

UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL  
(UCI)

PROJECT MANAGEMENT PLAN FOR THE LEARNING MANAGEMENT  
SYSTEM DEVELOPMENT PROJECT

SHERMAN LESLIE SYLVESTER

FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE  
MASTER IN PROJECT MANAGEMENT (MPM) DEGREE

Castries, Saint Lucia

January, 2018

UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL  
(UCI)

This Final Graduation Project was approved by the University as  
partial fulfillment of the requirements to opt for the  
Master in Project Management (MPM) Degree

Alberto Redondo Salas  
TUTOR

Melissa Hernández  
REVIEWER No.1

Juan Camilo Delgado  
REVIEWER No.2

Sherman Leslie Sylvester  
STUDENT

## **DEDICATION**

This project and by extension degree is dedicated to my parents, especially my father who wanted the very best for his children. He saw to it that we all got opportunities he was not afforded. Going such a distance will surely make them proud.

## **ACKNOWLEDGMENTS**

I would like to thank the giver of life for the health, strength and courage to endure the challenges during completion of this project. Many thanks to the persons who believed in my ability to undertake this course.

Special thanks to my tutor, Mr. Alberto Redondo, who meticulously and thoroughly reviewed my work giving invaluable suggestions and feedback. I would also like to thank Mrs. Alicia Valasse-Polius for her professional linguistic insight.

Finally, I want to express profound gratitude and heartfelt thanks to all those who assisted me in smaller ways, which contributed to the realization of the whole.

## INDEX OF CONTENTS

APPROVAL PAGE .....	ii
DEDICATION .....	iii
ACKNOWLEDGMENTS .....	iv
INDEX OF CONTENTS .....	v
INDEX OF FIGURES .....	vii
INDEX OF TABLES.....	viii
ABBREVIATIONS AND ACRONYMS .....	ix
EXECUTIVE SUMMARY (ABSTRACT) .....	x
1. INTRODUCTION .....	1
1.1 Background.....	1
1.2 Statement of the problem.....	2
1.3 Purpose .....	3
1.4 General objective.....	5
1.5 Specific objectives.....	5
2. THEORETICAL FRAMEWORK.....	6
2.1 Company/Enterprise framework .....	6
2.2 Project Management Concepts .....	10
3. METHODOLOGICAL FRAMEWORK.....	18
3.1 Information sources .....	18
3.2 Research Methods .....	22
3.3 Tools .....	27
3.4 Assumptions and Constraints .....	29
3.5 Deliverables .....	31
4. RESULTS.....	33
4.1 Scope Management Plan .....	33
4.2 Project Time Management .....	59
4.3 Cost Management Plan.....	80
4.4 Quality Management Plan .....	85
4.5 Project Human Resource Management .....	93
4.6 Risk Management Plan.....	102
4.7 Project Communications Management Plan .....	114
4.8 Procurement Management.....	119
4.9 Project Stakeholder Management.....	130
5. CONCLUSIONS .....	138
6. RECOMMENDATIONS .....	141
7. BIBLIOGRAPHY .....	143
8. APPENDICES .....	147
Appendix 1: FGP Charter .....	147
Appendix 2: FGP WBS .....	150
Appendix 3: FGP Schedule .....	151
Appendix 4: LMS Project Work Breakdown Structure.....	152
Appendix 5: FGP Philology Letter.....	153

**INDEX OF FIGURES**

Figure 1. Organizational Structure ..... 9  
Figure 2. Project Life Cycle ..... 11  
Figure 3. PMO Practices for IT Project Management ..... 12  
Figure 4. LMS WBS..... 43  
Figure 5. LMS Network Diagram and Project Schedule ..... 79  
Figure 6. Project Organization Structure..... 97  
Figure 7. Recruitment Process ..... 98  
Figure 8. Risk Breakdown Structure ..... 105

## INDEX OF TABLES

Table 1: CSEC Performance 2013 - 2016 in Mathematics and English.....	6
Table 2: Information Sources.....	20
Table 3: Research Methods.....	23
Table 4: Tools.....	27
Table 5: Assumption and Constraints .....	29
Table 6: Deliverables .....	31
Table 7: Scope Management Roles & Responsibilities.....	34
Table 8: Learning Management System WBS.....	40
Table 9: LMS WBS Dictionary .....	44
Table 10: Project Phases and Milestones Associated.....	56
Table 11: LMS Activity List.....	62
Table 12: Sequencing Activities .....	66
Table 13: List of Non-work days.....	69
Table 14: Resource Assignment and Activity Durations .....	69
Table 15: Human Resource Estimates .....	82
Table 16: Resources Estimates .....	82
Table 17: Project Budget.....	83
Table 18: International Quality Standards for E-learning Development.....	86
Table 19: Roles and Responsibility for Quality Management.....	87
Table 20: Matrix of Deployment .....	87
Table 21: Matrix of Quality Assurance .....	88
Table 22: Quality Checklist Template.....	89
Table 23: HR Management Roles & Responsibilities .....	94
Table 24: LMS Responsibility Matrix .....	99
Table 25: Roles and Responsibilities Matrix .....	102
Table 26: Risk Impact Assessment Scale .....	106
Table 27: Probability Scale .....	107
Table 28: Probability and Impact Matrix.....	108
Table 29: Risk Register .....	109
Table 30: Stakeholder Communication Delivery Methods.....	116
Table 31: Communications Management Matrix.....	117
Table 32: Communications Delivery Methods and Technologies.....	118
Table 33: Contracts Issued .....	120
Table 34: Selection Matrix Template.....	125
Table 35: Performance Metrics for Procurement Activities.....	126
Table 36: Stakeholder Register .....	132
Table 37: Stakeholder Power - Interest Grid.....	134
Table 38: Stakeholder Engagement Assessment Matrix .....	135
Table 39: Stakeholder Communications Strategy .....	136

## ABBREVIATIONS AND ACRONYMS

COQ	Cost of Quality
CSEC	Caribbean Secondary Education Certificate Examinations.
CXC	Caribbean Examinations Council
IT	Information Technology
ICT	Information and Communications Technology
LMS	Learning Management System
PMBOK Guide	Project Management Body Of Knowledge
PMI	Project Management Institute
SDLC	Software Development Lifecycle Methodologies
SWOT	Strengths Weaknesses Opportunities Threats
WBS	Work Breakdown Structure



## **EXECUTIVE SUMMARY (ABSTRACT)**

Educators across the Caribbean have complained about the poor grades and performances of students at the Caribbean Secondary Education Certificate Examinations (CSEC) level especially in the areas of Mathematics and English Language. Consequently, teachers have encouraged their students to enlist in after school lessons programmes that would assist their classroom learning. In the context of this environment, Oktave Solutions decided to embark upon a project in the education sector to benefit thousands of students across the Caribbean.

Oktave Solutions produced an interactive learning management system that would allow students to take responsibility for their own learning as the system provided a number of components in that regard. Students can choose content specific to their learning instead of structured material. The interactive nature of the system provided the learner with an online tutor, self-paced quizzes, past paper questions and a collaborative aspect to network with their peers. This option afforded many advantageous insights since the 21<sup>st</sup> century learner preferred to learn via technology as opposed to the traditional classroom. The system will also provide a collaborative aspect for teachers of the various subjects. Subject teachers from across the Caribbean would be able to share ideas, content and best practices with each other and users of the system. During the development of the content teachers would get an opportunity to dissect the prescribed syllabi to create meaningful material for the enhancement of student learning. The development of such a system would cut out commuting time for the student thus able to deliver quicker instruction compared to the traditional classroom-based learning.

The company undertook this project with a vast wealth of experience. The firm consisted of like-minded persons who are highly competent in their field. This IT Solutions Company is based out of Trinidad and Tobago, however collaborates with professionals across the Caribbean including here in Saint Lucia. Oktave Solutions will develop, design and teach interactive online courses conforming to the Caribbean Examination Council (CXC) syllabus. In the past, the company engaged in small projects that focused on Information Technology solutions for various agencies. These included government entities and local businesses. These projects were implemented without sound project management principles and guidelines. As a result, their ability to effect these solutions within scope and cost in a timely manner was affected.

This project created a project management plan to provide support for the development and creation of a learning management system. It formed the framework by which initiating, planning, monitoring and control, closing will be guided by thus increased the chances of completing the project within the triple constraints.

The Final Graduation Project's general objective was to create the Project Management Plan of the Learning Management System (LMS) Development

Project to tutor students preparing for the Caribbean Secondary Education Certificate (CSEC) examinations. The specific objectives were to create a Scope Management Plan to ensure the project includes the work that is required for a successful completion; to create a Time Management Plan to manage the timely execution of the project schedule; to create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget; to develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables; to design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project; to develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence; to create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team; to develop a Procurement Management Plan to identify the products and services required by the project; to develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.

The methodology used to conduct the research was a combination of four methods; analytical, descriptive, qualitative and quantitative. Interviews, surveys, meetings, empirical data, and stakeholder analysis were the tools used to gather and analyse information to complete the project.

In conclusion, it can be stated that Oktave Solutions should conduct their future projects using sound project management principles. Therefore, a project management plan with all the subsidiary plans must be incorporated and will serve as a guide towards the completion of the project complying with the triple constraints of time, budget and scope.

The recommendations are such that at all times proper communication is maintained by the project team and the relevant stakeholders to ensure issues are dealt with in a timely manner. In addition, the project manager and the team should adhere to strict budgetary constraints. Where modifications are needed, there must be permission from the appropriate authorities before proceeding with these changes. In addition, the learning management system must be properly maintained to guarantee customer satisfaction long after deployment. Finally, the Oktave Solutions could seek to undertake similar or larger projects in the future after having gained project management skills.

## 1. INTRODUCTION

### 1.1 Background

Oktave Solutions is a newly formed company comprising of a group of like-minded individuals seeking to provide Information and Communications Technology (ICT) solutions across the Caribbean. One such individual has been employed within the telecommunications for over 10 years. Included in the group are teachers with over forty (40) years combined experience. Also on the team is an Information Technology Specialist with concentration in networking.

The company has delivered solutions for telecommunication companies, governmental agencies and other private sector interests. These were conducted based on the technological skills but lacked project management principles.

The head of the company decided to undertake a project in the education sector to benefit thousands of students across the Caribbean. The creation of an interactive learning management system would allow students to take responsibility for their own learning, as the system would provide a number of components in that regard. The interactive nature of the system will provide the learner with an online tutor, self-paced quizzes, past paper questions and a collaborative aspect to network with their peers.

The firm engaged Ministries of Education in Trinidad, Grenada, and Saint Lucia to collect data to ascertain the pass rate of students including the demographics to get a sense of the necessity of the system and the manner in which it could assist students.

## 1.2 Statement of the problem

In the Caribbean, learners are faced with two major examinations that can be considered a “make or break” in their educational journey. The first one is taken towards the end of grade six (6) whilst the second, the focus of this project is done in and around the fourth and fifth form (grades 10 – 11). This particular examination is administered by the Caribbean Examinations Council (CXC). The council provides a wide cross section of subjects in Science, Business, Music, Arts, Modern Languages, Information Technology, Mathematics, Social Sciences and Industrial Technology.

Teachers and parents alike try to ensure that they create the best avenues to ensure that a positive learning environment is afforded to the students. To this end, students are encouraged to follow after - school lessons programmes to reinforce concepts taught during school hours and to learn new material that may not be covered by the class teacher.

Therefore, hundreds of students attempt to enrol in a program that is affordable and accessible to meet their demands. This situation engenders a number of challenges for the learner and parent:

1. The additional cost to the parent for the extra commute
2. Long hours directly after school
3. Maybe cost prohibitive
4. Classes are too full to provide individualized attention
5. At risk of information overload if the lessons tutor teach the same material as did the class teacher
6. Not everyone is inclined to sit in a classroom after school

In addition to the above issue, learners in the 21st century are more motivated to learn via technology as opposed to the traditional classroom which simple provides chalk and talk. “Technology is the #2 pencil of the 21st century. As

such, any good Service Learning project will be embedded with a wide array of real-world technology-based applications” (Sole, 2015).

The 21st century learner has a number of characteristics that are not adequately nurtured by the traditional classroom. They “often have higher levels of digital literacy than their parents or teachers” and would “want to connect with others in real time on their own terms. They want their social media, their phones and their mobile technology. They want to be connected. All the time. In a way that makes sense to them” (Eaton, 2011).

The project management plan is necessary to steer the project in the right direction such that it will remain within the triple constraints of scope, budget and time. Once these are maintained, the project will be successful and would definitely meet the needs of the stakeholders and users that would interact with the system.

### **1.3 Purpose**

This project will venture to create a project management plan to provide support for the development and creation of a learning management system. It will form the framework by which initiating, planning, monitoring and control and closing will be guided by.

A Learning Management System (LMS) allows students to take ownership of their learning as it will grade assessments and provide timely feedback. There will be a component whereby a ‘live’ tutor will deliver face-to-face instruction. The system is poised to track student learning and their progress. Students are encouraged to follow after-school lesson programmes especially in Mathematics and English. These classes are usually last two hours, and are not as individualised as it should be. Hence, this system will afford a student the opportunity to follow these very classes at their own leisure and comfort.

“Bruner believed that when students begin to learn new concepts, they need help from teachers and other adults in the form of active support. To begin with, they are dependent on their adult support, but as they become more independent in their thinking and acquire new skills and knowledge, the support can be gradually faded” (Wheeler, 2017). The system will support this theory by promoting methods subscribed to by (Alber, 2014):

1. “Show and Tell
2. Tap Into Prior Knowledge
3. Give Time to Talk
4. Use Visual Aids
5. Pause, Ask Questions, Pause, Review
6. Trying Something New”

The system will also allow students to collaborate with their peers as research has shown that students acquire knowledge from each other at a faster pace. “Peer learning, or peer instruction, is a type of collaborative learning that involves students working in pairs or small groups to discuss concepts, or find solutions to problems. This often occurs in a class session after students are introduced to course material through readings or videos before class, and/or through instructor lectures.” “Many instructors have found that through peer instruction, students teach each other by addressing misunderstandings and clarifying misconceptions” (Cornell University, 2012).

The benefits of an LMS are boundless but there are some key elements worthy of mention. These components include the:

1. Organization of eLearning content in one location.
2. Provision of unlimited access to eLearning materials.
3. Ease of tracking learner progress and performance.

4. Reduction of Learning and Development costs.
5. Reduction Learning and Development time.
6. Integration of social learning experiences.

Consequently, this project management plan will detail the procedures for a project manager to conduct the creation of such a system to be completed within budget and time whilst maintaining the scope.

#### **1.4 General objective**

To create the Project Management Plan of the Learning Management System (LMS) Development Project to tutor students preparing for the Caribbean Secondary Education Certificate (CSEC) examinations.

#### **1.5 Specific objectives**

1. To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.
2. To create a Time Management Plan to manage the timely execution of the project schedule.
3. To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.
4. To develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables.
5. To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.
6. To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.
7. To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team.

8. To develop a Procurement Management Plan to identify the products and services required by the project.
9. To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.

## 2. THEORETICAL FRAMEWORK

### 2.1 Company/Enterprise framework

#### 2.1.1 Company/Enterprise background

The company being recently formed would now like to focus on creating programmes for educational purposes. CSEC statistics over the years have contributed to teachers saying that students are not doing as well as expected. This is evidenced from the data extracted in Mathematics and English from the CXC website:

**Table 1: CSEC Performance 2013 - 2016 in Mathematics and English**

Subject - % Pass		
Year	Mathematics	English A
2016	44.31	67.48
2015	56.84	54.1
2014	49.71	59.05

(Source: CXC Annual Report 2013/2016)

Teachers and school administrators have continued to mull over the declining grades of students. Below is an outlook of the student performance throughout the Caribbean.



“This year, 14 of 20 schools had a worse pass rate in Mathematics, while three saw improvements, two remained level and one school entered candidates for the first time” (The Daily Observer Ltd., 2016)

“The fall-off in Mathematics comes after three consecutive years of improvement in the performance of students in the subject area. Passes moved from 37.2 per cent in 2012 to 62 per cent in 2015” (Government of Jamaica, 2017).

“Statistics released by the Ministry of Education revealed that performance in English Language dropped to 55.3 percent from 79.8 percent in 2011. It also showed that performance in Mathematics among Dominican students is below regional rates” (Dominica News Online, 2012)

From the research it is clear to see there is a fundamental issue where performance is concerned. Therefore it stands to reason that formulating a project management plan to create the LMS is timely and is looked at as a possible solution to the woes students face with those difficult subjects.

### **2.1.2 Mission and vision statements**

#### **Company Mission Statement**

Education is our passion. We continuously aim to improve the availability and delivery of quality educational content and study material to students throughout the Caribbean. Our mission is to provide an interactive and personalised educational experience to our students, in a manner that is secure, accurate, cost-effective, professional and innovative.

#### **Company Vision Statement**

To apply state-of-the-art concepts to enhance and solve critical problems in information technology through the use of innovative solutions.

*Mission and vision of the Ministry of Education, Innovation, Gender Relations and Sustainable Development in Saint Lucia:*

“We seek to optimize and sustain economic development and quality of life by creating a functional individual that is accepting of civic responsibility and empowered to compete in global environment” (Ministry of Education, 2017).

“A literate, informed, creative and productive society” (Ministry of Education, 2017).

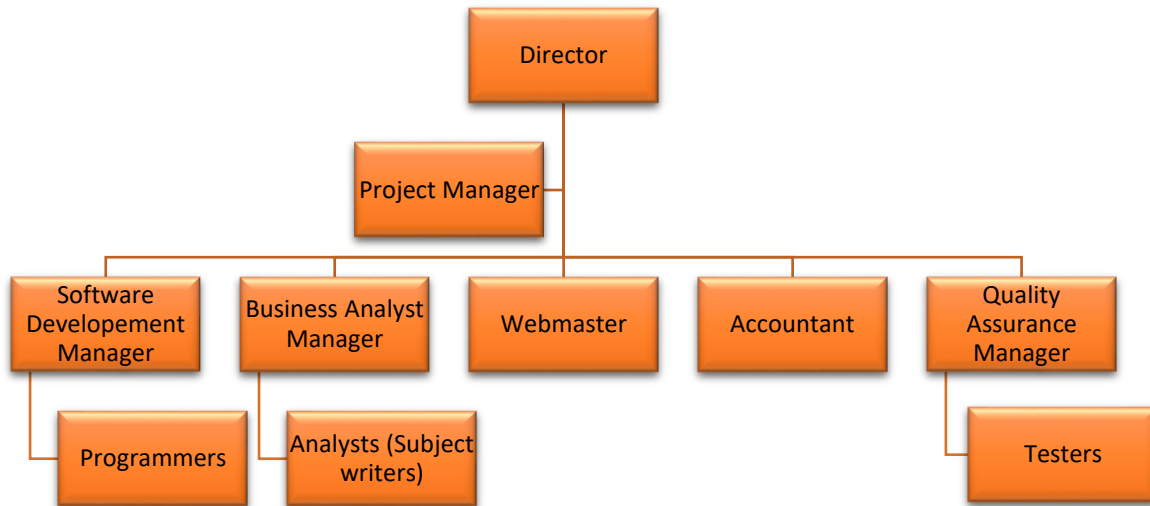
*Mission and vision of the Ministry of Education, Human Resource Development & the Environment in Grenada*

“The Ministry of Education will endeavour to provide the necessary support service to the nation’s children from ages five to sixteen. Efforts will continue to be made to widen access to quality education at the pre-primary, secondary and tertiary levels in a cost effective and efficient manner” (Government of Grenada, 2017).

“The Ministry of Education through the various programs will endeavour to implement the relevant aspects of the reform strategy in order to provide citizens with the knowledge, attitudes, values and skills that will help develop their capacity to communicate adequately and display a level of flexibility and creativity, which will enhance their capacity to respond adequately to the challenges of development” (Government of Grenada, 2017).

It appears from an analysis of the aforementioned missions and visions, that the education ministries across the Caribbean mention the use of ICTs in instruction – an objective in keeping with 21<sup>st</sup> century models of education. This explains the provision of laptops and tablets to students by some governments. Consequently, this outlook will complement the goals of this project in empowering students to take responsibility for their learning.

### 2.1.3 Organizational Structure



**Figure 1. Organizational Structure**  
(Source: Author of Study)

### 2.1.4 Products offered

Oktave Solutions prides itself on providing educational solutions best suited for Caribbean students. These solutions will be tailored to meet the demands of the Caribbean learner who in the past was subjected to material more appropriate for the metropolitan student.

Formulating the project management plan with the other subsidiary plans will assist the company in meeting its target as it relates to the completion the project within scope, budget and time; the triple constraints of project management.

## **2.2 Project Management Concepts**

### **2.2.1 Project**

According to PMI a project is considered to be “is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources.” It also goes on to indicate a project as being “unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal” (Project Management Institute, Inc 2017).

Project Insights goes on to add “projects are initiated by organizations for a variety of reasons, such as to meet a business need, attain a strategic objective or meet a market demand” (Project Insight, 2017).

From the above statement the proposed creation of the LMS falls in line with the strategic plans of the company. The project management plan will complement the project by ensuring it is completed within the set limits and guidelines.

### **2.2.2 Project Management**

Project Management as articulated by PMI is “the application of knowledge, skills, tools and techniques to project activities to meet the project requirements” (PMI, 2013, p. 5).

A project management plan will therefore be outlined to guide the creation of the LMS. This will give its creators a greater opportunity to complete the project within budget and the allotted time.

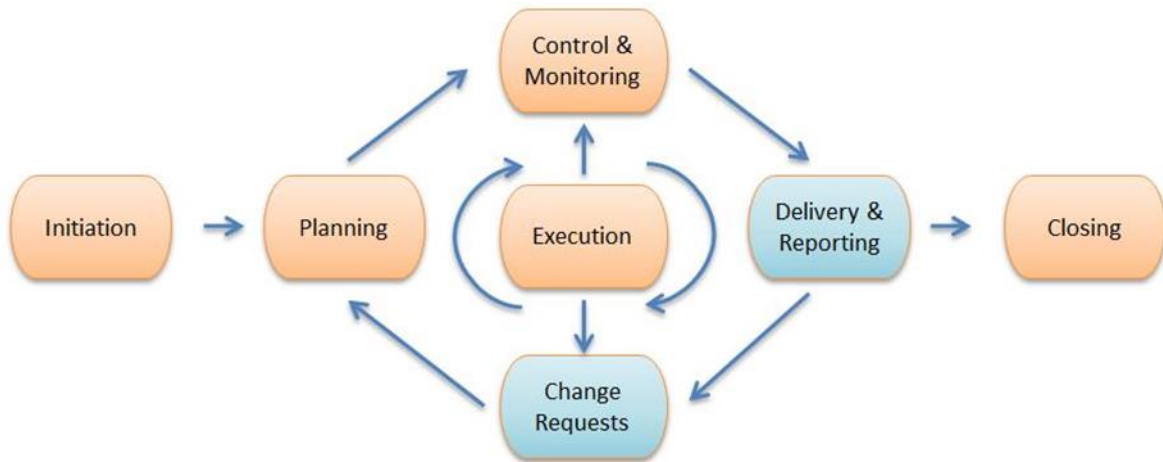
### 2.2.3 Project Life Cycle

PMI postulated that the “project life cycle is the series of phases (see Figure 2) that a project passes through from its initiation to its closure. The phases are generally sequential, and their names and numbers are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application” (PMI, 2013, p.38).

Due to the information technology focus of this project the figure below (figure 3) shows an adaption of the life cycle for the specific purpose of IT projects. Included in the iteration are delivery, reporting and change requests. The IT model coincides with the Software Development Lifecycle methodologies (SDLC) which takes into account “Waterfall, Unified Process, and Agile Process” (City University of Hong Kong, 2017).



**Figure 2. Project Life Cycle**  
(Source: Hillary, n.d.)



**Figure 3. PMO Practices for IT Project Management**  
(Source: City University of Hong Kong n.d.)

#### 2.2.4 Project Management Processes

PMI (2013) identifies five (5) processes namely;

- a. “Initiating - Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase;
- b. Planning – This is required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve;
- c. Executing – This is performed to complete the work defined in the project management plan to satisfy the project specifications;

- d. Monitoring and Controlling – This is performed to complete the work defined in the project management plan to satisfy the project specifications;
- e. Closing – This describes the finalization of all activities across all Process Groups to formally close the project or phase” (p. 49).

### **2.2.5 Project Management Knowledge Areas**

PMI enlists 10 project management knowledge areas that would encompass the activities necessary from the commencement to the closure of a project.

The ten areas include “Project Integration Management, Project Scope Management, Project Time Management, Project Quality Management, Project Human Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management and Project Stakeholder Management” (PMI, 2013, p. 60).

