemented by the project team. Figure 48 depicts the flow diagram for these minor changes.
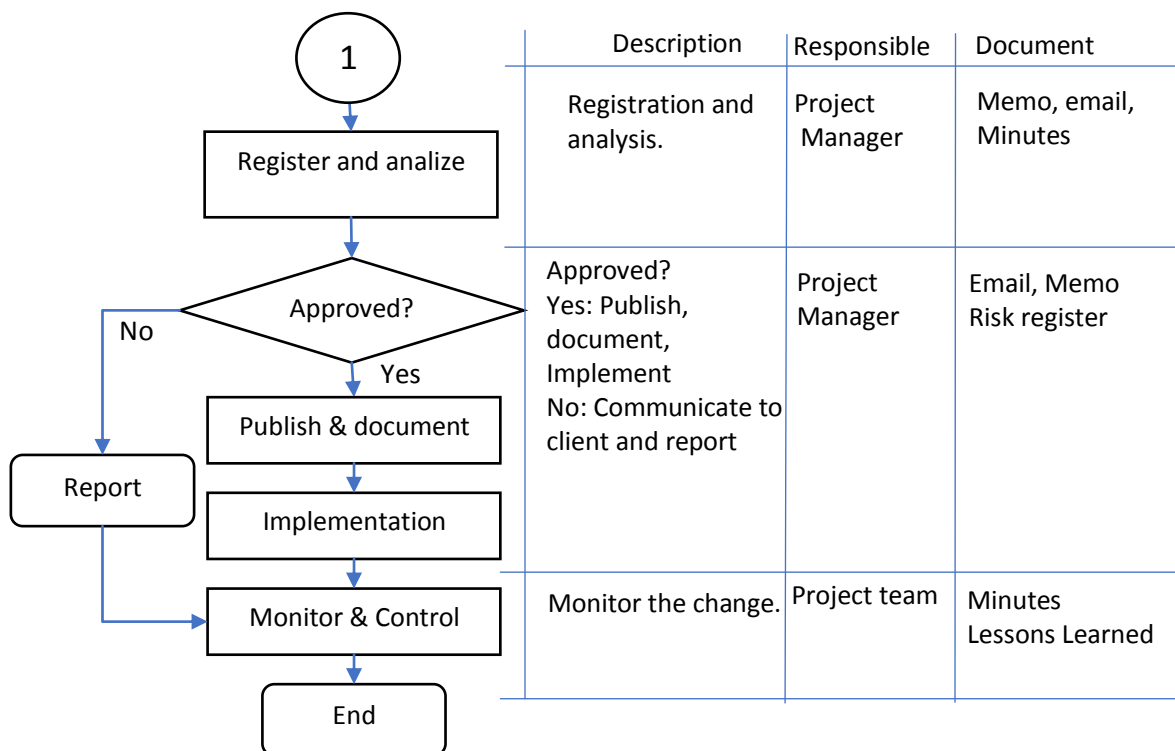
Figure 48. Process Flow for Minor Changes

(González, J. The Author, 2018)

categories:

- Relocation of resources
- Prioritization of activities
- Accompanions to projects or events without notice

- Equipment transfers
- Staff changes
- Loan of tools and equipments
- Updates to documents
- Corrective actions
- Preventive Actions
- Complaints

CONCLUSIONS

1. The most important tool used in this project for structuring, resuming, synthetizing, organizing and explaining information was the Mind Maps. The most used technique was the Expert judgment.

2. To create the Scope Project Management chapter, there were used the tools and techniques proposed in the PMBOK, 6th. Ed. Such as WBS; Traceability Requirements Matrix, Requirements list, Exclusions and Constraints, Deliverable list and acceptance criteria. However, the definition of the Scope would not have been possible without the characterization of the client and the knowledge of his business, due to its complexity and size. In the project management methodology, more emphasis could be placed on this tool, through visits, interviews and documentation of the client's mission processes. The most difficult topic for this objective was the Scope Definition. In this project it was not easy to define into paragraph or phrase. The Lessons Learned and Expert judgment were key to define the Scope for this project.

3. The Schedule Management, despite being the most difficult knowledge area to assimilate and build for a project manager, was a bit easy for this project. The reason, once again, is that the public tender establishes two unmodifiable dates regardless of the supplier: Start day and end day. This condition is not included into PMBOK. This means that the project can not have gaps or early completions. The closing phase is the most critical and must be completed in parallel with the execution phase with 100% of the documentation, which must be signed within the expected time of the contract.

