Engineering Institute of Technology.

Fundamentals of Professional Engineering (FPE)

Group Project Guide

Version	5		
Created by	EIT	**Date**	
Reviewed by	Deon	**Date**	March 2020

Group Project Guide Introduction

This document provides an overview of the FPE project component, and is intended as a support document for participating students. The project will cover a simple lighting system for isolated rural communities.

For any queries email your learning support officer.

At first glance this project may seem like a formidable exercise, but keep in mind that:
(a) it will be spread over 14 weeks
(b) it is a collaborative effort, and
(c) all documentation will be developed on templates.

All terminology used will be as per the Project Management Body of Knowledge or PMBOK (generally pronounced as “pim-bok”).

See Annexure 1 for more details on PMBOK. The PMBOK guide is normally for sale as a hard copy, but if you spend some time online you will find downloadable PDF copies.

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Group Project Guide

1.0 Problem Definition

Please document any assumptions you have to make.

- Each group represents a small R&D company.
- You have been asked to come up with a lighting system for use in remote areas where villagers have no access to electricity. The goal is to replace paraffin (kerosene) lamps and allow villagers to perform activities such as reading and sewing at night. Domestic appliances will not be supported.
- Yours will be a pilot project.
- Your solution should allow at least 4 hours' operation of one high-efficiency lamp per household per night.
- The maximum number of dwellings per village will be fifteen.
- Once the installation has been completed, the villagers will perform their own first-line maintenance.
- You may select a site anywhere in the world, provided there is sufficient sunlight, wind or water available, depending on the type of renewable energy you wish to use. The choice of location is all yours, but you need to supply the exact latitude and longitude and prove via Google earth that you are not in the middle of a lake, on top of a mountain, or right in the middle of a city! It will be advantageous, though, if some of the group members are personally familiar with the geography, culture, systems of governance, etc.
- The funding will be provided by a private donor, hence it is important to show that funds are spent judiciously. This is a not-for-profit exercise.
- Because of the remoteness of the proposed installation it must be relatively easy to transport, set up and maintain the hardware, and you must address the spares and maintenance issues in your proposal.

In real life the complete project might run over, say, two years. It would include the actual development, installation and commissioning of the lighting systems, including training in first line maintenance and provision of spares. However, for your 'FPE project' (over the 14 weeks) you will only do the planning for the project.

2.0 How To Approach The Project

Manpower

We are scheduling the project to commence after week 50 of your Advanced Diploma course. At this point the attrition rate is very small. In addition, we will place 4-6 students in each group.
The idea is that we share the workload, which reduces the individual workload dramatically.

Collaboration

Once the groups have been formed (you will receive the relevant information via your course coordinator) they will communicate as follows.

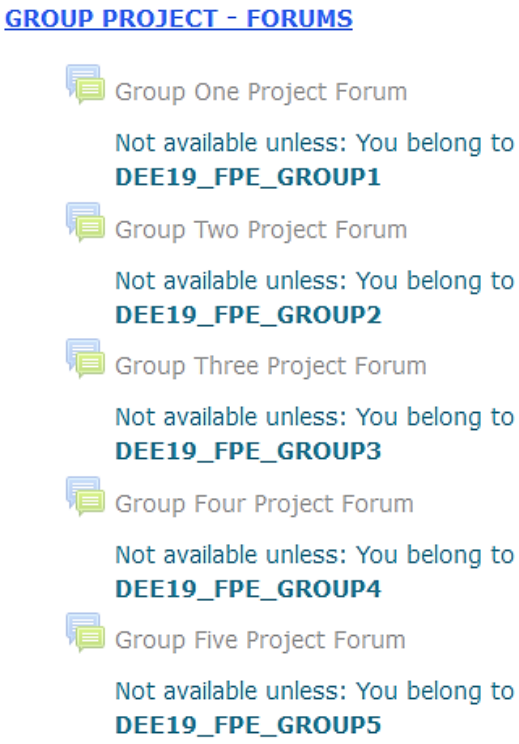
Please minimize group interaction via email, as this makes it very difficult for us at EIT to monitor the group's activities.

1. Group calls via Skype
   - See here for information on how to set up Skype group calls on a Windows PC.
   - For other operating systems just Google the topic.
   - In order to avoid a situation where everyone is waiting for someone else to take the lead, the course coordinator will request a specific group member to initiate this.

