Industrial, Manufacturing, & Systems Engineering
College of Engineering

Systems Engineering Project Practicum
Summary

| Project Title: | Planning and Monitoring System |
|---|---|
| Team members: | 1. Alex Hernandez<br><br>2. Elizabeth Lujan<br><br>3. Diana Canizales<br><br>4. German Ramirez<br><br>5. Oscar Diaz de Leon<br><br>6. Edgar Reyes<br><br>7. Braulio Monterroza |
| Semester, year: | Fall, 2017 |
| Type of project: | **Individual project at students work ( )**<br>**Team project assigned by instructor (X)**<br><br>**Project proposed by team ( )** |

**Insert Individual / team PICTURE HERE**

**List members in the picture from left to right**

Oscar Diaz de Leon, German Ramirez, Diana Canizales, Alex Hernandez, Edgar Reyes, Elizabeth M. Lujan, Dr. Oscar Mondragon. (Braulio Monterroza – Not present)

## INTRODUCTION

The System Engineering Project Practicum provides the opportunity to apply System Engineering concepts in developing a real system and create documents that formally describe the system. Students review documents and validate them with clients and customers through formal presentations. Teams are self-managed and assign roles to control planning, quality, requirements, design, and implementation.

**System Overview**

Project Overview:

Develop a system that facilitates project planning and monitoring. The planning and monitoring current system is a weekly schedule template to lists tasks with effort and due dates estimates.

The planning and monitoring has to be done at two levels: Project level and Project Activity level. At project level, major project activities are monitored. At project activity level, the task required to finish an activity are managed. Problems, risks, and work progress oversight shall be done for both levels of planning and monitoring.

Simultaneously, this new process and templates need to be automated. The scope of the project is to automate the new process being deploy that facilitates project planning and monitoring. An Excel document is attached with current template and the new templates.


Current problem, why is the problem important:

Projects developed by the PMO office include Service Systems, Engineering Systems, Software Systems amongst other. The differences for each of the systems vary in terms of the project activities and technical documents. The customer in this case has stated the following as some of the problems and areas of opportunity.

1.      Some students do not understand that customers have real needs and require that a working system be delivered.
2.      Some students do not commit to their project, nor to the team.
3.      Some teams do not review the quality of the work delivered.
4.      Some team members do not review the quality of the work delivered.
5.      Some teams do not follow the process to apply corrective sanctions to its members when needed.
6.      Some teams do not escalate problems with management or with customer's boss.
7.      Some customers do not attend to milestone and validation meetings or are distracted.
8.      Some team members do not attend to milestones or validation meetings or are distracted.

While the intention of this project is to solve  all of the customer's problems, the method of doing such is beyond the scope of this project. The problems identified consists of behaviors by fee-willed individuals. However, the customer did mention certain expectations that this system can address. These expectations can be translated as needs for the system we shall deliver.


Explain how the project addresses the problem:

By developing a Planning and Monitoring System for the Project Management Office (PMO), IMSE and UTEP. The scope of the project includes creating a system that will automate the new planning and monitoring process being deployed to manage projects at the PMO. The Planning and Monitoring system will be an automate software that will allow the PMO office to handle different projects in the community. The main system will be the overall software, we will then decompose the software into
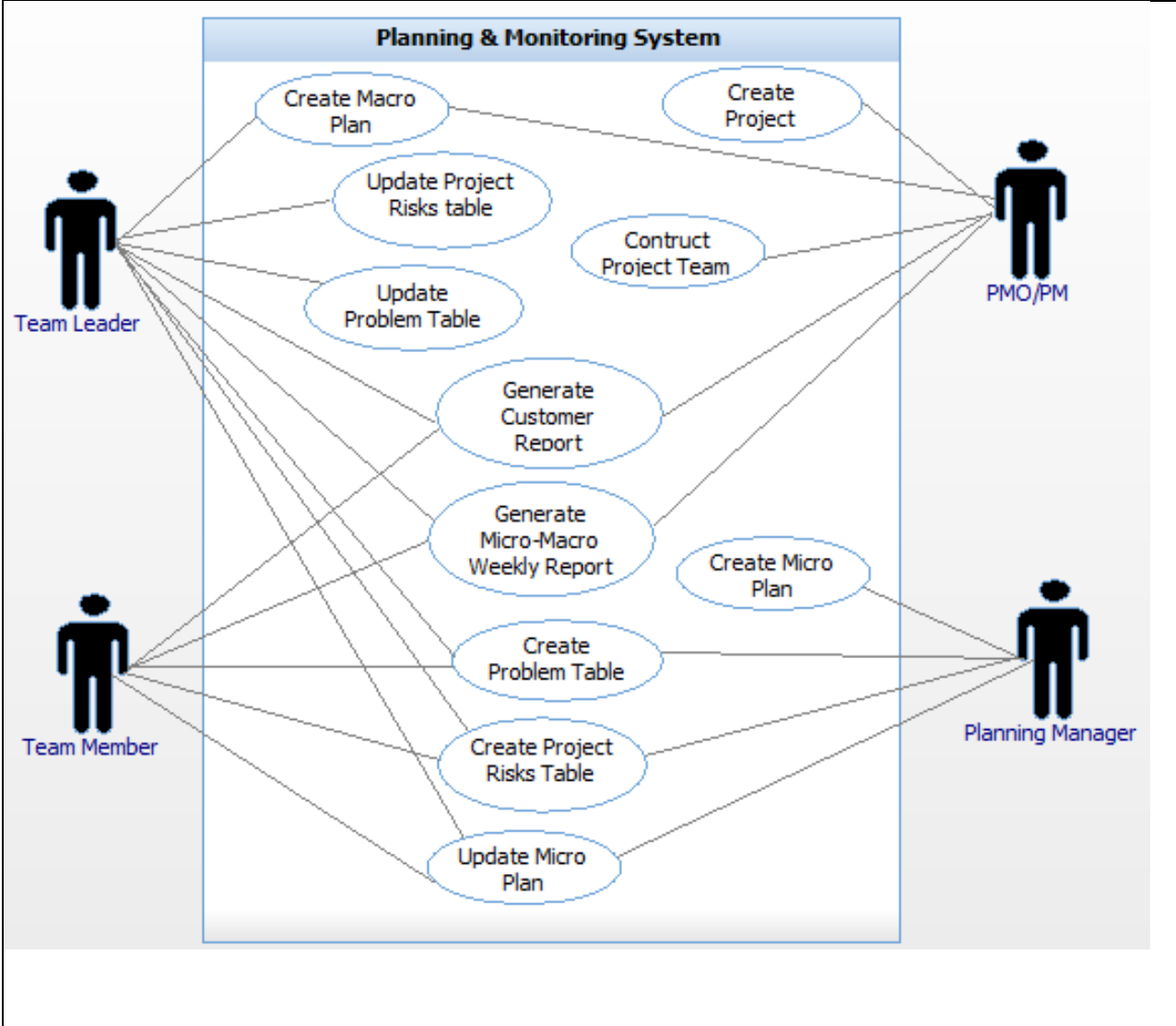
several functions based on the needs for our customer. We will approve the requirements after we receive the interview questionnaire answered from our customer and we do a requirements meeting with the stakeholders.
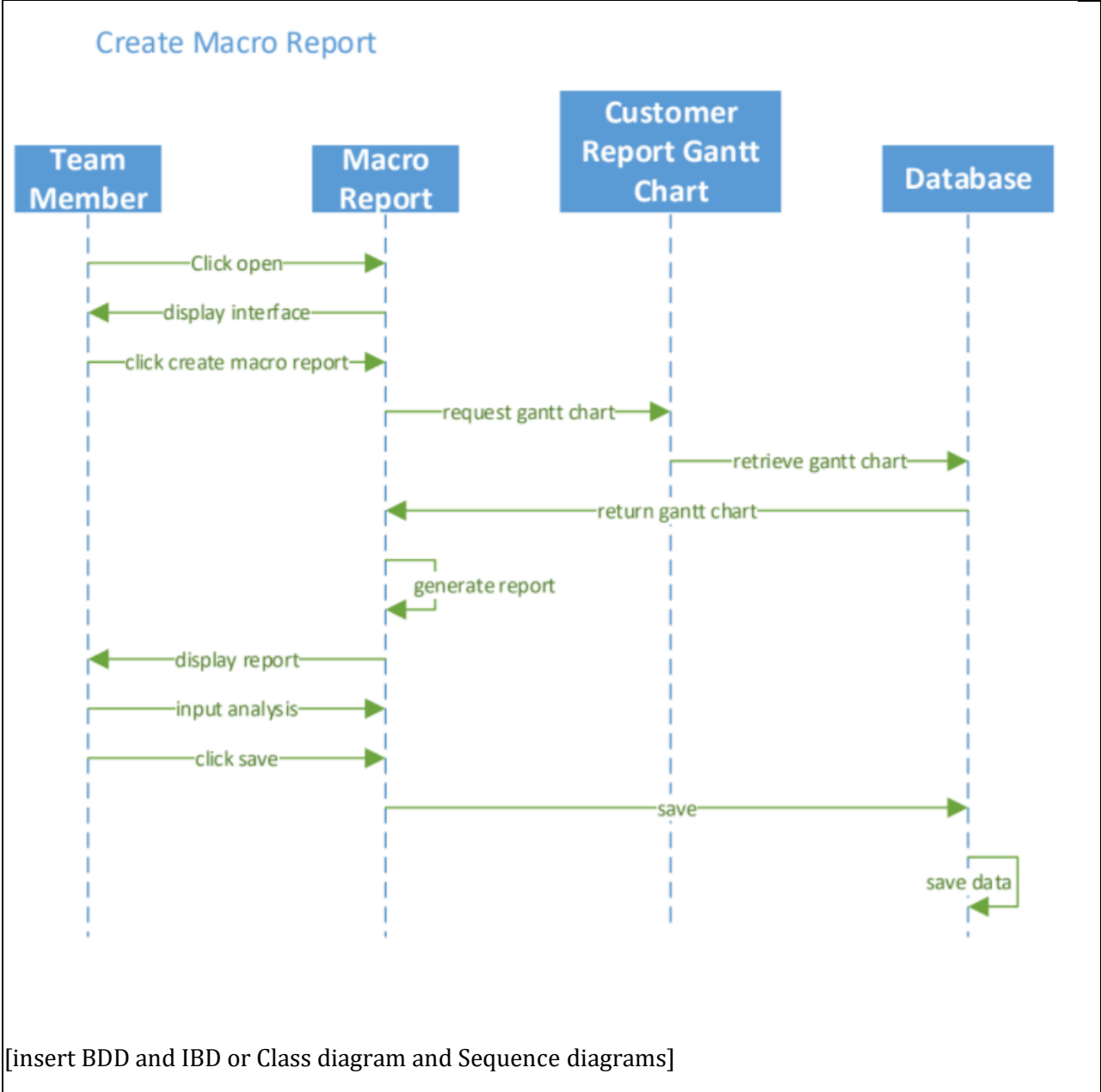
**System Description**