4. The Cost Project Management deliverable had two challenges to face: 1. The budget as the time is fixed in the public tender. The cost at the beginning must be as much accurate as possible. This requires the estimates to be precise costs and the minimum margin of error. Otherwise the company may incur in losses to accept projects with reduced profit

margins. The project is obliged to take the budget published in the tender as a roof

5. To develop the Quality Plan, the most import source for this chapter was the expert judgment and experience of project manager and architects in the company. The Quality Plan is closely related to Scope Definition and the outcomes of the project.

6. The Resource Project Management had the tender, as the primary source for estimating the human resources and the physical resources. The client published the staff required according to the service metrics. The architecture area added the administrative staff, quality and logistic resources. The physical resources were documented in the tender. The uncertainty was easy to analyze.

7. The Communications deliverable confronted the project team with a new paradigm in project management. The end users have no influence and power into the project and their position is unaware as stakeholder. The end users for this project are 800.000 students. It is not a common project where the end users have no or little influence in its development.

8. The Escenarios technique for the Quantitative Risk Analysis, it is the easy and cheap tool for replace the specialized tools and programs to develop the quantitative risk analysis. The advantage to use this tool is that it is based on the Profitability variable, which is the most common for the steering committees.

9. To manage the stakeholders´ engagement, the social networks showed great effectiveness, due to the large number of stakeholders and the high dispersion through 760 locations. The broadcast tool used in this project was WhatsApp to inform immediate changes and operative decisions.

RECOMMENDATIONS

1. COMWARE SAS should standardize the methodology and templates of Project Management Plans documents to increase performance and fiability in the execution of the projects.

2. The PMBOK should include mentions about projects developed for governmental and public sector, which have fixed the time, scope and budget for beginning and they impose these variables as a primary condition to start the contract. This impose a planning process different to projects where the time, scope and budget can be modified according to changes in the scope.

3. COMWARE SAS should employ a formal Project Charter to begin the project and executed it. Today, Project Charter is replaced by cost datasheet to formalize the projects.

4. COMWARE SAS should include in the planning process, a procedure for client characterization, since this can reduce the risks and the uncertainty in the scope of the project.

5. The three schedules used by COMWARE SAS (one for start-up, planning and one for execution and closure) should be unified into one.

6. The PMBOK should include a little mention about projects which define the schedule as a condition for signing the contract.

7. COMWARE SAS should include learned lessons for costs planning into the PMIS.

8. COMWARE SAS should decentralize the Quality Control and assign resources to every project.

9. The Quantitative Analysis should be done by COMWARE SAS at least for large projects, and adquire a tool for this.

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APPENDICES

Appendix 1: FGP Charter

PROJECT CHARTER	
Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries.	
Date	**Project Name:**
05/20/2018	Project Management Plan for the Help Desk implementation in Secretariat of Education District of Bogotá, Colombia.
Knowledge Areas / Processes	**Applicacion Area (Sector / Activity)**
Knowledge areas: Integration, Scope, Time, Cost, Resources, Quality, Risk, Communications, Procurement, Stakeholders. **Process groups:** Initiation, Planning, execution, Monitoring & control, Closing	Information Technology/ Outsourcing services
Start date	**Finish date**
05/20/2018	09/11/2018

Project Objectives (general and specific)
General objective: To create a Project Management Plan to manage the implemenation of the Help Desk in the Secretariat of Education of the Disctrict of Bogotá.   Specific objectives: 1. To create a Scope Management Plan to ensure that all the required work is carried out.   2. To create a Time Management Plan to control the time spent on specific activities.   3. To create a Cost Management Plan to handle properly the defined budget   4. To define a Quality Management Plan to meet the requirements of stakeholders   5. To develop a Resource Management Plan to warrant the resources assigment to the project   6. To create a Communication Management Plan to control the communications with the stakeholders timely and adequately   7. To develop a Risks Management Plan to control the identified risks   8. To create a Procurement Management Plan to manage the purchases and the contracts   **9. To define a Stakeholders Management Plan to promote their engagement**