Each of these knowledge areas contain a “detailed description of the process inputs and outputs along with a descriptive explanation of tools and techniques most frequently used within the project management processes to produce each outcome” (PMI, 2013, p. 60).

The knowledge areas applicable to this project will be described below indicating how each relates to the project.

“Plan Scope Management is the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled. The key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project” (PMI, 2013, p.107). Utilizing this knowledge area would allow the project manager to effectively keep the project within the stated

framework of the LMS since a project of that magnitude have the potential to balloon outside the scope.

“Project scope management contains 6 processes including Plan scope management, collect requirements, define scope, create work breakdown structure, validate scope and control scope” (CEM Solutions, 2013).

The second knowledge area designed to keep the creation of the LMS in punctual timelines is Project Time Management. This includes “the processes required to manage the timely completion of the project” (PMI, 2013, p. 141). “There are 7 processes of Project time management including plan schedule management, define activities, sequence activities, estimate activity resources, estimate activity duration, develop schedule and control schedule” (CEM Solutions, 2013).

In a valiant attempt to keep the project within the fixed monetary limits the cost management knowledge area will provide guidance. “Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget” (PMI, 2013, p.193). “There are 4 processes in this knowledge area including plan cost management, estimate cost, determine budget and control cost” (CEM Solutions, 2013).

A fourth vital area to be considered is quality. The LMS must be error free and user friendly before launching to potential consumers. Purposely the quality management plan “includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken” (PMI, 2013, p. 225). PMI adds that “Project Quality Management works to ensure that the project requirements, including product requirements, are met and validated” (PMI, 2013, p. 225). “It contains 3 processes including plan quality management, perform quality assurance and control quality” (CEM Solutions, 2013).



A key determinant to a successful project is having the appropriate staffing for the various components and activities. For example this project would require web designers, programmers, in alliance with other skilled labour. The knowledge area aligned to this task is the HR management plan. “It is the process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan. The key benefit of this process is that it establishes project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release” (PMI, 2013, p. 258). “These all are isolated into 4 processes of project human resource management including plan human resource management, acquire human resource, develop human resource and manage human resource” (CEM Solutions, 2013).

Project Communications Management “includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate is position of project information” (PMI, 2013, p. 286). Effective communication is an important element that will form connections with all the stakeholders and their various requirements which will redound to the realization of this project. “Project communication management comprises of 3 processes including plan communication management, manage communication and control communication” (CEM Solutions, 2013).

“If you treat risk management as a part-time job, you might soon find yourself looking for one” (Deloitte white paper, 2015). Ensuring that risks are identified and mitigated against is a fundamental constituent in project management and consequently for this undertaking in particular.

In this regard the eighth knowledge area that will be included is Project Risk Management which is “the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project. The objectives of project risk management are to increase the likelihood and impact of

positive events, and decrease the likelihood and impact of negative events in the project (PMI, 2013, p. 309). “There are 6 processes of project risk management; plan risk management, identify risk, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses and control risks” (CEM Solutions, 2013).

The penultimate knowledge area Project Procurement Management “includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project.

Project Procurement Management includes the contract management and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members” (PMI, 2013, p. 355). This is a useful knowledge area such that it will indicate the exact requirements to construct the LMS. “4 processes that are covered under project procurement management are plan procurement management, conduct procurement, control procurement and close procurement” (CEM Solutions, 2013).

The final knowledge area that will be formulated in the overall project management plan is stakeholder management. This area “includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

Stakeholder management also focuses on continuous communication with stakeholders to understand their needs and expectations, addressing issues as they occur, managing conflicting interests and fostering appropriate stakeholder engagement in project decisions and activities. Stakeholder satisfaction should be managed as a key project objective (PMI, 2013, p. 390). “There are 4 processes of project stakeholder

management; identify stakeholders, plan stakeholder management, manage stakeholder engagement and control stakeholder engagement” (CEM Solutions, 2013).

### 3. METHODOLOGICAL FRAMEWORK

#### 3.1 Information sources

Information Source is “any system producing information or containing information intended for transmission; in information science, the conventional designation for scholarly documents or publications, which serve not only as important sources but also as the means of transmission of information in space and time” (The McGraw-Hill Companies, 2003)

##### 3.1.1 Primary Sources

Primary sources allow researchers to get as close as possible to original ideas, events, and empirical research. These sources may include “creative works, first hand or contemporary accounts of events, and the publication of the results of empirical observations or research” (Virginia Polytechnic Institute and State University, 2017).

Examples of Primary Sources:

- “Archives and manuscript material
- Photographs, audio recordings, video recordings, films
- Journals, letters and diaries
- Speeches
- Scrapbooks
- Published books, newspapers and magazine clippings published at the time
- Government publications
- Oral histories
- Records of organizations
- Autobiographies and memoirs
- Printed ephemera
- Artefacts, e.g. clothing, costumes, furniture

- Research data, e.g. public opinion polls” (University of California, 2017)
- “Internet communications on email, listservs
- Interviews (e.g., oral histories, telephone, e-mail)” (Yale University Library, 2016)

### 3.1.2 Secondary Sources

Secondary sources analyze, review, or summarize information in primary resources or other secondary resources. Even sources presenting facts or descriptions about events are secondary unless they are based on direct participation or observation. Moreover, secondary sources often rely on other secondary sources and standard disciplinary methods to reach results, and they provide the principle sources of analysis about primary sources” (Virginia Polytechnic Institute and State University, 2017).

#### Examples of Secondary Sources

- “Biographies
- Dissertations
- Indexes, abstracts, bibliographies (used to locate a secondary source)
- Journal articles
- Monographs” (Virginia Polytechnic Institute and State University, 2017)
- “Commentaries, criticisms
- Dictionaries, Encyclopaedias (also considered tertiary)
- Histories
- Literary criticism such as Journal articles
- Magazine and newspaper articles
- Monographs, other than fiction and autobiography
- Textbooks (also considered tertiary)
- Web site (also considered primary)” (Yale University Library, 2016)

**Table 2: Information Sources**

Objectives	Information sources	
	Primary	Secondary
To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.	PMBOK Guide, discussion with potential stakeholders	Research data, Websites
To create a Time Management Plan to manage the timely execution of the project schedule.	PMBOK Guide, Websites,	Websites
To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.	PMBOK Guide, Internet	Books, Websites
To develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables..	PMBOK Guide , Websites	Books, Websites
To design a Human Resource Management	Published books, Websites	Books, Journal articles, Websites

Objectives	Information sources	
	Primary	Secondary
plan to determine the project roles, responsibilities and skills required to effectively complete the project.		
To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team.	Published books, Websites	Project Management related literature, Internet
To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.	Published books, Websites	Books, Journal articles, Websites
To develop a Procurement Management Plan to identify the products and services required by the project.	Published books, Websites, lessons learnt	Books, Websites

Objectives	Information sources	
	Primary	Secondary
To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.	Published books, Internet, student observations, discussions with company owner	Websites

(Source: Author of Study)

### 3.2 Research Methods

Research methods describe “the behaviour and instruments used in selecting and constructing research technique” (Kothari, 2004).

Descriptive research “includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present” (Kothari, 2004).

Analytical research “use facts or information already available, and analyze these to make a critical evaluation of the material” (Kothari, 2004).

#### 3.2.1 Quantitative Research Method

Quantitative research is “based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity” (Kothari, 2004).



Another meaning states that “quantitative research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than qualitative data collection methods. Quantitative data collection methods include various forms of surveys – online surveys, paper surveys, mobile surveys and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations” (Wyse, 2011).

### 3.2.2 Qualitative Research Method

Qualitative research deals “with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind” (Kothari, 2004). Qualitative Research is also looked at as a “primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations” (Wyse, 2011).

**Table 3: Research Methods**

Objectives	Research methods			
	Descriptive research	Analytical research	Quantitative research	Qualitative research
To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.	Through surveys, interviews and meetings the scope of the project will be	The information garnered from historical data will then be analysed.	N/A	N/A

Objectives	Research methods			
	Descriptive research	Analytical research	Quantitative research	Qualitative research
	formulated.			
To create a Time Management Plan to manage the timely execution of the project schedule.	Through surveys, interviews and meetings the time frame of the project will be estimated.	The information gleaned from historical data will then be analysed.	Using empirical data through the various estimating techniques to arrive at a time schedule.	This method will create a gateway to quantitative research by determining or developing a hypothesis from information gathered from the interviews.
To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.	Through surveys, interviews and meetings will allow budget to be estimated.	The information gleaned from historical data will then be analysed.	Using the various estimating techniques and empirical data, the budget of the project will be determined.	N/A
To develop a Quality Management Plan to identify the standards	N/A	N/A	Using the various estimating	A cost of quality assessment

Objectives	Research methods			
	Descriptive research	Analytical research	Quantitative research	Qualitative research
that will be used to evaluate the quality of project deliverables..			techniques and empirical data, quality standards for the project will be established.	will be carried out as a qualitative measure.
To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.	Through surveys, interviews and meetings a determination will be made for the human resource needs.	N/A	N/A	N/A
To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team.	N/A	N/A	The calculation of the number of channels necessary will be one such quantitative method used.	N/A
To develop a	Through	The	Methods here	This process

Objectives	Research methods			
	Descriptive research	Analytical research	Quantitative research	Qualitative research
compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.	surveys, interviews and meetings the risks that may affect the project, negatively or positively will be established.	information garnered from will then be analysed.	such as <i>Probability and Impact Matrix</i> a quantitative assessment will be derived.	will form the basis to quantitative research by determining or developing a hypothesis from data gathering techniques.
To develop a Procurement Management Plan to identify the products and services required by the project.	Conducting meetings will assist in developing the procurement plan.	Analysing that information will provide assistance to make selections.	N/A	N/A
To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project	Using meetings and other stakeholder analysis techniques the stakeholders will be	Analytical research will then be used to categorise each stakeholder in terms of <i>power and interest</i> among other	N/A	N/A

Objectives	Research methods			
	Descriptive research	Analytical research	Quantitative research	Qualitative research
success.	identified.	factors.		

(Source: Author of Study)

### 3.3 Tools

A tool as stated by PMI as “something tangible, such as a template or software program, used in performing an activity to produce a product or result” (PMI, 2013, p 565).

Table 4: Tools

Objectives	Tools
To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.	Interviews, Brainstorming, Prototypes, Questionnaires, Meetings, Document analysis, Product analysis, WBS Generator software, Product review
To create a Time Management Plan to manage the timely execution of the project schedule.	Meetings, Project Management software, Decomposition, Rolling wave planning, Precedence Diagramming Method, Critical Path Method.
To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.	Meetings, Three-Point Estimating, Project Management Software, Cost Aggregation.
To develop a Quality Management Plan	Cost-Benefit Analysis, Flow charts,

Objectives	Tools
to identify the standards that will be used to evaluate the quality of project deliverables..	Inspection.
To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.	Organization Charts
To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team.	Communication Requirements Analysis, Communication Technology, Communication Methods.
To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.	Meetings, Brainstorming, Cause and effect diagrams, SWOT Analysis, Risk Probability and Impact Assessment, Probability and Impact Matrix, Risk Categorization, Strategies for Negative Risks or Threats.
To develop a Procurement Management Plan to identify the products and services required by the project.	Market Research, Meetings, Independent Estimates.
To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.	Stakeholder Analysis, Meetings.

(Source: Author of Study)

### 3.4 Assumptions and Constraints

Assumption as defined by PMI is a “factor in the planning process that is considered to be true, real, or certain, without proof or demonstration” (PMI, 2013, p. 529).

PMI describes a constraint as a “limiting factor that affects the execution of a project, program, portfolio, or process” (PMI, 2013, p. 533).

**Table 5: Assumption and Constraints**

Objectives	Assumptions	Constraints
To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.	The work and activities are sufficiently detailed.	The scope of the project must be adhered to without deviation.
To create a Time Management Plan to manage the timely execution of the project schedule.	Adequate time is allotted to complete the activities of the project.	The project must be completed within the time schedule.
To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.	The budget will be accurately calculated to suit the scope of the project.	The project remains within the allotted budget.
To develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables..	Quality standards will be used to test the product.	The final product must meet the user standards and requirements.

Objectives	Assumptions	Constraints
To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.	The required staff complement is available to perform the tasks.	Resources may not be available when needed.
To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team.	Communication amongst all the stakeholders is relevant and up-to-date	Communication is dependent on a third party for example an ISP
To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.	All risks that will affect the project are listed.	Unforeseen risks are liable to develop as the project progresses.
To develop a Procurement Management Plan to identify the products and services required by the project.	The required products and services are acquired.  The necessary products such as software and hardware are available.	Goods and services are subject to external parties.
To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the	All stakeholders	Stakeholder requirements and



Objectives	Assumptions	Constraints
project based on the analysis of their needs, interests and potential impact on project success.	are identified and categorized accordingly.	level of interest may change during the project.

(Source: Author of Study)

### 3.5 Deliverables

A deliverable is “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).

**Table 6: Deliverables**

Objectives	Deliverables
To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.	Scope management plan
To create a Time Management Plan to manage the timely execution of the project schedule.	Time management plan
To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.	Cost management plan
To develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables. .	Quality management plan
To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively	Human resource plan

<b>Objectives</b>	<b>Deliverables</b>
complete the project.	
To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.	Risk management plan
To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team	Communications management plan
To develop a Procurement Management Plan to identify the products and services required by the project.	Procurement management plan
To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.	Stakeholder management plan

(Source: Author of Study)

## 4. RESULTS

### 4.1 Scope Management Plan

The scope management plan is a document from the project scope management area. This area includes the “processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully” (PMI, 2013, p. 104).

#### 4.1.1 Introduction

The Scope Management Plan provides the scope framework for the Learning Management Systems Development Project. This plan documents the scope management approach, roles and responsibilities as they pertain to project scope, scope definition, verification and control measures, scope change control, and the project’s work breakdown structure. Any project communication which pertains to the project’s scope should adhere to the Scope Management Plan.

The objective of this Project is to create a Learning Management System (LMS) Development Project to tutor students preparing for the Caribbean Secondary Education Certificate (CSEC) examinations.

#### 4.1.2 Scope Management approach

Scope management for this project will be undertaken by the project manager. The components of the scope are defined by the Scope Statement and Work Breakdown Structure (WBS). The Sponsor, Stakeholders and the Project Manager will approve and establish documentation for measuring project scope along the timeline of development of the LMS.

### 4.1.3 Roles and Responsibilities

In order to successfully manage a project's scope it is important that all roles and responsibilities for scope management are clearly defined in the Scope Management Plan. The Project Manager, Sponsor and team will all play key roles in managing the scope of this project. As such, they each must be aware of their responsibilities in order to ensure that work performed on the project is within the established scope throughout the entire duration of the project. The table below defines the roles and responsibilities for the scope management of this project.

Table 7: Scope Management Roles & Responsibilities

<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Octave Thomas	Project Sponsor	<ol style="list-style-type: none"> <li>1. Approve or deny scope change requests as appropriate</li> <li>2. Evaluate need for scope change requests</li> <li>3. Accept project deliverables</li> </ol>
	Project Manager	<ol style="list-style-type: none"> <li>1. Measure and verify project scope</li> <li>2. Facilitate scope change requests</li> <li>3. Facilitate impact assessments of scope change requests</li> <li>4. Organize and facilitate scheduled change control meetings</li> <li>5. Communicate outcomes of scope change requests</li> <li>6. Update project documents upon approval of all scope changes</li> </ol>
	Project Team Members	<ol style="list-style-type: none"> <li>1. Participate in defining change resolutions</li> <li>2. Evaluate the need for scope changes and communicate them to the project manager as necessary</li> </ol>
	Stakeholders	<ol style="list-style-type: none"> <li>1. Be able to offer scope changes</li> </ol>
	Instructional Designer	<ol style="list-style-type: none"> <li>1. Responsible for defining the instructional guides</li> </ol>
	Web-Administrator	<ol style="list-style-type: none"> <li>1. Responsible for managing and maintaining the webpage and the content</li> </ol>

(Source: Project Management Doc, n.d.)

#### **4.1.4 Scope Definition**

The scope definition section details the process of developing a detailed description of the project and its deliverables. This can only be completed after the requirements have been identified and defined during the requirements definition process.

The scope for this project was defined through a comprehensive requirements collection process. First, a thorough analysis was performed on what subjects and grade level the Learning Management system should focus on. From this information, the project team will develop the project requirements documentation, the requirements management plan, and the requirements traceability matrix for what the Learning Management System must accomplish.

The project description and deliverables are to be developed based on the requirements collection process and input from subject matter experts in software design, technical support, programming and instructional design. This process of expert judgment provided feedback on the most effective ways to meet the original requirements of providing this Learning Management System.

#### **4.1.5 Project Scope Statement**

The project scope statement provides a detailed description of the project, deliverables, constraints, exclusions, assumptions, and acceptance criteria. Additionally, the scope statement includes what work should not be performed in order to eliminate any implied but unnecessary work which falls outside of the project's scope.

#### **4.1.6 Scope Description**

The scope of this project is to develop a web-based learning management system capable of providing instruction for CSEC subjects. This e-learning system will contain subject guides, quizzes, student progress trackers and instructor guided learning. The system will be mobile and portable. Hence it can be accessed on any Wifi-enabled device.

#### **4.1.7 Situation Problem of High Level**

Students in the Caribbean are always engaged in after-school classes especially at levels where an external examination is expected. These examinations are taken at Grades 6 and 11. After-school classes are used to reinforce the instruction and learning of the formal classroom. Issues often arise that prevent students from participating in such classes. The drawbacks include:

- Travel constraints. Some students have to travel long distances to get to and from those after school class initiatives;
- Lack of class space since the instruction must be on a small scale

The deliverables for this project is a fully functioning learning management system with the flexibility to modify and expand the application as necessary in the future. This project will be accepted once the new software has been successfully tested. Additionally, the project is not to exceed 228 days in duration, commencing January 2018, US\$96,000 is expected to be spent. Assumptions for this project are that support will be provided by the project sponsor and that adequate resources will be available for the successful completion of this project.

The success of this project will be achieved with the development of:

1. A fully functioning Learning Management System.
2. A Scope Management Plan to ensure the project includes the work that is required for a successful completion.
3. A Time Management Plan to manage the timely execution of the project schedule.
4. A Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.
5. A Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables.
6. A Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.
7. A compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.
8. A Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team
9. A Procurement Management Plan to identify the products and services required by the project.
10. A Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.

### **Impacts or Expected Benefits of High Level**

- To provide an affordable option to students;
- Flexible learning as classes can be taken in comfort from any location with a Wi-Fi-enabled device;
- Students will learn using a medium best suited for their type of learning.

#### **4.1.8 High Level Preliminary Assumptions**

It is assumed that;

- The experts will be readily available;
- The software necessary can be sourced;
- The budget will be maintained;
- Changes will occur;
- All the resources needed will be readily available;
- The project will remain within scope;
- The requirements for the project will not change;
- The project will be successful.

#### **High Level Restrictions**

- Adherence to strict budget and time
- Different geographical locations of content writers

#### **Area or Economic Sector**

Information Technology in Education

#### **4.1.9 Summary of Milestone Schedule**

- Project Initiation
- Market Analysis Report



- Hardware/Software/Security
- Requirements Established
- Business Requirements Report
- Product Defined
- System design Completed
- User interface design completed
- Website design Completed
- Instructional Design Completed
- Network Completed
- Security Concepts Completed
- Launch Learning Management System
- Marketing Plan Completed
- Implementation of Marketing Plan
- All other relevant Project Plans Completed

#### **4.1.10 Work Breakdown Structure**

For more effective management, the work required to complete this Project will be subdivided into individual work packages. This will allow the Project Manager to more effectively manage the project's scope as the project team works on the tasks necessary for project completion.

The project is broken down into five phases: the project initiation phase, the design phase, the Build phase, the testing phase and the Marketing phase. Each phase is then subdivided into work packages using decomposition techniques and expert judgement. Below is the WBS for the LMS Project. Also see Appendix 4 for an illustration.

**Table 8: Learning Management System WBS**

<b>Activity ID Number</b>	<b>Activity Name</b>
<b>1.0</b>	<b>Systems Engineering</b>
	<b>Project Initiation</b>
1.1	Collect Sponsor Requirements
1.1.1	Meet with Sponsor
1.1.2	Establish Project Requirements/Scope
	Project Defined
1.2	Market Research
1.2.1	Conduct Market Survey
1.2.2	Collect Information
1.2.3	Analyze Information
1.2.4	Present Findings
	<b>Market Analysis Report</b>
1.3	Conduct Product Research
1.3.1	Determine Software Requirements Specification
1.3.2	Determine Hardware Requirements Specification
1.3.3	Determine Security Requirements Specification
	<b>Hardware/Software/Security Requirements Established</b>
1.4	Determine Business Definition Requirements
1.4.1	Identify Key Stakeholders
	Conduct interviews/focus group sessions to capture Stakeholder requirements
1.4.2	Categorize Requirements
1.4.3	Interpret and Record Requirements
	<b>Business Requirements Report</b>
	<b>Product Defined</b>
<b>2.0</b>	<b>Design Phase</b>
2.1	System Design
2.1.1	Establish Software Requirements
2.1.2	Establish Hardware Requirements
2.1.3	Establish Security Requirements
	<b>System design Completed</b>
2.2	User Interface Design
2.2.1	Develop Information Architecture
2.2.2	Design Graphical user interface
2.2.3	Develop Mock up
2.2.4	Develop Prototype
	<b>User interface design completed</b>

Activity ID Number	Activity Name
2.3	Website design
2.3.1	Create blueprint
2.3.2	Develop Site map
2.3.3	Sketch essential features
2.3.4	Arrange visual elements
	<b>Website Design Completed</b>
2.4	Instructional Design
2.4.1	Analyze requirements
2.4.2	Identify learners
2.4.3	Develop learning objectives
2.4.4	Determine Technology to be used
	<b>Instructional Design Completed</b>
2.5	Security Design
2.5.1	Establish Protocols
2.5.2	Establish Password entities
2.5.3	Establish third party payment options
	<b>Security Concepts completed</b>
<b>3.0</b>	<b>Build Phase</b>
3.1	Website build
3.1.1	Register Domain
3.1.2	Create website
3.1.3	Host website
3.1.4	Upload Content
	<b>Website Development completed</b>
3.2	System/network build
3.2.1	Create Network
	<b>Network Completed</b>
<b>4.0</b>	<b>Testing</b>
4.1	Quality Testing
4.1.1	User Acceptance testing
4.1.2	System testing
4.1.3	Security testing
	<b>Launch Learning Management System</b>
<b>5.0</b>	<b>Marketing</b>
5.1	Marketing Strategy
5.1.1	Develop Marketing Strategy
5.1.2	Develop Marketing Plan
	<b>Marketing Plan Completed</b>
5.2	Marketing Collateral
5.2.1	Source Advertising Packages
5.2.2	Select Advertising Package
	<b>Implementation of Marketing Plan</b>

<b>Activity ID Number</b>	<b>Activity Name</b>
<b>6.0</b>	<b>Project Management</b>
6.1	Planning
6.2	Scheduling
6.3	Execution
6.4	Accounting
6.5	Reporting
6.6	Meetings
	<b>All relevant Project Plans Completed</b>

(Source: Author of Study)

