

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

**PROJECT MANAGEMENT PLAN TO DEVELOP A NATIONAL PLAN TO
EXPAND INTERNET ACCESS TO RURAL AND REMOTE AREAS IN BELIZE**

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DEDICATION

This research project is dedicated to my sister, Yazmin Urbina, for believing in me, encouraging, and supporting me with my life decisions. To my nieces and nephews for giving me an even better reason to strive for excellence and be a better role model to them. I also want to dedicate this project to my friend, Stacy Badillo, who played a very important role in helping me to finish this Master's Program strong. Thank you Stace for being my biggest cheerleader!

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Lastly, I would like to express gratitude to my family and friends who supported me during this process and kept motivating me to carry on.

ABSTRACT

This document was developed with the objective to compile a project management plan that integrates project management principles to develop a National Plan to expand internet connectivity to remote and rural areas in Belize. The Covid-19 pandemic has shown us clearly that the internet is no longer a luxury rather access to internet has become a necessity. Currently rural and remote communities in Belize have identified challenges accessing affordable internet highlighting the gap between urban and rural connectivity.

Consequently, the final product of this project includes a plan to deploy internet access to rural communities of Belize. The plan will consist of related management plans for scope, schedule, costs, quality, resources, communications, risks, and stakeholders. Given that this project will not require services other than internal resources time, there is no need for a procurement plan.

For this project, the applied research method was used along with guidance from the Project Management Institute.

INDEX OF CONTENTS

APPROVAL PAGE ii

DEDICATION iii

ACKNOWLEDGMENTS iv

ABSTRACT v

INDEX OF CONTENTS vi

INDEX OF FIGURES vii

INDEX OF CHARTS viii

ABBREVIATIONS AND ACRONYMS ix

EXECUTIVE SUMMARY x

1 INTRODUCTION 1

 1.1 Background..... 1

 1.2 Statement of the problem..... 2

 1.3 Purpose 3

 1.4 General objective..... 3

 1.5 Specific objectives..... 3

2 THEORETICAL FRAMEWORKS 5

 2.1 Company/Enterprise framework..... 5

 2.2 Project Management concepts 8

3 METHODOLOGICAL FRAMEWORK..... 15

 3.1 Information sources 16

 3.2 Research methods 19

 3.3 Tools 22

 3.4 Assumptions and constraints 24

 3.5 Deliverables 25

4 RESULTS 28

 4.1 Project Charter 28

 4.2. Project Scope Management Plan 32

 4.3. Project Schedule Management Plan 42

 4.4. Project Cost Management Plan..... 46

 4.5. Project Quality Management Plan..... 51

 4.6. Project Resource Management Plan 54

 4.7. Project Communication Management Plan 61

 4.8. Project Risk Management Plan..... 64

 4.9. Project Stakeholder Management Plan..... 71

5 CONCLUSIONS 75

6 RECOMMENDATIONS 78

7 BIBLIOGRAPHIES 80

8 APPENDICES 81

 Appendix 1: FGP Charter 81

 Appendix 2: FGP WBS 72

 Appendix 3: FGP Schedule 73

INDEX OF FIGURES

Figure 1 Fiber to the Home Network 2021 (® Belize Telemedia Limited)..... 6
Figure 2 Organizational Structure (® Belize Telemedia Limited)..... 7
Figure 3 Project Management Life Cycle (PMBOK® Guide 6th Edition) 9
Figure 4 Project Management Processes (©John Wiley & Sons, Inc.)..... 10
Figure 5 Project Management Knowledge Areas (PMBOK® Guide 6th Edition) 11
Figure 6: Plan Scope Management: Input, Tools & Techniques and Outputs.
Reprinted from A Guide to..... 32
Figure 7: Work Breakdown Structure (Source: Compiled by author)..... 36
Figure 8: Project Schedule illustrating all project activities (MS Project) 44
Figure 9: Critical Path for the project (MS Project) 45
Figure 10 Risk Breakdown Structure (Compiled by Author) 67
Figure 11: Stakeholder Power/Interest Grid (Compiled by author) 73
Figure 12:Stakeholder Management Process and Methods (Copyright 2017-2019
Mark Warner, TheProject ManagementBlueprint.com) 74

INDEX OF CHARTS

| | |
|--|----|
| Chart 1: Project Management Knowledge Areas (PMBOK® Guide 6 th Edition) ... | 12 |
| Chart 2: Information sources (Source: Compiled by author) | 17 |
| Chart 3: Research methods (Source University of Udaipur, 2011)..... | 19 |
| Chart 4: Tools (Source: PMBOK® Guide 6th Edition) | 23 |
| Chart 5 Assumptions and constraints (Source: Compiled by author) | 25 |
| Chart 6 Deliverables (Source: Compiled by author) | 27 |
| Chart 7: Deliverables (Source: Compiled by author) | 35 |
| Chart 8: Cost Performance Indicators | 49 |
| Chart 9: Project Budget | 49 |
| Chart 10: Project Requirements Log (Source: Compiled by Author) | 53 |
| Chart 11: Quality Management Metrics for the Project (Compiled by Author) | 53 |
| Chart 12: High-level WBS and Resources Required (Compiled by Author) | 56 |

ABBREVIATIONS AND ACRONYMS

| | |
|---------------------|--|
| BDI | Broadband Development Index |
| BTL | Belize Telemedia Limited |
| CPI | Cost Performance Index |
| CV | Cost Variance |
| EVA | Earned Value Analysis |
| FTTH | Fiber to the Home |
| GSM | Global System for Mobile Communications |
| ICT | National Information and Communications Technology |
| ICU | International Telecommunication Union |
| IICCA | Instituto de Investigación y Capacitación |
| IDB | Inter-American Development Bank |
| LTE | Long Term Evolution (of Mobile Networks) |
| MS | Microsoft |
| NBP | National Broadband Plan |
| PDM | Precedence Diagramming Method |
| PERT | Program Evaluation and Review Technique |
| PMBOK® Guide | Project Management Body of Knowledge Guide |
| PMI | Project Management Institute |
| PMP | Project Management Plan |
| PoP | Point of Presence |
| RAN | Radio Access Network |
| RoI | Return of Investment |
| SPI | Schedule Performance Index |
| SRCi | Substantial Rural Connectivity Index |
| SUCi | Substantial Urban Connectivity |
| SWOT | Strengths, Weaknesses, Opportunities and Threats |
| SV | Schedule Variance |
| TaiwanICDF | International Cooperation and Development Fund |
| UMTS | Universal Mobile Telecommunications System |
| WBS | Work Breakdown Structure |

EXECUTIVE SUMMARY

The National Information and Communications Technology (ICT) Development Index by the International Telecommunication Union (ITU) shows that Belize performs well in areas such as the amount of international internet bandwidth per internet users, while the country needs more efforts in developing both fixed-telephone subscriptions and broadband subscriptions or households with internet. The research showed the historically low level of connectivity throughout the territory. The Substantial Rural Connectivity Index (SRCi) and Substantial Urban Connectivity (SUCi) study revealed that Belize belongs to the cluster with low significant rural connectivity, which means that there is a huge gap between urban connectivity and rural connectivity and the population does not have access to connectivity services of sufficient quality (IDB, IICCA, 2020). Highlighted in the study was the limited availability of broadband with an average of only 16.6% of the rural population able to access internet services.

In 2018, the Government of Belize made efforts to increase connectivity throughout the country by securing funding from the Taiwan ICDF to deploy internet, broadband Fiber to the Home (FTTH) service throughout Belize. Currently, the largest existing fiber network in the country, owned by Belize Telemedia Limited (BTL), can serve over 90,000 households with the fastest internet service in the country. Although the network has significantly increased the fixed broadband coverage, internet speeds and stability, its coverage was mainly on urban town, cities, and nearby villages.

The general objective of this document is to develop a plan to expand internet access to rural and remote areas of Belize. The specific objectives are to produce a project charter to outline the project purpose, objectives, and milestones; to create a Scope Management Plan that includes all work necessary to successfully implement the project; and to develop a Schedule Management Plan that includes a project schedule that will ensure the project is completed within the time frame.

The document also includes a Cost Management Plan clearly defining the project budget required to complete the project; a Quality Management Plan to outline the quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints; a resource management plan to identify the human resources needed to complete the project; and a communication plan to ensure timely and effective communication of the project status. Additionally, the document aims at producing a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them, as well as a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. Note that this project will not require a procurement plan since there will be no need to contract external goods or services.

The methodology used for this project includes descriptive, analytical, and applied research. The descriptive and analytical research method served a key role in statistics and data analysis of past and existing FTTH projects. Applied research was used to find practical solutions for deploying internet to rural and remote areas of Belize. Consequently, the results chapter shows that the research conducted was conclusive as there was sufficient resources within the company to develop a plan to expand internet access to rural and remote areas of Belize. Some of the major risks identified were delays in schedule which could be mitigated by establishing a monitoring system that will require weekly reports and assessments.

Although the executing organization, Digi, has a Program Management Officer and some project management components instituted, a revision of all these documents was done and presented in the results chapter. The successful implementation of the project which includes the phased action plan also referred to the National Plan will be used by Digi to present to the Government of Belize-E-Governance Department with the intention to seek funding for the expansion of internet to rural areas since it was highlighted in the ICT National Strategy of Belize.

1 INTRODUCTION

This chapter includes a brief background of the project, the problem statement, its purpose and the objectives by which this project was chosen.

1.1 Background

In 2011, the Government of Belize presented a National Information and Communications Technology (ICT) Strategy with the vision of accelerating development and improving quality of life for all Belizeans through universal access and widespread usage of ICT. The way Belizeans communicate, interact, learn, do business, healthcare, socialize and care for each other are all influenced by ICT. To help realize an important national policy of deploying internet broadband fiber to the home (FTTH) service throughout Belize, the Taiwan ICDF, provided a loan to the Belize Telemedia Limited (BTL) to finance its National Broadband Plan for replacing its fixed internet infrastructure with a fiber optic network to increase the quality of and access to fixed internet service in the country.

Currently, the largest existing fiber optic network can serve over 90,000 households with the fastest internet service in the country. Over 35,000 households throughout the country have internet access via the Fiber to the Home network. Although this network has significantly increased the fixed broadband coverage, internet speeds and stability, its coverage exists mainly in urban town, cities, and nearby villages.

In this Covid Era, it is even more necessary to increase access to internet particularly to rural areas to enhance education, health, and business needs. Internet service is no longer a luxury and should be made accessible and affordable to everyone. Internet

service is needed to improve education using attractive, multimedia-based curricula and pedagogy and through the development of distance education modalities.

Presently, the Belize's Government is fully committed to establish brand-new strategies to allow continuity at the level of operations and to increase universal access to services through digitalization. The current government has a strong commitment to accelerate digital transformation by focusing on connectivity, e-government, digital talent, and innovation.

1.2 Statement of the problem

The problem is that the existing fiber-optic network covers most urban areas, including major towns, cities, and nearby villages, but there are still several rural and remote communities without access to internet. The Covid pandemic has increased the need for expanding broadband connectivity countrywide, which is a basic condition necessary for accessing public services, remote learning and fostering the digital economy. especially in rural areas.

The ICT Development Index by the International Telecommunication Union (ITU) shows that Belize performs well in areas such as amount of international internet bandwidth per internet users and the number of broadband subscriptions or households with internet. However, the index also revealed the historically low level of connectivity throughout the territory.

The project management plan seeks to establish a national plan for Belize to expand internet access to rural areas of the country. This plan will assist in closing the

connectivity gap between rural and urban areas, as well as facilitate the digital agenda for the country.

1.3 Purpose

The purpose of this project is to develop a Project Management Plan that integrates project management principles in order to develop a National Plan for expanding internet connectivity to remote and rural areas in Belize. The plan will be used by the Project Management Team during the executing, monitoring and controlling, and closing processes.

The benefits of having the Project Management Plan is that it will bring together a collection of outputs that will assist with seeking funding for expanding internet access to rural and remote areas. To this end, the project management plan will define how the project will be executed, monitored and controlled. Another benefit is that the plan will also provide high-level costing for deploying fixed and wireless solutions.

1.4 General objective

To develop a Project Management Plan, as per the standards of the PMBOK® Guide 6th Edition, that integrates sustainable principles and effectively carries out a project to develop a National Plan to expand internet connectivity to remote and rural areas in Belize.

1.5 Specific objectives

1. To produce a project charter to outline the project purpose, objectives and milestones in order to develop the project management plan

2. To create a scope management plan that includes all work necessary to successfully implement the project
3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the given time frame.
4. To create a cost management plan clearly defining the project budget required to complete the project
5. To develop a quality management plan that outlines the quality requirements for the project to ensure that results meet expectations for approval within the time, cost and scope constraints.
6. To create a resource management plan to identify the human resources needed to complete the project.
7. To develop a communication plan to ensure timely and effective communication of the project status.
8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them.
9. To develop a stakeholder management plan to identify the stakeholders needed to ensure effective stakeholder engagement

2 THEORETICAL FRAMEWORKS

This chapter provides more insight into the executing company's background, its mission and vision, organizational structure and other related facts related to the project. In addition, it includes definitions of project management concepts as it relates to the project.

2.1 Company/Enterprise framework

Company/Enterprise background

Belize Telemedia Ltd. (BTL) operates a telecommunication network in Belize offering fixed and mobile voice and internet services. BTL is the largest business, telecommunications and multimedia company operating in the country of Belize. BTL operates many legacy networks for Fixed Wireless broadband and telephony services. In early 2015, BTL started the Network Evolution Plan which included replacing the mobile network with a Huawei single RAN for all technologies, GSM/UMTS/LTE, a single mobile packet core and a single IMS based core for mobile and fixed telephony services. In 2011, BTL requested support to replace the existing copper network with ultra-modern fiber optic technology. The project was built upon the Network Evolution Plan to provide broadband services to most of the people and businesses in Belize. The project proposed the way forward in the development of BTL's fixed and mobile broadband infrastructure and the investments needed to do so. The plan proposed the way forward in the development of BTL's broadband, especially fixed broadband, and for a small number of rural customers also in the development of fixed wireless, infrastructure from technological, commercial, and financial perspectives.

company’s revitalized aim to continue delivering on the promise of the digital world in a manner that is simple, reliable, and affordable.” (Belize Telemedia Limited, 2019) This strategy reflects the company’s mission and vision statements:

Mission: “Be fast and efficient in providing communications solutions, enriching the quality of life of customers, keeping them connected anytime, anywhere.”

Vision: “A highly proficient, customer driven, strategy focused, best-in-class, solutions provider, outstanding in everything we do.”

Organizational structure

Belize Telemedia Limited (BTL) currently employs over 400 Belizeans throughout the country. To improve the experience of their customers, the company reorganized in 2020 to include more technical resources in network operations and service delivery.