Project purpose or justification (merit and expected results)
The Secretariat of Education of District of Bogotá (SED) has launched the public bidding to design, implement and offer a Help Desk to provide the Information Technology Services to the academic community hosted in 760 locations in Bogotá, Colombia. This project will develop the subsidiary Plans necessary for the initiation, planning, execution, monitor and control and closing processes which will be used by the project team.   Currently, the Secretariat of Education of District (SED), has the IT infrastructure of Help Desk in house, but the high degree of obsolescence led them to request services outside their facilities provided by third parties for the first time in its history. One of the main requirements is the development of subsidiary management plans according to the PMI guidelines.   As eligible elements to participate in the tender, each tenderer must prepare to manage the project by developing the management plans in accordance with the 6th edition of the PMBOK. The project manager and the project team understand the importance of these subsidiary plans to win the contract and manage properly the project.

Description of Product or Service to be generated by the Project – Project final deliverables
The Project Management Plan for the Help Desk implementation in Secretariat of Education of District will be develop with this project (FGP). The final deliverables will be the subsidiary plans defined by the PMI guidelines methodology.

Assumptions
-The necessary information is available and its use is authorized
-The 3 months for develop the FGP is enough
-The FGP´s topic will be approved.

Constraints
1. Time: Three months.
2. Resources: One person

Preliminary risks
1. If the working conditions of master student change in the next months might affect the completion of document.
2. If the information required is not available might affect the design of management plans.

Budget
According to deliverables the budget of this project will be:
Documents, print, books: US$ 100
Internet services, Leasing Desktop, Office: US$ 500
Logistic, transport: US$ 400
Reserves: US$ 200
Budget: US$ 1.200

Milestones and dates

Milestone	Start date	End date
Seminar approval	11/06/2018	15/06/2018
Tutor assingment	18/06/2018	18/06/2018
Development deliverables	28/06/2018	31/08/2018
Tutor approval	14/09/2018	14/09/2018
Report for reviewers	08/10/2018	18/10/2018
Final review by board	05/11/2018	06/11/2018
FGP grade report	07/11/2018	09/11/2018

Relevant historical information
The Secretariat of Education of District, is an entity of Bogotá City Hall responsible for the administration and support of public elementary and high schools of Bogotá City. Currently, there are 760 locations and 32.000 teachers servicing more than 800.000 students. COMWARE SAS is an IT company with 30 years in the Colombian industry. Their services are related to IT industry like Help Desk services, Business Process Outsourcing - BPO, Unified Communications and IT integrator. COMWARE SAS has a PMO with a basic maturity level and a 20 staff of project managers with different levels of knowledge. The tender for Help Desk IT services, is going on in this moment and there are 9 bidders participating in the process. The PMI methodology and their subsidiary Plans are required for the proposal.

Stakeholders
Direct stakeholders:
Project Manager – José Adelmo González R.
FGP lecturer – Carlos Brennes