[provide a brief description of your system functionality and insert the following pictures:]
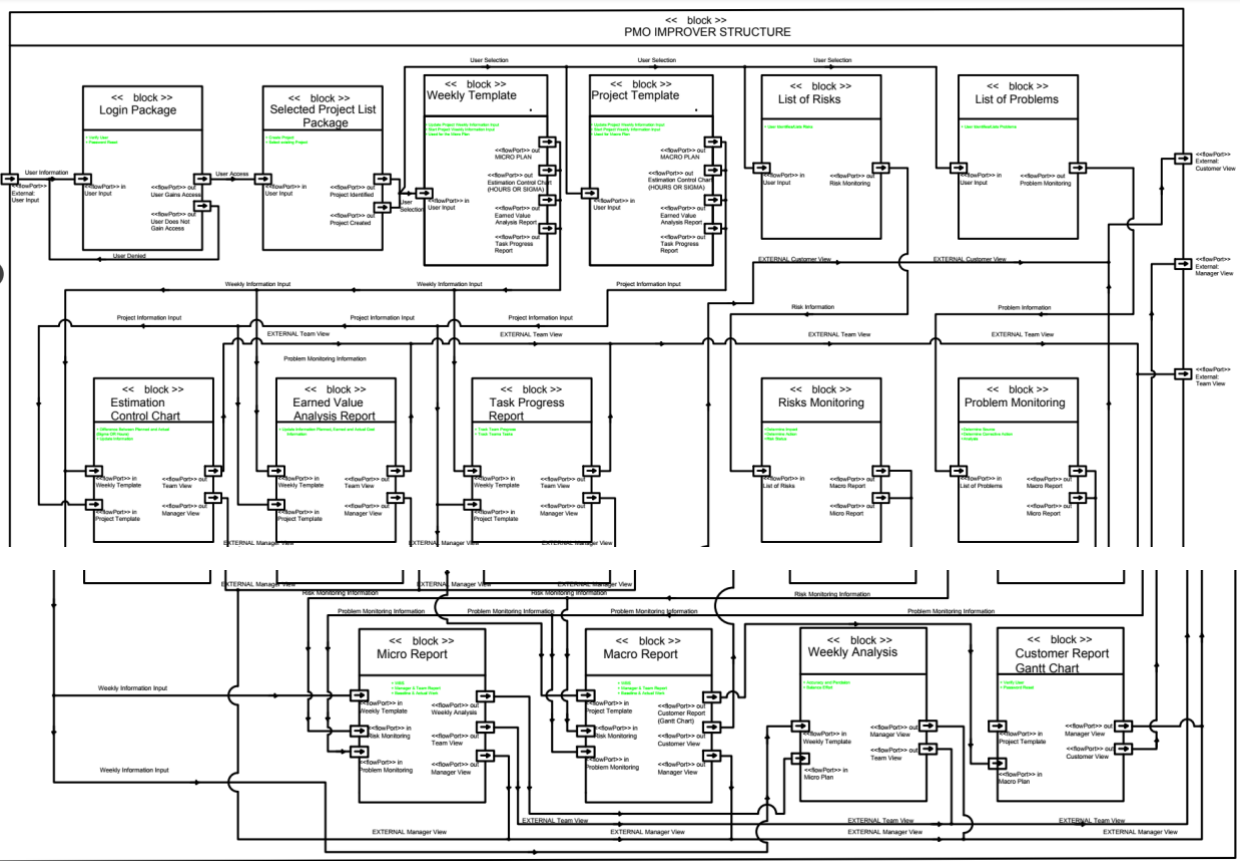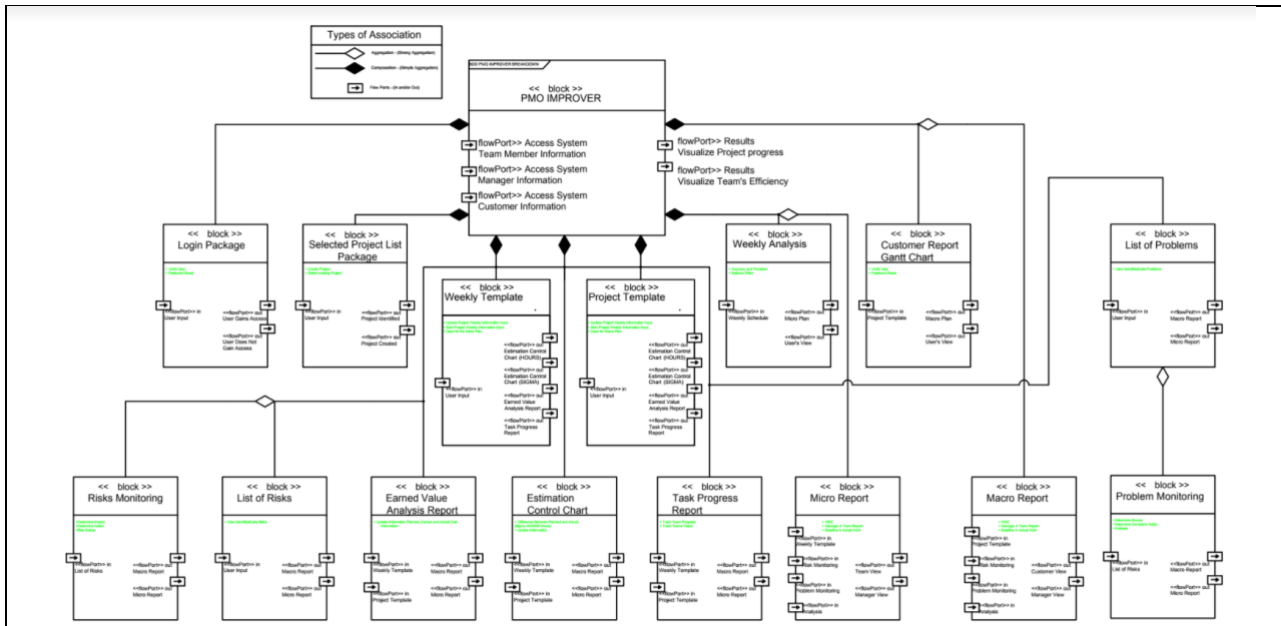
The proposed Planning and Monitoring System for the PMO shall provide the following functionalities:
- The system must provide a framework for project planning and monitoring
- The system must ensure electronic records transfer to the PMO office free from corruption
- The system must have reporting capabilities
- The system must create reports based on inserted project data
- The system must have database capabilities
- The system must be able to recover from system failure without affecting project's database
- The system must support multiple projects
- The system must produce a graphical representation of Earn Value Analysis for both the Project Activity and at the Project level
- The system must produce a graphical representation of control Activity Tasks,
- The system must produce task progress bars for plan, actual and remaining effort
- The system must provide Risk Monitoring
- The system must provide Problem Monitoring
- The system must require user permissions
- The system must be able to lock for project's security