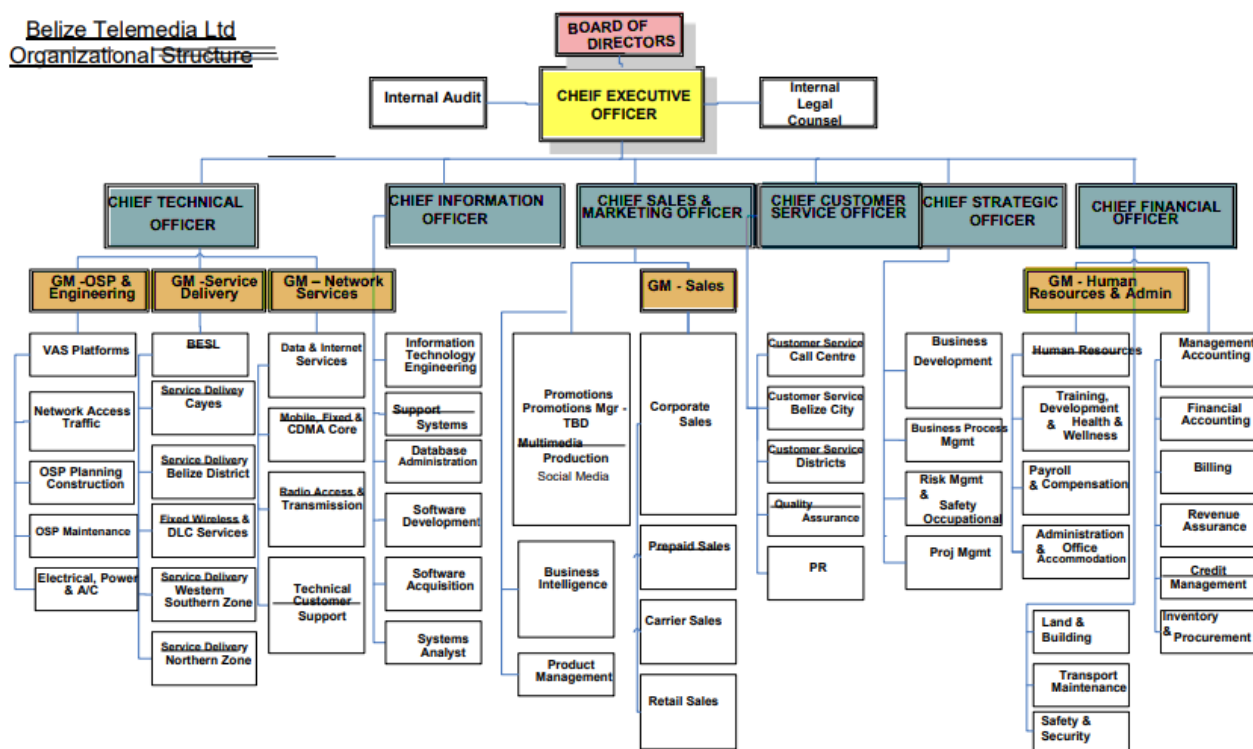


Figure 2 Organizational Structure (@ Belize Telemedia Limited)

Products offered

The services and products provided by Digi are vast, varied and distinguished by efficiency, quality, and advanced technology. The company has expanded its mission to go beyond just providing telephone service to providing telecommunications solutions for its residential, business and government customers.

“Digi operates an extensive network of telecommunication services in wireline, mobile, data, Internet and value-added features. Each offers a full range of products and services that include fixed line telephone service, fixed wireless, national and international mobile services, high speed data services, national and international data networks, and innovative new business solutions.” (Belize Telemedia Limited, 2019)

2.2 Project Management concepts

Project

According to the PMBOK® Guide Sixth Edition, a project is defined as “A temporary endeavour undertaken to create a unique product, service, or result” (Project Management Institute, 2013, p.31). To expand internet access to rural and remote areas of Belize is considered a temporary project since it will produce a set of deliverables within clearly specified time, cost, and quality constraints.

Project management

Project Management includes the skills, tools and management processes required to undertake a project successfully. It incorporates a set of skills, a suite of tools and a series of processes. Specialist knowledge, skills and experience are required to reduce the level of risk within a project and thereby enhance its likelihood of success. Various types of tools are used by project managers to improve their chances of success.

Additionally, various processes and techniques are required to monitor and control time, cost, quality, and scope on projects which include schedule management, cost management, quality management, change management, risk management and issue management.

Project life cycle

According to the Project Management Institute, the project life cycle is critical for any manager hoping to deliver projects to clients successfully. According to the Project Management Institute, the project life cycle is critical for any manager hoping to deliver projects to clients successfully. A project' life cycle is the series of phases that the project passes through as it goes from its start to its completion. A standard project usually follows four major phases: initiation, planning, execution, and project closure. The relationship between each phase is unique with each one contributing to the development of the other. A phase is a collection of logically related project activities that culminates in the completion of one or more project deliverables. Project Management Institute, A Guide to the Project Management Body of Knowledge, PMBOK® Guide 6th Edition, Project Management Institute Inc., 2017.

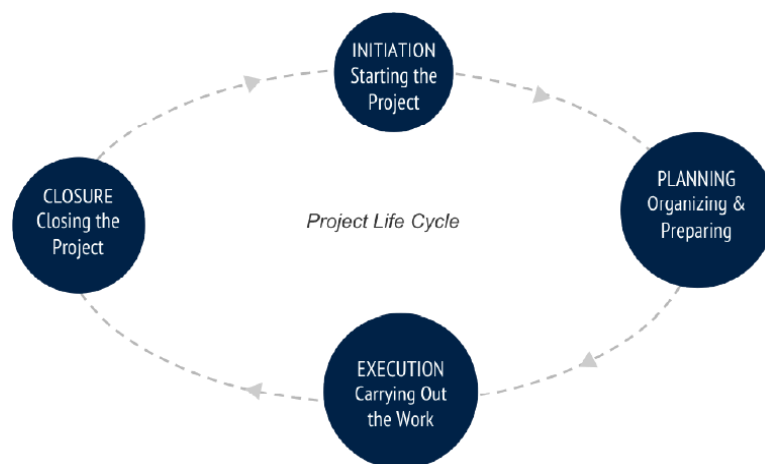


Figure 3 Project Management Life Cycle (PMBOK® Guide 6th Edition)

Project management processes

Project management consists of five sets of process groups that help support the project through the four phases of the life cycle. These process groups include initiation, planning, executing, monitoring, and controlling, and closing.

Initiation supports the work to be done by clarifying the business need, defining the high-level expectations, resources, budgets, and stakeholders. The planning process supports the organizing and preparing phase which include the project scope, time, resources, and risks, as well as communication, quality, and management of purchases of goods and services. The executing process guide the project tasks performed when carrying out the project. This process also establishes how the project team and will communicate when implementing the plan. In the monitoring and controlling processes the team tracks performance and takes actions necessary to ensure that project plans are successfully implemented.

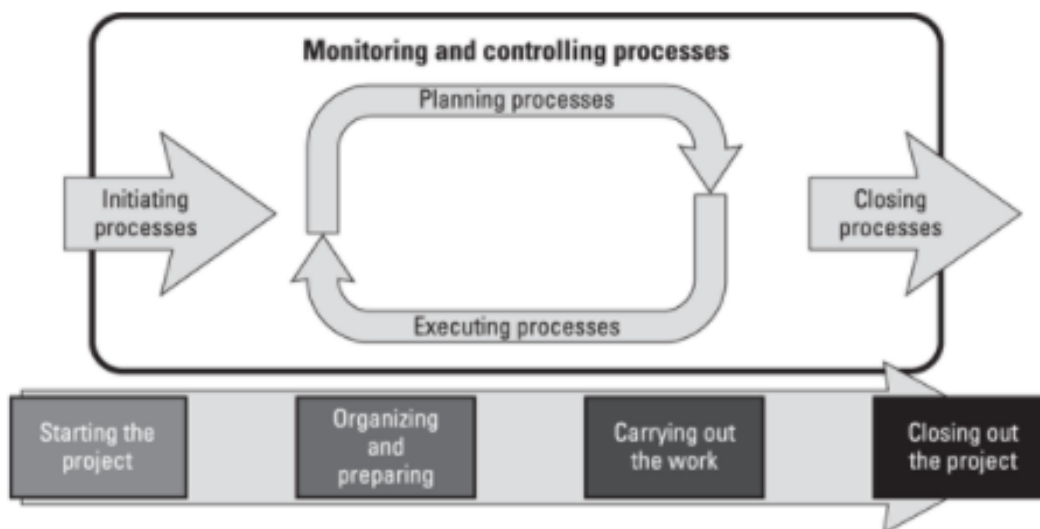


Figure 4 Project Management Processes (©John Wiley & Sons, Inc.)

Project management knowledge areas

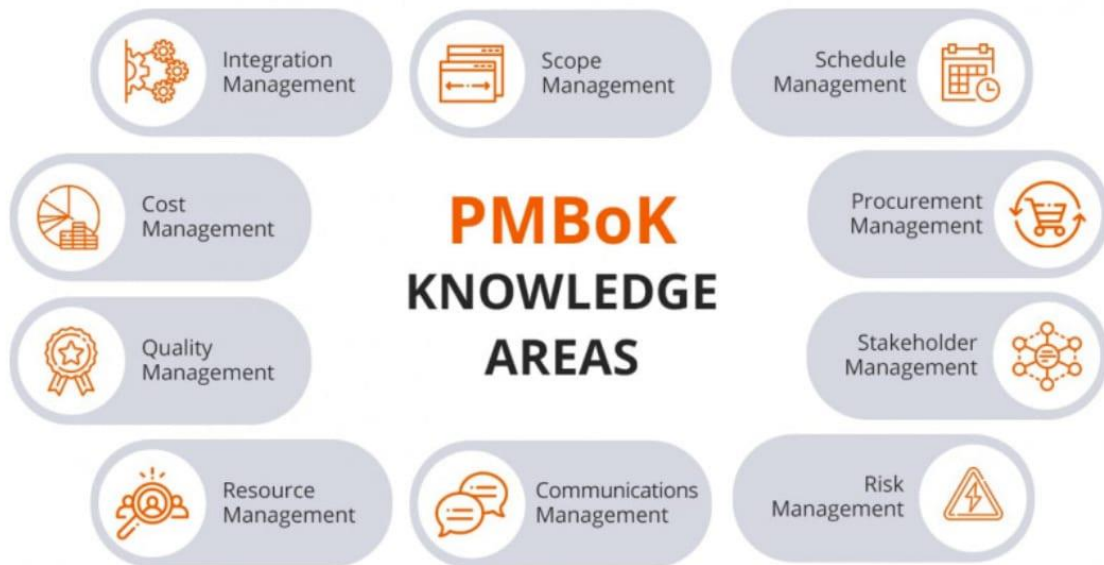


Figure 5 Project Management Knowledge Areas (PMBOK® Guide 6th Edition)

The Project Management Institute framework of project management consists of 49 processes which are categorized in 10 knowledge areas as set out in the Project Management Body of Knowledge (PMBOK®, 6th edition). The PMBoK knowledge areas describe what should be done throughout the lifecycle of the project. They include key documentation that should be completed and explain which tools and techniques will be developed. The table below contains the 10 knowledge areas and the 49 processes, and its relationship to the project to develop a national plan to expand internet access to rural and remote areas of Belize.

Chart 1: Project Management Knowledge Areas (PMBOK® Guide 6th Edition)

| Knowledge Area | Processes | Application to the project |
|-----------------------------------|-----------------------------------|---|
| 1) Project Integration Management | Develop Project Charter | Authorizes the project and links it with the strategic objectives of the organization. |
| | Develop Project Management Plan | Defines, prepares, and coordinates all plan components. |
| | Direct and Manage Project Work | Leads and performs the work as defined in the PMP as well as implements approved changes. |
| | Manage Project Knowledge | Uses existing and guides creation of new pieces of knowledge to achieve the project objectives and support organizational learning. |
| | Monitor and Control Project Work | The overall progress is tracked, reviewed, and reported to meet the performance objectives defined in the PMP. |
| | Perform Integrated Change Control | Reviews all change requests, gets approval for changes, and manages changes to deliverables, documents, and plans. |
| | Close Project or Phase | All activities, phases or contracts are finalized. |
| 2) Project Scope Management | Plan Scope Management | Creates a scope management plan that sets out the framework of the definition, validation and controlling of the project and product scope. |
| | Collect Requirements | Determines, documents, and manages stakeholder needs and requirements to meet the project objectives. |
| | Define Scope | Develops a detailed description of the project and product including the result boundaries and acceptance criteria. |
| | Create WBS | Creates the work breakdown structure by breaking down the project deliverables into small manageable components. |
| | Validate Scope | Formalizes the acceptance of the completed project deliverables. |
| | Control Scope | Monitors the project status and product scope and manages changes to the scope baseline. |

| Knowledge Area | Processes | Application to the project |
|--------------------------------|---|---|
| 3) Project Schedule Management | Plan Schedule management Define Activities | Establishes policies, procedures, and documentation of the project schedule management. |
| | Sequence Activities | Identifies and defines the actions needed to produce the project deliverables. |
| | Estimate Activity Durations | Identifies and document the relationships among the project activities. |
| | Develop Schedule | Estimates durations needed to perform each activity. Develops project schedule taking into consideration activity sequences, durations, resource requirements and schedule constraints. |
| | Control Schedule | Monitors the project status to update the project schedule and manages changes to the baseline. |
| 4) Project Cost Management | Plan Cost Management | Defines the approaches and procedures to estimate, budget, manage, monitor, and control project costs. |
| | Estimate Costs | Estimates an approximation of the cost of required resources. |
| | Determine Budget | Aggregates the estimated cost and work packages which are the foundation of the authorized cost baseline. |
| | Control Costs | Monitors, manages and updates actual and planned project costs as well as the cost baseline. |
| 5) Project Quality Management | Plan Quality Management Manage Quality | Identifies quality requirements and standards. Transforms the quality management plan into individual activities that incorporate the quality requirements and standards into the project. |
| | Control Quality | Monitors and controls the results of the quality management activities. Also includes verifying that project deliverables are in line with the requirements for final acceptance. |

| Knowledge Area | Processes | Application to the project |
|--------------------------------------|-----------------------------------|--|
| 6) Project Resource Management | Plan Resource Management | Defines how the team and physical resources will be estimated, acquired, managed, and used during the project. |
| | Estimate Activity Resources | Estimates the team headcount and physical resources that will be needed to perform the project work. |
| | Acquire Resources | Hires team members and acquire physical resources which includes the selection of sources as well as assignment of resources to specific activities. |
| | Develop Team | Improves skills and competencies, interactions, and the environment of the project team to enhance the overall project performance. |
| | Manage Team | Tracks performance, feedback and management of changes and adjustments. |
| | Control Resources. | Ensures that the physical resources are available and utilized as planned. Also includes corrective actions if required. |
| 7) Project Communications Management | Plan Communications Management | Develops the approach and plan for project communications. Stakeholders' information and available organizational assets are considered. |
| | Manage Communications | Ensures timely and appropriate communication is done in order to facilitate an efficient and effective information flow between project team and stakeholders. |
| | Monitor Communications. | Ensures that the information needs of the project and stakeholders are met properly and timely |
| 8) Project Risk Management | Plan Risk Management | Plans risk management activities which include tailoring of risk management considerations. |
| | Identify Risks | Identifies and documents individual risks as well as sources of overall project risks. |
| | Perform Qualitative Risk Analysis | Assesses the probability and the potential impact of individual project risks. |
| | Perform Quantitative Risk | Identifies individual project risks of ambiguity or uncertainty by conducting statistical analyses |

| Knowledge Area | Processes | Application to the project |
|------------------------------------|--|---|
| | <p>Analysis</p> <p>Plan Risk Responses</p> <p>Implement Risk Responses</p> <p>Monitor Risks</p> | <p>(e.g., Monte Carlo Simulation).</p> <p>Identifies and assess the ways to address overall and individual project risks.</p> <p>Responds to risk by implementing a response</p> <p>Monitors and track risk responses and identified risks as well as assess new risks.</p> |
| 9) Project Procurement Management | <p>Plan Procurement Management</p> <p>Conduct Procurements</p> <p>Control Procurements.</p> | <p>If the project requires external purchases of goods and services, documents the way project procurement decisions will be made, by specifying the approach and identifying potential sellers.</p> <p>Selects a seller and implement the agreements and contracts for delivery.</p> <p>Manages procurement relationships and monitor contract performance.</p> |
| 10) Project Stakeholder Management | <p>Identify Stakeholders</p> <p>Plan Stakeholder Engagement</p> <p>Manage Stakeholder Engagement</p> <p>Monitor Stakeholder Engagement</p> | <p>Identifies stakeholders and their interests, involvement, power, and impact on the project.</p> <p>Develops plan for involving stakeholders and interacting effectively during the project.</p> <p>Communicates and works with stakeholders to meet their needs and expectations. Highlight their support and reduces resistance from stakeholders.</p> <p>Monitors relationships and the adjustment of strategies to engage stakeholders.</p> |

3 METHODOLOGICAL FRAMEWORK

This chapter includes a definition of information sources type and the ones selected for this project. Chart 2 explains each objective and the information type used for the research for this document.