Indirect stakeholders:
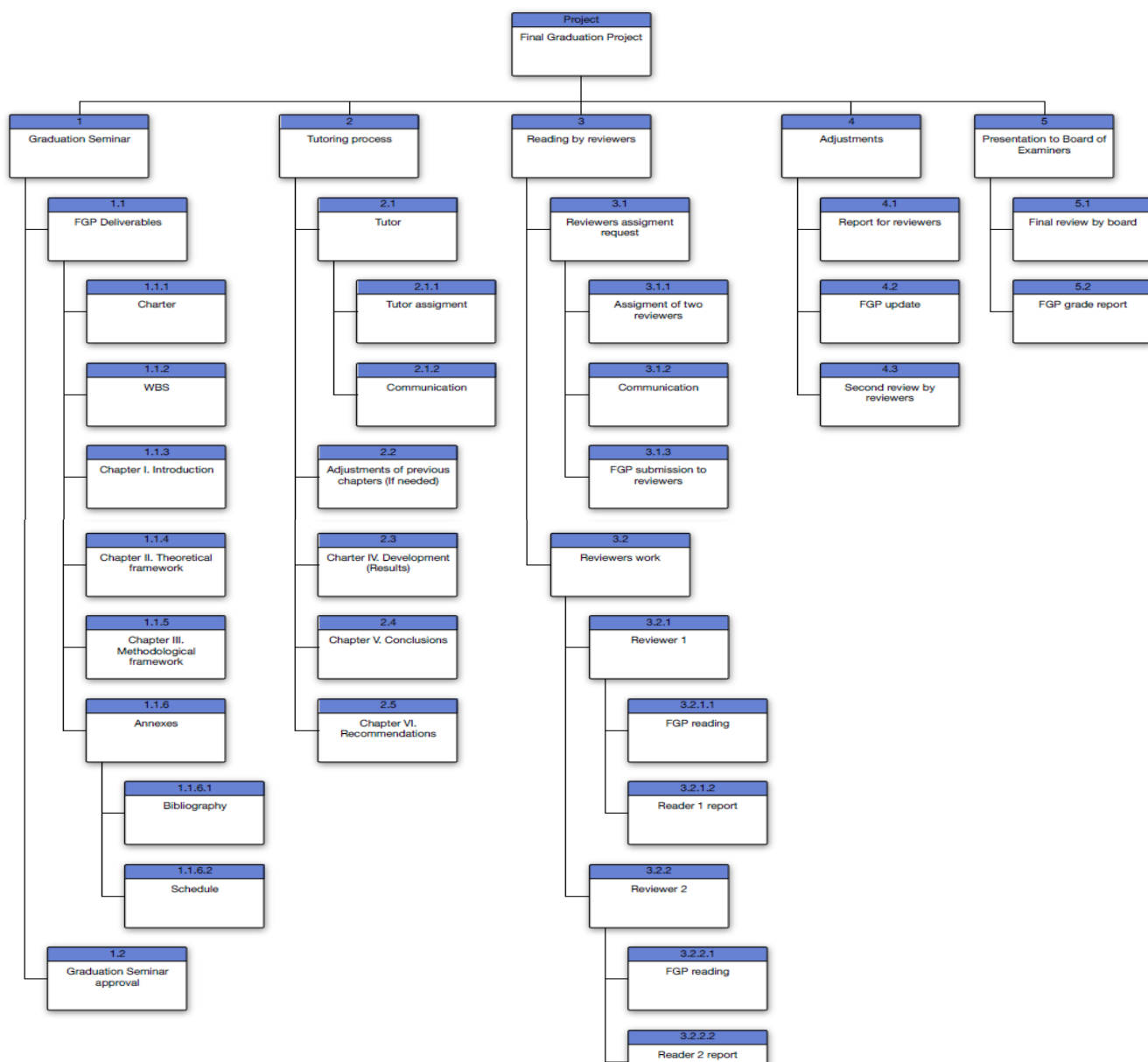Academic Assistant – Sofia Gómez

Project Manager: JOSE ADELMO GONZALEZ	
	Signature:
Authorized by:	Signature:

Appendix 2: FGP WBS

Appendix 3: FGP Schedule

	◢ Final Graduation Project	130 días	lun 14/05/18	vie 09/11/18
	FGP Start	0 días	lun 14/05/18	lun 14/05/18
	◢ 1,Graduation Seminar	25 días	lun 14/05/18	vie 15/06/18
	◢ 1.1,FGP Deliverables	20 días	lun 14/05/18	vie 08/06/18
	1.1.1,Charter	5 días	lun 14/05/18	vie 18/05/18
	1.1.2,WBS	5 días	lun 14/05/18	vie 18/05/18
	1.1.3,Chapter I. Introduction	5 días	lun 21/05/18	vie 25/05/18
	1.1.4,Chapter II. Theoretical framework	5 días	lun 28/05/18	vie 01/06/18
	1.1.5,Chapter III. Methodological framework	5 días	lun 04/06/18	vie 08/06/18
	◢ 1.1.6,Annexes	15 días	lun 21/05/18	vie 08/06/18
	1.1.6.1,Bibliography	5 días	lun 04/06/18	vie 08/06/18
	1.1.6.2,Schedule	5 días	lun 21/05/18	vie 25/05/18
	1.2,Graduation Seminar approval,	5 días	lun 11/06/18	vie 15/06/18
	◢ 2,Tutoring process	65 días	lun 18/06/18	vie 14/09/18
	◢ 2.1,Tutor	3 días	lun 18/06/18	mié 20/06/18
	2.1.1,Tutor assigment	1 día	lun 18/06/18	lun 18/06/18
	2.1.2,Communication	2 días	mar 19/06/18	mié 20/06/18
	2.2,Adjustments of previous chapters (If needed)	5 días	jue 21/06/18	mié 27/06/18
	2.3,Charter IV. Development (Results)	47 días	jue 28/06/18	vie 31/08/18
	2.4,Chapter V. Conclusions	5 días	lun 03/09/18	vie 07/09/18
	2.5,Chapter VI. Recommendations	5 días	lun 10/09/18	vie 14/09/18
	Tutor approval	0 días	vie 14/09/18	vie 14/09/18
	◢ 3,Reading by reviewers	15 días	lun 17/09/18	vie 05/10/18
	◢ 3.1,Reviewers assigment request	5 días	lun 17/09/18	vie 21/09/18
	3.1.1,Assigment of two reviewers	2 días	lun 17/09/18	mar 18/09/18
	3.1.2,Communication	2 días	mié 19/09/18	jue 20/09/18
	3.1.3,FGP submission to reviewers	1 día	vie 21/09/18	vie 21/09/18
	◢ 3.2,Reviewers work	10 días	lun 24/09/18	vie 05/10/18
	◢ 3.2.1,Reviewer	10 días	lun 24/09/18	vie 05/10/18
	3.2.1.1,FGP reading	9 días	lun 24/09/18	jue 04/10/18
	3.2.1.2,Reader 1 report	1 día	vie 05/10/18	vie 05/10/18
	◢ 3.2.2,Reviewer	10 días	lun 24/09/18	vie 05/10/18
	3.2.2.1,FGP reading	9 días	lun 24/09/18	jue 04/10/18
	3.2.2.2,Reader 2 report	1 día	vie 05/10/18	vie 05/10/18
	◢ 4,Adjustments	20 días	lun 08/10/18	vie 02/11/18
	4.1,Report for reviewers	9 días	lun 08/10/18	jue 18/10/18
	4.2,FGP update	1 día	vie 19/10/18	vie 19/10/18
	4.3,Second review by reviewers	10 días	lun 22/10/18	vie 02/11/18
	◢ 5,Presentation to Board of Examiners	5 días	lun 05/11/18	vie 09/11/18
	5.1,Final review by board	2 días	lun 05/11/18	mar 06/11/18
	5.2,FGP grade report	3 días	mié 07/11/18	vie 09/11/18
	FGP End	0 días	vie 09/11/18	vie 09/11/18

Appendix 4: Format Service – Report of Service

Mesacom	**REPORTE DE SERVICIO**				ALCALDÍA MAYOR DE BOGOTÁ D.C. SECRETARÍA DE EDUCACIÓN / BOGOTÁ MEJOR PARA TODOS

No. De Caso		Funcionario		Cédula:		Tel. Ext:	
Localidad:		Dirección:		Dependencia:		Piso:	

IE: (Institución Educativa)			Sede:	

INFORMACIÓN DEL EQUIPO	PC ☐ Portátil ☐ Impresora ☐ Switch ☐ Otro ☐ ¿Cúal?:	

Marca:	Serial: No.	**INFORMACIÓN DE TIEMPOS DE CASO**	
Modelo:	Placa: ☐ No.	Fecha dd/mm/aa	Hora
Ubicación (Campo Obligatorio)		Atención:	
Sistema operativo:	Nombre del solucionador:	Solución:	

Requerimiento ☐   Incidente ☐

Falla reportada /solicitud del usuario:

Acciones ejecutadas:

 # SELLO MANTENIMIENTO CORRECTIVO HARDWARE:

REPUESTO INSTALADO:	Marca: _____	Serial: _____
REPUESTO RETIRADO:	Marca: _____	Serial: _____

Nombre de quien recibe el repuesto dañado (Campo Obligatorio)

Especificación Técnica del repuesto: (Describir configuración de Hardware, si aplica)

Estado del Equipo: _____

Observaciones:	Satisfacción del Usuario ☐1 ☐2 ☐3 ☐4 ☐5	
	Si su calificación fue igual o menos que 3, indique la causa:	Firma de Usuario