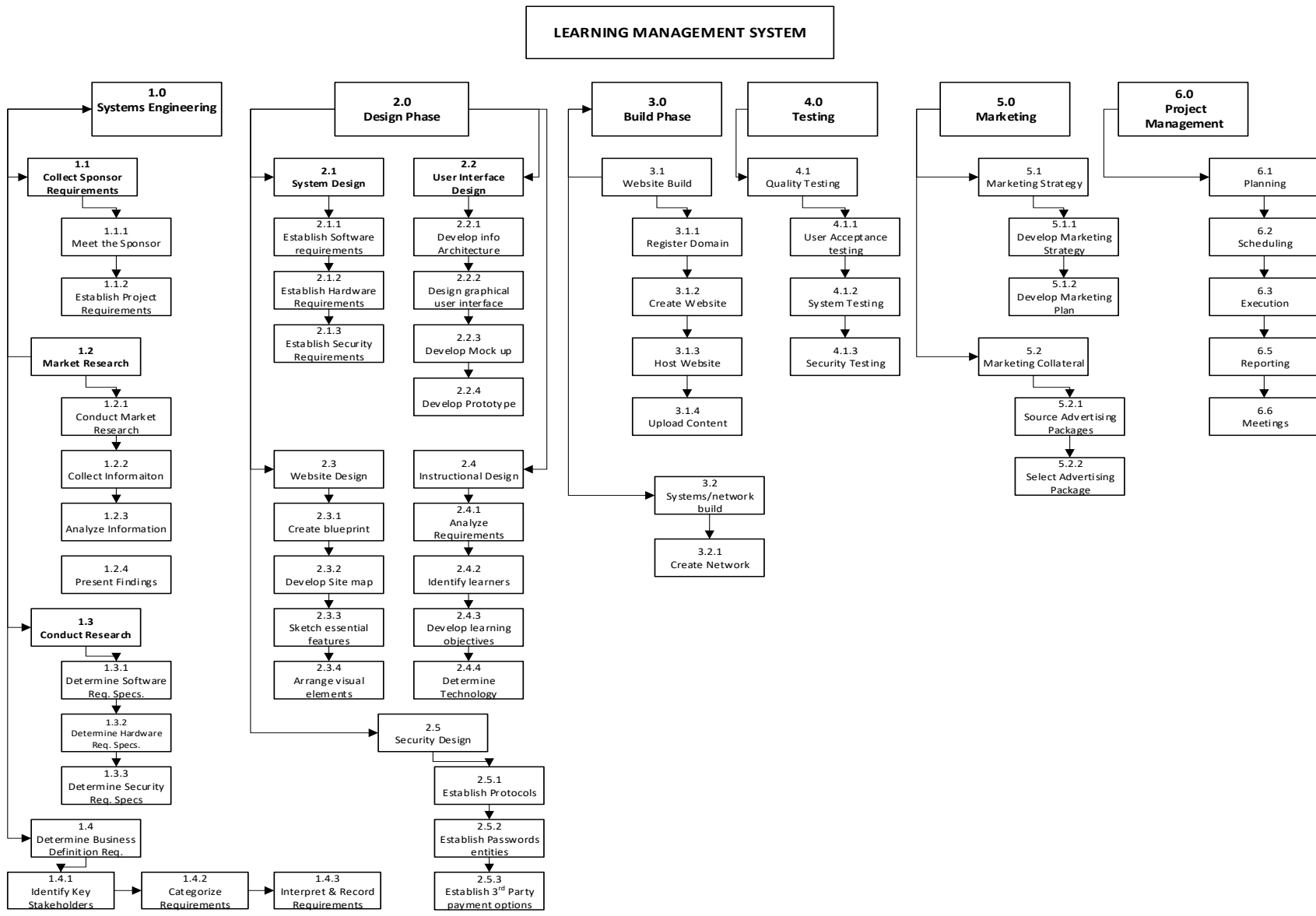


Figure 4. LMS WBS

Table 9: LMS WBS Dictionary

WBS Code	Activity Name	Description of Work	Deliverables	Budget	Resources
1.0	<b>Systems Engineering</b>	This preliminary analysis entails the collection of information necessary for making the project decisions.		<b>\$5,000.00</b>	
	<b>Project Initiation</b>				
1.1	Collect Sponsor Requirements	Meeting to determine project needs	Initial requirement documentation		Laptop Internet Relevant literature
1.1.1	Meet with Sponsor	Meet with Sponsor to understand the project requirements	Sponsor Directive		Laptop Internet Relevant literature
1.1.2	Establish Project Requirements/Scope	Description and scope of work established	Scope definition		Laptop Internet Relevant literature
	<b>Project Defined</b>	Project Scope established			
1.2	Market Research				
1.2.1	Conduct Market Survey	Conducting surveys to obtain pertinent information	Survey instruments		Survey software Laptop Internet
1.2.2	Collect Information	Collect findings	Survey findings		Laptop Internet
1.2.3	Analyze Information	Analyze findings	Survey evaluation		Survey software Laptop Internet

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
1.2.4	Present Findings	Present findings	Survey report		Laptop Internet Presentation apparatus
	<b>Market Analysis Report</b>				
1.3	Conduct Product Research	Research will identify the required components for the system			
1.3.1	Determine Software Requirements Specification	Develop the software requirements adequate for the LMS.	Software requirements		Laptop Internet Brochures
1.3.2	Determine Hardware Requirements Specification	Develop the hardware requirements necessary for the LMS.	Hardware requirements		Laptop Internet Brochures
1.3.3	Determine Security Requirements Specification	Develop the best layout for the security measures of the system for example logins and payments via credit/debit cards.	Security requirements		Laptop Internet Brochures
	<b>Hardware/Software/Security Requirements Established</b>				
1.4	Determine Business Definition Requirements	This process will determine the business case and			

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
		its feasibility			
1.4.1	Identify Key Stakeholders	Determine key stakeholders	Stakeholder list		Laptop Internet Spreadsheet software
1.4.1.1	Conduct interviews/focus group sessions to capture Stakeholder requirements	Collect Stakeholder Requirements	Stakeholder requirements		Laptop Internet Spreadsheet software
1.4.2	Categorize Requirements	Classify Requirements of Stakeholders	Classification document		Laptop Internet Spreadsheet software
1.4.3	Interpret and record requirements	Analyze requirements	Stakeholder register		Laptop Internet Spreadsheet software
	<b>Business Requirements Report</b>				
	<b>Product Defined</b>				
<b>2.0</b>	<b>Design Phase</b>			<b>\$5,000.00</b>	
2.1	System Design				
2.1.1	Establish Software Requirements	Specifying the software elements of the LMS	List of software components		Laptop Internet Spreadsheet software
2.1.2	Establish Hardware Requirements	Specifying the hardware elements of the LMS	List of hardware components		Laptop Internet Spreadsheet software
2.1.3	Establish Security	Specifying the	List of security		Laptop



<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
	Requirements	security elements of the LMS	components		Internet Spreadsheet software
	<b>System design Completed</b>				
2.2	User Interface Design	Develop a user-friendly interface that is Human-Computer Interaction prescribed.			
2.2.1	Develop Information Architecture	Create the platform for the content	Architecture documentation		Laptop Internet
2.2.2	Design Graphical User Interface	Designing user interface	Graphical interface concept		Laptop Internet Smart draw software
2.2.3	Develop Mock up	Creating mock up	Mock up concept		Laptop Internet Smart draw software
2.2.4	Develop Prototype	Creating prototype of user interface for testing	Prototype established		Laptop Internet Smart draw software
	<b>User Interface Design Completed</b>				
2.3	Website design	Designing elements for website	Website concepts and elements		
2.3.1	Create blueprint	Conceptualizing	Website layout		Laptop

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
		website layout			Internet Website design software
2.3.2	Develop Site map	Website sitemap detailing	Website sitemap		Laptop Internet Website design software
2.3.3	Sketch essential features	Conceptualizing website components	Collection of sketches		Laptop Internet Website design software
2.3.4	Arrange visual elements	Arrangement of elements to create proper fit	Web site design		Laptop Internet Website design software
	<b>Website Design Completed</b>				
2.4	Instructional Design	Collect the curriculum for the various CSEC subjects			Laptop Internet
2.4.1	Analyze Requirements				
2.4.2	Identify learners				
2.4.3	Develop learning objectives	Record the learning objectives for the various subjects	Subject/ course learning objectives		
2.4.4	Determine Technology to be used	Decision on the appropriate platform	Platform		
	<b>Instructional Design Completed</b>				
2.5	Security Design	Designing the aspects of security	Security concepts		Laptop Internet

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
					Security software/hardware
2.5.1	Establish Protocols	Determine security protocols	Security protocols		Laptop Internet Protocols
2.5.2	Establish Password entities	Creating password security	Password security protocol		Laptop Internet Security software
2.5.3	Establish third party payment options	Linkages with payment entities	Payment options		Laptop Internet
	<b>Security Concepts completed</b>				
<b>3.0</b>	<b>Build Phase</b>	<b>Construction of the physical components of the LMS</b>		<b>\$31,080.00</b>	
3.1	Website build	Construct the website in accordance to the design plan	Website for LMS		
3.1.1	Register Domain	Register website domain with hosting organization	Domain of website		Laptop Internet Domain Registration
3.1.2	Create website	Build a robust website	Website		Laptop Internet Website development

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
					software
3.1.3	Host website	Hosting website	Website on servers		Laptop Internet Webserver
3.1.4	Upload Content	Upload content onto website	Content uploaded		Laptop Internet Website
	<b>Website development completed</b>				
3.2	System/network build				
3.2.1	Create Network				
	<b>Network Completed</b>				
<b>4.0</b>	<b>Testing</b>	<b>Testing of system components</b>	<b>Test results</b>	<b>\$5,000.00</b>	<b>Laptop Internet Website LMS</b>
4.1	Quality Testing	Carry out quality test to ensure system is working as designed	Quality assurance report		Laptop Internet Website LMS
4.1.1	User Acceptance testing	Allow random users to interact with the LMS	User acceptance data		Laptop Internet LMS Users
4.1.2	System testing	Perform a beta system run to determine functionality.	System test report		Laptop Internet Website LMS
4.1.3	Security testing	Ensure the protection mechanisms are	Security testing report		Laptop Internet Website

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
		operational			LMS
	<b>Launch Learning Management System</b>				
<b>5.0</b>	<b>Marketing</b>	<b>Provide and execute strategies to sell the product</b>	<b>Marketing Strategies</b>	<b>\$10,000.00</b>	<b>Laptop Internet</b>
5.1	Marketing Strategy	Brainstorming the best possible selling outcomes	List of marketing options		Laptop Internet
5.1.1	Develop Marketing Strategy	Draft marketing strategies	Marketing strategies		Laptop Internet
5.1.2	Develop Marketing Plan	Layout plan	Marketing framework		Laptop Internet
	<b>Marketing Plan Completed</b>				
5.2	Marketing Collateral	Undertake tasks to sell the LMS to potential users	Marketing and advertising Plan		
5.2.1	Source Advertising Packages	Acquire advertising packages	Advertising options		Brochures
5.2.2	Select Advertising Package	Selection of suitable and affordable advertising package	Suitable advertising package		Brochures
<b>6.0</b>	<b>Implementation of Marketing Plan</b>			<b>\$187,000</b>	
<b>6.1</b>	<b>Project Management</b>	The management of the planning, execution, monitoring & controlling and closure activities of the project			

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
6.1.1	Planning	The development of the various Project Plans and the updating of those plans throughout the project lifecycle			
6.1.2	Scheduling	The assignment of timeframes and dates to project activities to establish the schedule and to control the duration of the project			
6.1.3	Execution	The monitoring and control of the implementation of project activities			
6.1.4	Accounting	The Monitoring of the finances and expenditure of the Project			
6.1.5	Reporting	The preparation of project reports and the documenting of project activities.			
6.1.6	Meetings	Meeting held during the Project to monitor and control activities and for the management of the			

<b>WBS Code</b>	<b>Activity Name</b>	<b>Description of Work</b>	<b>Deliverables</b>	<b>Budget</b>	<b>Resources</b>
		Project Office			
	<b>All relevant Project Plans Completed</b>				

(Source: Author of Study)

#### **4.1.11 Work Packages**

“A work package can be used to group the activities where work is scheduled and estimated, monitored, and controlled. In the context of the WBS, work refers to work products or deliverables that are the result of activity and not to the activity itself” (PMI, 2013, p. 125).

Work packages related to this project that will be used to monitor and control the scope include:

- Systems Engineering
- Design Phase
- Build Phase
- Testing
- Marketing
- Project Management

#### **Systems Engineering**

This work package will primarily cover the preliminary work to be carried out in order to proceed with the system. The market research is vital to ascertain information from stakeholders, the system requirements and the business case. It will give the project manager an insight and overview into the requirements necessary to build an LMS best suited for the users who would be benefiting from its existence.

#### **Design Phase**

The design phase will detail the provisions for the LMS, in terms of hardware and software elements, user interface design, website design, instructional design and security specifications. All the particulars of each of the aforementioned requirements will be chronicled for further development.



**Build Phase**

Creation of the system will effectively take place in this work package. This phase will see the experts taking the blueprint from the design phase and execute them to a fully functional LMS. The lesson plans and content will be written and uploaded onto the system. The hardware component of the system will be built simultaneously to support the website platform.

**Testing phase**

This phase is a crucial step in the process that would validate the system, check for errors and completeness. Every aspect of the system will be put through a series of tests to ensure it is error free as possible. For example it is of paramount importance that customers can feel confident that when they enter sensitive banking information it is secure from third party capture. In addition when a user is trying to complete an activity the system should be able to accommodate that request and not crash, causing frustration to the student and ultimately withdrawing their subscription.

**Marketing**

Strategies are to be employed to strengthen the reach of the pool of potential customers and provide buy in for the LMS. Thus methods to support this effort will be explored with the intention of selecting the methods that are best suited.

**Table 10: Project Phases and Milestones Associated**

<b>PROJECT PHASES</b>	<b>MILESTIONS ASSOCIATED</b>
Project Initiation	Project Defined
	Market Analysis Report Completed
	Hardware/Software/security requirements determined
	Product Defined
Design Phase	System Design Completed
	User Interface completed
	Website design completed
	Instructional Design Completed
	Security concepts completed
Build Phase	Website Development Completed
	Network completed
	Launch Learning Management System
Marketing Phase	Marketing Plan completed
	Implantation of Marketing Plan

(Source: Author of Study)

#### **4.1.12 Scope Verification**

Scope verification discusses how the deliverables will be verified against the original scope and how the deliverables from the project will be formally accepted. The deliverables for the project should be formally accepted and signed off on by the Project Manager throughout the lifecycle of the project and not held back as a single deliverable at the end of the project.

As this project progresses the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement, WBS and WBS Dictionary.

Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager and Sponsor will meet for formal acceptance of the deliverable. During this meeting the Project Manager will present the deliverable to the Project Sponsor for formal acceptance. The Project Sponsor will accept the deliverable by signing a project deliverable acceptance document. This will ensure that project work remains within the scope of the project on a consistent basis throughout the life of the project.

#### **4.1.13 Scope Control**

Scope control is the process of monitoring the status of the scope of the project. This section of the Scope Management Plan also details the change process for making changes to the scope baseline.

The Project Manager and the project team will work together to control the scope of the project. The project team will leverage the WBS Dictionary by using it as a statement of work for each WBS element. The project team will ensure that they perform only the work described in the WBS dictionary and generate the defined deliverables for each WBS element. The Project Manager will oversee the project team and the progression of the project to ensure that this scope control process is followed.

If a change to the project scope is needed the process for recommending changes to the scope of the project must be carried out. Any project team member or sponsor can request changes to the project scope. All change requests must be submitted to the Project Manager in the form of a project change request document. The Project Manager will then review the suggested change to the scope of the project. The Project Manager will then either deny the change request if it does not apply to the intent of the project or convene a change control meeting between the project team and Sponsor to review the change request further and perform an impact assessment of the change. If the change request receives initial approval by the Project Manager and Sponsor, the Project Manager will then formally submit the change request to the Project Sponsor.

The Project Sponsor approves the scope change requested by signing the project change control document. Upon acceptance of the scope change by the Project Sponsor and Project Manager, the Project Manager will update all project documents and communicate the scope change to all project team members and stakeholders.

## 4.2 Project Time Management

“Project Time Management includes the processes required to manage the timely completion of the project” (PMI, 2013, p. 141). The processes necessary to complete this process includes, Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Resources, Estimate Activity Durations, Develop Schedule and Control Schedule.

The deliverable coming out of this process is the Time Management Plan and will guide the project team through the schedule. The guide will ensure that the project team remains on task and within the time frame stipulated. The inputs for this process are the Project Charter and Scope Management Plan with the creation of the Schedule Management Plan as a major output.

The PMI (2013) provides an outline as to the project time management processes.

They include:

1. Plan Schedule Management
2. Define Activities
3. Sequence Activities
4. Estimate Activity Resources
5. Estimate Activity Durations
6. Develop Schedule
7. Control Schedule

#### 4.2.1 Schedule Management Approach

The framework of the approach to be taken to complete the project schedule is outlined in this section. The concepts to be addressed are scheduling tool/format, schedule milestones, and schedule development roles and responsibilities.

Microsoft Project 2016 will be used to illustrate the project schedule. This software will provide the project team with a network diagram and the project scheduling. The work packages will lead to the activities necessary to complete each deliverable.

The Schedule Management Plan will be used to “establish activities for developing, monitoring, and controlling the schedule” (PMI, 2013 p 148) of the LMS. The project manager will use this guide to track changes in schedule throughout the life of project.

Other utilities of this plan include:

**WBS.** “Which provides the framework for the schedule management plan, allowing for consistency with the estimates and resulting schedules” (PMI, 2013, p. 148).

**Project schedule model maintenance.** “The process used to update the status and record progress of the project in the schedule model during the execution of the project is defined” (PMI, 2013, p. 148).

**Control thresholds.** “Variance thresholds for monitoring schedule performance may be specified to indicate an agreed-upon amount of variation to be allowed before some action needs to be taken rules of performance measurement” (PMI, 2013, p. 148).

**Earned value management (EVM)** “Rules or other physical measurement rules of performance measurement are set” (PMI, 2013, p. 149).

The milestones generated for the LMS project are as follows.

1. Project Initiation
2. Market Analysis Report
3. Hardware/Software/Security
4. Requirements Established
5. Business Requirements Report
6. Product Defined
7. System design Completed
8. User interface design completed
9. Website design Completed
10. Instructional Design Completed
11. Network Completed
12. Security Concepts completed
13. Launch Learning Management System
14. Marketing Plan Completed
15. Implementation of Marketing Plan
16. All relevant Project Plans Completed

#### **4.2.2 Define Activities**

Defining the activities follows next and is the “process of identifying and documenting the specific actions to be performed to produce the project deliverables. The key benefit of this process is to break down work packages into activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work”(PMI, 2013, p. 148). In this process the work packages are created and exhibited in the WBS. These work packages are further decomposed into smaller units called activities.

To ensure that all the work necessary to complete the LMS is carried out an activity list will be drawn up. PMI (2013) postulates the activity list as “a comprehensive list that includes all schedule activities required on the project” (p.149).

**Table 11: LMS Activity List**

<b>Activity ID Number</b>	<b>Activity Name</b>	<b>Description of Work</b>
<b>1.0</b>	<b>Systems Engineering</b>	This preliminary analysis entails the collection of information necessary for making the project decisions.
	<b>Project Initiation</b>	
1.1	Collect Sponsor Requirements	Meeting to determine project needs
1.1.1	Meet with Sponsor	Meet with Sponsor to understand the project requirements
1.1.2	Establish Project Requirements/Scope	Description and scope of work established
	Project Defined	Project Scope established
1.2	Market Research	
1.2.1	Conduct Market Survey	Conducting surveys to obtain pertinent information
1.2.2	Collect Information	Collect findings
1.2.3	Analyze Information	Analyze findings
1.2.4	Present Findings	Present findings
	<b>Market Analysis Report</b>	
1.3	Conduct Product Research	Research will identify the required components for the system
1.3.1	Determine Software Requirements Specification	Develop the software requirements adequate for the LMS.
1.3.2	Determine Hardware Requirements Specification	Develop the hardware requirements necessary for the LMS.
1.3.3	Determine Security Requirements Specification	Develop the best layout for the security measures of the system for example logins and payments via credit/debit cards.
	<b>Hardware/Software/Security Requirements Established</b>	
1.4	Determine Business Definition Requirements	This process will determine the business case and its feasibility



Activity ID Number	Activity Name	Description of Work
1.4.1	Identify Key Stakeholders	Determine key stakeholders
1.4.1.1	Conduct interviews/focus group sessions to capture Stakeholder requirements	Collect Stakeholder Requirements
1.4.2	Categorize Requirements	Classify Requirements of Stakeholders
1.4.3	Interpret and record requirements	Analyze requirements
	<b>Business Requirements Report</b>	
	<b>Product Defined</b>	
<b>2.0</b>	<b>Design Phase</b>	
2.1	System Design	
2.1.1	Establish Software Requirements	
2.1.2	Establish Hardware Requirements	
2.1.3	Establish Security Requirements	
	<b>System design Completed</b>	
2.2	User Interface Design	Develop a user friendly interface that is Human-Computer Interaction prescribed.
2.2.1	Develop Information Architecture	
2.2.2	Design Graphical User Interface	
2.2.3	Develop Mock up	
2.2.4	Develop Prototype	
	<b>User Interface Design Completed</b>	
2.3	Website design	
2.3.1	Create blueprint	
2.3.2	Develop Site map	
2.3.3	Sketch essential features	
2.3.4	Arrange visual elements	
	<b>Website Design Completed</b>	
2.4	Instructional Design	Collect the curriculum for the various CSEC subjects
2.4.1	Analyze Requirements	
2.4.2	Identify learners	
2.4.3	Develop learning objectives	
2.4.4	Determine Technology to be used	
	<b>Instructional Design Completed</b>	
2.5	Security Design	
2.5.1	Establish Protocols	
2.5.2	Establish Password entities	
2.5.3	Establish third party payment	

Activity ID Number	Activity Name	Description of Work
	options	
	<b>Security Concepts completed</b>	
<b>3.0</b>	<b>Build Phase</b>	
3.1	Website build	Construct the website in accordance to the design plan
3.1.1	Register Domain	
3.1.2	Create website	
3.1.3	Host website	
	Upload Content	Upload content onto website
	<b>Website development completed</b>	
3.3	System/network build	
3.3.1	Create Network	
	<b>Network Completed</b>	
<b>4.0</b>	<b>Testing</b>	
4.1	Quality Testing	Carry out quality test to ensure system is working as designed
4.1.1	User Acceptance testing	
4.1.2	System testing	Perform a beta system run to determine functionality.
4.1.3	Security testing	Ensure the protection mechanisms are operational
	<b>Launch Learning Management System</b>	
<b>5.0</b>	<b>Marketing</b>	Provide and execute strategies to sell the product
5.1	Marketing Strategy	
5.1.1	Develop Marketing Strategy	Draft marketing strategies
5.1.2	Develop Marketing Plan	Layout plan
	<b>Marketing Plan Completed</b>	
5.3	Marketing Collateral	Undertake tasks to sell the LMS to potential
	Source Advertising Packages	
	Select Advertising Package	
	<b>Implementation of Marketing Plan</b>	
<b>1.6</b>	<b>Project Management</b>	The management of the planning, execution, monitoring & controlling and closure activities of the project
1.6.1	Planning	The development of the various Project Plans and the updating of

Activity ID Number	Activity Name	Description of Work
		those plans throughout the project lifecycle
1.6.2	Scheduling	The assignment of timeframes and dates to project activities to establish the schedule and to control the duration of the project
1.6.3	Execution	The monitoring and control of the implementation of project activities
1.6.4	Accounting	The Monitoring of the finances and expenditure of the Project
1.6.5	Reporting	The preparation of project reports and the documenting of project activities.
1.6.6	Meetings	Meeting held during the Project to monitor and control activities and for the management of the Project Office
	<b>All relevant Project Plans Completed</b>	

(Source: Author of Study)

#### 4.2.3 Sequencing Activities

“The process of identifying and documenting relationships among the project activities” (PMI, 2013, p. 153) is the third phase and the inputs to be used to carry out the Learning Management System project are the schedule Management Plan, Activity list, Milestone list and Project Scope Statement. The rationale for this process is to define the logical sequence of work to obtain the greatest efficiency given all project constraints (PMI, 2013, p. 153).