3.1 Information sources

The various types of information sources can be divided into two broad categories.

1. Documentary Sources- generally published or recorded documents of knowledge.
2. Non-Documentary Sources-form a substantial part of communication especially in science and technology

Primary sources

Primary sources of information are the first published records of original research and development of description of new application or new interpretation of an old theme or ideas. “A primary source is information taken directly from a person, event, location, or material at the point of the occurrence” (Schmidt, 2013, p. 62).

For this project, several primary approaches will be used such as meetings, interviews, surveys, and statistical data,

Secondary sources

According to Scribbr, a secondary source is “anything that describes, interprets, evaluates, or analyses information from primary sources.” (Streefkerk, 2021)

In this project, the secondary sources used primarily include the PMBOK® Guide 6th Edition and the Project Management Institute (PMI) online database.

Chart 2: Information sources (Source: Compiled by author)

| Objectives | Information sources | |
|--|--|--|
| | Primary | Secondary |
| 1. To produce a project charter to outline the project purpose, objectives, and milestones to produce the project management plan | BTL's PMO project management templates. Digital Agenda Belize document, | PMBOK® Guide and the Project Management Institute (PMI) online database. Plan Belize Portfolio, and personal interviews with CEO of E-governance in Belize |
| 2. To create a scope management plan that includes all work necessary to successfully implement the project | Digi's Work Breakdown Structure, interviews with Project Managers and technical lead at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. | Digi's Work Breakdown Structure, interviews with Project Managers and technical lead at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 4. To create a cost management plan clearly defining the project budget required to complete the project | Digi's High-level costing for FTTH Expansions, interviews with Project Managers at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |

| Objectives | Information sources | |
|--|--|---|
| | Primary | Secondary |
| 5. To develop a quality management plan to outline the quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints. | Digi's Work Breakdown Structure, interviews with Project Managers and Quality Manager and technical lead at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 6. To create a resource management plan to identify the human resources needed to complete the project. | Digi's Work Breakdown Structure, interviews with Project Managers and Human Resource Manager at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 7. To develop a communication plan to ensure timely and effective communication of the project status. | Digi Communication Plan, interviews with Project Managers at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them. | Digi Risk Management Plan, interviews with Project Managers at Digi | PMBOK® Guide and the Project Management Institute (PMI) online database |
| 9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. | Interviews with Project Managers, Work Breakdown Structure and E-Governance team at Ministry. | PMBOK® Guide and the Project Management Institute (PMI) online database |

3.2 Research methods

In this Final Graduation Project, the research methods that will be used are both descriptive and the analytical method.

3.2.1 Descriptive Research Method

The descriptive research method “describes a population, situation, or phenomenon that is being studied and focuses on answering the how, what, when and where” (University of Udaipur, 2011). In short, the descriptive research classifies, describes, compares, and measures data. Chart 3 below details how the descriptive research method is used for this project.

3.2.2 Analytical method

The analytical research method sometimes referred to as the explanatory method “involves critical thinking skills and the evaluation of facts and information relative to the research being conducted” (University of Udaipur, 2011). There are different types of analytical techniques used to forecast potential outcomes based on possible variations of project or environmental variables and their relationships with other variables. Analytical research focuses on cause and effect. Chart 3 below details how the analytical research method is used for this project.

Chart 3: Research methods (Source University of Udaipur, 2011)

| Objectives | Descriptive Research | Analytical Research |
|--|--------------------------------------|---------------------|
| 1. To produce a project charter to outline the project | This method was used to identify and | |

| Objectives | Descriptive Research | Analytical Research |
|--|---|--|
| purpose, objectives, and milestones to produce the project management plan | describe all existing data that can be helpful in developing the components of the charter | |
| 2. To create a scope management plan that includes all work necessary to successfully implement the project | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate the gathering of facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable scope management plan |
| 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable schedule management plan |
| 4. To create a cost management plan clearly defining the project budget required to complete the project | This method will provide a thorough explanation of the components involved with the | This method will facilitate facts and information from the sources identified in Chart 1 above, that will |

| Objectives | Descriptive Research | Analytical Research |
|--|---|--|
| | project topic, as they already exist. | assist in creating a more sustainable cost management plan |
| 5. To develop a quality management plan to outline the quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable quality management plan |
| 6. To create a resource management plan to identify the human resources needed to complete the project. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable resource management plan |
| 7. To develop a communication plan to ensure timely and effective communication of the project status. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable communication |

| Objectives | Descriptive Research | Analytical Research |
|--|---|---|
| | | management plan |
| 8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable risk management plan |
| 9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. | This method will provide a thorough explanation of the components involved with the project topic, as they already exist. | This method will facilitate facts and information from the sources identified in Chart 1 above, that will assist in creating a more sustainable stakeholder management plan |

3.3 Tools

The PMBOK® Guide 6th Edition defines a tool as “something tangible, such as a template or software program, used in performing an activity to produce a product or result” (Project Management Institute, 2013, p. 565). This project will use several tools under each of the three research methods being proposed in Chart 2 above.

The tools that will be used for this Final Graduation Project include having meetings and interviews with experts in network expansions, senior management of Digi, data gathering of existing data, expert judgment and consultations, scheduling tools, cost-benefit analysis, information management, decision making, observations as recommended by PMBOK Guide (PMI, 2017).

Chart 4: Tools (Source: PMBOK® Guide 6th Edition)

| Objectives | Tools |
|--|--|
| 1. To produce a project charter to outline the project purpose, objectives, and milestones to produce the project management plan | Project Charter Template |
| 2. To create a scope management plan that includes all work necessary to successfully implement the project | Interviews, consultations and Facilitated workshop: Brainstorming Observations |
| 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. | Gantt Chart (Ms Project), PERT, Critical Path Method |
| 4. To create a cost management plan clearly defining the project budget required to complete the project | Expert Judgment, Analogous Estimation, Parametric Estimation, Bottom-Up Estimation Three-Point Estimation |
| 5. To develop a quality management plan to outline the | Cost-Benefit Analysis, Cost of quality, Benchmarking, Quality Control, Flow charts |

| Objectives | Tools |
|--|--|
| quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints. | Check Sheets, Process Decision Program Charts |
| 6. To create a resource management plan to identify the human resources needed to complete the project. | Organizational Charts Responsibility Matrix |
| 7. To develop a communication plan to ensure timely and effective communication of the project status. | Communication Requirement Analysis Communication Methods Expert Judgement |
| 8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them. | Risk Identification Qualitative and Quantitative Risk Analysis Risk Monitoring and Control Checklist Analysis, Assumptions Analysis |
| 9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. | Stakeholder Analysis Expert Judgement Meetings Analytical Techniques |

3.4 Assumptions and constraints

According to PM Study Guide (2021), “an assumption is what you believe is to be true. The anticipated events that are expected during the project Lifecycle. A constraint is a limitation imposed on the project that budget, schedule, or

resources.” Chart 5 below shows the assumptions and constraints considered for each specific objective of the Final Graduation Project.

Chart 5 Assumptions and constraints (Source: Compiled by author)

| Objectives | Assumptions | Constraints |
|--|---|--|
| 1. To produce a project charter to outline the project purpose, objectives, and milestones to produce the project management plan | The charter will be created prior to any other document | Time allocated to develop the charter is limited. (1week) |
| 2. To create a scope management plan that includes all work necessary to successfully implement the project | It is assumed that stakeholders are adequately identified for this plan. It is assumed that Digi will be supportive in the development of scope management plan. | Time allocated to develop the plan is limited. |
| 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. | It is assumed that a realistic schedule management plan will be developed | Not enough expert judgement available to provide guidance. |
| 4. To create a cost management plan clearly defining the project budget required to complete the project | It is assumed that the budget created during the planning process will be accurate. | Time allocated to develop a complete and detailed budget. |

| Objectives | Assumptions | Constraints |
|--|--|---|
| 5. To develop a quality management plan to outline the quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints. | It is assumed that the quality management plan will identify all quality requirements | Limited budget that will sacrifice quality |
| 6. To create a resource management plan to identify the human resources needed to complete the project. | It is assumed that all roles and responsibilities will be identified in the resource management plan | Unable to determine if overtime will be needed to include man hours in the budget |
| 7. To develop a communication plan to ensure timely and effective communication of the project status. | It is assumed that required technology is available to communicate efficiently | Technology and platforms used does not cover the target audience |
| 8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them. | It is assumed that all potential risks are identified in the risk management plan | All potential risks identified at the planning stage |
| 9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. | It is assumed that the stakeholder management plan will identify all stakeholders and plan how to manage them properly | Availability of stakeholders during the proposed timelines |

3.5 Deliverables

A deliverable is defined 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.” (PMI, 2013, p. 537) Chart 6 below outlines the deliverables for each specific objective.

Chart 6 Deliverables (Source: Compiled by author)

| Objectives | Deliverables |
|--|---------------------------------|
| 1. To produce a project charter to outline the project purpose, objectives, and milestones to produce the project management plan | The Project Charter |
| 2. To create a scope management plan that includes all work necessary to successfully implement the project | The Scope Management Plan |
| 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. | The Schedule Management Plan |
| 4. To create a cost management plan clearly defining the project budget required to complete the project | The Cost Management Plan |
| 5. To develop a quality management plan to outline the quality requirements for the project to ensure results meet expectations for approval within the time, cost, and scope constraints. | The Quality Management Plan |
| 6. To create a resource management plan to identify the human resources needed to complete the project. | The Resource Management Plan |
| 7. To develop a communication plan to ensure timely and effective communication of the project status. | The Communication Plan |
| 8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them. | The Risk Management Plan |
| 9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement. | The Stakeholder Management Plan |

4 RESULTS

The results chapter is a compilation of the research conducted for this project. It includes the project charter and all eight management plans as outlined in the specific objectives.

4.1. Project Charter

This project was developed using Belize Telemedia Limited (BTL)/Digi's existing template format with a few recommended improvements. The main source of information used to create this charter was a review of past FTTH expansion project charters, interviews with BTL's internal Project Managers and members of Fixed and Transport Network Engineering Passive Department. Other sources include Ministry of Education Internet for Schools Program, National Broadband Plan (NBP), and Fixed and Mobile Evolution Project document.



Belize Telemedia Limited-Digi Project Charter

Purpose

This Project Charter defines the scope, objectives, deliverables, and overall approach for the work to be completed. It is the critical element for initiating, planning, executing, controlling, monitoring, and closing the project. It is the master document for the project and a point of reference on the project for goals and objectives, scope, deliverables, and budget.

| | |
|-----------------------------|---|
| Document ID: | BTLPC00001 |
| Document Owner: | Jessamyn Ramos, FTNE Passive |
| Issue Date: | March 7, 2022 |
| Project Name: | A Project Management Plan to Develop a National Plan to Expand Internet Access to Rural and Remote Areas of Belize. |
| Location of Project: | Belize, Central America |

| | |
|---|--|
| Department Executing Project: | (PMO - Project Management Office) in conjunction with Fixed and Transport Network Engineering-Passive Department |
| PMO Overseeing Project: | (PMO - Project Management Office) in conjunction with Fixed and Transport Network Engineering-Passive Department |
| Product/Service/Result Created: | Expansion of broadband services via FTTH & Wireless Network |
| Project Sponsor (Program Sponsor if applicable): | |
| Commercial Project Manager: | Technical Project Manager: Jessamyn Ramos |

| |
|------------------------|
| Project Summary |
|------------------------|

Problem Statement:
The Rural Significant Connectivity Index (ICSr) and Significant Urban Connectivity (ICSu) index developed by IDB, IICA and Microsoft in 2020, categorized Belize in the cluster with low significant connectivity. This means that there is a huge gap between urban connectivity and rural connectivity. (IDB, IICCA, 2020).
Despite the efforts of the government in 2018 to increase connectivity throughout the country, the Covid-19 pandemic highlighted the need for expanding the levels of broadband connectivity, especially in rural areas of Belize. Therefore, this project seeks to establish a proposal to expand internet access allowing full coverage via the National Telecom provider, Belize Telemedia Limited (BTL), to close the connectivity gap between rural and urban areas.

Project Goals (what will project accomplish – project purpose/justification) & Objectives: Include business case where required
The project includes the creation of a Project Management Plan (PMP) that will be used by the Project Management Team during the executing, monitoring, and controlling, and closing processes. The PMP will include Scope Management Plan, Schedule Management Plan, Cost Management Plan, Quality Management Plan, Resource Management Plan, Communication Management Plan, Risk Management Plan, and Stakeholder Management Plan.

Project Purpose:
The purpose of this project is to develop a Project Management Plan that integrates project management principles to expand internet connectivity to remote and rural areas in Belize. The plan will be used by the Project Management Team during the executing, monitoring, and controlling, and closing processes. The benefit of having the Project Management Plan is that it will bring together a collection of outputs that will assist to seek funding for a proposed phased-out approach. It will also provide a high-level costing for deploying fixed and wireless solution for each phase.

Project Objectives:

General Objectives:
To develop a proposal for a phased approach to expand internet access to rural and remote areas of Belize. This proposal will be used to seek funding and execution of the plan by Belize Telemedia Limited (BTL).

Specific Objectives:

1. To conduct an analysis of BTL's existing fixed fiber network and its coverage to determine the rural and remote areas in need of internet access. Statistics from the Ministry of Education's (MoE) Internet for School Program should be used for this analysis.
2. To develop a study of the best possible and cost-efficient solution (fixed or wireless) for expanding internet to the areas by providing a high-level costing and recommendation for proposed solutions.

3. To develop a phased action plan to deploy internet to the identified rural and remote areas based on demand, accessibility, and costing.