Appendix 5: Linguist Concept
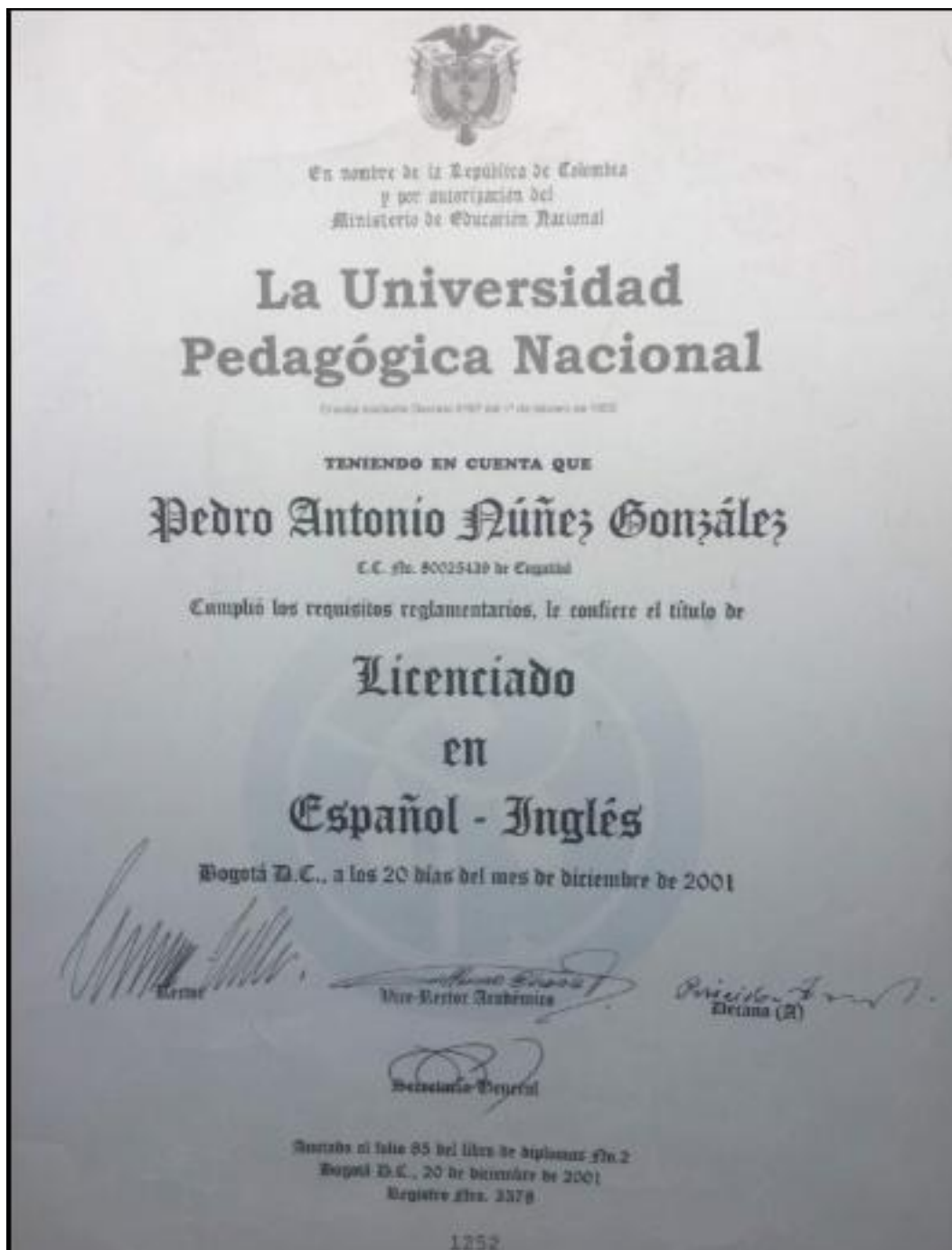
INTERNATIONAL ENGLISH LANGUAGE TESTING SYSTEM

Test Report Form

ACADEMIC

NOTE   Admission to undergraduate and postgraduate courses should be based on the ACADEMIC Reading and Writing Modules. GENERAL TRAINING Reading and Writing Modules are not designed to test the full range of language skills required for academic purposes. It is recommended that the candidate's language ability as indicated in this Test Report Form be re-assessed after two years from the date of the test.