Table 12: Sequencing Activities

Activity ID Number	Description	Predecessor
<b>1.0</b>	<b>Systems Engineering</b>	
	<b>Project Initiation</b>	
1.1	Collect Sponsor Requirements	
1.1.1	Meet with Sponsor	
1.1.2	Establish Project Requirements/Scope	5
	<b>Project Defined</b>	5, 6
1.2	Market Research	
1.2.1	Conduct Market Survey	7
1.2.2	Collect Information	9
1.2.3	Analyze Information	10
1.2.4	Present Findings	11
	<b>Market Analysis Report</b>	12
1.3	Conduct Product Research	
1.3.1	Determine Software Requirements Specification	13
1.3.2	Determine Hardware Requirements Specification	13
1.3.3	Determine Security Requirements Specification	13
	<b>Hardware/Software/Security Requirements Established</b>	15,16,17
1.4	Determine Business Definition Requirements	
1.4.1	Identify Key Stakeholders	7
	Conduct interviews/focus group sessions to capture Stakeholder requirements	20
1.4.2	Categorize Requirements	21
1.4.3	Interpret and record requirements	22
	<b>Business Requirements Report</b>	23
	<b>Product Defined</b>	18, 20, 24
<b>2.0</b>	<b>Design Phase</b>	
2.1	System Design	
2.1.1	Establish Software Requirements	25
2.1.2	Establish Hardware Requirements	25
2.1.3	Establish Security requirements	25
	<b>System Design Completed</b>	28, 29, 30
2.2	User Interface Design	

<b>Activity ID Number</b>	<b>Description</b>	<b>Predecessor</b>
2.2.1	Develop Information architecture	20
2.2.2	Design Graphical user interface	33
2.2.3	Develop Mock up	34
2.2.4	Develop Prototype	35
	<b>User interface design completed</b>	36
2.3	Website design	
2.3.1	Create blueprint	37, 28
2.3.2	Develop Site map	39
2.3.3	Sketch essential features	40
2.3.4	Arrange visual elements	41
	<b>Website Design Completed</b>	42
2.4	Instructional Design	
2.4.1	Analyze requirements	24
2.4.2	Identify learners	45
2.4.3	Develop learning objectives	46
2.4.4	Determine Technology to be used	45, 47
	<b>Instructional Design Completed</b>	48
2.5	Security Design	
2.5.1	Establish Protocols	30
2.5.2	Establish Password entities	30,51
2.5.3	Establish third party payment options	30, 51, 52
	<b>Security Concepts completed</b>	53
<b>3.0</b>	<b>Build Phase</b>	
3.1	Website build	
3.1.1	Register Domain	43
3.1.2	Create website	43
3.1.3	Host website	57
	Upload Content	49
	<b>Website development completed</b>	60
3.3	System/network build	
3.3.1	Create Network	31
	<b>Network Completed</b>	63
<b>4.0</b>	<b>Testing</b>	
4.1	Quality Testing	54, 61, 64
4.1.1	User Acceptance testing	66
4.1.2	System testing	66
4.1.3	Security testing	68
	<b>Launch Learning Management System</b>	69
<b>5.0</b>	<b>Marketing</b>	

<b>Activity ID Number</b>	<b>Description</b>	<b>Predecessor</b>
5.1	Marketing Strategy	
5.1.1	Develop Marketing Strategy	66
5.1.2	Develop Marketing Plan	73
	<b>Marketing Plan Completed</b>	74
5.3	Marketing Collateral	
	Source Advertising Packages	74
	Select Advertising Package	77
	<b>Implementation of Marketing Plan</b>	78

(Source: Author of Study)

#### **4.2.4 Estimate Activity Resources**

“Estimate Activity Resources is the process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity. The key benefit of this process is that it identifies the type, quantity, and characteristics of resources required to complete the activity which allows more accurate cost and duration estimates” (PMI, 2013, p. 160).

#### **4.2.5 Estimating Activity Durations**

“Estimate Activity Durations is the process of estimating the number of work periods needed to complete individual activities with estimated resources. The key benefit of this process is that it provides the amount of time each activity will take to complete, which is a major input into the Develop Schedule process” (PMI, 2013, p. 165).

A number of instances can affect the timing of this project, for instance holidays, geographic distance of project team and sponsor and hurricanes in the region.

The following holidays will affect the progress of the project and may have the potential to delay its end date. As a result the project manager should remain vigilant and monitor these foreseen possible setbacks.

**Table 13: List of Non-work days**

<b>Holiday</b>	<b>Date</b>
<b>Independence Day</b>	February 22, 2018
<b>Good Friday</b>	March 30, 2018
<b>Easter Monday</b>	April 2, 2018
<b>Labour Day</b>	May 1, 2018
<b>Whit Monday</b>	May 21, 2018
<b>Corpus Christi</b>	May 31, 2018
<b>Emancipation Day</b>	August 1, 2018
<b>Thanksgiving Day</b>	October 1, 2018

(Source: Author of Study)

**Table 14: Resource Assignment and Activity Durations**

<b>Activity ID Number</b>	<b>Task</b>	<b>Duration</b>	<b>Resources Names</b>
<b>1.0</b>	<b>Systems Engineering</b>		
	<b>Project Initiation</b>	<b>0 days</b>	
1.1	Collect Sponsor Requirements	3 days	Project Manager
1.1.1	Meet with Sponsor	1 day	Project Manager
1.1.2	Establish Project Requirements/Scope	2 days	Project Manager
	<b>Project Defined</b>	<b>0 days</b>	
1.2	Market Research	10 days	Project Team
1.2.1	Conduct Market Survey	6 days	Project Team
1.2.2	Collect Information	1 day	Project Team
1.2.3	Analyze Information	1 day	Project Team
1.2.4	Present Findings	1 day	Project Team
	<b>Market Analysis Report</b>	<b>0 days</b>	
1.3	Conduct Product Research	10 days	Project Team
1.3.1	Determine Software Requirements Specification	5 days	Project Team
1.3.2	Determine Hardware Requirements	2 days	Project Team

Activity ID Number	Task	Duration	Resources Names
	Specification		
1.3.3	Determine Security Requirements Specification	3 days	Project Team
	<b>Hardware/Software/Security Requirements Established</b>	<b>0 days</b>	
1.4	Determine Business Definition Requirements	10 days	Project Team
1.4.1	Identify Key Stakeholders	1 day	Project Team
	Conduct interviews/focus group sessions to capture Stakeholder requirements	7 days	Project Team
1.4.2	Categorize Requirements	1 day	Project Team
1.4.3	Interpret and record requirements	1 day	Project Team
	<b>Business Requirements Report</b>	<b>0 days</b>	
	<b>Product Defined</b>	<b>0 days</b>	
<b>2.0</b>	<b>Design Phase</b>		
2.1	System Design	5 days	Project Team
2.1.1	Establish Software Requirements	5 days	Project Team
2.1.2	Establish Hardware Requirements	5 days	Project Team
2.1.3	Establish Security requirements	5 days	Project Team
	<b>System Design Completed</b>	<b>0 days</b>	
2.2	User Interface design	10 days	Web Administrator
2.2.1	Develop Information architecture	3 days	Web Administrator
2.2.2	Design Graphical user interface	5 days	Web Administrator
2.2.3	Develop Mock up	3 days	Web Administrator
2.2.4	Develop Prototype	4 days	Web Administrator
	<b>User Interface Design Completed</b>	<b>0 days</b>	
2.3	Website design	15 days	Web Administrator
2.3.1	Create blueprint	2 days	Web Administrator
2.3.2	Develop Site map	3 days	Web Administrator
2.3.3	Sketch essential features	5 days	Web Administrator
2.3.4	Arrange visual elements	5 days	Web Administrator



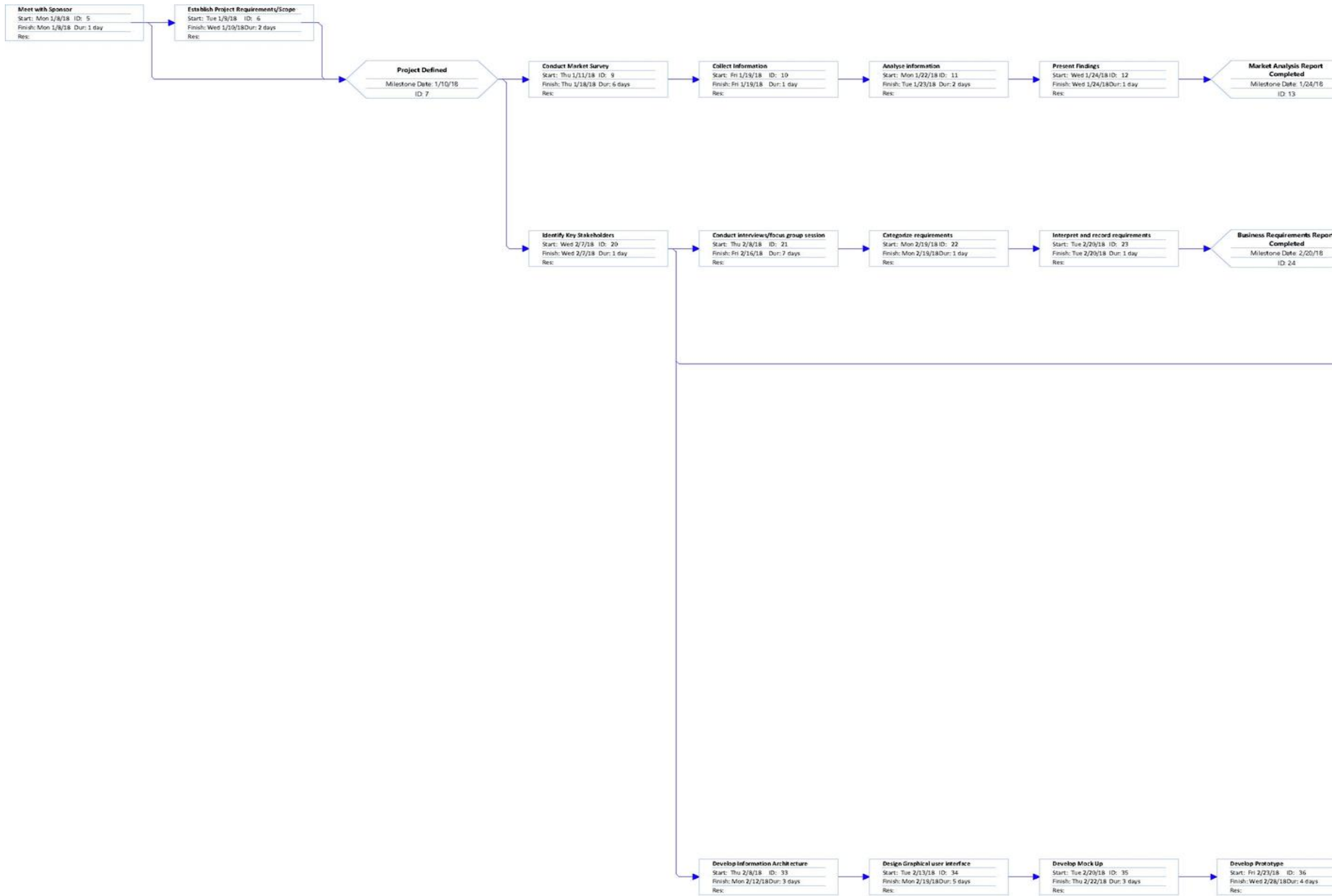
<b>Activity ID Number</b>	<b>Task</b>	<b>Duration</b>	<b>Resources Names</b>
	<b>Website Design Completed</b>	<b>0 days</b>	
2.4	Instructional Design	15 days	Education and Content Leader
2.4.1	Analyze requirements	5 days	Education and Content Leader
2.4.2	Identify learners	3 days	Education and Content Leader
2.4.3	Develop learning objectives	5 days	Education and Content Leader
2.4.4	Determine Technology to be used	2 days	Education and Content Leader
	<b>Instructional Design Completed</b>	<b>0 days</b>	
2.5	Security Design	30 days	Project Team
2.5.1	Establish Protocols	30 days	Project Team
2.5.2	Establish Password entities	30 days	Project Team
2.5.3	Establish third party payment options	30 days	Project Team
	<b>Security Concepts completed</b>	<b>0 days</b>	
<b>3.0</b>	<b>Build Phase</b>		
3.1	Website build	40 days	Website administrator
3.1.1	Register Domain	5 days	Website administrator
3.1.2	Create website	40 days	Website administrator
3.1.3	Host website	5 days	Website administrator
	Upload Content	15 days	Website administrator
	<b>Website Development Completed</b>	<b>0 days</b>	
3.3	System/network build	20 days	Systems administrator
3.3.1	Create Network	20 days	Systems administrator
	<b>Network Completed</b>	<b>0 days</b>	
<b>4.0</b>	<b>Testing</b>		
4.1	Quality Testing	20 days	Systems administrator
4.1.1	User Acceptance testing	20 days	Systems administrator
4.1.2	System testing	20 days	Systems

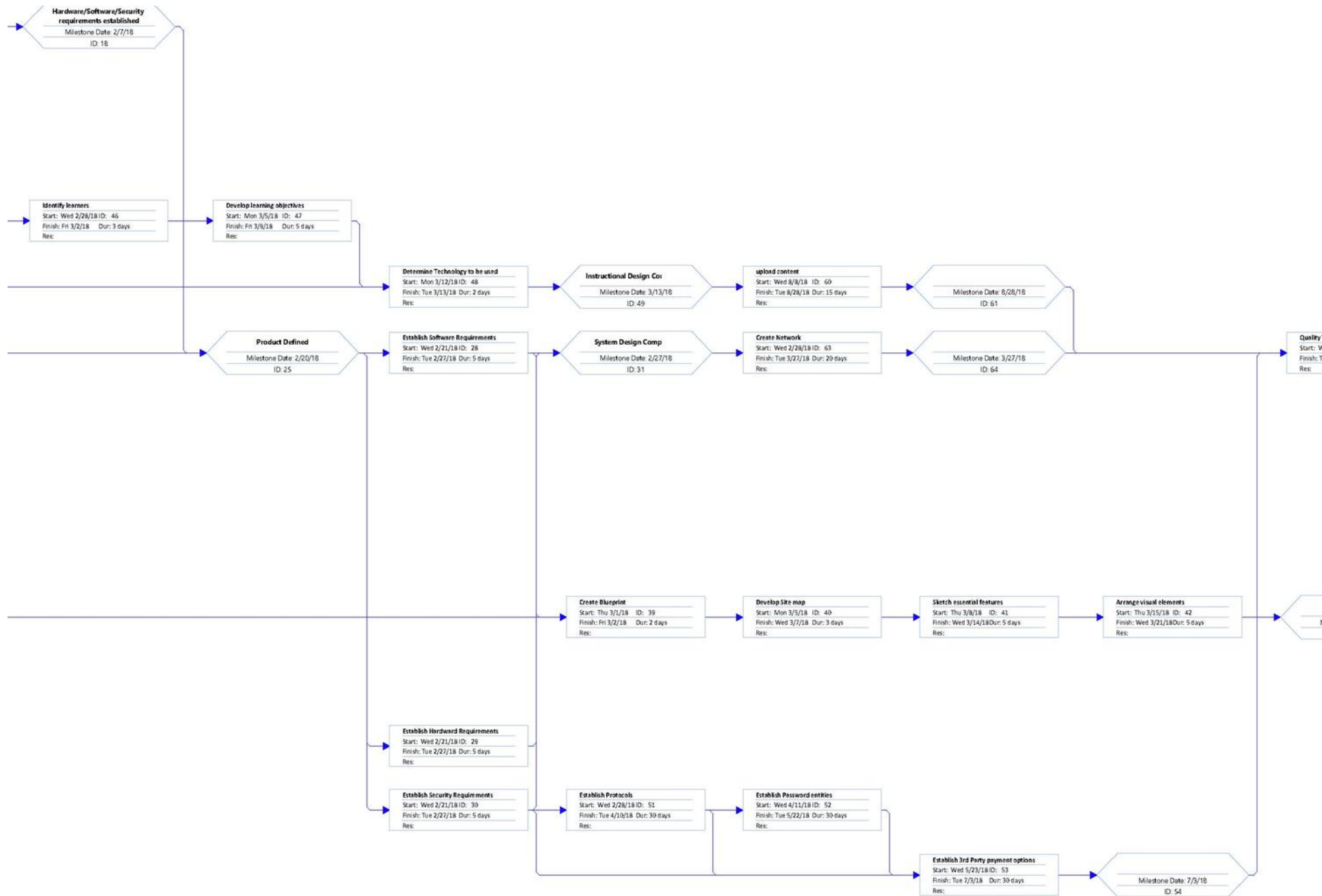
Activity ID Number	Task	Duration	Resources Names
			administrator
4.1.3	Security testing	20 days	Systems administrator
	<b>Launch Learning Management System</b>	<b>0 days</b>	
<b>5.0</b>	<b>Marketing</b>		
5.1	Marketing Strategy	5 days	Project Team
5.1.1	Develop Marketing Strategy	5 days	Project Team
5.1.2	Develop Marketing Plan	5 days	Project Team
	<b>Marketing Plan Completed</b>	<b>0 days</b>	
5.3	Marketing Collateral	3 days	Project Team
	Source Advertising Packages		
	Select Advertising Package	3 days	Project Team
	<b>Implementation of Marketing Plan</b>	<b>0 days</b>	
<b>1.6</b>	<b>Project Management</b>		
1.6.1	Planning		Project Manager
1.6.2	Scheduling		Project Manager
1.6.3	Execution		Project Manager
1.6.4	Accounting		Project Manager
1.6.5	Reporting		Project Manager
1.6.6	Meetings		Project Manager
	<b>All relevant Project Plans Completed</b>	<b>0 days</b>	

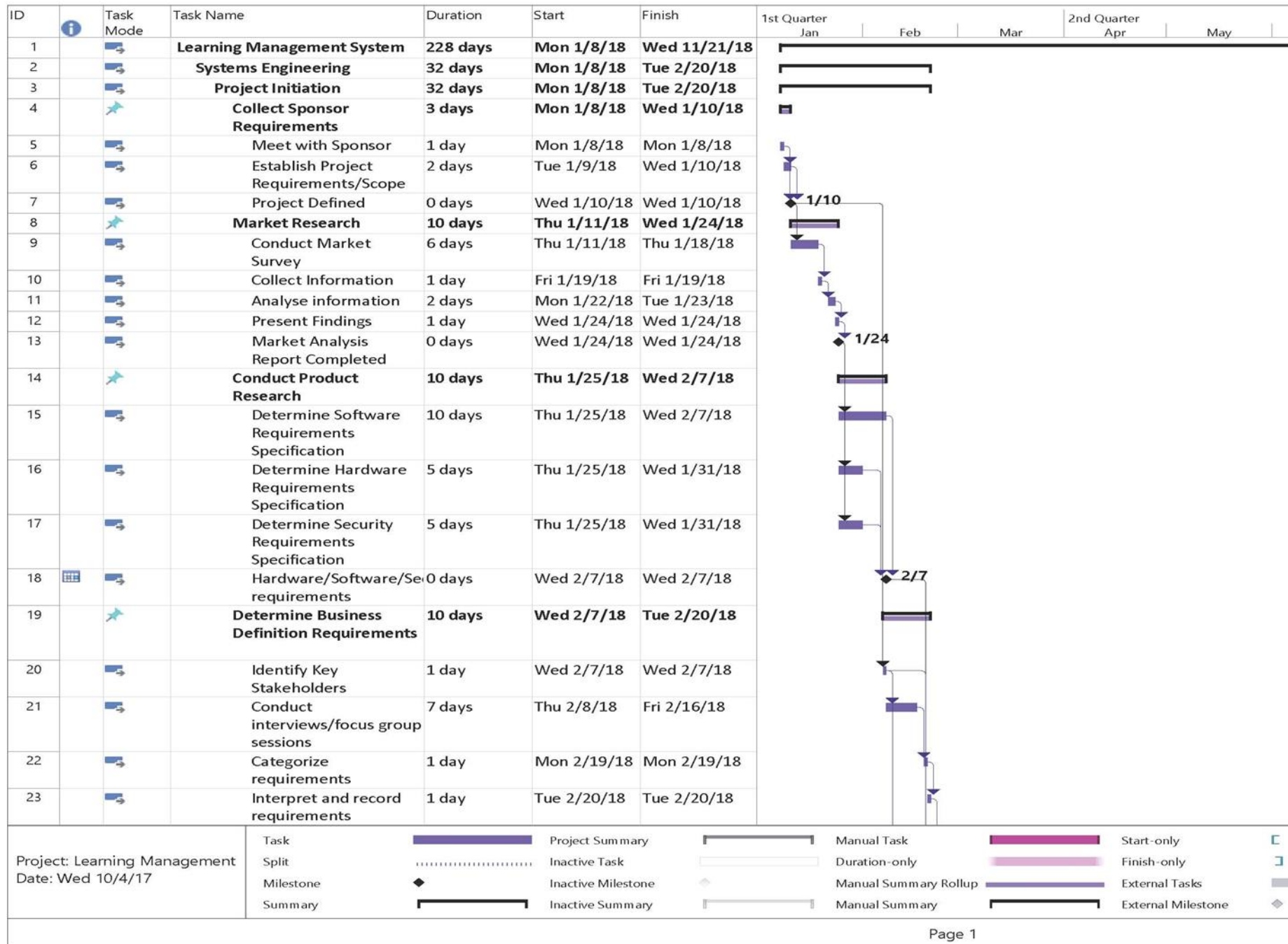
(Source: Author of Study)

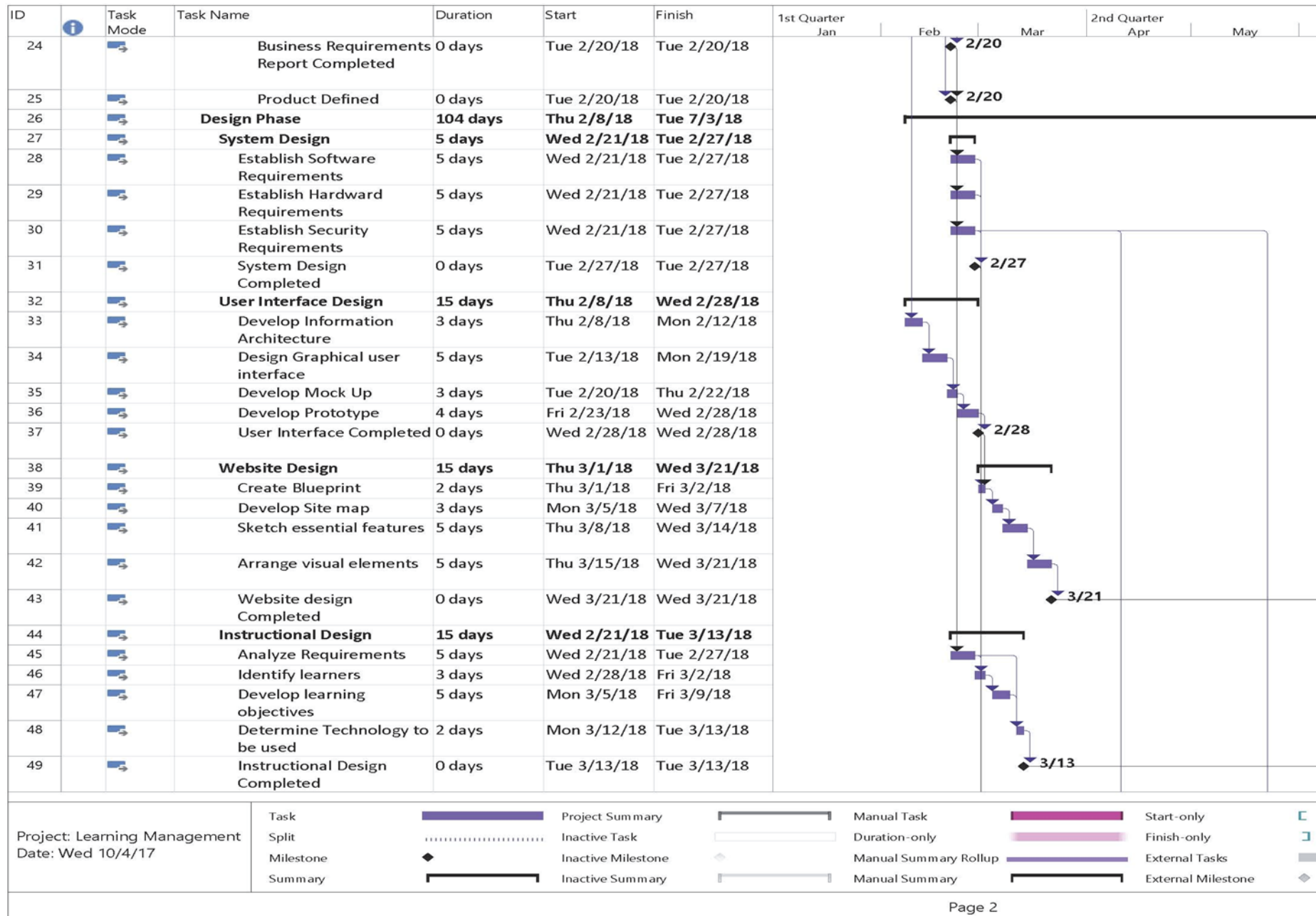
The last planning process conducted during the development of the Project Schedule Management, as explained in the *PMI Guide*, is the development of the Schedule. “Develop Schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model.” (PMI, 2013, p.172)

The inputs to this process include the Schedule Management Plan, Activity List, Project Schedule Network Diagram, Activity Resource Requirements, Resource calendar, Activity Durations, Project Scope Statement, Risk Register, and Resource Requirements. The tools and techniques to be utilized is Microsoft Project 2016. See Figure 5 below.