Project Scope – includes:

Identifying the existing coverage area for the largest fiber-based network owned by BTL will allow clear visibility of rural communities with no internet access. Since the covid pandemic, limitations to students living in rural and remote areas has been highlighted. This plan will student population statistics to determine the short-, medium- and long-term phases required to reach the goal of providing internet access

Project Scope – does NOT include:

Sources of Funding as this will be determined by the Board of Directors and in negotiations with the Government of Belize

Project Milestones (significant points for tracking):

| Milestone | Start Date | End Date |
|--------------------------------------|-------------|----------------|
| Data Gathering | May 2022 | June 2022 |
| Conduct Analysis of existing network | June 2022 | July 2022 |
| Cost-benefit Analysis | July 2022 | August 2022 |
| Phased Action Plan | August 2022 | September 2022 |

| | |
|---|--|
| Assigned Budget Amount: \$ | Estimated Project Cost: \$17,120 |
| Charge Project To: | |
| Main Company Pillar Project Supports | Drive Broadband Connectivity across the country |
| Assigned Human Resource: | Project Management Office- Program Manager Fixed and Transport Network Engineering- Senior Designer Chief Financial Officer |
| Assigned Non-Human Resource: | |
| Assumptions: | <ol style="list-style-type: none"> Human Resources- Adequate BTL's resources will be assigned to the project as needed Commitment- All human resources assigned to the project will be fully committed to achieving the deliverables set out. Funding- BTL is prepared to negotiate the action plan with the Government of Belize to seek funding to expand FTTH network. |
| Constraints | <ol style="list-style-type: none"> Availability of statistical data to be used for analysis |
| Major Opportunities: | In keeping with the roll out of the National Broadband Plan, the FTTH network is needed to provide Broadband services in line with the |

| | |
|----------------------------|---|
| | company's strategic direction. |
| Major Risk: | <ol style="list-style-type: none"> 1. High-level costings are unrealistic 2. Capacity of existing network to adhere to expansion demands 3. Source of funding are not secured within 3 years 4. In availability of resources for executing the plan |
| Other Requirements: | <ol style="list-style-type: none"> 1. Track Project Schedule 2. Provide weekly project updates on activities, issues & risk & project schedule 3. Provide weekly updates for schedule, cost & milestone progress |

Commercial Project Manager Signature
Signature

Technical Project Manager

Project Sponsor Signature
Signature

Program Sponsor (if applicable)

SECTION – II:

| OFFICIAL USE BY PROJECT MANAGEMENT STEERING COMMITTEE (PMSC) | | | | | |
|---|--|----------------------------|--------------|-----------------------|--|
| Date Received at PMO: | | | | | |
| Date Reviewed (PMO): | | Decision: | GO | Decision Date: | |
| | | | NO-GO | | |
| Comments (if necessary): | | | | | |
| Approval Signature: | | Approval Signature: | | | |
| Approval Signature: | | Approval Signature: | | | |

SECTION – III:

| OFFICIAL USE BY ACCOUNTING DEPARTMENT | | | |
|--|--|-------------------------|--|
| Date Received: | | Processed By: | |
| Project Number: | | Approved Amount: | |
| Charged To: | | | |
| Certified By: | | Approved By: | |

4.2. Project Scope Management Plan

The second objective of the Final Graduation Project is the development of the Project Scope Management plan. This plan includes the processes that need to be in place to define how the scope is explained, developed, structured, and verified. This phase includes planning the processes to define the work that must be done throughout the project, controlling, and monitoring of these processes, as well as documenting, and tracking to avoid scope creep when approving or disapproving changes and closing of the project.

Figure below depicts the Inputs, Tools & Techniques and Outputs of the Plan Scope Management process.



Figure 6: Plan Scope Management: Input, Tools & Techniques and Outputs. Reprinted from A Guide to the Project Management Body of Knowledge (p.134), Project Management Institute, 2017. Copyright 2017 by Project Management Institute Inc.

The inputs used to develop the Scope Management Plan were the project charter, historical information from the Network Evolution Program, Digi's policies and procedures, Digi's organizational chart, and lessons learnt from past projects. The tools used include meetings with Project Management Office and expert judgement by the technical lead of the project. The outputs produced include the definition of scope and the Work Breakdown Structure (WBS).



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO RURAL AND REMOTE AREAS OF BELIZE

SCOPE MANAGEMENT PLAN

VERSION 0.1

MARCH 27, 2022

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|----------------|-------------------|---------------------------|-------------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

Scope Management Approach

The Scope Management Plan for this project provides the framework that will guide the development of the National Plan to expand internet access to rural and remote areas of Belize. The aim is to ensure that only the work required is outlined for the successful completion of the project. This plan therefore documents the scope management approach; roles and responsibilities; scope definition, verification and control measures, scope change control; and the project's overall Work Breakdown Structure (WBS). Subsequently, any work that is outside of and does not support the objectives of this project should not be performed.

Introduction

Belize Telemedia Limited is proposing a plan to deploy internet access to rural and remote areas of Belize through expansion of its current fixed fiber network. This document provides a description of scope of the solution.

Background

Through the National Broadband Plan (NBP), Belize Telemedia Limited has expanded Fiber to the Home (FTTH) to all urban communities and surrounding villages. The phased-out approach NBP 1, 2,3, and 4 has extended the fiber network to serve over 90,000 households with the fastest internet service in the country. Currently, over 35,000 households throughout the country already have internet access via the Fiber to the Home network. Although it has significantly increased the fixed broadband coverage, internet speeds and stability, until recently, the network's coverage was mainly on urban town, cities, and nearby villages. The pandemic exacerbated the need for internet access in rural and remote areas specifically for continued learning and business from home.

Goals and Project Closure Criteria

The section outlines the high-level goals and closing criteria of the project.

Deliverables

The deliverables of the project are subdivided into three main areas and the respective closing criteria as follows:

Chart 7: Deliverables (Source: Compiled by author)

| Description | Closing Criteria |
|--|---|
| <ol style="list-style-type: none"> 1. Data Gathering <ol style="list-style-type: none"> a. All FTTH as built-in shapefiles (points, lines, and polygons) including NBP coverage areas, cables routes, Point of Presence (PoP), pole locations, building footprints, district and location boundaries, Student population and location etc. b. Capacity report of BTL’s existing network elements c. BTL’s expansion plan | All the data gathered |
| <ol style="list-style-type: none"> 2. Analysis of existing network <ol style="list-style-type: none"> a. Overlay of MoE’s Student population cluster points over BTL’s fixed coverage areas b. List of rural and remote areas and their geographic location in need of internet c. Analysis in table format of all areas and recommended solutions (Fixed or Wireless). Capacity report must be used to identify viability of solution | Complete analysis in table format along with Stakeholder’s Approval |
| <ol style="list-style-type: none"> 3. Cost-benefit Analysis <ol style="list-style-type: none"> a. High-level costing using BTL’s costing template for each area b. Cost-benefit Analysis based on BTL’s Return of Investment (RoI) template | One cost-benefit analysis for each area along with Stakeholder’s Approval |
| <ol style="list-style-type: none"> 4. Phased Action Plan <ol style="list-style-type: none"> a. Phased Action Plan based on the Cost-Benefit Analysis conducted, | A Phased Action Plan along with Stakeholder’s Approval |

Work Breakdown Structure (WBS)

This section outlines the WBS which is a visual, hierarchical, and deliverable-oriented decomposition of work that is to be done by the project team to accomplish the project goals and objectives. This essential planning tool will allow the Project Manager to outline the steps of the project work and in finding the critical path. It will also be used in the planning, scheduling, and budgeting phases.

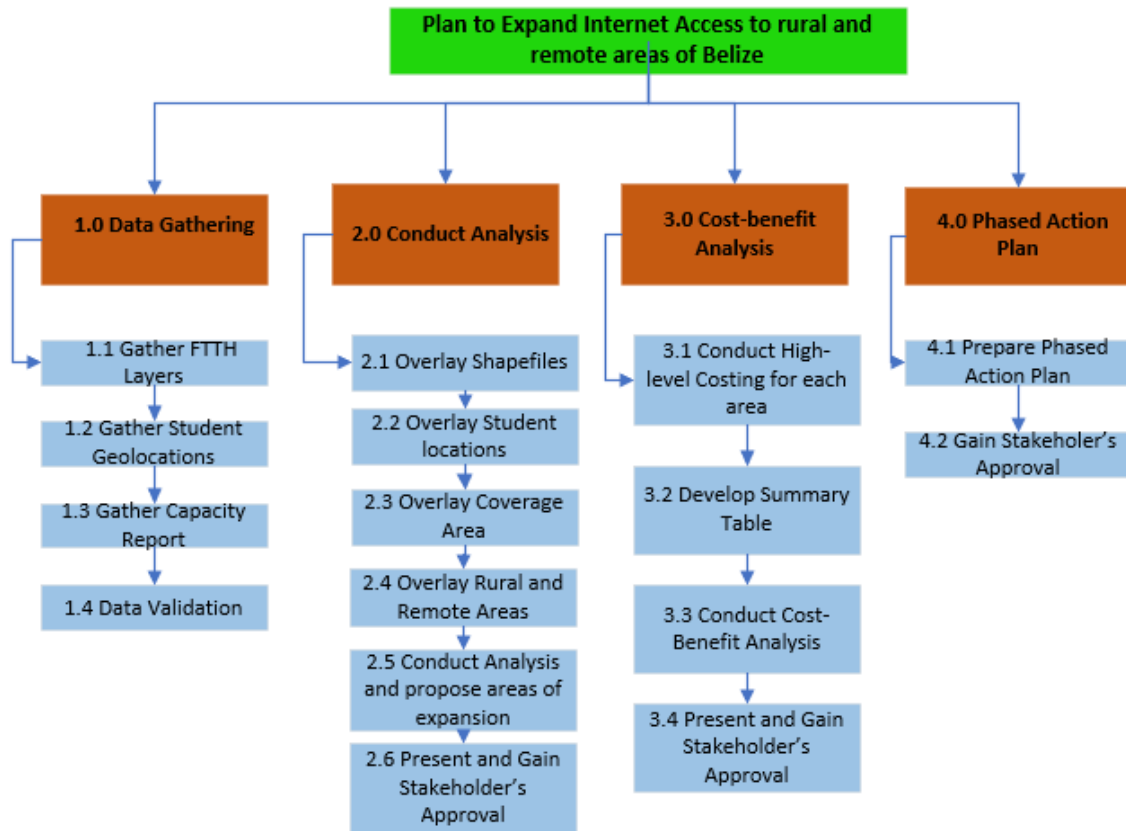


Figure 7: Work Breakdown Structure (Source: Compiled by author)

Scope

This section provides information about the scope of the project. It is broken down into various subsections.

Solution

This subsection outlines the requirements for the expansion of Belize Telemedia Limited existing fiber and mobile Network at a high level from a technical perspective.

The requirement for the proposed solution must be compliant with the following terms:

1. The solution must include an analysis of capacity on the existing fiber network.

2. The solution must have a Return on Investment within 5 years based on the internal business case analysis.

Business Processes

This subsection outlines the main internal business processes that will form a part of the initiation, planning, execution, controlling and closing of this project. These processes also form a part of the lifecycle of the proposed solution.

| Processes Included | Processes Excluded |
|-----------------------------------|-----------------------------------|
| 1. Project Management Process | 1. Capacity Management Process |
| 2. Data Center Management Process | 2. Engineering E2E Design Process |
| 3. Change Management Process | 3. Technical Pre-Sales Process |
| 4. Incident Management Process | 4. Order-to-Install Process |
| 5. Problem Management Process | |

Organizational Units

This subsection lists the main departments or units of the organization that will be involved in the proposed project:

- Network Engineering
- Corporate Sales
- PMO
- Audit
- Finance

Other areas for deployment may include the customer premises in the case of a distributed solution, as well as other BTL sites. This deployment plan is dependent on the selected solution and is therefore subject to change.

Resources

The subsection outlines the resources required for the project that are not otherwise stated in this document.

General Resource Requirements

For the initiation of the project, most general resources will be obtained from existing Business as usual resources. However, as the solution becomes defined and more detailed technical requirements are finalized, resources will be allocated directly from project budget.

Human Resource Requirements

The core implementation team that will carry out this project will consist of the project manager as well as the technical lead with close support from other members from Network Engineering, Mobile and Construction, especially those who are familiar with the existing or related solutions.

A more in-depth description of human resource requirements will be dependent on the final solution chosen.

Data

This subsection lists at a high level the data requirements of this project. These data requirements are listed as follows:

| Existing Data | Capacity Data |
|--|---|
| 1. Cable Layer (Backbone, Backhaul, Primary and Secondary) in .shp | 1. Required capacity for MSANs |
| 2. Points of Presence in .shp | 2. Required capacity for Mobile (TDD.FDD) |
| 3. MDT Boundaries in .shp | 3. Required capacity on existing backbone and backhaul cables |
| 4. Splice Closures in .shp | |

| | |
|------------------------------|--|
| 5. Addresses in .shp | |
| 6. Student locations in .shp | |
| 7. Mobile Coverage in .shp | |

The capacity information may be extrapolated from existing usage data (for example growth over time) or from other sources such as the marketing potential of the system. Alternatively, expert consensus can be sought to determine capacity of new solution.

Assumption, Constraints and Dependencies

This section registers the first approximation of the assumptions, constraints and dependencies for this project. The assumptions, constraints and dependencies may change throughout the course of the project.

The main assumptions, constraints and dependencies include:

1. It will be possible to deliver the project within scope, schedule and budget.
2. BTL's staff has the necessary expertise to carry out the project
3. BTL has the infrastructure to carry out the project.
4. BTL's existing technologies and processes can be integrated with the new solution.
5. The new solutions will provide benefits to BTL in terms of profits and can maintain or increase the existing customer base.

Critical Success Factors

This section defines the high-level requirement that can determine whether the project has been successful.

At the strategic level, the four critical success factors include:

1. The project is completed within cost limits and on time.

2. The sponsors are satisfied with the phased action plan.
3. The new solution meets and/or exceeds the scope of the project.
4. The solution has potential to attract new customers and attract revenue.

Risk Register

This section describes some of the key project risks and their potential impact on the success of the project. This list of risks should be regarded as provisional rather than complete because risks are identified and must be dealt with continuously during the project. Risks can relate to operating principles, conflicts of interest or priority, choosing between alternatives, the use of resources or unfulfilled responsibilities.

| Risk | Possible Mitigation Strategy |
|---|---|
| 1. High-level costings produced are unrealistic | Ensure that as much data is gathered from previous projects to be used when generating costings |
| 2. Insufficient capacity of the existing network is needed to adhere to expansion demands | Ensure that sufficient time is allocated for capacity analysis |
| 3. Funding is not secured within 3 years | Ensure validity dates are stated in costings estimates |
| 4. Project Proposal is shared with the competitors | Ensure that data is kept confidential |

Scope Change Management Process

The Change Management Plan documents and tracks the necessary information required to effectively manage project change from project inception to delivery.

The Change Management Plan is created during the Planning Phase of the project. Its intended audience includes the project manager, project team, project sponsor and any senior leaders whose support is needed to carry out the plan. Any change in the scope of the project will be managed via the Change Request Form to be submitted with relevant information for the request of change to be presented to the Change Control Board for approval.