2. File sharing via DropBox
   - The designated group leader needs to visit DropBox.com and create a free (2GB) DropBox account.
   - The group leader will then send out invitations to all group members, so all can access and share files.
   - The 'problem' is that your files will all be live in the 'cloud' and therefore you will need to log in to DropBox every time you want to access them.
   - The solution is to download and install the DropBox application for your PC (or iPad, MAC, or Android device). This will integrate DropBox with the file structure on your machine, so that when you paste (or edit the contents of) a file in the DropBox folder on (say) your C drive, it will be synced with the same file in the Cloud. Just Google 'download DropBox' and look for the appropriate download page.
   - Once a document is ready for submission to EIT, (only) the group leader at that point in time will upload the document to Moodle so it can be graded.

3. Group text communication via Moodle Forums
   - Please conduct intra-group communication via Moodle forums as far as possible. In doing so, you will be maintaining a 'paper trail' of your communications, and it is easier for both your lecturer and coordinator to remain 'on top of' things.
   - It will be necessary for you to log into the forum at least once a day for the duration of your project.

This is what you will see on Moodle:



Monitoring

It is of critical importance that every group member participates. This is an Engineers Australia requirement. In a perfect world one would prefer not to 'police' the process, but as we proceed we will not only check individual participation, but we will also require declarations by individuals and/or group leaders. We simply cannot afford freeloaders, and we trust that you will understand.

If personal circumstances make it difficult or impossible to participate, you need to contact your course coordinator immediately. To make progress monitoring easier we will also break the work into chunks or 'segments' with a duration of one to five weeks.

Templates

There are many project templates available online. However, to simplify things we will use our own. Segment Guidelines and templates are available on Moodle.
See section 3.7 for an explanation of 'segments'.

Final Submissions

We will create submission folders on Moodle. Only the group leaders need to submit the final documents for each segment.

Sharing of Work-in-Progress

While busy collaborating on a specific segment (and before the final document is ready to be submitted on Moodle), groups will share source documents (i.e. personal contributions, sections to be proofread, etc.) with each other via DropBox. See Section 3.2 above for information on file sharing via Dropbox.

Segments

To simplify things and make the project more manageable, we had to break the project up in 'chunks'. Because the word 'phases' would be apt, but has another meaning in Project Management, we opted for 'segments'.

The segments are as follows:

Segment 1: Preliminary scope and Identification of Community
Segment 2: Initiation Phase Part 1: Feasibility Study
Segment 3: Initiation Phase Part 2: Formalized Design and Extent of Work
Segment 4: Initiation Phase Part 3: Financials and Schedule
Segment 5: Additional Topics
Segment 6: Group Presentation

Scheduling

Because the dates differ for each cohort, we will publish the schedules separately. See Moodle for details.

The allocated times are as follows:

Segment 1: 1 Week
Segment 2: 5 Weeks
Segment 3: 3 Weeks
Segment 4: 3 weeks
Segment 5: 1 week
Segment 6: 1 week

EIT will not police the week-on-week progress, but groups have to submit by the deadline date for each segment

Description of segments

In short; here is what the student groups will produce over the 3-month period:

1. Project Study
    a. Problem Definition
    b. Contextual Analysis
    c. Requirements Analysis (Functional Specification)
    d. Alternative Solutions
    e. Analysis of Alternatives (selection of best option)
    f. Risk Analysis
2. Detailed System Specification (of the proposed solution)

3. Work Breakdown Structure
4. Project Scope
5. Project Budget
6. Project network diagram (PERT)
7. Project schedule (Gantt)
8. Discussion
9. Presentation

The following is the detailed project execution plan.

Segment 1: Preparation (1 week)
Output: Group decision on community to be serviced. (Use the template identified in 3.4)
- Group operational and able to communicate via Moodle forums
- All group members have read this document
- Skype group set up for live meetings
- DropBox accounts set up for sharing project files
- First group leader selected
- Decision made (by group) on the location of the community to be serviced
- Project Charter written

Segment 2: Initiation Phase Part 1 (5 weeks)
Output: Feasibility Study. (Use the template identified in 3.4)
- Problem Definition
- Contextual Analysis
- Requirements Analysis (Functional Specification)
- Alternative Solutions
- Analysis of Alternatives (selection of preferred solution)
- Risk Analysis

Segment 3: Initiation Phase Part 2 (3 weeks)
Output: Formalized Design and Extent of Work (Use the template identified in 3.4)
- Detailed System Specification (Proposed Solution)
- Work Breakdown Structure
- Project Scope

Segment 4: Initiation Phase Part 3 (3 weeks)
Output: Financials and Schedule (Use the template identified in 3.4)
- Project Budget
- Network Diagram (PERT)
- Schedule (Gantt)

Segment 5: Additional topics (1 week)
Output: Discussion of these topics in relation to project. (Use the template identified in 3.4)
- Project Cash Flow
- Leadership and Professional Conduct
- Ethics in Engineering

- Responsibilities of the Engineering Associate
- Engineering Standards and Codes of Practice
- Global and Environmental Issues
- Sustainable Engineering
- Health and Safety Issues

Segment 6: Presentation (1 week)
Output: Live group presentation on Blackboard Collaborate, and PowerPoint slides.