ID	Task Mode	Task Name	Duration	Start	Finish	1st Quarter	Jan	Feb	Mar	2nd Quarter	Apr	May
50		<b>Security Design</b>	<b>90 days</b>	<b>Wed 2/28/18</b>	<b>Tue 7/3/18</b>							
51		Establish Protocols	30 days	Wed 2/28/18	Tue 4/10/18							
52		Establish Password entities	30 days	Wed 4/11/18	Tue 5/22/18							
53		Establish 3rd Party payment options	30 days	Wed 5/23/18	Tue 7/3/18							
54		Security Concepts completed	0 days	Tue 7/3/18	Tue 7/3/18							
55		<b>Build Phase</b>	<b>191 days</b>	<b>Wed 2/28/18</b>	<b>Wed 11/21/18</b>							
56		<b>Website Build</b>	<b>40 days</b>	<b>Wed 7/4/18</b>	<b>Tue 8/28/18</b>							
57		Register Domain	5 days	Wed 7/4/18	Tue 7/10/18							
58		Create website	40 days	Wed 7/4/18	Tue 8/28/18							
59		Host Website	5 days	Wed 7/11/18	Tue 7/17/18							
60		upload content	15 days	Wed 8/8/18	Tue 8/28/18							
61		Website Development Completed	0 days	Tue 8/28/18	Tue 8/28/18							
62		<b>System/Network Build</b>	<b>20 days</b>	<b>Wed 2/28/18</b>	<b>Tue 3/27/18</b>							
63		Create Network	20 days	Wed 2/28/18	Tue 3/27/18							
64		Network Completed	0 days	Tue 3/27/18	Tue 3/27/18							
65		<b>Testing</b>	<b>80 days</b>	<b>Thu 8/2/18</b>	<b>Wed 11/21/18</b>							
66		Quality Testing	20 days	Wed 8/29/18	Tue 9/25/18							
67		User Acceptance testing	20 days	Wed 9/26/18	Tue 10/23/18							
68		System testing	20 days	Wed 9/26/18	Tue 10/23/18							
69		Security Testing	20 days	Wed 10/24/18	Tue 11/20/18							
70		Launch Larning Management System	0 days	Tue 11/20/18	Tue 11/20/18							
71		<b>Marketing</b>	<b>15 days</b>	<b>Wed 9/26/18</b>	<b>Tue 10/16/18</b>							
72		<b>Marketing Strategy</b>	<b>10 days</b>	<b>Wed 9/26/18</b>	<b>Tue 10/9/18</b>							
73		Develop Marketing Strategy	5 days	Wed 9/26/18	Tue 10/2/18							
74		Develop Marketing Plan	5 days	Wed 10/3/18	Tue 10/9/18							
75		Marketing Plan Completed	0 days	Tue 10/9/18	Tue 10/9/18							
76		<b>Marketing Collateral</b>	<b>5 days</b>	<b>Wed 10/10/18</b>	<b>Tue 10/16/18</b>							
77		Source Advertising Package	2 days	Wed 10/10/18	Thu 10/11/18							
78		Select Advertising Package	3 days	Fri 10/12/18	Tue 10/16/18							

3/27

Project: Learning Management  
Date: Wed 10/4/17

Task		Project Summary		Manual Task		Start-only
Split		Inactive Task		Duration-only		Finish-only
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks
Summary		Inactive Summary		Manual Summary		External Milestone



ID	Task Mode	Task Name	Duration	Start	Finish	1st Quarter	2nd Quarter			
						Jan	Feb	Mar	Apr	May
79		Implement Marketing Plan	0 days	Tue 10/16/18	Tue 10/16/18					

Project: Learning Management Date: Wed 10/4/17	Task Split Milestone Summary		Project Summary Inactive Task Inactive Milestone Inactive Summary		Manual Task Duration-only Manual Summary Rollup Manual Summary		Start-only Finish-only External Tasks External Milestone
---	---------------------------------------	--	--	--	---	--	---

**Figure 5. LMS Network Diagram and Project Schedule**

(Source: Author of Study)

### 4.3 Cost Management Plan

Having recognized Cost as one of the triple constraints of a project, the accurate determination of the budget is undoubtedly vital. Projects often go over budget for several reasons. Thus creating a cost baseline will guide the project manager and team. “Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget” (PMI, 2013, p. 193).

There are four processes to be explored from planning to controlling the cost.

**Plan Cost Management** — the process that establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs.

**Estimate Costs** —the process of developing an approximation of the monetary resources needed to complete project activities.

**Determine Budget** — the process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.

**Control Costs** —the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline.

#### 4.3.1 Plan Cost Management

Through expert judgement and a series of meetings between the team and I.T. subject matter experts the cost will be planned. Costs for this project are predicated on the human resource, hardware, software needs required to achieve the goals of the stakeholders. The current market conditions will be used to determine the remuneration for the internal and external project staff. Those hired from outside to complete specific tasks will do so on a contractual basis. The equipment required will be cost based on inviting suppliers to send quotations. Online searches for providers may also be considered.

The acceptable level of accuracy will be a small percentage since this project is not a large one; therefore a tight budget will suit. Thus this project will be hinged on a  $\pm 5\%$  range. In addition a 3% management reserve will be instituted in the event of any unforeseen changes especially when dealing with fluctuating prices in I.T. procurement. For precise dollar values the estimates will be rounded off to the nearest dollar for example \$10,500.60 up to \$10,501 and \$9562.30 down to \$9562.

Funding for this project will come directly from the project sponsor. Proper records will be kept in an accounting program such as a Microsoft Excel spread sheet. Microsoft Excel will be used as it is readily available instead of acquiring a standalone accounting package that would increase the cost of the project. With proper record keeping the project manager would be able to keep track of the direction of the budget. Reports are to be delivered by the project team to the project manager on a weekly basis. All invoices, contracts or whatever money spent must be documented and stored away on softcopy for quick retrieval.

#### **4.3.2 Estimate Costs**

Estimating the costs will be done in collaboration with the project sponsor who has experience in telecommunications and information technology. He has the expert knowledge of the type of equipment required for the system. In addition, the project manager will acquire information on current pay scales as well as the activities of the project to aggregate the budget.

Documents such as the WBS, project scope statement, project schedule, human resource plan, enterprise factors (market conditions, brochures gathered) and the cost plan will be necessary in this regard.

Using the vendor bid analysis the costs of the equipment will be estimated from the quotations submitted. The project manager along with the sponsor will examine each carefully to determine the best-suited option.

**Table 15: Human Resource Estimates**

Human Resource Estimates		
Position	Number of Positions	Salary (XCD)
Project Manager	1	40,000.00
Project Team	4	80,000.00
Web administrator	1	25,000.00
System administrator	1	20,000.00
Instructional Designer	2	22,000.00
Total		<b><u>187,000.00</u></b>

(Source: Author of Study)

**Table 16: Resources Estimates**

Resource estimates	Cost (XCD) \$
Web server and components	20000.00
Windows Server 2012	680.00
Website domain	400.00
Software and licenses	10000.00
Total	<b><u>31080.00</u></b>

(Source: Author of Study)

### 4.3.3 Determine Budget

All the acquired estimates will then be aggregated to determine the budget for the project. This cost baseline will be the basis by which the project manager and team will measure the performance of the project along with monitoring and controlling the costs within the project.

**Table 17: Project Budget**

Component	Cost (XCD) \$
System Engineering	5,000.00
Designing	5,000.00
Human Resource	187,000.00
Testing	5,000.00
Hardware/Software	31,080.00
Marketing	10,000.00
Sub-Total	<b>243,080.00</b>
Contingency Reserve (5% of total)	<b>12,154.00</b>
Management Reserve (3%)	<b>7,657.00</b>
Total	<b><u>262,891.00</u></b>

(Source: Author of Study)

#### 4.3.4 Control Costs

To properly monitor and control the costs a set of control thresholds will be defined along with the actions to be taken if the project activates control threshold. This would prompt the project manager to set the corrective measure in motion to deal with the offset. Any such action must be taken in communication with the sponsor. Any action that would alter the budget, modify the scope or decrease the quality of the final product must be approved by the sponsor.

The metrics to be used are as follows:

1. Schedule Variance (SV) – “is a measure of schedule performance expressed as the difference between the earned value and the planned value” (PMI, 2013, p. 218). It indicates the point at which the project is at any given time. It is calculated using the following equation:  $SV = EV - PV$
2. Cost Variance (CV) – “is the amount of budget deficit or surplus at a given point in time, expressed as the difference earned and the actual cost” (PMI, 2013, p. 218). It is calculated using the equation:  $CV = EV - AC$

3. Schedule Performance Index (SPI) – “is a measure of schedule efficiency expressed as the ratio of earned value to planned value” (PMI, 2013, p. 219). It can be derived using the formula  $SPI = EV/PV$
4. Cost Performance Index (CPI) – “is a measure of the cost efficiency of budgeted resources, expressed as a ratio of earned value to cost” (PMI, 2013, p. 219). The formula used to compute this index is  $CPI = EV/AC$

Each of the above metrics would have varying thresholds and interpretations that would lead the project manager to implement prescribed control measures.

When the CV and SV lie between +/- 0.1 the project manager would need to begin to pay close attention to the project status and document that variance. A move to a +/- 0.2 variance range should trigger a red flag and swift remedial action must be taken to normalise the project and return it to approved acceptable levels.

When the CPI or SPI goes less than 0.95 or greater than 1.05 the project manager must put in the corrective actions to bring the project back to budget and time.

## 4.4 Quality Management Plan

### 4.4.1 Introduction

For a product to meet certain standards and by extension the ultimate satisfaction of the customer it must meet certain criteria and compliances. Consequently quality control must be factored into any project. This also applies to conducting the activities for the LMS.

“Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken” (PMI, 2013, p. 363). It includes the following processes:

**“Plan Quality Management** —The process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements.

**Perform Quality Assurance** —The process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used.

**Control Quality** —The process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes” (PMI, 2013, p. 363).

Learning Management systems have been developed in the past in relation to set international quality standards. According to ISO, standards can be defined as "documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose"(Bianco, 2005). Here are some of the international standards that will be employed for this LMS project.

#### 4.4.2 Quality Standards for E-learning

**Table 18: International Quality Standards for E-learning Development**

Standard	
ISO/IEC 19796 (ISO/IEC,2005)	<p>ISO/IEC 19796-1 is a quality standard following the principles of quality management developed for learning, education and training in general and it has been adopted to the specific needs of developers and providers of online services and digital resources in many implementations and projects.</p> <p>The reference process model covers the whole lifecycle of the needs analysis, design, development, realization and evaluation of any learning opportunity or process including e-Learning and blended learning.</p>
Open ECBCheck (ECBCheck,2012)	The ECBCheck tool can also be used for internal quality check of the courses and program

(Source: ISO 9126 Software Quality Characteristics, n.d.)

#### 4.4.3 Quality Policy

1. Provide products that lead to customer satisfaction.
2. Pay attention to proper understanding of the requirements of the users of the system.
3. Provide all agreed deliverables to the users in accordance with the schedules agreed upon.
4. Minimize complaints by taking all possible measures like, maintaining records of complaints, using quality tools such root cause analysis and creating suitable preventive measures.



5. To follow the prescribed internationally set standards for measuring quality of IT products.

#### 4.4.4 Roles and Responsibilities

**Table 19: Roles and Responsibility for Quality Management**

<b>Roles</b>	<b>Responsibilities</b>
Project Manager	Delivers the Learning Management System to meet stakeholder expectations
Customer	Provides the quality expectations for the system being delivered by the project
Tester (from Project Team)	Responsible for validating the test basis, designing and developing test cases/scripts and data sets, executing tests, and reporting and diagnosing defects to the project manager

(Source: Author of Study)

**Table 20: Matrix of Deployment**

<b>Level of Responsibility</b>	<b>Activities</b>	<b>Indicators</b>	<b>Goals</b>
Project Manager	To follow the prescribed internationally set standards for measuring quality of IT products.	International Standards	Measure the quality of the system based on the use of internationally approved standards.
Project Team	Pay attention to proper understanding of the requirements of the users of the system.	Survey data	Adhere to the surveys conducted and the elements the users require.
Project Team	Provide products that lead to customer satisfaction.	Quality plan	Deliver a user-friendly system.
Project Manager	Minimize complaints by taking all possible measures like, maintaining records of	Quality tools provided	Ensure the system is free of errors and defects as to minimize user

<b>Level of Responsibility</b>	<b>Activities</b>	<b>Indicators</b>	<b>Goals</b>
	complaints, using quality tools such root cause analysis and creating of suitable preventive measures.		dissatisfaction.
Project Manager	Provide all agreed deliverables to the users in accordance with the schedules agreed upon.		

**Table 21: Matrix of Quality Assurance**

<b>Deliverable</b>	<b>Acceptance Requirements</b>	<b>Metrics</b>
Website Development Completed	Run the website offline to verify the links are functional and all the activities and exercises are uploaded.	Review of Scope Management Plan  Allow some selected users to interact with the system to ascertain if it meets their satisfaction
Website Design Completed	Design must fit user requirements	Review of Scope Management Plan
Network Completed	Network must be able to accommodate multiple (100s) user logins at once	Review of Scope Management Plan  Run the LMS on the network

(Source: Author of Study)

#### **4.4.5 Assurance and Control Methods**

Quality assurance is necessary to ensure the progression is in harmony with the quality standards set out in the plan. This will ensure that the deliverables are to the satisfaction and approval of the stakeholders. The methods for used are as follows:

Quality Audit: review the processes leading up to the final product to establish its compliance with the prescribed principles. It will be carried out with the Project Manager and the team.

Comparative analysis: using fixed criteria a comparison will be conducted to determine whether or not the deliverables are consistent with the set quality guidelines

Process analysis: will be incorporated into certain aspects of the project in the effort to improve the processes leading up the learning management system.

#### 4.4.6 Checklist

The quality checklist would be used as a qualitative measure to analyse aspects of the quality management plan. It will provide the team with a balanced overview and insight of the plan and where improvements can be made.

**Table 22: Quality Checklist Template**

Quality Checklist					
<b>Project:</b> Learning Management System					<b>Date:</b>
	Verification				
Quality Item	Yes	No	N/A	Date	Comments
Does the project have an approved quality management plan?					
Has the quality management plan been reviewed by all stakeholders?					
Do all stakeholders have access to the quality management plan?					
Is the quality management plan consistent with the rest of the overall project plan?					
Have product quality metrics been established, reviewed, and agreed upon?					

<b>Quality Checklist</b>					
<b>Project:</b> Learning Management System					<b>Date:</b>
	<b>Verification</b>				
<b>Quality Item</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Date</b>	<b>Comments</b>
Have process quality metrics been established, reviewed, and agreed upon?					
Do all metrics support a quality standard which is acceptable?					
Do all metrics have agreed upon collection mechanisms?					
Do all metrics have an agreed upon collection frequency?					
Have Quality Metrics Review Meetings been scheduled throughout the project's duration?					
Are all metrics clear, measurable, controllable, and reportable?					
Is the project team familiar with the project's quality review process?					
Does the project have an appropriate number of resources assigned for quality assurance and control?					
Has the project team established a repository for all quality documentation?					
Do all team members have access to the quality documentation repository?					
Have all appropriate team members been notified of their required participation in quality reviews?					
Have quality responsibilities been assigned and documented and the applicable personnel notified?					
Have process quality standards been established, documented, and communicated?					
Have quality thresholds and limits been established, documented, and communicated?					
Does the change control process accommodate project changes based on quality improvements?					

Quality Checklist					
Project: Learning Management System					Date:
	Verification				
Quality Item	Yes	No	N/A	Date	Comments
Is the project leader aware of his/her responsibilities relating to quality acceptance?					
Is the external Stakeholder aware of his/her responsibilities relating to quality acceptance?					

(Source: Project Management Doc, n.d.)

The template above would allow the project team to track faults or errors through the phases of the project build. Where a 'no' response occurs the project manager would have to revert to the location of best fit or trace the error and endeavour to repeat steps to ensure on the next evaluation a 'yes' response is obtained.

#### 4.4.7 Cause and Effect Diagram

The Cause and effect diagram (also called Ishikawa or fishbone chart): will be used to trace and track errors through the system with the possible solutions. The project team will brainstorm the reasons why or the causes for the various potential issues that may arise. For example the project team may like to know the cause of the system crash and the effect on the stability and customer use of the system.

#### 4.4.8 Flowchart

"A flowchart is a diagram that shows the step-by-step flow of operation to get a solution of a problem or to figure out the correct sequence of the process" (Mades, 2014). It will provide a pictorial representation of the processes taking place. The flowchart will give an indication of the process of entering logins and the possible outcomes. Thus it can assist with the decision making process and the steps necessary for correcting faults.

#### **4.4.9 Control Charts**

“The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit and a lower line for the lower control limit. These lines are determined from historical data. By comparing current data to these lines, you can draw conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation)” (Tague, 2005).

Therefore a control chart could be used for testing the system in terms of speed of access of activities by a user.

## 4.5 Project Human Resource Management

### 4.5.1 Introduction

Human resource is a very important process that deals with the human capital of the project. “Human Resource Management involves management functions like planning, organizing, directing and controlling.

- It involves procurement, development, maintenance of human resource
- It helps to achieve individual, organizational and social objectives
- Human Resource Management is a multidisciplinary subject. It includes the study of management, psychology, communication, economics and sociology.
- It involves team spirit and team work.
- It is a continuous process” (whatishumanresource.com).

According to PMI (2013) as it relates to a project “Human Resource Management includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project” (PMI, 2013, p. 255).

It also involves a number of processes necessary to complete this knowledge area, According to PMI (2013) they include:

**Plan Human Resource Management**—The process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan.

**Acquire Project Team**—The process of confirming human resource availability and obtaining the team necessary to complete project activities.

**Develop Project Team**—The process of improving competencies, team member interaction, and overall team environment to enhance project performance.

**Manage Project Team**—The process of tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance

For the purposes of developing the LMS, the staff complement would comprise full time and part time employees. In addition some of the tasks would be outsourced from overseas territories. The roles and responsibilities of each are to be clearly outlined and detailed.

#### 4.5.2 Plan Human Resource Management

“Plan Human Resource Management is the process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan. The key benefit of this process is that it establishes project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release” (PMI, 2013, p. 257).

In this phase the roles and responsibilities of the project team will be defined.

**Table 23: HR Management Roles & Responsibilities**

Position	Roles and responsibilities	Skills
Project Manager 1 Position	<ul style="list-style-type: none"> <li>Set objectives in line with your organisation or client needs, which may include scope, content, timings and budget.</li> <li>Plan work and set deadlines to meet the agreed needs.</li> <li>Select, lead and motivate your project team from both internal and external stakeholder organisations.</li> <li>Monitor the work to make sure it is on time and within budget.</li> </ul>	<ul style="list-style-type: none"> <li>Excellent organisation skills to plan the use of people and resources to meet deadlines.</li> <li>Strong interpersonal skills to motivate and lead your project team.</li> <li>The ability to monitor and control budgets.</li> <li>Good communication and negotiation skills to manage expectations.</li> <li>The ability to use your initiative and make decisions under pressure.</li> </ul>

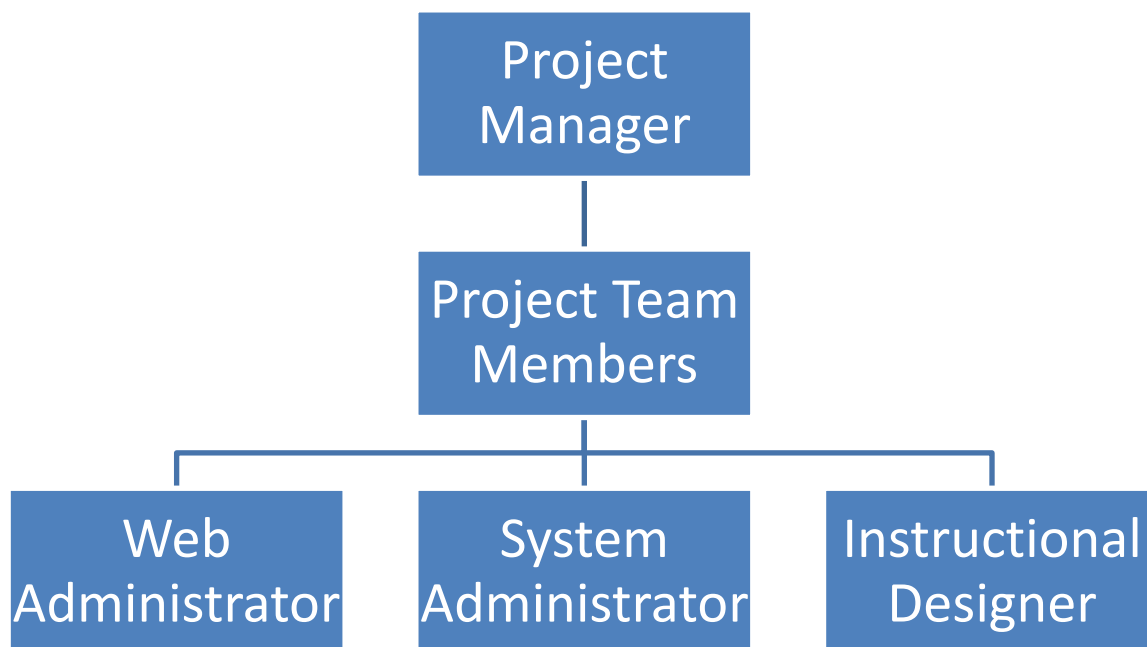


Position	Roles and responsibilities	Skills
	<ul style="list-style-type: none"> <li>• Co-ordinate the work of your project team and delegate tasks where appropriate.</li> <li>• Identify and manage risks to ensure delivery is on time.</li> <li>• Implement any changes throughout the process.</li> <li>• Report regularly to management and the client.</li> </ul> <p>Adapted from (<a href="https://www.prospects.ac.uk/job-profiles/project-manager">https://www.prospects.ac.uk/job-profiles/project-manager</a>)</p>	<p>Adapted from (<a href="https://www.prospects.ac.uk/job-profiles/project-manager">https://www.prospects.ac.uk/job-profiles/project-manager</a>)</p>
<p>Web Administrator  1 Position</p>	<ul style="list-style-type: none"> <li>• Establishes Web system specifications by analyzing access, information, and security requirements; designing system infrastructure.</li> <li>• Establishes Web system by planning and executing the selection, installation, configuration, and testing of server hardware, software, and operating and system management systems; defining system and operational policies and procedures.</li> <li>• Maintains Web system performance by performing system monitoring and analysis, and performance tuning; troubleshooting system hardware, software, and operating and system management systems; designing and running system load/stress testing; escalating application problems to vendor.</li> <li>• Accomplishes organization goals by accepting ownership for accomplishing new and different requests.</li> </ul> <p>Adapted from (<a href="https://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/job-descriptions/web-system-administrator-job-description.aspx">https://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/job-descriptions/web-system-administrator-job-description.aspx</a>)</p>	<ul style="list-style-type: none"> <li>• System Administration</li> <li>• Technical Understanding</li> <li>• Technical Management</li> <li>• Telecommunications Technologies</li> <li>• Dependability</li> <li>• Handles Pressure</li> <li>• General Programming Skills</li> <li>• Internet Technologies</li> <li>• Verbal Communication</li> </ul> <p>Adapted from (<a href="https://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/job-descriptions/web-system-administrator-job-description.aspx">https://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/job-descriptions/web-system-administrator-job-description.aspx</a>)</p>
<p>Instructional Designer  2 Positions</p>	<ul style="list-style-type: none"> <li>• Create engaging learning activities and compelling course content that enhances retention and transfer.</li> <li>• Work with subject matter experts and identify target audience's training needs.</li> <li>• State instructional end goals and create content that matches them.</li> </ul>	<ul style="list-style-type: none"> <li>• Proven working experience in instructional design and with instructional technology.</li> <li>• Excellent knowledge of learning theories and instructional design models.</li> <li>• Lesson and curriculum planning skills.</li> </ul>

Position	Roles and responsibilities	Skills
	<ul style="list-style-type: none"> <li>• Visualize instructional graphics, the user interface and the finished product.</li> <li>• Conduct instructional research and analysis on learners and contexts.</li> <li>• Apply tested instructional design theories, practice and methods.</li> <li>• Provide exercises and activities that enhance the learning process.</li> <li>• Create supporting material/media (audio, video, simulations, role plays, games etc)</li> <li>• Decide on the criteria used to judge learner's performance and develop assessment instruments.</li> <li>• Maintain project documentation and course folders.</li> </ul> <p>Adapted from: (<a href="https://resources.workable.com/instructional-designer-job-description">https://resources.workable.com/instructional-designer-job-description</a>)</p>	<ul style="list-style-type: none"> <li>• Basic HTML and Flash programming knowledge.</li> <li>• Solid knowledge of course development software and at least one Learning Management System.</li> <li>• Visual design skills (Dreamweaver, Photoshop, Illustrator) and ability to storyboard.</li> <li>• Ability to write effective copy, instructional text, audio scripts/video scripts.</li> <li>• BS or MA degree in instructional design, educational technology or similar.</li> </ul> <p>Adapted from: (<a href="https://resources.workable.com/instructional-designer-job-description">https://resources.workable.com/instructional-designer-job-description</a>)</p>
<p>Systems Administrator</p> <p>1 Position</p>		<ul style="list-style-type: none"> <li>• LAN/WAN/NOC Administration</li> <li>• Project Management</li> <li>• Workflow Planning</li> <li>• Productivity Improvement</li> <li>• Technical Support</li> <li>• Systems Installation, Configuration &amp; Upgrading</li> <li>• Security Solutions</li>   <li>• Database Design &amp; Management</li>   <li>• NOS Patches &amp; Updates</li> <li>• Training &amp; Mentoring</li> </ul>