Change Request Form

| SUBMITTER - GENERAL INFORMATION | | | |
|-------------------------------------|------------------------------|---------------------------------|--|
| CR# | | | |
| Submitter Name | | | |
| Brief Description of Request | | | |
| Date Submitted | | | |
| Date Required | | | |
| Priority | <input type="checkbox"/> Low | <input type="checkbox"/> Medium | <input type="checkbox"/> High <input type="checkbox"/> Mandatory |
| Reason for Change | | | |
| Other Artifacts Impacted | | | |
| Assumptions and Notes | | | |
| Attachments or References | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| | Link: | | |

| INITIAL ANALYSIS | |
|------------------------|--|
| Hour Impact | |
| Duration Impact | |
| Schedule Impact | |
| Comments | |
| Recommendations | |

| CHANGE CONTROL BOARD - DECISION | | | |
|---------------------------------|-----------------------------------|---|--|
| Decision | <input type="checkbox"/> Approved | <input type="checkbox"/> Approved w/Conditions | <input type="checkbox"/> Rejected <input type="checkbox"/> More Info |
| Decision Date | | | |
| Decision Explanation | | | |
| Conditions | | | |
| | | | |

Acceptance

The following table lists the personnel, roles and sign-off required for the approval of this document:

| Name | Role | Signature | Date |
|--|----------------|-----------|------|
| Senior Designer, Fixed and Transport Layer Network Engineering | Technical Lead | | |

| | | | |
|---|------------------------|--|--|
| Manager, Active and Transport Layer Network Engineering | Receipt and Acceptance | | |
| Project Manager, Project Management Office | Project Manager | | |
| Manager, Project Management Office | Receipt and Acceptance | | |
| General Manager, Network Operations, CTO Division | Receipt and Acceptance | | |
| Chief Technical Officer, CTO Division | Sponsor | | |

4.3. Project Schedule Management Plan

The Project Schedule Management Plan is the precise organization of project activities and tasks by time factors that outline the start and end dates of tasks and milestones.

As stated in the PMBOK® Guide 6th Edition, the Project Schedule Management knowledge area contains six processes: plan schedule management, define activities, sequence activities, estimate activity durations, develop schedule, and control schedule. The schedule is an important part of this project as it will provide the project team, sponsor, and all stakeholders an insight into the project status at any given time throughout the project lifecycle. The purpose of this plan is to define the approach that will be used to create, execute, monitor, and control the project schedule.



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO RURAL AND REMOTE AREAS OF BELIZE

SCHEDULE MANAGEMENT PLAN

VERSION 0.1

MARCH 27, 2022

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|----------------|-------------------|---------------------------|-------------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

1. Schedule management and development

The schedule for this project will be created using Microsoft (MS) Project 2016.

The inputs will include those identified in the WBS, and the milestones include those identified in the project charter. The Precedence Diagramming Method (PDM) will be used to map out the project development by creating a visual representation of the critical paths and dependencies. As stated in the PMBOK® Guide 6th Edition, the PDM model can reflect four types of sequencing

relationships which include finish-to-start, finish-to-finish, start-to-start and start-to-finish. For this project, the relationship method used is the finish-to-start where a successor activity starts until a predecessor activity is completed.

The Project Manager and project team will use the Project Schedule model shown in Figure 8 with milestones start/finish dates for all activities in the project to measure, monitor and report the progress of the project.

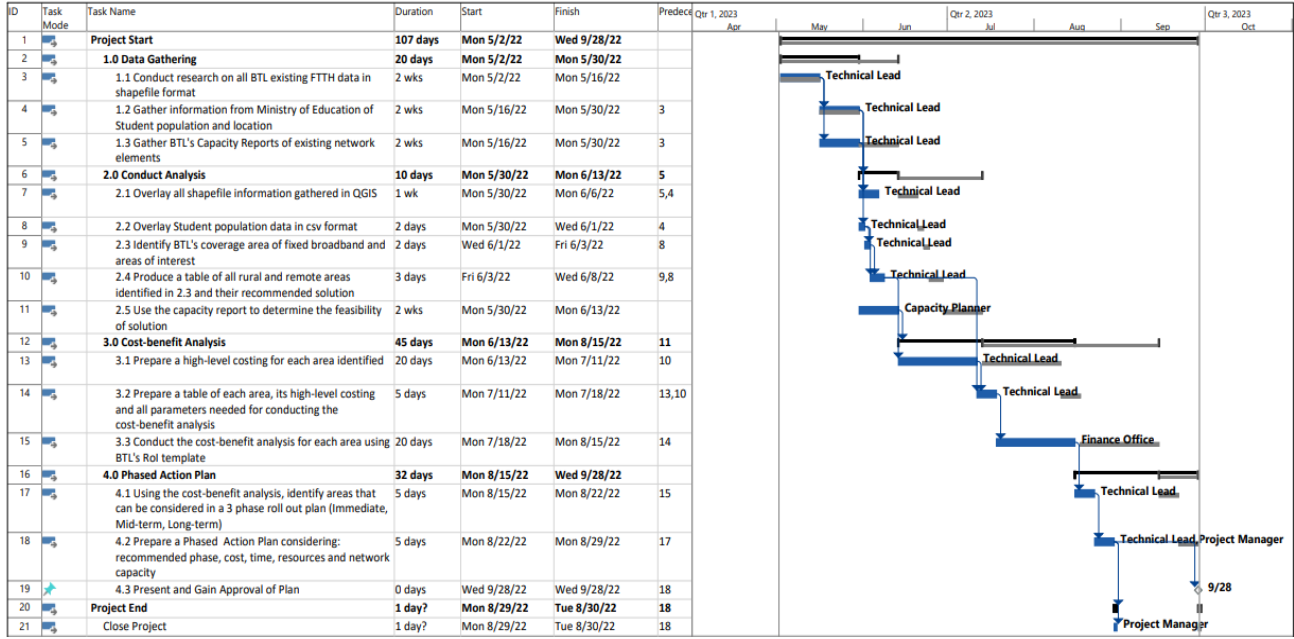


Figure 8: Project Schedule illustrating all project activities (MS Project)

The Project Manager will schedule a meeting with the project team and relevant resource managers to review the schedule and resources assigned to each project task. The project team and resource managers must agree to the proposed work package assignments, durations, and schedule. The Project Manager will present the agreed schedule to the project sponsor for approval. Once approved this

schedule will become the baseline against which the progress of the project will be tracked.

2. Critical Path Method

As stated in the PMBOK® Guide 6th Edition, the critical path is defined as the “sequence of activities that represent the longest path through a project, which determines the shortest possible duration.” The critical path method will be used to identify tasks necessary for project completion. For this project MS Project was used to calculate the critical path of the project which comprises the longest sequence of activities that must be finished on time to complete the project. Figure 9 below show the activities in red that are part of the critical path.

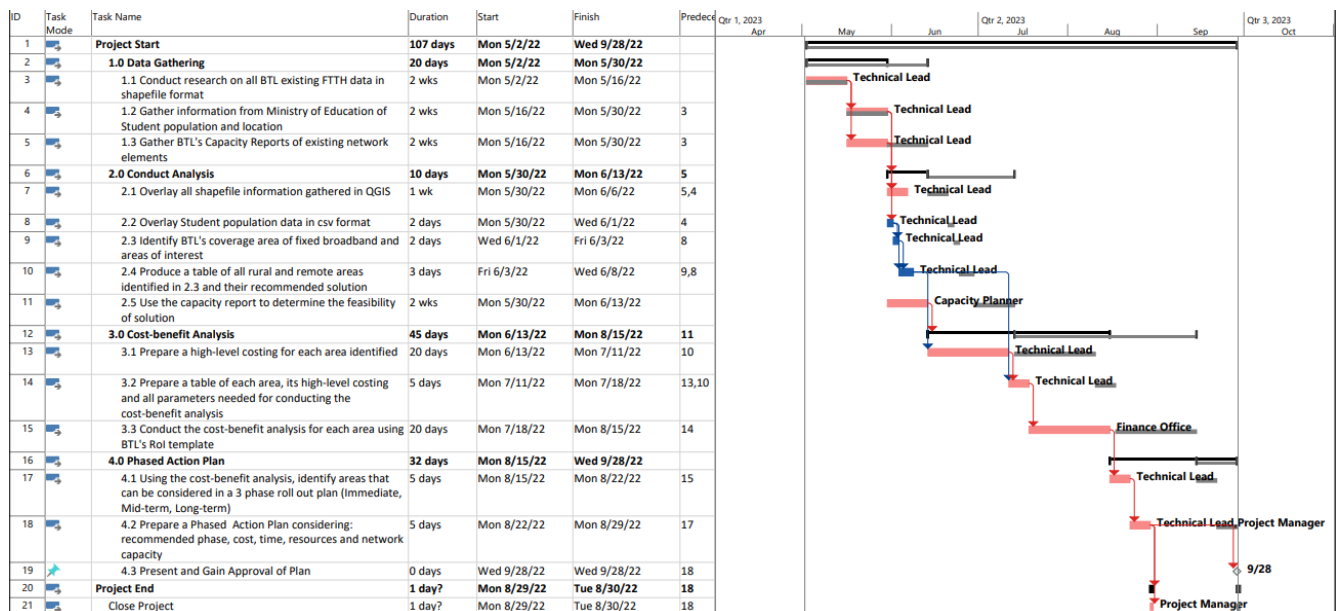


Figure 9: Critical Path for the project (MS Project)

3. Schedule Control

The PMBOK® Guide 6th Edition states that the key benefit of Control Schedule is that it provides the means to recognize deviation from the plan and take timely corrective and preventive action, thus minimizing risks.

The Project Manager will be responsible for scheduling a weekly reoccurring meeting with the project team members to review and update the actual start, actual finish, and completion percentages as presented by the task owners. During this meeting any variation to the schedule and the impact it will have on the project will be highlighted. The Project Manager will be responsible for submitting schedule change requests and for reporting the status to stakeholders in accordance with the project's communication plan.

4.4. Project Cost Management Plan



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

COST MANAGEMENT PLAN

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|---------|----------------|--------------------------|------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

1. Introduction

The Project Cost Management Plan includes the processes that are required to maintain financial control of the project and will be one of the primary functions of the Project Manager. This plan includes the processes involved in planning, estimating, budgeting, financing, managing, and controlling costs so the project can be completed within the approved budget. It is particularly concerned with the cost of resources that are required to complete the project activities. Also, it will help the project manager to foresee the project expenses and take precautionary actions to mitigate the chances of over-expenditure.

On a monthly basis, the Project Manager will be responsible for tracking the expenses and ensure the Cost Management Plan is being honoured. This tracking will consist of carrying out a comparison analysis for the predictive costs vs actual costs to provide benchmarks for future expenses.

2. Cost Management Approach

The PMBOK® Guide 6th Edition details plan cost management as it concerns the cost of the resources needed to complete the project activities. Consequently, this

project will use the Earned Value Analysis (EVA) to measure the performance of the project. EVA combines scope, schedule, and resource management to assess the performance of the project, therefore, the dimensions that will be used are planned value, earned value and actual cost.

The EVA metrics that will be used are:

- Schedule Variance (SV) – indicating whether the project is ahead or behind
- Cost Variance (CV) – difference between project earned value and actual costs
- Schedule Performance Index (SPI) – measure of the project's schedule efficiency
- Cost Performance Index (CPI) – measure of the project's cost efficiency

Chart 8 below shows the performance measurement for each metric. A SPI or CPI that is equal to 1.0 is indicative of the estimated schedule and budget are going as per the plan. If the result is less than 1.0, then it means that the project is either behind schedule or over budget and if the variance is greater than 1.0 then the project is ahead of schedule or under budget. Any variance greater than 0.2 will require the Project Manager to report the reason for the exception and provide a detailed corrective plan to get the project back to acceptable levels.

Chart 8: Cost Performance Indicators

| Performance Measure | | Score | Status |
|----------------------------|--|------------------|------------------------------|
| Schedule Performance Index | | Less than 1.0 | Project is behind schedule |
| | | Greater than 1.0 | Project is ahead of schedule |
| Cost Performance Index | | Less than 1.0 | Project is over budget |
| | | Greater than 1.0 | Project is under budget |

3. Cost Change Control Process

The Cost Change Control process will be triggered when there are any changes that will cost budget overruns and it will follow the established change control process. The Project Manager will ensure that any change be approved by the project sponsor.

3.0.1 Cost Breakdown

Chart 9: Project Budget

| Task Name | Duration | Costs Involved | Unit Cost | Total Cost |
|--|----------------|----------------|--------------------|----------------|
| 1.0 Data Gathering | 30 days | | | \$4,800 |
| 1.1 Conduct research on all BTL existing FTTH data in shapefile format | 2 wks | Staff Time | \$20 per hour (80) | \$1,600 |
| 1.2 Gather information from Ministry of Education of Student population and location | 2 wks | Staff Time | \$20 per hour (80) | \$1,600 |
| 1.3 Gather BTL's Capacity Reports of existing network elements | 2 wks | Staff Time | \$20 per hour (80) | \$1,600 |
| 2.0 Conduct Analysis | 22 days | | | \$3,520 |
| 2.1 Overlay all shapefile information gathered | 1 wk | Staff | \$20 per hour (40) | \$800 |
| 2.2 Overlay Student population data in csv format | 2 days | Staff Time | \$20 per hour (16) | \$320 |
| 2.3 Identify BTL's coverage area of fixed broadband and areas of interest | 2 days | Staff Time | \$20 per hour (16) | \$320 |

| Task Name | Duration | Costs Involved | Unit Cost | Total Cost |
|--|----------------|----------------|---------------------|-----------------|
| 2.4 Produce a table of all rural and remote areas identified in 2.3 and their recommended solution | 3 days | Staff Time | \$20 per hour (24) | 4480 |
| 2.5 Use the capacity report to determine the feasibility of solution | 2 wks | Staff Time | \$20 per hour (80) | \$1,600 |
| 2.6 Present and Gain Stakeholder's Approval | 1wk | Time | \$50 per hour (10) | \$500 |
| 3.0 Cost-benefit Analysis | 45 days | | | \$7,700 |
| 3.1 Prepare a high-level costing for each area identified | 20 days | Staff Time | \$20 per hour (160) | \$3,200 |
| 3.2 Prepare a table of each area, its high-level costing and all parameters needed for conducting the cost-benefit analysis | 5 days | Staff Time | \$20 per hour (40) | \$800 |
| 3.3 Conduct the cost-benefit analysis for each area using BTL's RoI template | 20 days | Staff Time | \$20 per hour (160) | \$3,200 |
| 3.4 Present and Gain Approval | 1wk | Time | \$50 per hour (10) | \$500 |
| 4.0 Phased Action Plan | 10 days | | | \$2,100 |
| 4.1 Using the cost-benefit analysis, identify areas that can be considered in a 3 phase roll out plan (Immediate, Mid-term, Long-term) | 5 days | Staff Time | \$20 per hour (40) | \$800 |
| 4.2 Prepare a Phased Action Plan considering: recommended phase, cost, time, resources, and network capacity | 5 days | Staff Time | \$20 per hour (40) | \$800 |
| 4.3 Present and Gain Approval of Plan | 2 days | Time | \$50 per hour (10) | \$500 |
| Total | | | | \$18,620 |

4.5. Project Quality Management Plan



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

QUALITY MANAGEMENT PLAN

VERSION 0.1

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|---------|-------------------|--------------------------|------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

1. Introduction

to ensure the highest quality products and deliverables produced by this project, there are two main goals for the Quality Management Plan which are ensuring a quality end-product and ensuring that all the processes involved during the project lifecycle are carried out efficiently. This plan is broken down into three main processes: Quality Planning, Quality Assurance, and Quality Control.