| Centre Number | CO001 | Date | 08/AUG/2009 | Candidate Number | 001376 |

Candidate Details

Family Name	NUÑEZ GONZALEZ
First Name	PEDRO ANTONIO
Candidate ID	80025439

| Date of Birth | 30/05/1979 | Sex (M/F) | M | Scheme Code | British Council |
| Country or Region of Origin | Colombia | First Language | Spanish | | |

| Repeating IELTS (Y/N) | Y | Previous Test Date | 08/AUG/2006 | Previous Test Centre | BC COLOMBIA |

Test Results

| Listening | 7.0 | Reading | 5.0 | Writing | 5.5 | Speaking | 6.5 | Overall Band Score | 6.0 |

Administrator Comments

Centre stamp

BRITISH COUNCIL
Colombia

Validation stamp

IELTS

| Writing Examiner Number | 995022 | Administrator's Signature | |
| Speaking Examiner Number | 997512 | Date | 20/08/2009 | Test Report Form Number | 09CO001376NUEP001A |

BRITISH COUNCIL   **IELTS idp AUSTRALIA**   **UNIVERSITY of CAMBRIDGE ESOL Examinations**
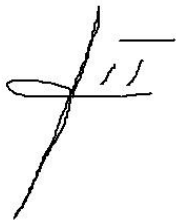
Certificate of Review

For

_____Jose Adelmo González_____

Final Graduation Project, Master in Project Management (MPM) Degree, Project Management Plan For The Help Desk Implementation In Secretariat of Education of District of BOGOTÁ, COLOMBIA `

Comments: Minor and scarce grammatical corrections such as subject and verb agreement, use of some collocations and position of adjective. Some repetitious words were changed to create a more interesting read. The paper strength lies in its structure and the writer's adherence to this outline throughout the paper. The paper's weakness is in the use of some words, which are much repeated. Ultimately, the paper is convincing and clear enough to demonstrate that PMI is appropriate for this sort of projects.

_____

Pedro Antonio Nuñez, Spanish and English Graduate. BA

Bogotá, Colombia _____3rd November, 2018_____

FGP READER REPORT

Student: JOSE ADELMO GONZALEZ

Topic of Final Graduation Project:

PROJECT MANAGEMENT PLAN FOR THE HELP DESK IMPLEMENTATION IN
SECRETARIAT OF EDUCATION DISTRICT OF BOGOTÁ, COLOMBIA

Reader: **Ruben Dario Alzate Mora. Signature:** **Date: 29–NOV–2018.**

Telephone: +513107975165

E-mail: ruben.alzate@gmail.com

MERIT CRITERIA: APPROVED_X_ FAILED __

CHART OF APPROVAL

FGP Requirements	Fulfills requirements Yes or No	Observations (if any)
Executive Summary	Y	
Submits in a satisfactory and summarized manner the background, objectives, methodology, results and recommendations.		
1) Introduction of the FGP	Y	
Includes in a satisfactory manner the background, problematic and justification of the project as well as its general and specific objectives.		
2) Theoretical Framework for FGP	Y	
Includes the theoretical elements related to the study, including the institution´s referential framework.		
3) Methodological Framework for FGP	Y	
Methods, techniques, procedures and tools are identified and described in accordance to the EDT of the investigation.		
4) Content Development	Y	
Contributions for the organizations involved, for knowledge and innovation are presented.		
5) Conclusions and Recommendations	Y	

FGP READER REPORT

Student: José Adelmo González

Topic of Final Graduation Project: PROJECT MANAGEMENT PLAN FOR THE HELP DESK IMPLEMENTATION IN SECRETARIAT OF EDUCATION DISTRICT OF BOGOTÁ, COLOMBIA

Reader: Carlos Ramírez Montero   Signature: Date: Dec–02–2018.

Telephone: 506-8991-5589

E-mail: Carlosramirezuniversidad@gmail.com

MERIT CRITERIA: APPROVED_X_   FAILED __

CHART OF APPROVAL

FGP Requirements	Fulfills requirements Yes or No	Observations (if any)
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Includes in a satisfactory manner the background, problematic and justification of the project as well as its general and specific objectives.		
2) Theoretical Framework for FGP	Y	
Includes the theoretical elements related to the study, including the institution´s referential framework.		
3) Methodological Framework for FGP	Y	
Methods, techniques, procedures and tools are identified and described in accordance to the EDT of the investigation.		
4) Content Development	Y	
Contributions for the organizations involved, for knowledge and innovation are presented.		
5) Conclusions and Recommendations	Y	
Coherent and linked to the objectives.		