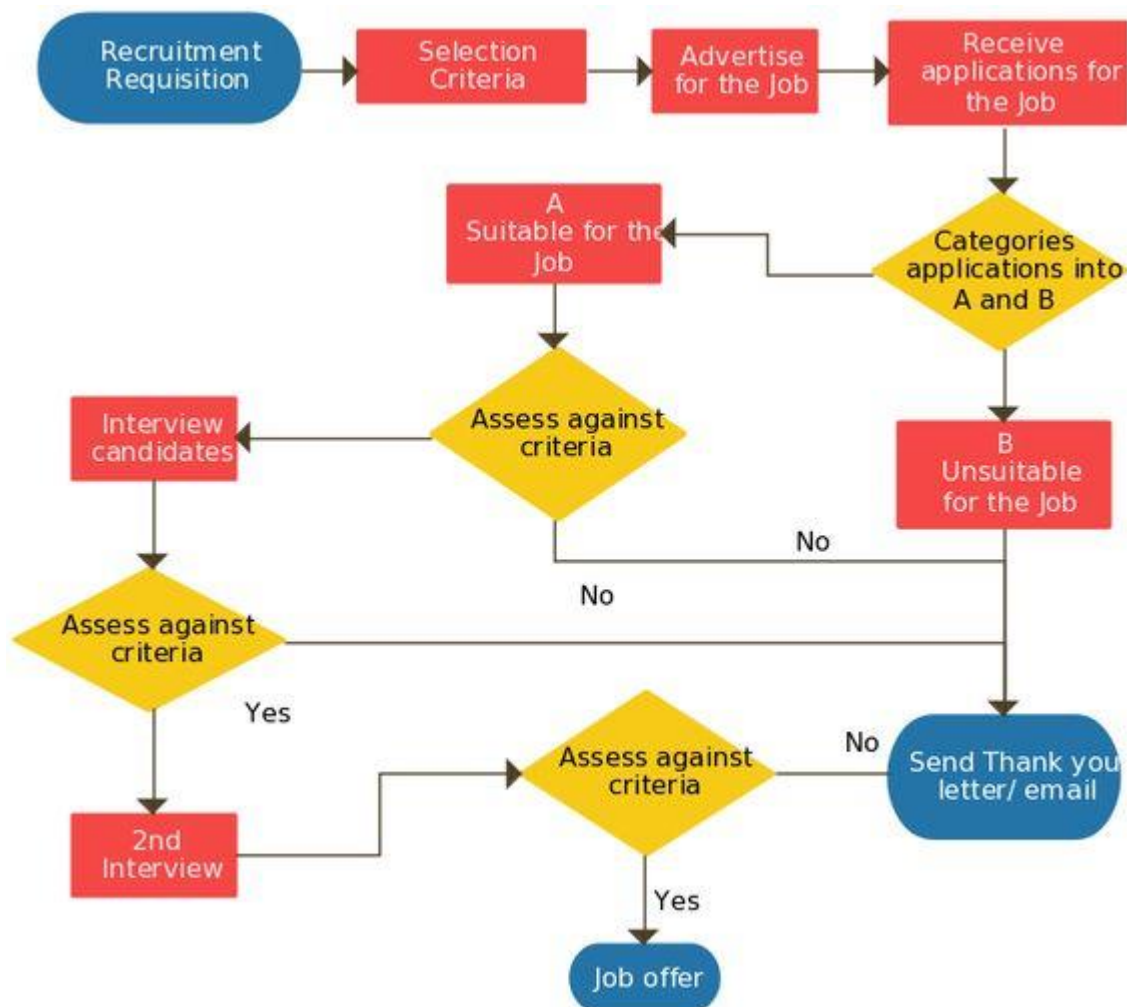
### 4.5.3 Project Organizational Charts

The project organization chart is a hierarchical representation of the reporting roles along the project. “It is particularly effective in the attempts to thoroughly and carefully keep careful track and record the actual project staff deployment processes that have been implemented within the scope of the project and any particular relationships between these specific project staff members during the project” (Project Management Knowledge, 2017)



**Figure 6. Project Organization Structure**  
(Source: Author of Study)

#### 4.5.4 Recruitment and selection process



**Figure 7. Recruitment Process**  
(Source: Creately Templates, n.d.)

The project will make use of the flowchart above to acquire the human capital to duly perform the tasks of the project.

#### 4.5.5 Responsibility Matrix

The Responsibility Assignment Matrix is used to illustrate the connections between work that needs to be done and project team members.

**Table 24: LMS Responsibility Matrix**

	R = Responsible A = Accountable C = Consult I = Inform				
RACI Chart					
Activity	Project Sponsor	Project Manager	Web Administrator	Systems Administrator	Project Team
Project Initiation	R	A	I	I	I
Collect Sponsor Requirements	C	R/A	I	I	R
Meet with Sponsor		R	I	I	I
Establish Project Requirements/Scope	C	R/A	I	I	R
Project Defined	C	R/A	I	I	R
Market Research	I	R/A	I	I	R
Conduct Market Survey	C	R/A	I	I	R
Collect information	I	R	I	I	R
Analyze information	C	R/A	I	I	R
Present Findings	I	C	I	I	R
Determine Software Requirements Specification	I	A	I	R	R
Determine Hardware Requirements Specification	I	A	R	O	R
Determine Security Requirements Specification	I	R	I	R	C
Identify Key Stakeholders	C	R/A	I	I	R
<b>Product Defined</b>					
System Design	I	R/A			
User Interface design	I/C	A	R	C	C
Instructional Design	I	A	C	R	C
Analyze requirements					
Identify learners	I	A	I	R	C
Develop learning objectives	I	A	I	R	C

(Source: Author of Study)

#### **4.5.6 Acquire Project Team**

“Acquire Project Team is the process of confirming human resource availability and obtaining the team necessary to complete project activities. The key benefit of this process consists of outlining and guiding the team selection and responsibility assignment to obtain a successful team” (PMI, 2013, p. 267).

The project manager will be responsible for hiring the staff complement who will diligently work on completing the project.

#### **4.5.7 Develop Project Team**

This phase is designed to establish performance evaluation instruments for the project. It is of paramount importance as it serves as indicators to measure performance along with staff motivation techniques.

PMI describes this process as “the process of improving competencies, team member interaction, and overall team environment to enhance project performance. The key benefit of this process is that it results in improved teamwork, enhanced people skills and competencies, motivated employees, reduced staff turnover rates, and improved overall project performance” (PMI, 2013, p. 272).

#### **4.5.8 Manage Project Team**

“Manage Project Team is the process of tracking team member performance, providing feedback, resolving issues, and managing team changes to optimize project performance. The key benefit of this process is that it influences team behaviour, manages conflict, resolves issues, and appraises team member performance” (PMI, 2013, p. 279)

The project manager will ensure that the team works cohesively and that structures are maintained. The assembled team must be able to conduct their tasks in a manner whereby conflicts will be minimised thus allowing the project to be completed on time.

#### **4.5.9 Performance Reviews**

Performance will be based on the level of work completed according to the work plan assigned to the various individuals. The project manager will review each team member's assigned work activities at the onset of the project and communicate all expectations of work to be performed. The project manager will then evaluate each team member throughout the project to evaluate their performance and how effectively they are completing their assigned work.

An evaluation scale which goes from 1 – 5 will be used to assess team performance based on the following;

1. Bad Performance
2. Satisfactory Performance
3. Good Performance
4. Very Good Performance
5. Excellent Performance

Due to the length of the Project the evaluation will take place at the conclusion of the Project.

#### **4.5.10 Recognition and Rewards**

The scope of this project does not allow for ample time to provide cross-training or the potential for monetary rewards.

## 4.6 Risk Management Plan

### 4.6.1 Introduction

The main purpose of a risk management plan is to create a logical process of classifying, evaluating and responding to risks that may occur in the project. It seeks to develop the instances of positive risks and reduce the occurrence of adverse events. The overall goal is to create a plan to monitor and respond to risks that may positively or negatively affect the project.

According to PMI (2013) “Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project. The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project” (PMI, 2013, p. 309).

### 4.6.2 Roles and Responsibilities

It is important to assign roles and responsibilities to personnel to adequately plan, foster analysis and respond to risks. This activity will ensure response times to risks are shortened since persons would already know their role instead of scrambling to attend to the risk as they occur.

Table 25: Roles and Responsibilities Matrix

<b>Roles &amp; Responsibilities</b> ( <b>A</b> - Accountable, <b>R</b> – Responsible, <b>C</b> – Consulted, <b>I</b> – Informed)	<b>Project Manager</b>	<b>Project Owner/sponsor</b>	<b>SME</b>	<b>Project Team</b>	<b>Stakeholder</b>
<b>Risk Planning</b>	<b>A</b>	<b>R</b>		<b>R</b>	
<b>Risk Identification</b>	<b>A</b>	<b>R</b>	<b>R</b>	<b>R</b>	<b>C</b>
<b>Risk Analysis</b>	<b>A</b>	<b>C</b>	<b>R</b>	<b>R</b>	
<b>Quantitative Risk Analysis</b>	<b>A</b>			<b>C</b>	



<b>Roles &amp; Responsibilities</b> ( <b>A</b> - Accountable, <b>R</b> – Responsible, <b>C</b> – Consulted, <b>I</b> – Informed)	<b>Project Manager</b>	<b>Project Owner/sponsor</b>	<b>SME</b>	<b>Project Team</b>	<b>Stakeholder</b>
<b>Risk Response Planning and Action Plan Development</b>	<b>A</b>	<b>R/C</b>	<b>I</b>		<b>I</b>
<b>Risk Monitoring and Control</b>	<b>A/R</b>	<b>I</b>	<b>I</b>		<b>I</b>
<b>Lessons Learned Documentation</b>	<b>C</b>	<b>I</b>			

(Author of Study)

#### 4.6.3 Risk identification

The risk identification process places tremendous analysis into the aspects of the project such as project stakeholders, the baseline of the scope, the baseline of the schedule, the budget, along with the quality management plan in order to identify potential risks. Special emphasis will be given to the project deliverables, assumptions, constraints and Work Breakdown Schedule in this process.

The following methods will be used to assist in the identification of risks associated with the project:

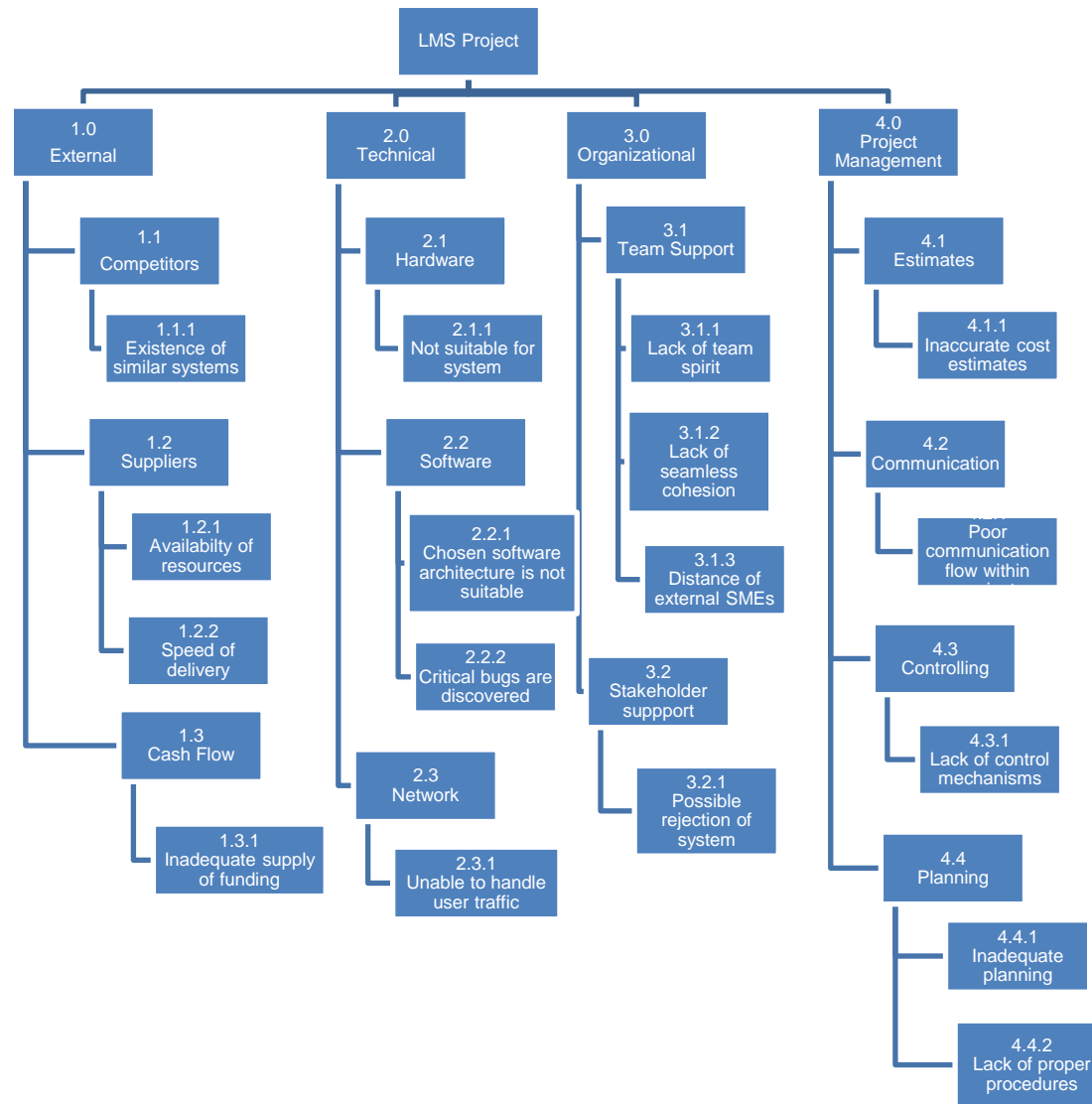
1. Subject Matter Expert Interviews
2. Risk Assessment Meetings
3. Brainstorming
4. Interviewing
5. SWOT (Strengths, Weaknesses, Opportunities and Threats)

#### **4.6.4 Risk Prioritization & Categorization**

Once the potential risks are identified the next step for the project team is to categorize them for ease of management and control. The risks will be categorized as follows:

1. Technical
2. External
3. Operational
4. Project Management

Using the Risk Breakdown Structure (RBS) risks will be diagrammed and organized in terms of the categories above. This hierarchal outlook will assist the project team to properly analyse the potential risks that threaten the project. Further, decomposition will expose the actual risks that may occur under each category. Each will then be taken and worked on to minimise its negative effect on the project.



**Figure 8. Risk Breakdown Structure**  
 (Source: Author of Study)

After the classification of the potential risks the identification matrix will be created to associate it with an activity of the WBS.

Further to the identification of risks, the qualitative assessment process will be carried out, where both the probability and the impact are evaluated in the event the risk occurs. This assessment is undertaken to determine the severity of the risks identified by the team. A probability and impact factor will be assigned to each risk. This process will allow the project team to then prioritize risks based upon the potential impact they will have on the project.

**Table 26: Risk Impact Assessment Scale**

Impact Relative/numeric scales	Cost	Time	Quality
Very Low/1	Insignificant cost increase	Insignificant time increase	Slight reduction in quality no overall impact
Low/2	Requires some additional funding	Project schedule increase by one month	quality degradation noticeable
Medium/3	Requires significant additional funding	Project schedule increase by 3 months	Significant components of the scope for functionality will be unavailable
High/4	Requires significant reallocation of funds	Project schedule increase by 6 months	Quality reduction unacceptable to sponsor and stakeholders
Very high/5	Increases threaten	Project schedule	Project results

	viability of project	increases by over 6 months	effectively useless and unusable
--	----------------------	-------------------------------	-------------------------------------

(Source: Author of Study)

**Table 27: Probability Scale**

Rating	Interpretation	Probability Range
5	Very likely to occur	81 – 100%
4	Probably will occur	61-80%
3	May occur – about half of the time	41-60%
2	Unlikely to occur	21-40%
1	Very unlikely to occur	0-20%

(Source: Author of Study)

#### 4.6.5 Probability and Impact Matrix

Subsequent to the rating of the probability and impact, ratings will be assigned to the risk based on the specific combinations of probability and impact, by multiplying the two metrics. Risks will then be classified or colour coded with the key which follows:

High Risk:           Red  
Moderate Risk:      Yellow  
Low Risk:             Green

**Table 28: Probability and Impact Matrix**

<b>Probability and Impact Matrix</b>	
<b>PI</b>	<b>Threats</b>
15-25	red
10-14	yellow
1-9	green

(Source: Author of Study)

At the end of all these exercises a detailed risk register will be compiled. This document will serve as a guide that the project manager and team will use to monitor and control any potential threats to the project.

**Table 29: Risk Register**

<b>Id</b>	<b>Category</b>	<b>Description of Risk</b>	<b>Triggers</b>	<b>Probable Cause</b>	<b>Consequences</b>	<b>Risk Probability</b>	<b>Risk Impact</b>	<b>Risk Score P*I</b>	<b>Risk Agreed Response</b>	<b>Responsible Individual</b>
1.0	External									
1.1		Existence of similar systems	The market is conducive for other such systems	Other persons realize the potential benefit	Late entry into market leading to decreased customer levels	3	4	12		Project Manager
1.2.1		Availability of resources	Suppliers providing resources to other buyers	Sellers being offered more money or more lucrative contracts	Delay in schedule whilst seeking other suppliers. Possible increase in cost	3	4	12		Project Manger Sponsor
1.2.2		Speed of delivery	Delivery of goods predicated upon a third party such as shipping agent	Shipping routing changes	Delay in certain activities and increasing the budget	2	3	6		Project Team Member
1.3.1		Inadequate supply of funding	Sponsor running out of capital	Underestimation of project magnitude	Delay in project schedule increased cost	5	4	20		Sponsor
2.0	Technical									
2.1.1		Hardware not suitable for	Software Component	Inadequate technical	Would not be able to	3	4	12		Project Team

<b>Id</b>	<b>Category</b>	<b>Description of Risk</b>	<b>Triggers</b>	<b>Probable Cause</b>	<b>Consequences</b>	<b>Risk Probability</b>	<b>Risk Impact</b>	<b>Risk Score P*I</b>	<b>Risk Agreed Response</b>	<b>Responsible Individual</b>
		system	unable to run on platform	planning	accommodate expected volumes of traffic, decreased quality of system					Member
2.2.1		Chosen software architecture is not suitable	Software incompatible with hardware	Inadequate technical planning	Quality of system could be compromised. Delays due to rework	3	4	12		Project Team Member
2.2.2		Critical bugs are discovered	Errors evolving	Lack of quality testing throughout the development stages	Decrease quality, increase costs and time due to rework	2	4	8		Project Team Member
2.3.1		Network unable to handle user traffic	Frequent system crashes	More users than expected at any point in time.	Decrease quality, increase costs and time due to rework	3	5	15		Project Team Member
3.0	Organizational									
3.1.1		Lack of team spirit	Persons don't feel appreciated	Demanding work with less than equal remuneration	Time delays	3	3	9		Project Manger
3.1.2		Lack of seamless	Team members	Decrease reporting and	Quality standards	3	3	9		Project Manger



<b>Id</b>	<b>Category</b>	<b>Description of Risk</b>	<b>Triggers</b>	<b>Probable Cause</b>	<b>Consequences</b>	<b>Risk Probability</b>	<b>Risk Impact</b>	<b>Risk Score P*I</b>	<b>Risk Agreed Response</b>	<b>Responsible Individual</b>
		cohesion amongst team	doing their own thing	work standards						
3.1.3		Distance of external SMEs	Availability of experts	Experts not available in the country	Cost increases	2	3	6		Project Manger
3.2.1		Possible rejection of system by stakeholders	Potential customers become aware of similar systems	Length of time to wait for this system to come on stream	Increase in budget to speed up development process	3	4	12		Project Manger
	Project Management									
4.1.1		Inaccurate cost estimates	Use of proper estimating techniques	Lack of understanding of project management techniques	Increase in original budget	3	5	15		Project Manger
4.2.1		Poor communication flow within project	Not knowing who to address concerns	Misguiding of communication channels	Delays when issues arise	2	4	8		Project Manger
4.3.1		Lack of control mechanisms	Decisions necessary to handle changes	Lack of understanding of project management techniques	Project can go in unmanageable directions	2	4	8		Project Manger
4.4.1		Inadequate planning	Sourcing documentation	Lack of understanding of project management techniques	Increase costs, decrease quality and increase time	2	5	10		Project Manger

<b>Id</b>	<b>Category</b>	<b>Description of Risk</b>	<b>Triggers</b>	<b>Probable Cause</b>	<b>Consequences</b>	<b>Risk Probability</b>	<b>Risk Impact</b>	<b>Risk Score P*I</b>	<b>Risk Agreed Response</b>	<b>Responsible Individual</b>
4.4.2		Lack of proper procedures	Sourcing documentation	Lack of understanding of project management techniques	Increase costs, decrease quality and increase time. Project could become unmanageable	2	5	10		Project Manger

(Source: Author of Study)

#### 4.6.6 Risk Response Planning

Subsequent to conducting the identification, classification and assessment of the risks the next step is to develop strategies to improve the potential threats. These risks fall in the red and yellow colour scheme. Four strategies are outlined to provide responses to these risks:

1. Avoid – Elimination of the threat such that the impact of the risk can be avoided entirely. This would entail altering the original project plan by changing the time, cost, budget and scope.
2. Accept – The risk is taken on by the project thus there will be no change in the project plan.
3. Transfer – Handover the negative risk to a third party, such that after transference procedures and responses will be dealt with by that third party (insurance – for example).
4. Mitigate – Prescribe ways to reduce the probability of the occurrence and/or impact of the negative risks.

Risks can also have positive impacts and opportunities on the project. As a result the project team could take advantage of this opportunity. Four strategies are outlined to provide responses to these risks:

1. Exploit – Perform actions at targeting the opportunity for the project.
2. Share – Allow for instances where other parties can engage in the ownership of the opportunity for example to increase the market share.
3. Enhance – Institute measures and mechanism to increase in the probability or likelihood of occurrence and/or impact of the opportunity.
4. Accept – Make no changes to the original project plan.

## 4.7 Project Communications Management Plan

### 4.7.1 Introduction

“Project Communications Management includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information” (PMI, 2013, p. 279). Effective communication is important for the efficient operation of a project. Communication will take place both internally and externally of the project and must be managed properly. External communication will involve software and hardware vendors, Ministries of Education and teachers to name a few. According to PMI (2013), the process necessary to complete the Communication Management include:

**Plan Communications Management**—The process of developing an appropriate approach and plan for project communications based stakeholder’s information needs and requirements, and available organizational assets.

**Manage Communications**—The process of creating, collecting, distributing, storing, retrieving and the ultimate disposition of project information in accordance with the communications management plan.

**Control Communications**—The process of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met.

### 4.7.2 Communications Management Approach

The Project Manager will play an active role in ensuring effective communications on the project. The communications requirements will be documented in the

Communications Matrix. The Communications Matrix will be used as the guide for what information should be communicated, who provides the communication, when the communication is to be sent and who should receive the communication.

### 4.7.3 Plan Communications Management

“Plan Communications Management is the process of developing an appropriate approach and plan for project communications based on stakeholder’s information needs and requirements, and available organizational assets. The key benefit of this process is that it identifies and documents the approach to communicate most effectively and efficiently with stakeholders” (PMI, 2013, p. 289).

### 4.7.4 Communication Channels

The project manager must be aware of the all the potential communication channels existing in the project. These lines of communication reside between the various stakeholders therefore must be carefully appointed. Using the formula  **$n(n - 1)/2$** , where  **$n$  represents the number of stakeholders**, to arrive at the number of channels will give the project manager some guidance as to the intricacy of the LMS project.

Number of stakeholders = 12

(Sponsor, Project manager, Web Administrator, Project team 4, Instructional, Teacher, Ministry of Education, Students)

**Total number of channels:       $12(12-1)/2 = 12(11)/2 = 66$**

#### 4.7.5 Distribution of Information

Information will be disseminated via numerous mediums between the various stakeholders. The most effective and efficient means would be utilised to ensure adequate sender and receiver participation.