2. Quality Management Plan

The Quality Management Plan for this project will include quality standards that are applicable to the project and can be validated by the projects processes and deliverables. The quality of the project will be assured during the project by satisfactory complying with the standards and requirements agreed upon. During the project lifespan, any non-conformances found will be identified and addressed immediately. An integrated quality approach will be used to define, measure, and improve quality.

i. Quality Planning

Project quality planning is the process of relating quality requirements or standards for the project to its deliverables and documenting how the project will comply with the requirements outlined. The quality requirements list will be created by the project manager with considerable input from stakeholders and members of the project team. The quality requirements log shown in Chart 10 below will be used to document the requirements list.

Chart 10: Project Requirements Log (Source: Compiled by Author)

| Project Name | | Date | |
|-----------------|--|----------------------|--|
| Project Number | | Document Number | |
| Project Manager | | Project Owner/Client | |

| ID # | Received From | Received On | Detailed Description of Attribute | Measurement Method | Acceptable Variance |
|------|---------------|-------------|-----------------------------------|--------------------|---------------------|
| | | | | | |
| | | | | | |
| | | | | | |

ii. Quality Management

The project manager will be responsible to conduct day-to-day quality assurance checks and report any identified discrepancy. Chart 10 below will be used as a guide for Quality Assurance.

Chart 11: Quality Management Metrics for the Project (Compiled by Author)

| ID # | Process Action | Acceptable Standards | Quality Assurance Activity | Frequency/Interval |
|------|-----------------------|---|---|--------------------|
| QA#1 | Data Gathering | 100% Geospatial data gathered to be used for analysis (FTTH Existing layers, poles, Student Location) | Data is compatible with QGIS or .csv file format | Once per phase |
| QA#2 | Conduct Analysis | A clear and concise Analysis Report with Stakeholder's Approval | Analysis is sufficient to conduct cost-benefit analysis | Once per phase |
| QA#3 | Cost-Benefit Analysis | A Cost-benefit Analysis for each area along with Stakeholder's Approval | Cost-benefit Analysis is sufficient to be used to prepare Action Plan | Once per phase |
| QA#4 | Action Plan | A clear and concise phased action plan approved by Stakeholders. | Action plan can be used to seek budget approval | Once per phase |

iii. Quality Control

Quality control involves the monitoring and controlling of quality activities to assess performance and recommend changes. All stakeholders must be fully engaged in improving processes, products, and service of the project.

4.6. Project Resource Management Plan



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

RESOURCE MANAGEMENT PLAN

VERSION 0.1

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|---------|----------------|--------------------------|------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

1. Introduction

“Project Resource Management includes the processes to identify, acquire and manage the resources needed for the successful completion of the project,” (PMI, 2017, p.307). The processes in this knowledge area will help to ensure that the Project Manager and Project Team have the right resources available, and the quantity needed for a successful project. The Resource Management Plan includes the resources allocated, detailed resource requirements and roles and responsibilities of team members.

In addition, to facilitate managing, organizing, and leading a project team made up of people with specific skills and responsibilities, the Project Resource Management Plan establishes guidelines on how the resources will be defined, in terms of staffing, managing, controlling, and releasing. The purpose of the plan is to ensure that the project has human resources with relevant skill sets and experience to complete the project.

As stated in the PMBOK® Guide 6th Edition, this knowledge area is composed of plan resource management, acquire project team, develop project team, and manage project team. The human resources for this project will be comprised of internal BTL staff. The Project Manager will be responsible for identifying the adequate human resources within the existing staff to make up the project team. However, this plan will need to align with the existing human resource management plan of BTL.

2. Resource Planning Process

To plan the resource requirements for the project, it is important for the Project Manager along with the Project Team to prioritize the required resources and manage them to ensure they are utilized as assigned. The following chart shows the resources that will be necessary for the completion of the project.

Chart 122: High-level WBS and Resources Required (Compiled by Author)

| Project Phase | Effort (days) | Resource Type | Resource |
|-----------------------|---------------|-----------------------------------|---|
| Data Gathering | 20 days | Human Resource, Material Resource | <ul style="list-style-type: none"> Project Manager, Technical Lead, Senior Designer, Computer System equipped with Microsoft Office Suite and QGIS |
| Conduct Analysis | 10 days | Human Resource, Material Resource | <ul style="list-style-type: none"> Project Manager, Technical Lead, Senior Designer, General Manager, C-level manager Computer System equipped with Microsoft Office Suite and QGIS |
| Cost Benefit Analysis | 45 days | Human Resource, Material Resource | <ul style="list-style-type: none"> Project Manager, Technical Lead, Senior Designer, Finance Department, Computer System equipped with Microsoft Office Suite and QGIS |
| Phased Action Plan | 32 days | Human Resource, Material Resource | <ul style="list-style-type: none"> Project Manager, C-Level Manager, Technical Lead, Senior Designer, BoD Computer System equipped with Microsoft Office Suite and QGIS |

3. Roles and Responsibilities

The following roles and responsibilities will guide the project team:

- Board of Directors- Project Sponsor, responsible to approve the budget before start and provide the final approval when the project has concluded.

- Chief Operations Officer- Project Sponsor, will be responsible for reviewing and approving the project management plan, detailed budget, and human resource allocation.
- General Manager, Network Operations- will be responsible for ensuring that the project has no obstacles impeding it from completing. He will provide project updates on scope, time, and budget to the C-level.
- Project Manager- will be responsible for managing the project using the principles outlined in the PMBOK® Guide 6th Edition. The Project Manager will also be responsible for ensuring that project activities are being implemented in accordance with scope, time, and budget. In addition, the project manager will be responsible for overall supervision of the project team and reporting on project activities to the Project Management Office Manager.
- Senior Network Designer- will be the technical lead for the project. He will be responsible for providing any technical guidance to the Project manager when developing the plan. He will also be part of the project executing team.

4. Organizational Chart

The RACI (Responsible, Accountable, Consult and Inform) chart below illustrates the project tasks and their relationships with identified team members.

Chart 13: RACI Matrix (Compiled by Author)

| | Board of Directors | Chief Operations | General Manager | Project Manager | Senior Network |
|--|--------------------|------------------|-----------------|-----------------|----------------|
| 1.0 Data Gathering | | | | | |
| 1.1 Conduct research on all BTL existing FTTH data in shapefile format | I | I | I | A | R |
| 1.2 Gather information from Ministry of Education of Student population and location | I | I | I | A | R |
| 1.3 Gather BTL's Capacity Reports of existing network elements | I | I | I | A | R |
| 2.0 Conduct Analysis | | | | | |
| 2.1 Overlay all shapefile information gathered | I | I | I | A | R |
| 2.2 Overlay Student population data in csv format | I | I | I | A | R |
| 2.3 Identify BTL's coverage area of fixed broadband and areas of interest | I | I | I | R | R |
| 2.4 Produce a table of all rural and remote areas identified in 2.3 and their recommended solution | I | I | I | R | A |
| 2.5 Use the capacity report to determine the feasibility of solution | I | I | I | A | R |
| 3.0 Cost-benefit Analysis | | | | | |
| 3.1 Prepare a high-level costing for each area identified | I | I | I | A | R |
| 3.2 Prepare a table of each area, its high-level costing and all parameters needed for conducting the cost-benefit analysis | I | I | I | A | R |
| 3.3 Conduct the cost-benefit analysis for each area using BTL's Rol template | I | I | I | R | A |
| 4.0 Phased Action Plan | | | | | |
| 4.1 Using the cost-benefit analysis, identify areas that can be considered in a 3 phase roll out plan (Immediate, Mid-term, Long-term) | I | I | I | R | A |
| 4.2 Prepare a Phased Action Plan considering: recommended phase, cost, time, resources, and network capacity | I | I | I | R | A |
| 4.3 Present and Gain Approval of Plan | I | I | R | A | A |

Key:

R – Responsible for completing the work

A – Accountable for ensuring task completion/sign off

C – Consulted before any decisions are made

I – Informed of when an action/decision has been made

4. Staffing Management

For this project the staffing management plan includes how resources will be acquired; the timeline for resources/skill sets; training required to develop skills; how performance reviews will be conducted; and recognition and rewards systems. Due to the nature of the project, the human resources required will be identified from within the organization. The Project Manager will be responsible for ensuring the key team players are identified and communicate with the respective managers. There will be no new recruits for this project.

5. Change Management Process

Any change in the resource management of the project will be managed via the Change Request Form to be submitted with relevant information for the request of change to be presented to the Change Control Board for approval.

Change Request Form

| SUBMITTER - GENERAL INFORMATION | | | |
|---------------------------------|------------------------------|---------------------------------|--|
| CR# | | | |
| Submitter Name | | | |
| Brief Description of Request | | | |
| Date Submitted | | | |
| Date Required | | | |
| Priority | <input type="checkbox"/> Low | <input type="checkbox"/> Medium | <input type="checkbox"/> High <input type="checkbox"/> Mandatory |
| Reason for Change | | | |
| Other Artifacts Impacted | | | |
| Assumptions and Notes | | | |
| Attachments or References | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| | Link: | | |
| INITIAL ANALYSIS | | | |
| Hour Impact | | | |
| Duration Impact | | | |

| | | |
|------------------------|--|--|
| Schedule Impact | | |
| Comments | | |
| Recommendations | | |

| CHANGE CONTROL BOARD - DECISION | | | | |
|--|-----------------------------------|---|-----------------------------------|------------------------------------|
| Decision | <input type="checkbox"/> Approved | <input type="checkbox"/> Approved w/Conditions | <input type="checkbox"/> Rejected | <input type="checkbox"/> More Info |
| Decision Date | | | | |
| Decision Explanation | | | | |
| Conditions | | | | |
| | | | | |

Acceptance

The following table lists the personnel, roles and sign-off required for the approval of this document:

| Name | Role | Signature | Date |
|--|------------------------|------------------|-------------|
| Senior Designer, Fixed and Transport Layer Network Engineering | Technical Lead | | |
| Manager, Active and Transport Layer Network Engineering | Receipt and Acceptance | | |
| Project Manager, Project Management Office | Project Manager | | |
| Manager, Project Management Office | Receipt and Acceptance | | |
| General Manager, Network Operations, CTO Division | Receipt and Acceptance | | |
| Chief Technical Officer, CTO Division | Sponsor | | |

4.7. Project Communication Management Plan

Project Communications Management includes the processes necessary to ensure that the information needs of the project and its stakeholders are met through development of artifacts and implementation of activities designed to achieve effective information exchange. (PMBOK® Guide 6th Edition, 2017)



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

COMMUNICATION MANAGEMENT PLAN

VERSION 0.1

1. Communication Management Approach

This Project Communications Plan outlines the information to be provided to all project stakeholders to keep them informed of the progress of the project. A clear Communications Plan is vital to the success of the project to ensure that all project

resources are working towards the stated project objectives and that any hurdles are overcome in a well-planned and informed manner.

The Communications Plan contains the following information:

- The communication requirements for each project stakeholder
- A schedule of the communication events, methods, and releases
- A matrix of the resource involved in each communication event
- A clear process for undertaking each communication event within the project.

2. Stakeholders and Communication Requirements

A ‘communications stakeholder’ is a person or entity within or outside the project requiring regular information about the project. For instance, a Project Sponsor will be interested in the overall progress of the project, whereas an External Body may be concerned with legislative or regulatory compliance. The chart below provides a list of all communications stakeholder groups who require information during the project. The information required to keep them appropriately informed of the progress of the project is listed next to each stakeholder.

Chart 14: Stakeholder requirements (Compiled by Author)

| Stakeholder | Requirement |
|----------------------|---|
| Project Sponsor | <ul style="list-style-type: none"> • Project status information (schedule, budget, and scope) • Understanding of critical project risks and issues • Information required to approve each project phase |
| Project Review Group | <ul style="list-style-type: none"> • Project status information (schedule, budget, and scope) • Detailed knowledge of important risks and issues • Information regarding proposed project changes (for approval) |

| | |
|-----------------|--|
| Project Manager | <ul style="list-style-type: none"> • Detailed project status information (schedule, budget, and scope) • Understanding of current project deliverables' quality • Detailed knowledge of all risks, issues and change requests |
| Project Leader | <ul style="list-style-type: none"> • Status of project activities and task status information • Day-to-day knowledge of issues and risks identified |
| Project Members | <ul style="list-style-type: none"> • Status of the activities and tasks they have been asked to perform • Awareness of events which may affect their ability to undertake their role |
| Quality Manager | <ul style="list-style-type: none"> • Progress of each deliverable against quality standards and criteria set • Detailed understanding of all quality issues for resolution |

3. Communication Delivery Methods

The primary means of communication for this project will be face-to-face meetings, teams' meetings, telephone calls, presentations, and reports. To remain effective, the communication matrix must be accessible to all stakeholders and updated throughout the project.

Chart 15: Communication Matrix (Compiled by Author)

| Event | Objective | Method | Frequency | Audience | Owner | Deliverable |
|----------------------------------|--|----------------------|-----------|--|-----------------|--------------------------------|
| Kick-off meeting | To open the project, introduce the project team players and their roles | Presence | Once | Sponsor, Project team, Main stakeholders | Project manager | Agenda, Minutes of the meeting |
| Project team meetings | Update meetings to discuss challenges and risks | Presence, Conference | Weekly | Project team | Project manager | Agenda, Minutes of the meeting |
| Technical design meetings | To discuss the design phases and the way forward | Presence | On demand | Technical project team | Technical lead | Agenda, Minutes of the meeting |
| Project status meetings | Update meetings to discuss accomplishments and challenges | Presence, Conference | Monthly | Sponsor, Project team, Main stakeholders | Project manager | Agenda, Minutes of the meeting |
| Project status reports | Report about the status of the Project including the activity progress, costs and risks. | Email | Weekly | All stakeholders | Project manager | Project status report |

4. Scope Change Management Process

Any change in the communication management of the project will be managed via the Change Request Form to be submitted with relevant information for the request of change to be presented to the Change Control Board for approval.

Change Request Form

| SUBMITTER - GENERAL INFORMATION | | | |
|---------------------------------|------------------------------|---------------------------------|--|
| CR# | | | |
| Submitter Name | | | |
| Brief Description of Request | | | |
| Date Submitted | | | |
| Date Required | | | |
| Priority | <input type="checkbox"/> Low | <input type="checkbox"/> Medium | <input type="checkbox"/> High <input type="checkbox"/> Mandatory |
| Reason for Change | | | |
| Other Artifacts Impacted | | | |
| Assumptions and Notes | | | |
| Attachments or References | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| | Link: | | |

| INITIAL ANALYSIS | |
|------------------|--|
| Hour Impact | |
| Duration Impact | |
| Schedule Impact | |
| Comments | |
| Recommendations | |

| CHANGE CONTROL BOARD - DECISION | | | |
|---------------------------------|-----------------------------------|--|--|
| Decision | <input type="checkbox"/> Approved | <input type="checkbox"/> Approved w/Conditions | <input type="checkbox"/> Rejected <input type="checkbox"/> More Info |
| Decision Date | | | |
| Decision Explanation | | | |
| Conditions | | | |
| | | | |

Acceptance

The following table lists the personnel, roles and sign-off required for the approval of this document:

| Name | Role | Signature | Date |
|--|------------------------|-----------|------|
| Senior Designer, Fixed and Transport Layer Network Engineering | Technical Lead | | |
| Manager, Active and Transport Layer Network Engineering | Receipt and Acceptance | | |
| Project Manager, Project Management Office | Project Manager | | |
| Manager, Project Management Office | Receipt and Acceptance | | |
| General Manager, Network Operations, CTO Division | Receipt and Acceptance | | |
| Chief Technical Officer, CTO Division | Sponsor | | |

4.8. Project Risk Management Plan

Risk management is the practise of identifying, evaluating, preventing, and mitigating risks that can have potential impact to the outcomes of a project. These risks need to be properly managed otherwise it can cause deviations and other adverse effects to the project management plan. On the other hand, some risks can also have a positive effect to the project and can be seen as opportunities and beneficial to the project outcomes.