**Planning & Monitoring System**

- Create Macro Plan
- Create Project
- Update Project Risks table
- Contruct Project Team
- Update Problem Table
- Generate Customer Report
- Generate Micro-Macro Weekly Report
- Create Micro Plan
- Create Problem Table
- Create Project Risks Table
- Update Micro Plan

Team Leader

Team Member

PMO/PM

Planning Manager

| ACTOR | USE CASES |
|---|---|
| PMO/PM | UC1: Create New Project |
| PMO/PM | UC2: Construct Project Team |
| PMO/PM, TL, TM, PgM | UC3: Generate Micro/Macro Weekly Report |
| TL, TM, PgM | UC4: Create Project Risks |
| TL | UC5: Update Project Risks |
| PMO/PM, TL | UC6: Create Macro Plan |
| PgM | UC7: Create Micro Plan |
| PMO/PM, TL, TM, PgM | UC8: Update Micro Plan |
| TL, TM, PgM | UC9: Create Problem Table |
| TL | UC10: Update Problem table |
| TL, TM, PgM | UC11: Generate Customer Report |
| PMO/PM, TL | UC12: Update Macro Plan |

## Create Macro Report



Sequence diagram "Create Macro Report" showing interactions between Team Member, Macro Report, Customer Report Gantt Chart, and Database:

- Team Member → Macro Report: Click open
- Macro Report → Team Member: display interface
- Team Member → Macro Report: click create macro report
- Macro Report → Customer Report Gantt Chart: request gantt chart
- Customer Report Gantt Chart → Database: retrieve gantt chart
- Database → Macro Report: return gantt chart
- Macro Report: generate report
- Macro Report → Team Member: display report
- Team Member → Macro Report: input analysis
- Team Member → Macro Report: click save
- Macro Report → Database: save
- Database: save data

[insert BDD and IBD or Class diagram and Sequence diagrams]

PROJECT OUTCOMES

Provide a brief description for the impact of this system in the organization.

The system developed was designed in order to automate the monitoring and planning of active projects.The Planning and Monitoring System will allow the stakeholder to monitor the overall project status by providing a project monitoring report with graphical representation of team performance, Earned Value (EV) Analysis, Task Progress Report, and Control Charts. It will also allow for problem monitoring as well as risk monitoring.

Provide your impression on how the reviews impact the quality of the system under development

[insert a picture of the excel quality dashboard].