**Table 30: Stakeholder Communication Delivery Methods**

Stakeholders		Method
Sponsor	Project manager	Email, telephone calls, reports, meetings
Project Manager	Project Team	Email, meetings, reports, minutes
Project Manager	Systems Administrator	Email, meetings, reports, minutes
Project Manager	Web Administrator	Email, meetings, reports, minutes
Project Manager	Content Leader	Email, meetings, reports, minutes
Systems Administrator	Vendors	Email, brochures, meetings
Web Administrator	Vendors	Email, brochures, meetings
Content Leader	Teachers, students	Email, questionnaires, reviews
Project Team	Customers	Social Media, websites,

(Source: Author of Study)

#### 4.7.6 Manage Communications

Manage Communications is the process of creating, collecting, distributing, storing, retrieving, and the ultimate disposition of project information in accordance to the communications management plan. The key benefit of this process is that it enables an efficient and effective communication flow between project stakeholders.

**Table 31: Communications Management Matrix**

<b>Communication Type</b>	<b>Objective of Communication</b>	<b>Medium</b>	<b>Frequency</b>	<b>Audience</b>	<b>Owner</b>	<b>Deliverable</b>	<b>Format</b>
Kick off Meeting	Introduce the project team and the project. Review project objectives and management approach.	<ul style="list-style-type: none"> <li>• Face to Face</li> <li>• Video conference</li> </ul>	Once	<ul style="list-style-type: none"> <li>• Project Sponsor</li> <li>• Project Team</li> <li>• SMES</li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>• Agenda</li> <li>• Meeting Minutes</li> <li>• Course of Action</li> </ul>	<ul style="list-style-type: none"> <li>• Audio Recording, Soft copy archived on project SharePoint site and project web site.</li> </ul>
Project Team Meetings	Review status of the project with the team.	<ul style="list-style-type: none"> <li>• Face to Face</li> <li>• Video conference</li> </ul>	Weekly	<ul style="list-style-type: none"> <li>• Project Team</li> <li>• Project Manager</li> <li>• SMEs</li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>• Agenda</li> <li>• Meeting Minutes</li> <li>• Project schedule</li> <li>• Project Updates</li> </ul>	Audio Recording, Soft copy archived on project SharePoint site and project web site.
Project Status Meetings	Report on the status of the project.	<ul style="list-style-type: none"> <li>• Face to Face</li> <li>• Conference Call</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>• Project Sponsor</li> <li>• Project Manager</li> <li>• SMEs</li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>• Slide updates</li> <li>• Project schedule</li> <li>• Project Updates</li> </ul>	Audio Recording, Soft copy archived on project SharePoint site and project web site.
Project Status Reports	Report the status of the project including activities, progress, costs and issues.	<ul style="list-style-type: none"> <li>• Email</li> <li>• Hard copy</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>• Project Sponsor</li> <li>• Project Team</li> <li>• SMEs</li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>• Project Status Report</li> <li>• Project schedule</li> </ul>	Audio Recording, Soft copy archived on project SharePoint site and project web site.
Website	Inform and engage Stakeholders about LMS.	<ul style="list-style-type: none"> <li>• Website</li> </ul>	Daily	<ul style="list-style-type: none"> <li>• All Stakeholders</li> </ul>	Project Manager Web administrator	<ul style="list-style-type: none"> <li>• Webpage</li> </ul>	
Social Media	Inform and engage Stakeholders about LMS.	<ul style="list-style-type: none"> <li>• Facebook</li> <li>• Instagram</li> <li>• Twitter</li> </ul>	Daily	<ul style="list-style-type: none"> <li>• All Stakeholders</li> </ul>	Project Manager Marketing expert	<ul style="list-style-type: none"> <li>• Social Media updates</li> </ul>	
Q & A Forum with Specific Stakeholders	Engaging partners by developing dialogue and promoting education.	<ul style="list-style-type: none"> <li>• Face to Face</li> </ul>	Quarterly	<ul style="list-style-type: none"> <li>• Specific Groupings of Stakeholders</li> </ul>	Project Manager	<ul style="list-style-type: none"> <li>• Project Updates</li> </ul>	Audio Recording, Soft copy archived on project SharePoint site and project web site.

(Source: Author of Study)

**Table 32: Communications Delivery Methods and Technologies**

<b>Who we need to communicate with</b>	<b>When</b>	<b>Why</b>	<b>Method</b>
<b>Project Team</b>	As the project requires, regularly and consistently.  When announcements are to be made.	Keep communication flowing – if no new announcements or decisions then reiterate key messages.  Updates on any role employees will have in the process and when.  Updates on project progress.	Email  Scheduled meetings  (soft and hard copies)  Video conferencing (Skype)
<b>Web Administrator</b>	When announcements are made or expected.	Update on any major aspects relating to portfolio	1. Meetings 2. Emails 3. Letters
<b>Students and Teachers</b>	When announcements are made.  Key decisions affecting specific classification of taxpayers.	Update on timeline for decisions/announcement.	Letters  Meetings

(Source: Author of Study)



## 4.8 Procurement Management

### 4.8.1 Introduction

Projects have a level of purchase for goods and services to conduct the activities through the end. There must be proper procurement techniques to ensure that monies are spent properly and the right goods and services are purchased.

“Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project” (PMI, 2013, p.355).

In addition to the buying and selling decisions to be made this process also deals with contractual arrangements and management.

**Plan Procurement Management** - the process of documenting project procurement decisions, specifying the approach, and identifying potential sellers.

**Conduct Procurements** - the process of obtaining seller responses, selecting a seller, and awarding a contract.

**Control Procurement** - the process of managing procurement relationships, monitoring contract performance, and making changes and corrections as appropriate.

**Close Procurements** - the process of completing each project procurement (PMI, 2013, p. 355).

### 4.8.2 Plan Procurement Management

Plan Procurement Management is the process of documenting project procurement decisions, specifying the approach, and identifying potential sellers (PMI, 2013, p.358).

### 4.8.3 Type of Contract to be used

#### Firm Fixed Price Contracts (FFP).

“The price for goods is set at the outset and not subject to change unless the scope of work changes. Any cost increase due to adverse performance is the responsibility of the seller, who is obligated to complete the effort. Under the FFP contract, the buyer should precisely specify the product or services to be procured, and any changes to the procurement specification can increase the costs to the buyer” (PMI, 2013, p. 363).

**Table 33: Contracts Issued**

	Type of contract	Reason
Web Administrator	Firm Fixed Price Contracts (FFP).	Once the contract is signed, the person tasked with completion of the work would be expected to do so within a specified time frame. This will effectively prevent the cost from increasing over time. Consequently the responsibility of that additional cost would be placed onto the seller. Thus the seller would be obliged to first have an understanding of the work plan and then the course of action necessary to complete the task.
Systems Administrator	Firm Fixed Price Contracts (FFP).	Once the contract is signed, the person tasked with completion of the work would be expected to do so within a specified time frame. This will effectively prevent the cost from increasing over time. Consequently the responsibility of that additional cost would be placed onto the seller. Thus the seller would be obliged to first have an understanding of the work plan and then the course of action necessary to complete the task.
Instructional Leader	Firm Fixed Price Contracts (FFP).	Once the contract is signed, the person tasked with completion of the work would be expected to do so within a specified time frame. This will effectively prevent

	Type of contract	Reason
		the cost from increasing over time. Consequently the responsibility of that additional cost would be placed onto the seller. Thus the seller would be obliged to first have an understanding of the work plan and then the course of action necessary to complete the task.

(Source: Author of Study)

#### 4.8.4 Procurement Risks

There will be some level of risk on this project as it relates to procurement. Accordingly they will be managed with respect to the risk management plan. The procurement risks are identified as follows:

1. The technology may not be available or increases in price at the time of purchase
2. Incorrect purchase of
3. Potential delays in shipping due to a number of factors including
  - a. inclement to severe weather (hurricanes)
  - b. shipper manifest issues
4. Poor vendor background checks
5. Inaccurate vendor brochures about products

Any unforeseen risks that may develop during the course of the procurement phase will be communicated to the project manager to have it managed in the appropriate way.

#### 4.8.5 Estimates and Evaluation Criteria

A very critical aspect of procurement is the evaluation of the required goods and services from potential suppliers. This would give the project team a clear indication of

the potential seller that can adequately meet the needs of the project. It will also assist in making a determination of the cost of the goods and services thus remaining in line with the allocated budget.

Request for information (RFI) – This document will be used to solicit from potential sellers specific material in relation to products needed for the system. Once such document is received it will assist the project team in making decisions such as affordability, availability and maintenance among other criteria.

Request for quotation (RFQ) – Upon various informational material from potential sellers, an RFQ will be issued to get quotations, detailing cost estimates from a short-list of sellers.

### **Goods to be Procured**

- Webserver
- Website domain
- Bandwidth for server
- Software platform (open source, general or custom built)

### **Services to be Procured**

- Web Administrator
- Instructional Designer
- Systems Administrator

### **Standardized Procurement Documentation**

- Background of sellers
- Proposal process and timelines
- Proposal guidelines
- Source selection criteria
- Pricing forms
- Statement of work on contracts

- Terms and Conditions
- Procurement performance evaluation form
- Selection evaluation criteria forms

#### **4.8.6 Management of Deadlines**

This project requires the suppliers to follow and adhere to strict timelines. Consequently deadlines must state the calendar date and time must be expressed in 24 hour clock.

#### **4.8.7 Control of Contracts**

The condition of the contract shall form an essential part of the procurement process.

The contract documents shall clearly define the following:

- a) the scope of the work to be performed
- b) the goods to be supplied
- c) the definitions of the contract terms
- d) the language and laws of the contract
- e) the forum for the settlement of disputes
- f) the functions and authority of the contract administrator
- g) information on contract scheduling, contract quality control, contract cost control and payments
- h) liquidated damages and bonus clauses
- i) force majeure

*Adapted from the Procurement Act No.19 of 2015 of Saint Lucia.*

#### 4.8.7 Contract Statement of work

<b>Contract for Web and Database Server</b>	
<b>Summary</b> To supply Web and Database Server for Oktave Solutions	
<b>Schedule</b> Two (2) weeks	
<b>Cost</b> \$10 000	
<b>Specifications of Server</b>	
<u>Hardware</u> 6 x 1.6 GHz CPU 10 GB RAM 2 x 100 GB Hard Drive	<u>Software</u> Windows PowerShell 2.0, 3.0 or 4.0 Internet Information Services (IIS) 6, 7.0, 7.5 or 8 Windows Server 2012 R2

<b>Contract for Systems Administrator</b>	
<b>Summary</b> To set up, configure and install a web and database server to accommodate a Learning Management System	
<b>Schedule</b> Five (5) weeks	
<b>Cost</b> \$6000	
<b>Description of Work to be completed</b>	
<p>Responsible for designing, organizing, modifying, and supporting a company's computer systems. Designs and installs LANs, WANs, Internet and intranet systems, and network segments.</p> <p>Install hardware and software            Configure hardware and software            Perform network address assignment.            Assign routing protocols and routing table configuration.            Assign configuration of authentication and authorization of directory services.</p>	

<b>Contract for Web administrator</b>	
<b>Summary</b>	To create a website and platform for the Learning Management System
<b>Schedule</b>	Three (3) weeks
<b>Cost</b>	\$5000
<b>Description of Work to be completed</b>	To establish website specifications by analyzing access, information, and security requirements. To create a secure website for the LMS by developing system access, monitoring, control, and evaluation; establishing and testing disaster recovery policies and procedures; completing back-ups

<b>Contract for Instructional Designer</b>	
<b>Summary</b>	To create lesson content for the LMS
<b>Schedule</b>	Four (4) weeks
<b>Cost</b>	\$5500
<b>Description of Work to be completed</b>	To create lesson plans for the various subjects complete with activities and evaluation exercises

#### 4.8.8 Selection of Supplier

Suppliers will be selected on the basis of rating score in terms of price and speed of delivery

**Table 34: Selection Matrix Template**

Supplier	Price (40%)	Speed of Delivery (60%)
Supplier 1		
Supplier 2		
Supplier 3		

(Source: Author of Study)

The supplier with the highest score at the end of the exercise will receive the contract to undertake the given task.

### Contract Award

1. The emerging supplier would be notified via letter or email.
2. The supplier must respond to this notification in two (2) working days.
3. The contract will be signed by the project sponsor and the potential seller during a face-to-face meeting. Witnesses for both parties should also be present at the meeting.

The following procurement metrics are established for better measuring vendor performance and procurement activities. Each metric is given a score with 100 as the total. After the summation, a rating scale will be used to select the vendor to perform the undertaking.

**Table 35: Performance Metrics for Procurement Activities**

Vendor	Product Quality	On Time Delivery	Documentation Quality	Development Costs	Development Time	Cost per Unit	Transactional Efficiency	Total
	(40)	(5)	(5)	(10)	(10)	(15)	(15)	(100)
Vendor #1								
Vendor #2								
Vendor #3								
1 – Unsatisfactory ( below 60) 2 – Acceptable (60 – 84) 3 – Exceptional (85 – 100)								

Adapted from (Source: MYMG Team, 2010)



All the listed metrics can get the following actual values: **Unsatisfactory, Acceptable and Exceptional.**

The values of the metrics will be used to create a vendors rating table and build a past-performance database in order to get a foundation for selecting vendors for future procurement activities. This activity will be carried out once due to the nature of the project. As a result once the selection is made a contract will be awarded.

### **Vendor Performance Measurements**

“In order to measure the vendor’s progress throughout the project, the following steps will be undertaken:

- **Require the vendor’s schedule** ---this is needed also to integrate into the Projects work plan
- **Conduct status meetings**---this will help minimize surprises by probing on status and “inspecting what is expected”
- **Address performance issues immediately**---don’t provide a third or fourth chance for vendor performance recovery
- **Document, document, document**---ensure that all documentation is fact-based and shared with the vendor; other partners (e.g., legal, procurement) will be engaged where appropriate in addressing vendor issues”

(Source: Mclsaac, 2008)

#### **4.8.9 Reporting the Performance of the Acquisitions**

A review of the suppliers will be conducted to analyse their performance in relation to the contract scope of works. The following questions will be used for the analysis via a rating scale:

1. Did the supplier give the best price?
2. Was the supplier punctual with the delivery?
3. Was there value for money?
4. Was the work completed as prescribed?

#### **4.8.10 Inspection and Verification of Deliverables**

The project team will use the contract statement of work to verify and inspect the deliverables. Once it meets the requirements an approval will be granted and the seller could proceed to acquire payment.

#### **4.8.11 Payment Systems**

A seller would first have to submit invoices for the work carried out. Upon verification and satisfaction of work provided, the project manager will authorize and issue payment via a cheque. The use of cheques will help the project track all payments and maintain proper accounting. A payment system of that nature will also provide control mechanisms, therefore assisting in tracking the deliverables that have been done.

#### **4.8.12 Closing of Acquisitions**

1. All contracts must be closed.
2. Verification of deliverable(s) to scope of work to be conducted.
3. Sign off contract between seller and project sponsor.
4. Submittal of seller performance reports by project team.
5. Project manager will document the process as well as lessons learnt for future use.

## 4.9 Project Stakeholder Management

### 4.9.1 Introduction

Identifying all the stakeholders, both internal and external, who will be affected by a project is a key to success. “One of the main reasons projects fail is because the deliverables were not what the customer wanted or they did not meet the customer’s needs. To ensure project success, it helps that you know all of the key stakeholders on your project, how they prefer to communicate, what their needs are, and what the acceptable end results are” (Lori Schoenhard, 2017).

Consequently, it is of paramount importance that as many as can be found are engaged at the beginning of the project, thus ensuring their participation throughout the life of the project. There must be a plan to guide the interaction between the project and stakeholders.

According to the PMBOK Guide (2013) “Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution”( PMI, 2013, p. 391).

According to PMI (2013) the stakeholder management processes include the following:

**Identify Stakeholders**—The process of identifying the people, groups, or organizations that could impact or be impacted by a decision, activity, or outcome of the project; and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success.

**Plan Stakeholder Management**—The process of developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success.

**Manage Stakeholder Engagement**—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.

**Control Stakeholder Engagement** — The process of monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders. The Stakeholder Management Plan will be created by the Project Manager working closely with the sponsor and project team. Input will be gleaned from other stakeholders such as the Instructional Designer, teachers and students. This plan will ensure that all the relevant stakeholders are identified and their concerns addressed.

#### **4.9.2 Identify Stakeholders**

This process endeavours to ascertain all the persons who may be affected by the project. They may be positively or negatively affected by the results of the project or any activity wherein. An assessment or analysis is to be carried out to determine among other things “their interests, involvement, interdependencies, influence, and potential impact on project success” (PMI, 2013, p. 391). Accordingly, stakeholder management is a key objective to the successful completion of the project.

Through meetings and surveys the stakeholders who will be affected by the LMS will be identified. A series of meetings will take place with persons who maybe potential stakeholders, for example teachers tasked with providing instruction along with CXC officials who set the curriculum. In addition surveys will be carried out in schools and otherwise to gather information from students who can be deemed the primary users of the system. The table below depicts the stakeholders identified on this project:

**Table 36: Stakeholder Register**

<b>PROJECT NAME: LMS</b>									
<b>PREPARED BY : Sherman Sylvester (Author)</b>									
<b>PROJECT SPONSOR : Mr. Thomas</b>					<b>DATE : October 2017</b>				
ID	Name	Role	Contact Information	Communication Type	Communication Method	Stake in project	Influence	Perspective on project	Comments
0		Sponsor		Internal	E-mail Telephone Face to Face	Initiates the project, provides the budget and is involved in decision making.	High	Positive	
1		Project Manager		Internal	E-mail Telephone Face to Face	High	High	Positive	
2		Project Team		Internal	E-mail Telephone Face to Face		High	Positive	
3		Students		External			Low	Neutral	
4		Teachers		External			Low	Neutral	
5		Web Administrator		External	E-mail Telephone Video conferencing Presentations		Medium	Neutral	
6		Systems Administrator		External	E-mail Telephone Video conferencing Presentations		Medium	Neutral	
7		Vendors		External	E-mail		Low	Neutral	

<b>PROJECT NAME: LMS</b>									
<b>PREPARED BY : Sherman Sylvester (Author)</b>									
<b>PROJECT SPONSOR : Mr. Thomas</b>					<b>DATE : October 2017</b>				
ID	Name	Role	Contact Information	Communication Type	Communication Method	Stake in project	Influence	Perspective on project	Comments
					Telephone Video conferencing Presentations				
8		Instructional Leader		External	E-mail Telephone Video conferencing Presentations		Medium	Neutral	

(Source: Author of Study)

Alongside the stakeholder register a power-interest grid will be formulated to ascertain the type of relationship needed between the project team and stakeholders. Students will have to be monitored very closely since their interest in the system is very high. This group will have to be properly managed to ensure their interest is sustained partly because where their desires are not met; they will not want to become users of the LMS. Below is a table detailing the stakeholder and their power-interest.

**Table 37: Stakeholder Power - Interest Grid**

<b>Interest</b>	High Impact	Low Impact
<b>Power</b>		
High Influence	Keep Satisfied  <b>Sponsor Project Team</b>	Manage Closely  <b>Web Administrator, System administrator Instructional Lead</b>
Low Influence	Monitor  <b>Students, Ministries of Education, Teachers</b>	Keep Informed  <b>Vendors</b>

(Source: Author of Study)

#### **4.9.3 Plan Stakeholder Management**

The stakeholders are to be analysed to assess their current level of engagement with the system. The sponsor would be the most supportive at this point primarily being the initiator and would have the desire to have a completed Learning Management System. On the other hand, groups such teachers, students and vendors are naturally unaware of such a project but would be elevated to the supportive category through proper management namely keeping them informed of the processes involved and quizzing them (students, teachers) as to their requirements of the system. Once their level of



engagement is sustained at the required level, the project could progress unabated. See Table 36 below.

**Table 38: Stakeholder Engagement Assessment Matrix**

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Sponsor				C	C
Project Manager				C	C
Project Team				C	
Students	C			D	
Teachers	C			D	
Web Administrator	C			D	
Systems Administrator	C			D	
Vendors	C			D	
Instructional Leader	C			D	

**Stakeholder Engagement Assessment Matrix.** List stakeholders and place a “C” for their current level of engagement and “D” in the column of their desired level of engagement.

The engagement level of the stakeholders can be classified as follows:

- **Unaware** Unaware of project and potential impacts.
- **Resistant** Aware of project and potential impacts and resistant to change.
- **Neutral** Aware of project yet neither supportive nor resistant.
- **Supportive** Aware of project and potential impacts and supportive to change.
- **Leading** Aware of project and potential impacts and actively engaged in ensuring the project is a success.

(Source: Author of Study)

The project team will subsequently develop strategies to maintain their reach with every stakeholder. Maintaining effective communication with stakeholders would ensure the success of the project as their concerns will be dealt with during the project. This fosters a greater opportunity of buy-in and approval at the completion of the final product.

**Table 39: Stakeholder Communications Strategy**

<b>Stakeholder</b>	<b>Type</b>	<b>Class</b>	<b>Peak Interest</b>	<b>Communication Method</b>	<b>Strategy</b>
Sponsor	Internal	Positive	Initiating Closing	Phone Email Presentations Face-to-face meetings	Keep Satisfied <ul style="list-style-type: none"> <li>Ensure the sponsor requirements are carried out, any deviation is too communicated before proceeding.</li> </ul>
Project Team	Internal	Positive	Planning Execution	Phone Email Presentations Face-to-face meetings	Keep Satisfied <ul style="list-style-type: none"> <li>The team must be made to feel that they are central to the project and not simply employees. Thus some sense of ownership is necessary.</li> </ul>
Students	External	Positive	Execution Closing	Presentations Meetings	Monitor <ul style="list-style-type: none"> <li>The ultimate users of the LMS form this group; consequently their requirements must be adhered to.</li> </ul>
Teachers	External	Positive	Execution Closing	Presentations Meetings	Monitor <ul style="list-style-type: none"> <li>Tutors will be used to instruct the students thus their input is necessary through the process.</li> </ul>
Web Administrator	External	Positive	Execution	Presentations Meetings Email	Manage Closely <ul style="list-style-type: none"> <li>Expected to carry out the technical aspect dealing with the website and its components therefore a watchful eye must be placed on the individual to ensure they are complying with the specifications.</li> </ul>
Systems Administrator	External	Positive	Execution	Presentations	Manage Closely <ul style="list-style-type: none"> <li>Expected to carry out</li> </ul>

Stakeholder	Type	Class	Peak Interest	Communication Method	Strategy
				Meetings E-mail	the technical aspect dealing with the system and its components therefore a watchful eye must be placed on the individual to ensure they are complying to the specifications.
Instructional Leader	External	Positive	Execution	Presentations Meetings E-mail	<p>Manage Closely</p> <ul style="list-style-type: none"> <li>Expected to carry out the task of building content therefore a watchful eye must be placed on the individual to ensure they are complying with the specifications.</li> </ul>

(Source: Author of Study)

## 5. CONCLUSIONS

Developing the project management plan along with its subsidiary plans for the proposed learning management system would assist in creating the final product in time, within budget and remain in scope. Without a proper plan projects have a tendency to either fail or not meet stakeholder requirements.

The scope management plan detailed the requirements of the project. Outlining the scope baseline will indicate the latitudes of the project and provide a measure of monitoring and control to the project manager. In addition the various roles and responsibilities were articulated. A WBS was created to indicate the work packages necessary to complete the LMS. The WBS dictionary will ensure the project team will perform only the work outlined and will serve as a verification mechanism.

Creating the time management plan will ensure the project team completes the tasks within the appropriate time frame. Projects going outside the triple constraints, of which, time is one, lends itself to potential failure. Special attention was given to identifying the activities necessary for the project completion. They were sequenced giving clear indication of the predecessors – the tasks that need to be completed before another starts. Another important document created was the project schedule diagram which will provide a synopsis of the project tasks.

Costing the project was an engaging activity to derive the budget and the Cost Management Plan. The cost baseline is an important parameter that will be used to monitor and control the project. The sponsor had full input in this exercise. Pertinent information such as vendor quotations, market conditions and the WBS were used to arrive at the cost. The various components were tabulated and a cost attached and the totalled to become the project budget. Metrics were then set to measure variances to the cost in the event of any modifications to the budget.

To gain approval from stakeholders the final product must meet the predetermined quality standards. To achieve this, a quality management plan was structured from internationally accepted standards to suit the project. A set of principles were formulated as a mandate to follow to achieve the best quality product. Quality assurance procedures were factored in as a basis for measuring various components of the system. The final aspect of the plan was the control methods to adhere to ensure the quality of the product is kept to a high standard and stakeholder expectation.