As stated in the PMBOK® Guide 6th Edition, there are seven processes in project risk management which include plan risk management, identify risks, perform qualitative risk analysis, perform quantitative risk analysis, plan risk response, implement risk responses and monitor risks.



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

RISK MANAGEMENT PLAN

VERSION 0.1

Version History

| Date | Version | Authors | Summary of Changes | Revised by |
|---------------|---------|----------------|--------------------------|------------|
| 27 March 2022 | 0.1 | Jessamyn Ramos | Creation of first draft. | |

1. Risk Management Approach

For this project, a qualitative risk analysis will be used to identify, score and rank all the possible risks that might have the greatest impact on the success of the

project. The Project Manager will also act as Risk Manager for this project responsible for conducting periodic assessment and updates to this plan including other risks that may arise during the project lifecycle.

To ensure that all potential risks are identified, techniques such as brainstorming, interviewing and root cause analysis will be used. Additionally, a risk register will be created to capture all identified risks and quantified to determine the likelihood of occurrence and the impact each risk will have on project objectives.

2. Risk Identification

Risk identification is, “the process of identifying individual project risks as well as sources of overall project risk, and documenting their characteristics,” (Project Management Institute, 2017). The Risk Breakdown Structure (RBS) is a hierarchical display of potential risks grouped and represented in descending order detailing the definition of sources of risks.

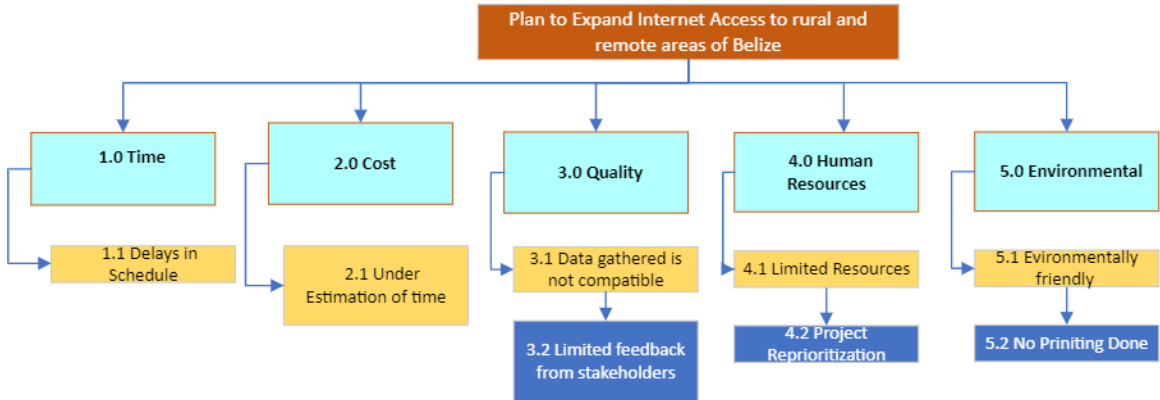


Figure 10 Risk Breakdown Structure (Compiled by Author)

3. Risk Prioritization

As part of this process, a probability-impact factor assessment was done for each identified risk. The Project Manager will be able to prioritize risks based on their effect on the project. The probability-impact matrix shown below was created to capture the identified risk and its probability of occurrence relative to its impact on the project's objectives if a specific risk occurs. The identified risks will be further detailed in a risk register which will include, but are not limited to identified risk, cause, risk owner and strategy.

Chart 16: Probability-Impact Matrix (Compiled by Author)

| Probability | Impact | | | | |
|------------------------------|--------------|---------|------------|----------|---------------|
| | Very Low (1) | Low (2) | Medium (3) | High (4) | Very High (5) |
| Most likely to occur (5) | 5 | 10 | 15 | 20 | 25 |
| Likely to occur (4) | 4 | 8 | 12 | 16 | 20 |
| Moderate chance to occur (3) | 3 | 6 | 9 | 12 | 15 |
| Unlikely to occur (2) | 2 | 4 | 6 | 8 | 10 |
| Very unlikely to occur (1) | 1 | 2 | 3 | 4 | 5 |

| Category | Scores |
|----------------|----------|
| Low Risks | 1 to 5 |
| Moderate Risks | 6 to 15 |
| High Risks | 15 to 20 |
| Very High Risk | 20 to 25 |

Chart 17: Risk Register (Compiled by Author)

| RBS Code | Cause | Risk Description | Consequence | Owner | Probability | Impact | PxI | Risk Response | Strategy |
|----------|--------------------|------------------|------------------|-----------------|-------------|--------|-----|---------------|--|
| 1.1 | Delays in Schedule | Schedule delays | Delay of project | Project Manager | 4 | 5 | 20 | Mitigate | Weekly monitoring of deliverable. Allow only 3 days delay. |
| 2.1 | Under | Estimating | Delay of | Project | 4 | 5 | 20 | Mitigate | Weekly |

| | | | | | | | | | |
|-----|------------------------------------|------------------------------|--|------------------------|---|---|----|----------|--|
| | estimation of time | Error | Project/ Lack of support by project team | Manager | | | | | monitoring of proposed time. |
| 3.1 | Data gathered is incompatible | Incompatibility | Delay of Project | Technical Lead | 3 | 4 | 12 | Mitigate | Conduct proper research before executing |
| 3.2 | Limited feedback from stakeholders | Schedule Delays | Delay in Decision Making | Project Manager | 2 | 4 | 8 | Mitigate | Ensure to share documents atleast 3 days prior to scheduled meetings |
| 4.1 | Limited Resources | Overburdened team members | Poor Performance | Project Manager | 2 | 4 | 8 | Mitigate | Ensure to have managers commitment to provide team members required |
| 4.2 | Project Reprioritization | Schedule Delays | Delay of project | Project Manager | 3 | 5 | 15 | Mitigate | Ensure to have C-level managers well informed of impact that reprioritization can cause. |
| 5.1 | Environmentally Friendly | Dissemination of Information | Communication gaps | Project Manager | 2 | 1 | 2 | Avoid | Avoid printing of reports, send only electronic copies |

4. Risk Response Planning

Risk response planning is the process of developing options and actions to enhance opportunities or reduce threats to the project's objectives. From the risk identification, there are three risks rated as high or very high, the Project Manager should take action to lower it. This can be done by using the schedule reserve, which is a pre-planned time reserve, also referred to as "buffer time", that can be incorporated in the project plan, either at critical points in the schedule plan or at the end of the project. Any buffer time needed within work packages will

correspond to the time that an activity may be delayed, without having any impact on the overall project duration.

5. Risk Monitoring and Control

Identified risks will need to be monitored continuously during the project life cycle. In this process any new, changed or no longer existing risk will be identified and logged in the Risk Register.

Risk monitoring and control starts at the risk identification stage when risks are identified before they happen. Risk monitoring is continuously checking whether the identified risks are still there or if its probability or impact has changed during the execution of the project.

6. Contingency and Management Reserve

Given that the project will be executed using internal resources and the budget includes paid time and salaries only, there is no contingency reserve and management reserve included. Therefore, the project will need to be closely monitored to avoid cost and schedule overruns that will require additional funding.

4.9. Project Stakeholder Management Plan



DEVELOP A PLAN TO EXPAND INTERNET ACCESS TO
RURAL AND REMOTE AREAS OF BELIZE

STAKEHOLDER MANAGEMENT PLAN

VERSION 0.1

1. Introduction

PMBOK® Guide 6th Edition describes Stakeholder Management as the process required to identify the people, groups or organizations that could impact or be impacted by the project. This term also refers to the plan to analyse stakeholder expectations and their impact on the project and to develop an appropriate management strategy to effectively engage stakeholders in project decision and execution.

2. Identify Stakeholders

The process of identifying project stakeholders regularly includes analysing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success. (PMBOK® Guide 6th Edition, 2017)

The most important benefit of this process is that it will allow the project team to identify the necessary focus for each stakeholder. The Stakeholder risk matrix below outlines the stakeholders and their influence/impact on the project.

Chart 18: Stakeholder Risk Matrix (Compiled by Author)

| ID | Stakeholders | Functional Area | Roles - Responsibilities | Main Expectation | Major Requirements | Influence /Impact (Low-Medium-High) |
|----|---------------------------------|---------------------------|---|-------------------------------------|---|-------------------------------------|
| 1 | Corporate Solutions Manager | Sponsor | Funding of project, facilitation of resources | A successful project | Compliance with company strategic objectives | high/high |
| 2 | General Manager for Engineering | Beneficiary | Oversee project manager | A successful project | Compliance with company strategic objectives | high/high |
| 3 | Senior Network Designer | Administrative | Technical Lead | Conduct Analysis and Action Plan | Quality deliverables and successful implementation | high/high |
| 4 | Board of Directors | Operational | Funding of project, Acceptance of action plan | A successful project | Financial viability | high/high |
| 5 | Project Manager | Project Management Office | Successful Project | A successful project | Successful implementation of project within scope, cost, and schedule | high/high |
| 6 | Government of Belize | Regulatory Body | Receive action plan | Seek funding to execute action plan | To be informed | high/high |
| 7 | Residence of Rural Belize | Beneficiary | Potential Customers | | | med/low |

| | | |
|--------------|--|---|
| High | BoD General manager KEEP SATISFIED | Senior Network Designer Corporate Solutions Manager MANAGE CLOSELY |
| POWER | MONITOR | GoB Residents KEEP INFORMED |
| Low | INTEREST | |
| | Low | High |

Figure 11: Stakeholder Power/Interest Grid (Compiled by author)

3. Manage Stakeholder Engagement

Managing Stakeholder Engagement is the process of communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle. (PMBOK® Guide 6th Edition, 2017).

The project manager will benefit from this process since it will encourage her to increase support and minimize resistance from stakeholders, significantly increasing the chances to achieve project success.

4. Monitor Stakeholder Engagement

To increase the efficiency and effectiveness of stakeholder engagement activities, the monitor stakeholder engagement will allow stakeholders to be more engaged through modification of engagement strategies. Stakeholder Engagement will be an ongoing, iterative process that continues throughout the project lifecycle.

Identifying, documenting, analysing, planning, and implementing engagement will be done from the start of the project through closure. Figure 12 below depicts the Stakeholder Management Process and Methods that will be used for this project.

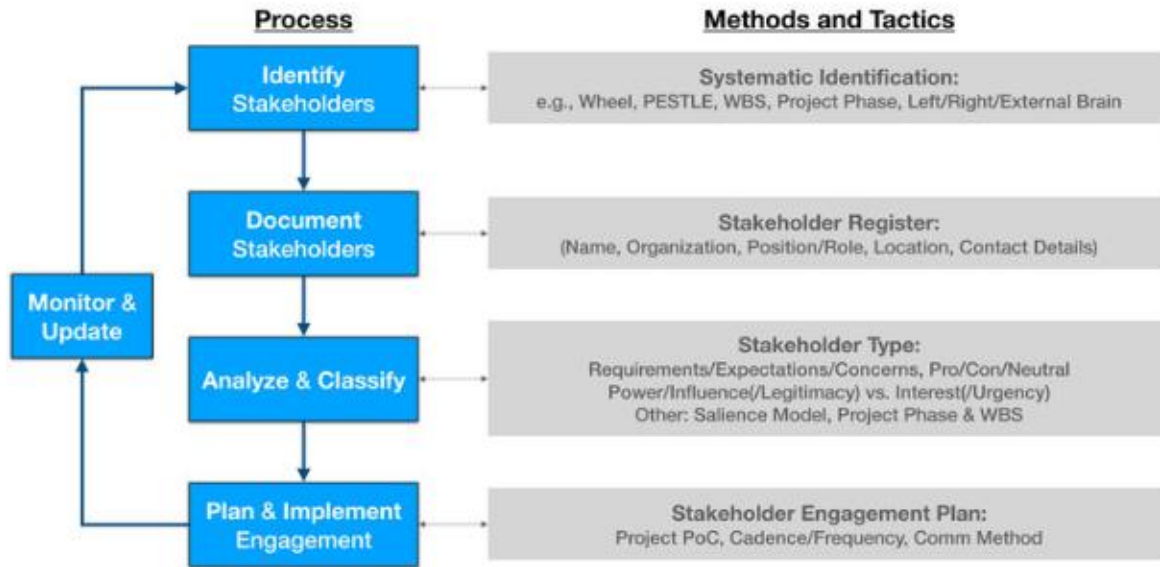


Figure 12:Stakeholder Management Process and Methods (Copyright 2017-2019 Mark Warner, TheProject ManagementBlueprint.com)

5 CONCLUSIONS

After completing the Project Management Plan for Developing a National Plan to Expand Internet Access to Rural and Remote Areas in Belize, the following can be concluded:

1. The successful implementation of the project will create a road map for the country of Belize to accomplish its goal of expanding internet to all rural areas of the country.
2. The Project Management Plan was created using both the descriptive and the analytical research method guided by the 6th Edition of the PMBOK® Guide.
3. The first specific objective was completed using a revised template for the Project Charter. The executing organization, Digi, already had an existing template which was modified to include components as guided by the 6th Edition of the PMBOK® Guide. Components of the project including the problem statement, project goals, project purpose and its general and specific objectives were outlined. The project charter also included the project milestones and assumptions, constraints, and risks. The Project Charter also included identification of the project manager and the sponsor's authorization for the project to commence.
4. The second specific objective brought forth the Scope Management Plan. This included the WBS, general resource and human resource requirements as well as data requirements. One of the important forms elaborated was

the Change Request Form that will be needed to make or request any change of project scope.

5. The third specific objective was addressed by presenting the Schedule Management Plan. This included the project schedule created in Project Gantt chart using Microsoft Project which outlined the start and end time of each activity to ensure the project is completed within time constraints.
6. The fourth specific objective produced the Cost Management Plan. Using the project activities, the cost for each was estimated and included in a Microsoft Excel template which was used to develop the project budget.
7. The fifth specific objective was met by developing the Quality Management Plan. This included quality planning, quality assurance and quality control measures. The requirements Log as well as quality assurance metrics were established as part of this plan.
8. To address the sixth specific objective, the Resource Management Plan was outlined. It included a list of roles and responsibilities for the parties involved and an RACI Matrix to illustrate the project tasks and their relationships with team members.
9. The seventh specific objective, the Communications Plan, was done by listing the stakeholder and their communication requirements. A communication matrix was used to list the events, objectives, method and frequency of communication, its owner and expected deliverable.
10. The deliverable for the eighth specific objective was the creation of the Risk Management Plan. The qualitative risk analysis, using the risk register, was used to identify, score, and rank all possible risks that can most likely occur

during the execution of the project. Additionally, to capture and classify project risks, so that effective risk responses could be planned, a probability-impact matrix was established.

11. The ninth specific objective was to produce a Stakeholder Management Plan. This was done by using a Stakeholder Risk Matrix that listed all stakeholders and their functions, roles and responsibilities, main expectations, and requirements. The plan also identified the stakeholders' influence and impact on the project. The plan also included the how stakeholder engagement was to be managed and monitored.
12. In conclusion, all plans created will contribute to the effective project management and success of the project. Given that this project will not require services other than internal resources time, there is no need for a procurement plan.