Reviews help to redesigned and correct the system under each system cycle phase, It allows us to understand the mistakes and redefined concepts and diagrams and thus improves the quality of the system. Below the quality table shows the defects found in every phase of the system development cycle.

| | | Conceptual Phase | Conceptual Review | System Requirements Phase | System Requirements Review | SEM Plan Phase | SEM Plan Review | Prototype Phase | Prototype Review | Design Phase | Design Review | Implementation Phase | Implementation Review | Unit Testing Phase | Integration Testing Phase | System Testing Phase | Total Lifecycle |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | Time (hr) | 99 | 45 | 53 | 20 | 72 | 30 | 25 | 15 | 85.5 | 40 | 40 | 20 | 10 | 30 | 30 | 614.5 |
| B | Time (%) | 16.1% | 7.3% | 8.6% | 3.3% | 11.7% | 4.9% | 4.1% | 2.4% | 13.9% | 6.5% | 6.5% | 3.3% | 1.6% | 4.9% | 4.9% | 100% |
| C | # Defect Injected | 20 | | 7 | | 3 | | 0 | | 8 | | 7 | | | | | 45 |
| D | % Defect Injected | 44.4% | | 15.6% | | 6.7% | | 0.0% | | 17.8% | | 15.6% | | | | | 100% |
| E | Injection Rate (defect/hr) | 0.2 | | 0.1 | | 0.0 | | 0.0 | | 0.1 | | 0.2 | | | | | |
| F | # Defects Removed | | 20 | | 7 | | 3 | | 0 | | 8 | | 0 | 5 | 1 | 1 | 45 |
| G | % Defect Removed | | 44.4% | | 15.6% | | 6.7% | | 0.0% | | 17.8% | | 0.0% | 11.1% | 2.2% | 2.2% | 100% |
| H | Removal Rate (defect/hr) | | 0.4 | | 0.4 | | 0.1 | | 0.0 | | 0.2 | | 0.0 | 0.5 | 0.0 | 0.0 | |
| I | Defect Removal Leverage (DRL) | | 0.9 | | 0.7 | | 0.2 | | 0.0 | | 0.4 | | 0.0 | | | | |
| J | Yield (%) | | 100.0% | | 100.0% | | 100.0% | | #DIV/0! | | 100.0% | | 0.0% | 71.4% | 50.0% | 100.0% | |
| K | Step Size | 91 | | 147 | | 9 | | 101 | | 100 | | 156 | | 16 | 9 | 6 | 635 |
| L | Defect Density | | 0.22 | | 0.05 | | 0.33 | | 0.00 | | 0.08 | | 0.00 | 0.31 | 0.11 | 0.17 | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

Defect Injection Phase
Defect Removal Phase
Input Data

[What soft skills have you  (or need to) developed to work on teams]

We've learned leadership skills by self-managing and self-monitoring  our effort and progress for every task during the project.

Communication abilities were also developed during the project since there was constant communication among the team members.

In addition, Creative thinking, decision making, problem solving and conflict resolution were skills developed during the project.

## MASTERS OF SCIENCE IN SYSTEM ENGINEERING PROGRAM ASSESSMENT

During my time in the M.S.S.E. program I developed several soft skills, I learned to be a leader, communicate with my colleagues better, as well as improve my presentation skills. The methodologies and techniques developed are very valuable, as many employers are looking for individuals who can perform Integration, validation, and verification processes, as well as develop and analyze requirements for their systems, there are more methodologies and techniques to learn of course. There are other very sought out skills, such as systems engineering critical thinking. It will be up to you to combine and understand how a system will come together and ensure it is the proper system for the final client or user. Due to these skills, I was able to obtain an internship with a large government contractor. I was able to further develop my system engineer skills and become a better person and engineer overall. It was a great experience and taught me how important it is to become a systems engineer and how valuable one will become for an employer. On top of this, I was able to see how the entire system of the projects I worked on came together. If you seek to improve yourself and become a better engineer, or if you want to see how a system comes all together, systems engineering is a very rewarding path to choose. It is challenging, but very rewarding.