The Human Resource Management Plan will determine the human resource aspect and will install the right people for the undertaking. Once the various positions were identified roles and responsibilities were assigned to each post. The skillset outlined was in congruence with the abilities necessary for the project. A reporting mechanism using an organizational chart will indicate to the project staff (external and internal) their levels of authority. Another imperative facet of the human resource plan was the assignment of personnel to tasks using a RACI.

The Risk Management Plan endeavoured to uncover potential negative and positive risks. The objective is to alleviate against the negative ones and take advantage of the positive. A risk register is a key element in this regard, that identifies all the possibilities, their causes, probabilities along with the responses. To achieve this, a matrix of roles and responsibilities was created along with an RBS. The impact and probability scales were developed to prioritize the potential threats and opportunities. Further to that risk response strategies were outlined in the event of these incidences.

Designing the Communication Management Plan created the synergies and flow of information within the project. The proper communication methods between sender and receiver were determined as a means of reporting schedules. Lastly, management of the communication systems was formulated to keep track of messages, the medium, prescribed frequencies and formats necessary for sending.

A Procurement Management Plan was developed to identify the goods and services for the project ensuring that appropriate contracts and contractual arrangements were defined. The evaluation and subsequent selection of vendors was done via RFIs and RFQs. Lastly, payment systems and protocols were established to monitor and control the flow of money through the project.

A Stakeholder Management Plan was developed to foster management strategies to engage all stakeholders. Stakeholder identification and management is paramount to establishing the basis for the LMS and gaining approval upon completion. Consequently, a stakeholder register was conceptualized detailing all the possible stakeholders positive or negative. This register will become a very significant project document that will be used to keep the stakeholders informed and updated. Classification of the stakeholders was done to rank each in terms of power and influence. An engagement assessment matrix determined the current and expected levels of stakeholder interaction with the system. This is a powerful tool such that can be used to manage and monitor the stakeholders.

## 6. RECOMMENDATIONS

After having gone through this exercise of creating a project management plan for the creation of the learning management system, the following recommendations are being proposed:

1. Moving forward, Oktave Solutions should always use sound project management techniques in pursuit of any project no matter the size. Subsequently, the project management plan along with the other subsidiary plans must always be formulated and documented. This particular one can be used as a guide for reference.
2. Proper communication within the project is necessary to maintain project success. The project manager must therefore possess managerial skills to create an environment whereby the team works in unison and when issues or conflicts arise they can be solved without placing the project in jeopardy.
3. Due to the nature of the LMS being two fold, for use by students to enhance their learning and an income generator for the sponsor, the Project Manager should ensure that quality remains high on the agenda. If the final product fails to meet the satisfaction of the intended customer then the sponsor may realize less on his return.
4. The Human resource plan proved to be a valuable document that provided an outline of the human capital necessary to conduct the project. It was recognized for a project of such magnitude it is imperative to acquire persons with advanced skills in networking, web administration and any other skills required for the project.
5. Lastly, special attention must be placed by the project team as it relates to maintaining strict budget measures. Deviations from the streamlined budget

could send the project out of sync and threaten other areas such as time, scope and quality.

6. Finally, to acquire a strict control of the budget of the project, automated templates to track spending should be created and constant analysis of the value gained from the project should be made. The Project Manager should adhere to the communications procedure regarding the frequency of follow-up meetings, as well as the cost management plan that determines the budget control mechanisms. In addition, to ensure that costs are maintained the project manager must adhere to strict monitoring and control mechanisms for example making use of the cost metrics.



## 7. BIBLIOGRAPHY

Alber, R. (2014). Six Scaffolding strategies to use with your students. Retrieved from <https://www.edutopia.org/blog/scaffolding-lessons-six-strategies-rebecca-alber>

Bianco, A. M., De Marsico, M., & Temperini, M. (2005). *Standards for e-learning*. Retrieved from [http://www2.tisip.no/quis/public\\_files/wp5-standards-for-elearning.pdf](http://www2.tisip.no/quis/public_files/wp5-standards-for-elearning.pdf)

Collaborative Learning: Group Work. (2017). Retrieved from <https://www.cte.cornell.edu/teaching-ideas/engaging-students/collaborative-learning.html>

Control Chart. (n.d.). Retrieved from <http://asq.org/learn-about-quality/data-collection-analysis-tools/overview/control-chart.html>

Comparative Literature: Primary, secondary & tertiary sources. (n.d.) Retrieved from <http://guides.library.yale.edu/c.php?g=295913&p=1975839>

DeFranzo, S. (2011, September 16). What's the difference between qualitative and quantitative research?. Retrieved from <https://www.snapsurveys.com/blog/qualitative-vs-quantitative-research/>

Eaton, S. (n.d.). 21 Characteristics of 21st Century Learners. Retrieved from <https://drsaraheaton.wordpress.com/2011/12/07/21st-century-learners>

Examples of Primary Sources. (n.d.) Retrieved from <https://www.lib.uci.edu/examples-primary-sources>

Government of Saint Lucia. (2015). *Public Procurement and Asset Disposal Act* No. 19 of 2015.

Haughey, D. (n.d.). *RACI Matrix*. Retrieved from <https://www.projectsmart.co.uk/raci-matrix.php>

Hayes, H. (August, 2016). *Project Manager*. Retrieved from <https://www.prospects.ac.uk/job-profiles/project-manager>

Human Resource Management. (n.d.). Retrieved from <http://www.whatishumanresource.com/human-resource-management>

Information Source. (n.d.) *McGraw-Hill Dictionary of Scientific & Technical Terms, 6E*. (2003). Retrieved from <https://encyclopedia2.thefreedictionary.com/Information+Source>

Innovative Design Thinking: Types of Sources. (n.d.) Retrieved from <https://guides.lib.vt.edu/c.php?g=517873&p=3540912>

Instructional Designer job description. (n.d.). Retrieved from <https://resources.workable.com/instructional-designer-job-description>

ISO 9126 Software Quality Characteristics. (n.d.). Retrieved from <http://www.sqa.net/iso9126.html>

Mades, N. (2014, July 30). Flowchart – The First of 7 Basic Quality Control Tools. Retrieved from <https://www.qualityengineersguide.com/flowchart-the-first-7-basic-quality-control-tools>

Palmer, T. (2015, June 20). 15 Characteristics of a 21st-Century Teacher. Retrieved from <https://www.edutopia.org/discussion/15-characteristics-21st-century-teacher>

- Pappas, C. (2016, January 7). *The Top 8 Benefits of Using Learning Management Systems*. Retrieved from <https://elearningindustry.com/top-8-benefits-of-using-learning-management-systems>
- Project Management Institute. (2013). *A Guide to the Project Management Body of Knowledge, (PMBOK® Guide) - Fifth Edition*, Pennsylvania, E.U.A..
- Project Organization Chart. (n.d.). Retrieved from <https://project-management-knowledge.com/definitions/p/project-organization-chart/>
- Recruitment Process. (n.d.). Retrieved from <https://creately.com/diagram/example/gsy8pdq4f/Recruitment%20Process>
- Sample resume for an experienced systems administrator. (n.d.). Retrieved from <https://www.monster.com/career-advice/article/sample-resume-systems-administrator-experienced>
- Schoenhard, L. (n.d.). Retrieved from <http://proficientlearning.com/4-ways-stakeholders-are-important-to-a-project/>
- Sole, J. (2015, July 12). 10 Hallmarks of 21st Century Teaching and Learning. Retrieved from <https://www.edutopia.org/discussion/10-hallmarks-21st-century-teaching-and-learning>
- The Project Management Methodology. (2017). Retrieved from <http://www.cityu.edu.hk/pmo/pmmethodology.htm>
- Web System Administrator Job Description. (n.d.). Retrieved from <https://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/job-descriptions/web-system-administrator-job-description.aspx>

What is Project Management?. (n.d.). Retrieved from Project Management Institute  
<https://www.pmi.org/about/learn-about-pmi/what-is-project-management>

What is the difference between projects and operations?. (n.d.) Retrieved from  
<https://www.projectinsight.net/project-management-basics/projects-and-operations>

Wheeler, S. (n.d.). Learning Theories: Jerome Bruner on the Scaffolding of Learning.  
Retrieved from <http://www.teachthought.com/learning/learning-theories-jerome-bruner-scaffolding-learning/>

## 8. APPENDICES

## Appendix 1: FGP Charter

PROJECT CHARTER	
<b>Date</b>	<b>Project Name:</b>
June 2017	Project Management Plan for the Learning Management System Development Project
<b>Knowledge Areas / Processes</b>	<b>Application Area (Sector / Activity)</b>
<b>Knowledge areas:</b> Cost Management Human Resource Management Risk Management Stakeholder Management Time Management Quality Management Scope Management Procurement Management <b>Process groups:</b> Initiating, Planning, Monitoring and Control, Closing	Information Technology in Education
<b>Start date</b>	<b>Finish date</b>
June 2017	January 2018
<b>Project Objectives (general and specific)</b>	
<p>General objective:</p> <p>To create the Project Management Plan of the Learning Management System (LMS)Development Project to tutor students preparing for the Caribbean Secondary Education Certificate (CSEC) examinations.</p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. To construct a Scope Management Plan to ensure the project includes the work that is required for a successful completion.</li> <li>2. To create a Time Management Plan to manage the timely execution of the project schedule.</li> <li>3. To create a Cost Management Plan to manage project costs ensuring that the project is completed within the approved budget.</li> <li>4. To develop a Quality Management Plan to identify the standards that will be used to evaluate the quality of project deliverables.</li> <li>5. To design a Human Resource Management plan to determine the project roles, responsibilities and skills required to effectively complete the project.</li> <li>6. To develop a compliant Risk Management Plan that identifies possible risks and the appropriate risk responses to minimize the likelihood of their occurrence.</li> <li>7. To create a Communications Management Plan to create the appropriate linkages and communication channels between stakeholders and project team</li> </ol>	

8. To develop a Procurement Management Plan to identify the products and services required by the project.
9. To develop a Stakeholder Management Plan to engage stakeholders throughout the lifecycle of the project based on the analysis of their needs, interests and potential impact on project success.

### **Project purpose or justification (merit and expected results)**

This project will endeavour to create a project management plan to provide support for the development and creation of a learning management system. It will form the framework by which initiating, planning, monitoring and control, closing will be guided by.

An LMS allows students to take ownership of their learning as it will grade assessments and provide timely feedback. There will be a component whereby a 'live' tutor will deliver face-to-face instruction. The system is poised to track student learning and their progress. Students are encouraged to follow an after school lesson programme especially in Mathematics and English. These classes are usually a couple of hours in duration, and are not as individualised as it should be. Hence this system will afford a student the opportunity to follow these very classes at their own leisure and comfort.

The system will also allow students to collaborate with their peers as research has shown that students acquire knowledge from each other at a faster pace.

Thus this project management plan will detail the procedures for a project manager to conduct the creation of such a system to be completed within budget and time whilst maintaining the scope.

### **Description of Product or Service to be generated by the Project – Project final deliverables**

The development of a Project Management Plan for the creation of a Learning Management System. This plan will consist of nine subsidiary plans to satisfy the objectives of the project.

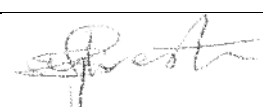
The subsidiary plans will include the following information

- A plan specific to the schedule of the project
- Guidelines for the acquisition of the project staff
- A plan to guide the scope of the project
- A basis to determine the budget of the system
- Course of action to recognize and mitigate the risks
- Plan of action to ensure proper communication throughout the life of the project
- Determination of the persons who would be negatively or positively affected by the undertaking
- Set of guidelines to test the quality of the project against
- Principles to acquire the resources for the project

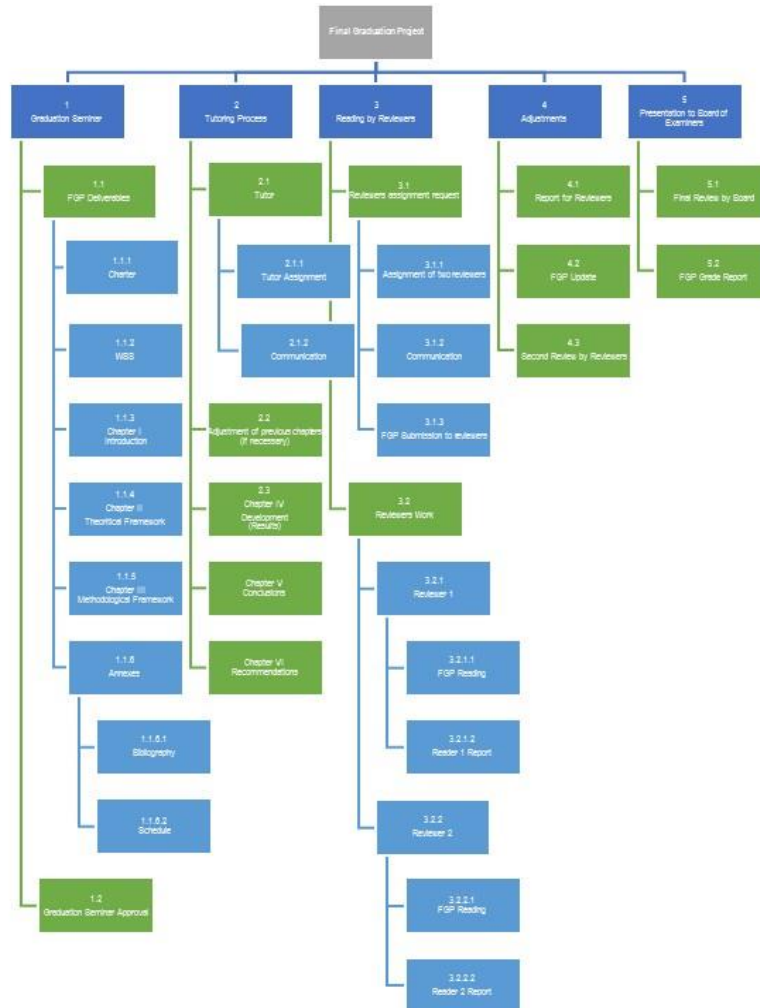
### **Assumptions**

1. It is assumed that the project will be completed in the allotted time
2. It is assumed that the guidance will always be forthcoming
3. It is assumed that the relevant information and documentation is available to carry out the project
4. It is assumed that the scope of this project will remain tightly confined

<b>Constraints</b>		
<ol style="list-style-type: none"> <li>1. The strict time plan which must be adhered to by the student</li> <li>2. Grades are awarded to an exercise that is not fully understood</li> </ol>		
<b>Preliminary risks</b>		
<ol style="list-style-type: none"> <li>1. Insufficient time to adequately complete the deliverables will affect the time and quality of the project</li> <li>2. Delays may occur if documentation is not readily available and retard the progress of the project</li> <li>3. Requisite technology may not be available or difficult to source which would cause delays in submission and decrease quality of the project</li> </ol>		
<b>Budget</b>		
No budget stated at this time		
<b>Milestones and dates</b>		
Milestone	Start date	End date
FGP Start	26 <sup>th</sup> June, 2017	26 <sup>th</sup> June, 2017
Charter and WBS completed	30 <sup>th</sup> June, 2017	30 <sup>th</sup> June, 2017
Introduction and FGP completed	7 <sup>th</sup> July, 2017	7 <sup>th</sup> July, 2017
Theoretical Framework Completed	14 <sup>th</sup> July, 2017	14 <sup>th</sup> July, 2017
Methodological Framework Completed	21 <sup>st</sup> July, 2017	21 <sup>st</sup> July, 2017
Graduation Seminar Approval	28 <sup>th</sup> July, 2017	28 <sup>th</sup>
Tutor Approval	10 <sup>th</sup> November, 2017	10 <sup>th</sup> November, 2017
FGP End	5 <sup>th</sup> January, 2018	5 <sup>th</sup> January, 2018

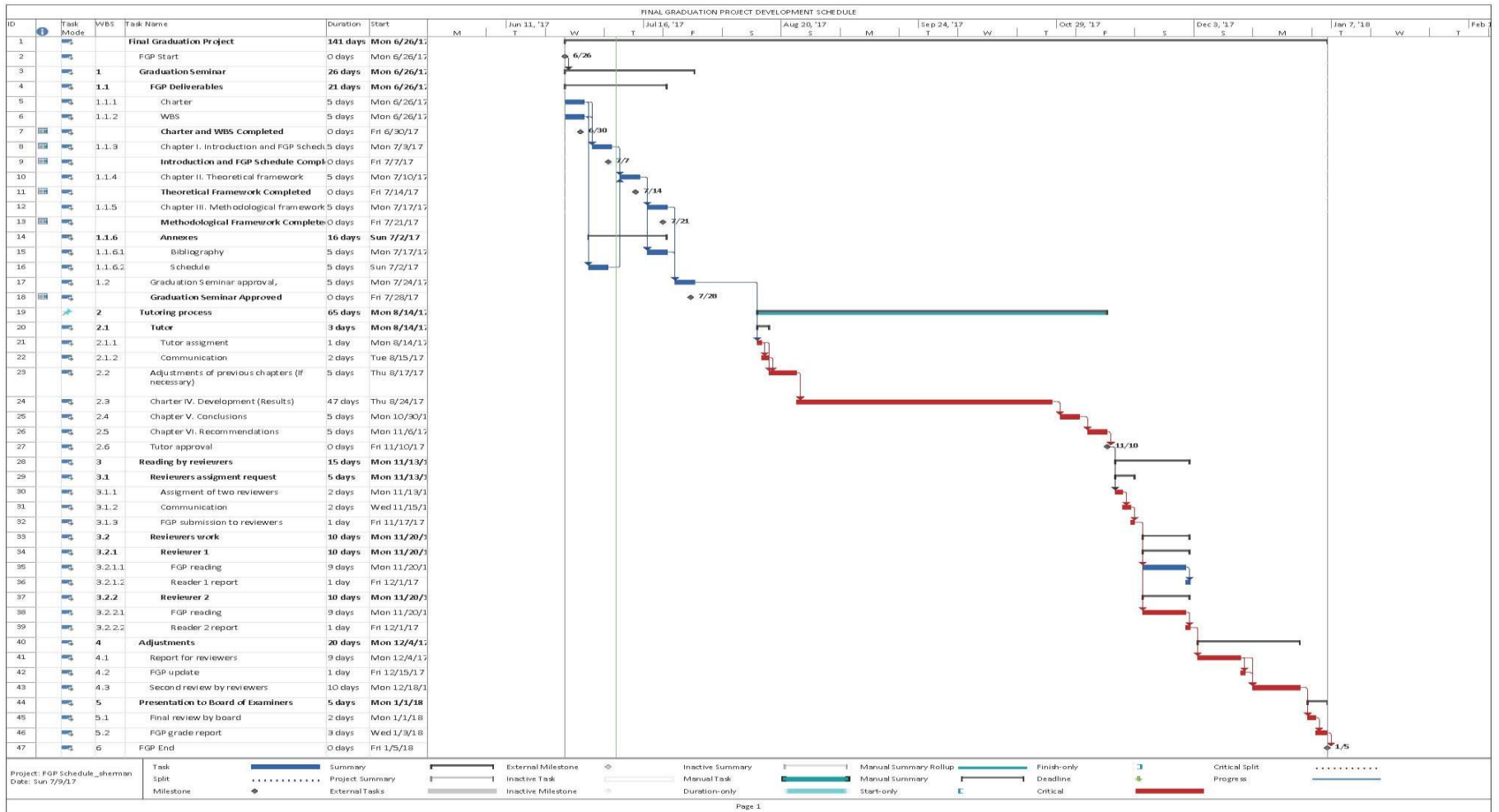
<b>Relevant historical information</b>	
<p>This project will be undertaken by a company with experience in instructional design, producing platforms for educators and students alike. They have created programs for many schools across the Caribbean, for use as interactive instructional guides. The company has also engaged various Education Ministries in the development of teacher grading applications.</p>	
<b>Stakeholders</b>	
<p>Direct stakeholders:            Course Facilitator            Reviewer            Board of Examiners</p> <p>Indirect stakeholders:            Course Administrator            Subject Teachers</p>	
<p><b>Project Manager:</b>            Sherman L Sylvester</p>	 <b>Signature:</b>
<p><b>Authorized by:</b></p>	<p><b>Signature:</b></p>

Appendix 2: FGP WBS

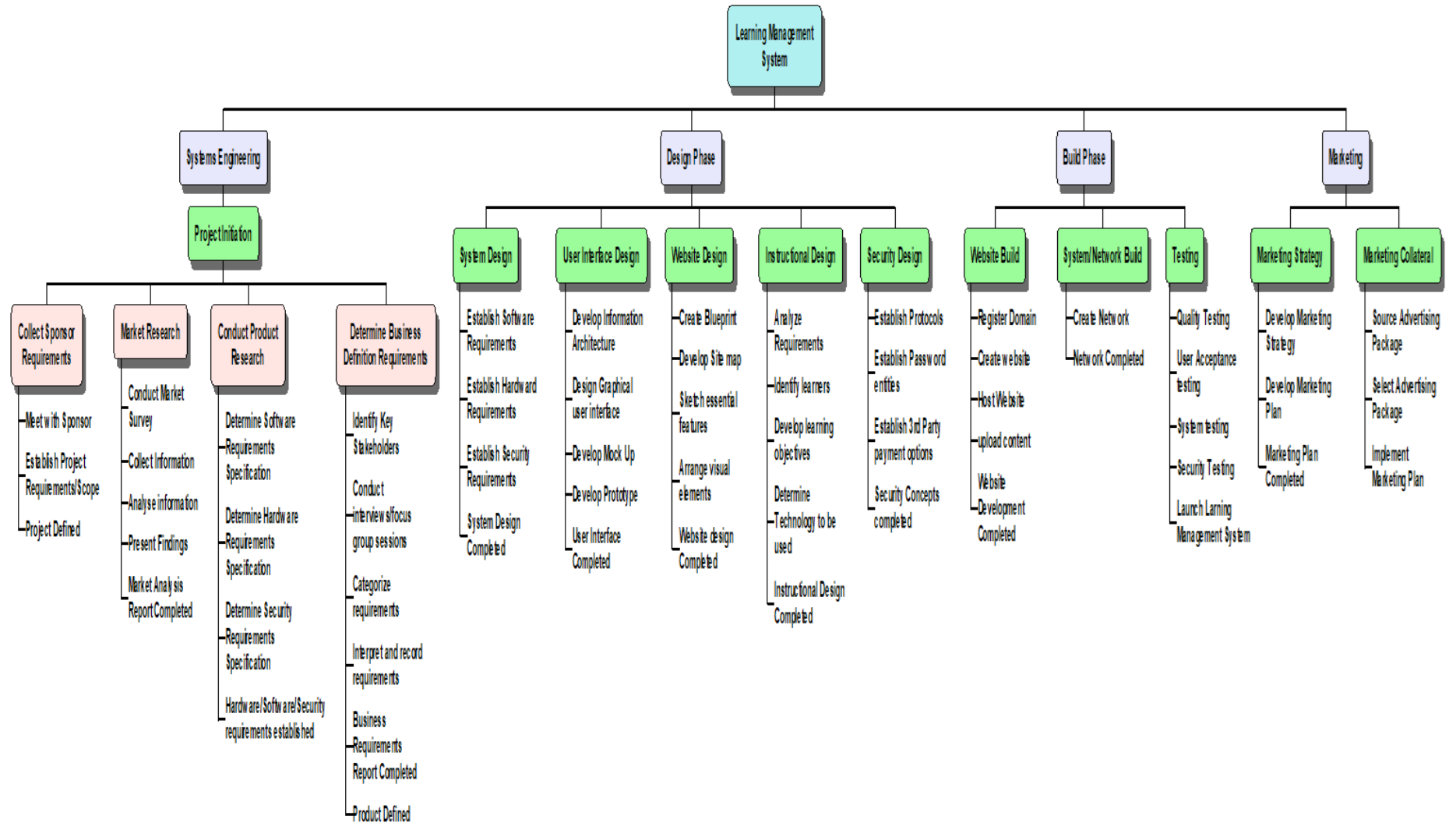




### Appendix 3: FGP Schedule



Appendix 4: LMS Project Work Breakdown Structure




## Appendix 5: FGP Philology Letter

Academic Advisor  
Masters Degree in Project Management (MPM)  
Universidad para la Cooperacion Internacional (UCI)

Dear Academic Advisor,

**Re: Philological Review of Final Graduation Project submitted by Sherman Leslie Sylvester in partial fulfilment of the requirements for the Masters in Project Management Degree**

I hereby confirm that **Sherman Leslie Sylvester** has made all the required corrections and improvements suggested to the Final Graduation Project document as I have recommended. In my judgement, the document meets the literary and linguistic standards required for a student reading for a degree at the Masters level.



.....  
Alicia Valasse-Polius