6 RECOMMENDATIONS

In developing the Project Management Plan for the project, “Develop a National Plan for Expanding Internet Access to Rural and Remote Areas in Belize”, the following recommendations were made:

1. The output of the project which includes the Phased Action Plan also referred to the National Plan should be presented to the Government of Belize-E-Governance Department to seek funding for the expansion of internet to rural areas since it was highlighted in the ICT National Strategy of Belize.
2. Digi should be considered the service provider for all expansions since they currently host the largest network in the country.
3. Digi should also seek funding from other sources such as grants and loans to accomplish the proposed plan.
4. Digi should use the project plan template as a guide when developing future project management plans.
5. Digi should implement proper project management practises such as initiation and planning documents before executing projects.
6. All plans should be reviewed and signed by the Project Sponsor before executing.
7. All projects executed by Digi should be done with a proper project team and assigned to a Project Manager
8. Since Resource Management is a challenge at Digi, a proper Resource Management Plan must be developed and synced with other ongoing projects that utilize the same project team.

9. The Project Management Office at Digi should be more engaged in the project management best practises and tailor documents to the specific projects.
10. Digi should incorporate proper documentation of all projects and templates for easy succession planning.

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8 APPENDICES

Appendix 1: FGP Charter

| PROJECT CHARTER | | |
|---|---|--------------------------|
| Date | Name of Project | |
| November 14, 2021 | Project Management Plan to develop a national plan to expand internet access to rural and remote areas in Belize. | |
| Type of project: | Hybrid | |
| Knowledge areas / process groups | Application area (Sector / Activity) | |
| Processes: Intitate, Plan, Execute, Monitor and Control, Close Knowledge areas: Integration, Scope, Time, Cost, Quality, Human Resource, Communication, Stakeholder | Infrastructure/Information Technology | |
| Tentative start date | Tentative completion date | Duration (months) |
| November 14, 2021 | March 14, 2022 | 4months |
| Project objectives (general and specific) | | |
| <p>General objective To develop a Project Management Plan to expand internet access to rural and remote areas in Belize</p> <p>Specific objectives:</p> <ol style="list-style-type: none"> 1. To produce a project charter to outline the project purpose, objectives and milestones in order to produce the project management plan 2. To create a scope management plan that includes all work necessary to successfully implement the project 3. To develop a schedule management plan that includes a project schedule that will ensure the project is completed within the time frame. 4. To create a cost management plan clearly defining the project budget required to complete the project 5. To develop a quality management plan to outline the quality requirements for the project to ensure results meet expectations for aproval within the time, cost and scope constraints. 6. To create a resource management plan to identify the human resources needed to complete the project. 7. To develop a communication plan to ensure timely and effective communication of | | |

the project status.

8. To produce a risk management plan to identify the risks involved in the successful completion of the project and the plan to minimize them.

9. To develop a stakeholder management plan to identify the stakeholders necessary to ensure effective stakeholder engagement.

Justification or purpose of the project (Contribution and expected results)

The project to develop the Project Management Plan to expand internet access to rural and remote areas in Belize, will require the creation of document that will be used by the Project Management Team during the executing, monitoring and controlling, and closing processes.

In 2018, the Government of Belize through the Taiwan International Cooperation and Development Funds, made efforts to increase connectivity throughout the country by implementing a National Broadband Project via the largest telecommunications company in the country, Belize Telemedia Limited. The project aimed at deploying fiber-optic network to most urban areas including major towns, cities and nearby villages. Nevertheless, there are still several rural and remote communities without access to internet. The recent pandemic has increased the need for expanding broadband connectivity countrywide, especially in rural areas, which is a basic condition necessary for accessing public services, remote learning and fostering the digital economy.

Therefore, this project seeks to develop a project management plan to expand internet connectivity to remote and rural areas in Belize.

Description of the product or service that the project will generate - Final project deliverables

This project will generate the Project Management Plan for expanding internet connectivity to remote and rural areas in Belize. It will include the necessary documents needed to execute the project effectively.

Assumptions

1. The project can be completed in 4 months
2. The acquired knowledge during the Master's course for Project Management is sufficient enough for one person to execute the project
3. Authorization and permission is granted by the telecommunications company

Restrictions

1. Time frame: 4 months
2. Resources to plan: 1 Project Manager


Preliminary identification of risks

- If the requirements are underestimated, incomplete project deliverables will impact project scope, time, and cost.

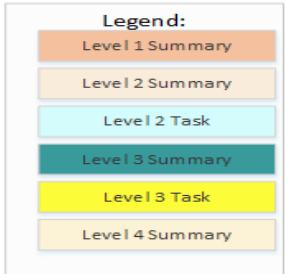
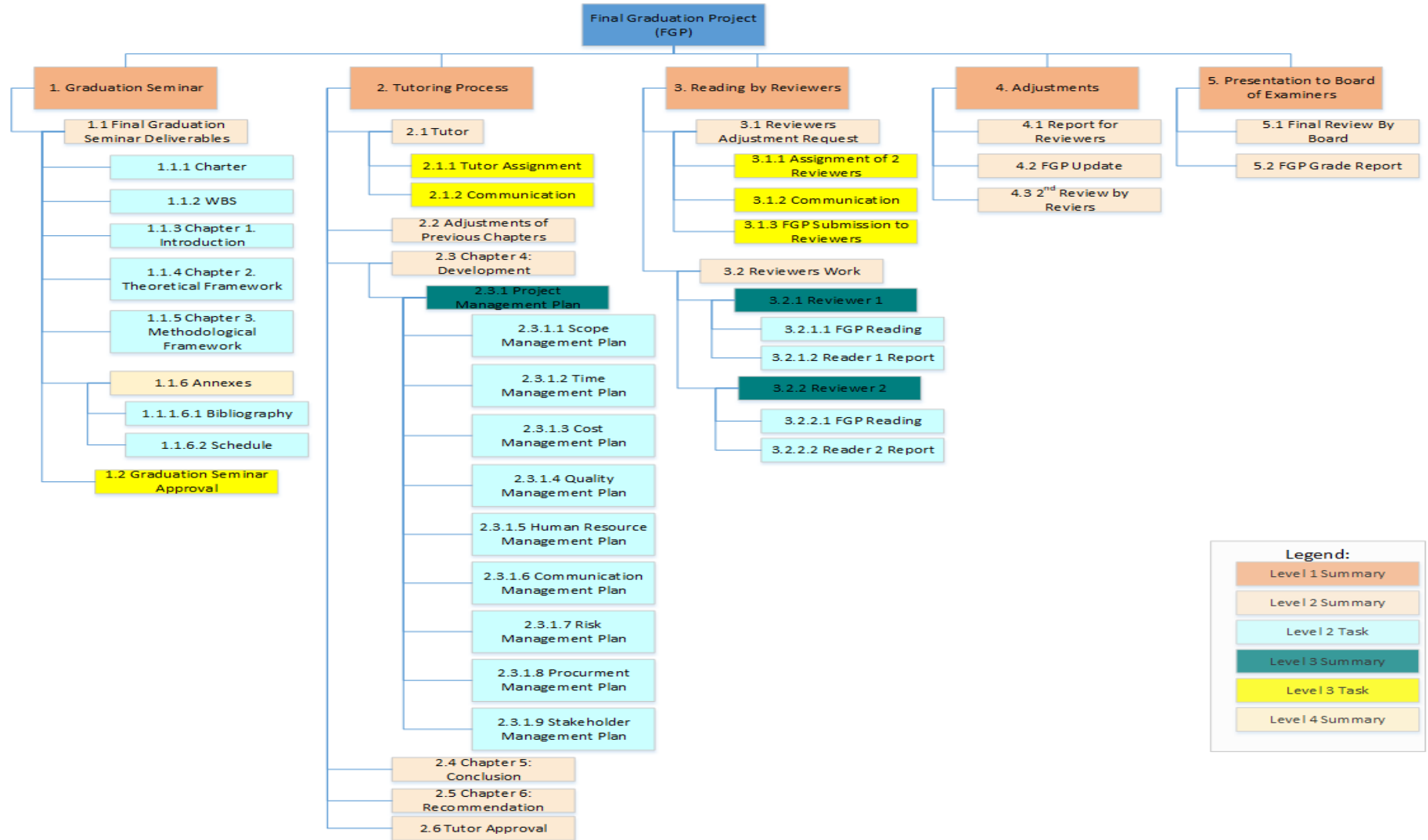
- If deliverables are not submitted or delayed, project management plan will impact project time.

General resources and budget
 Budget will include expenses for printing of document and shipping to Costa Rica.

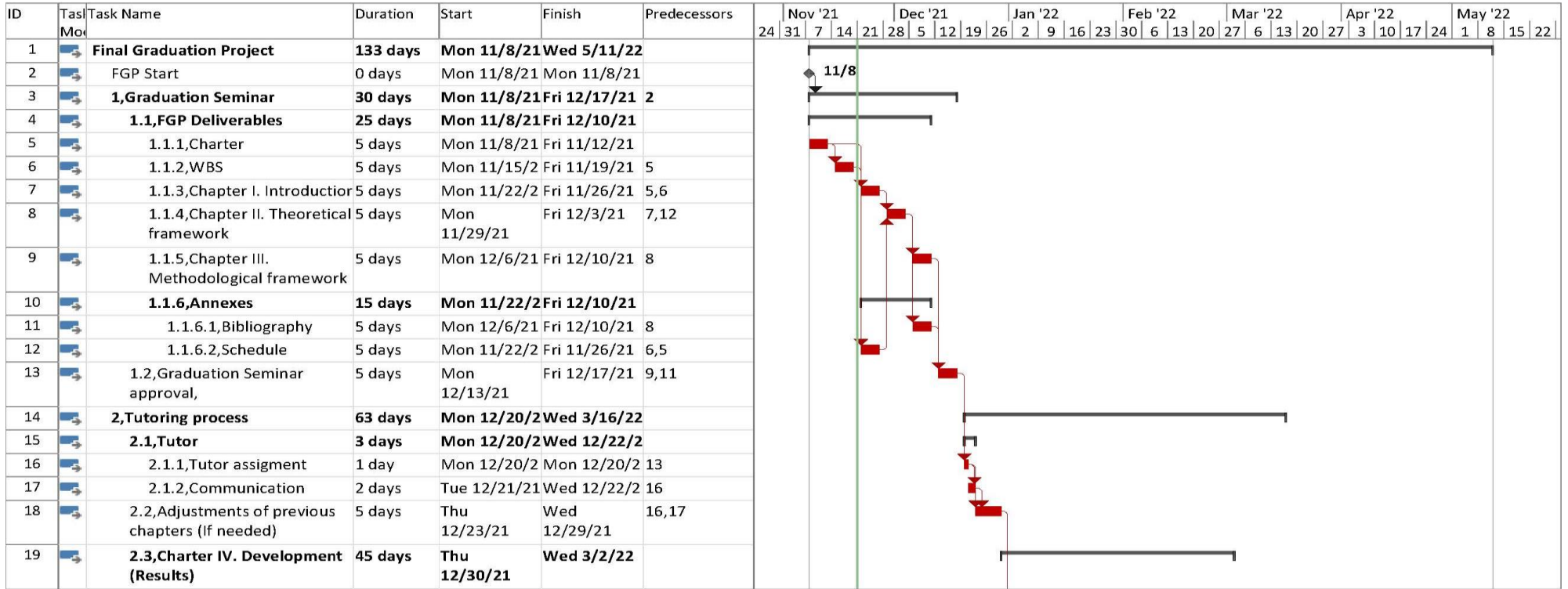
| Milestones schedule | | |
|--|-------------------|-----------------|
| Milestone name | Start Date | End Date |
| Final Graduation Seminar | Nov 8, 2021 | Dec 10, 2021 |
| Tutoring | Dec 13, 2021 | Mar 11, 2022 |
| Reading by Reviewers | Mar 14, 2022 | Apr 1, 2022 |
| Adjustments | Apr 4, 2022 | Apr 29, 2022 |
| Presentation to the Board of Examiners | May 2, 2022 | May 6, 2022 |

| Relevant historical information | |
|---|---|
| <p>The National Information and Communications Technology (ICT) Strategy presented by the Government of Belize (GOB) in 2011 outlined the vision of accelerating development and improving quality of life for all Belizeans through universal access and widespread usage of ICT. To help realize an important national policy of deploying internet broadband fiber to the home (FTTH) service throughout Belize, the TaiwanICDF, provided a loan to the Belize Telemedia Limited (BTL) to finance its National Broadband Plan for replacing its fixed internet infrastructure with fiber optic network, so as to increase the quality of and access to fixed internet service of BTL. Currently, the existing network can serve over 90,000 households with the fastest internet service in the country. Over 35,000 households throughout the country have internet access via the Fiber to the Home network. Although it has significantly increased the fixed broadband coverage, internet speeds and stability, its coverage was mainly on urban town, cities and nearby villages.</p> | |
| Identification of groups of interest (stakeholders) | |
| <p>Direct Stakeholders: Project Manager(Jessamyn Ramos), Belize Telemedia Limited, Government of Belize Indirect Stakeholders: Public Utilities Commission, Students and residents of rural and remote areas</p> | |
| <p>Student's name (project manager): Jessamyn Ramos</p> | <p>Signature:</p>  |
| <p>Name and title of the authorizing person (facilitator):</p> | <p>Signature:</p> |

Appendix 2: FGP WBS



FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE



Project: Final_FGP_Schedule
Date: Sun 11/21/21.

| | | | | | | | |
|-----------------|--|--------------------|--|-----------------------|--|----------------|--|
| Task | | External Tasks | | Manual Task | | Finish-only | |
| Split | | External Milestone | | Duration-only | | Deadline | |
| Milestone | | Inactive Task | | Manual Summary Rollup | | Critical | |
| Summary | | Inactive Milestone | | Manual Summary | | Critical Split | |
| Project Summary | | Inactive Summary | | Start-only | | Progress | |

Appendix 3: FGP Schedule

Appendix 4: Linguist Certification

Virginia L. Hampton, Ph.D.

920 Maren Lane SW
Albuquerque, NM 87105

9 May 2022

To Whom It May Concern:

This is to certify that I have made suggestions to the master's degree candidate, Jessamyn Ramos, for corrections regarding her Final Graduation Project, including but not limited to:

- Spelling, grammar, and usage appropriate for candidates at the master's level
- Sentence structure, syntax, and development appropriate to Standard American English
- Repetition and sentence awkwardness
- Format issues

It is my opinion that once the recommended guidelines and suggestions are followed, this candidate will have completed her project in accordance with the standard for proficiency in written English for the Master's in Project Management (MPM) Degree offered by the Universidad Para la Cooperación Internacional.

Respectfully,

Virginia L. Hampton

The University of New Mexico

has conferred upon

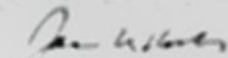
Virginia Louliere Hampton

the degree of

Doctor of Philosophy
English


with all the rights and privileges appertaining to that degree.


In testimony whereof the Regents of the University upon recommendation
of the Faculty have granted this diploma bearing the seal of the University
this twentieth day of December, two thousand three.


James W. Blodgett
Secretary of the Regents


John C. Williams
Secretary of the Regents




Edward C. Calhoun
President of the University


Benjamin L. Johnson
President of the University