3.0 Background Reading

Reference Documents

Ideally all students should have copies of 'A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition' which, in printed format, costs around $60. You could, alternatively, Google it and find uploaded PDF copies. It's all up to you.

You can also read a PowerPoint slideshow on the topic of the Project Plan (and its mapping to the PMBOK) *Plan Your Work Then Work Your Plan* by Will Brimberry, program manager at the Project Management Office of USGS (U.S. Geological Survey) which can be found in your readings folder.

Project Management Support

By default groups will use GanttProject for project management. EIT has nothing against the use of more sophisticated software such as MSProject, but then ALL group members need to have it installed on their computers.

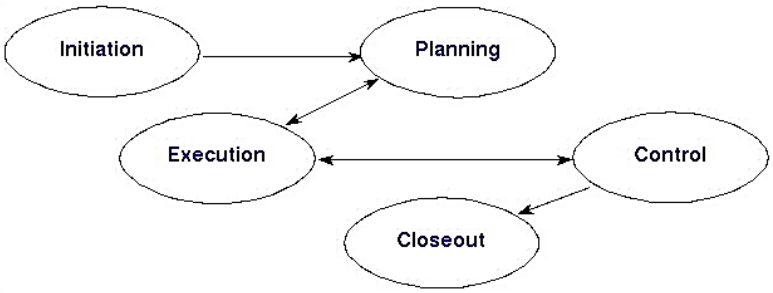
PM Process Groups vs. Project Phases

Now let's look at some terminology. You will find more detail in the PMBOK guide.

PMBOK Process Groups

PMBOK defines the following 'Process Groups'. Do not confuse these with 'phases' (see next section) as some of them could be present in several project phases. One phase can contain more than one process group and vice versa.

- Project Initiation
- Project Planning
- Project Execution
- Project Monitoring and Control
- Project Closeout



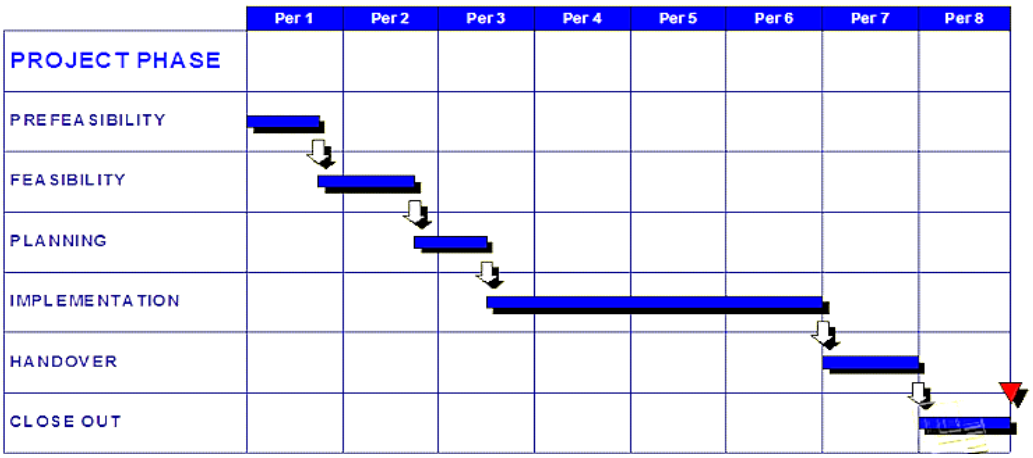
Project Phases

Here are some typical phases. Their use depends on the type of project and also the industry in which the project is being executed. You will be focusing primarily on those marked with asterisks.

- Concept development
- Prefeasibility
- Feasibility *
- Validation
- Planning *
- Product design
- Product prototyping
- Construction
- Implementation
- Testing
- Commissioning
- Handover
- Closure
- Disposal
- Environmental Rehabilitation

One or more of the Process Groups will be visited during each of these project phases. For a more detailed discussion on process groups and phases, see the PMBOK Guide mentioned earlier.

The following figure depicts the phases of a typical project.



PM Roles

Just for the record we are listing some relevant roles here.

- Project Management Office (PMO)
- Project Manager
- Project Management Team
    - Configuration Manager
    - Quality Manager
    - Risk Manager
    - Project Team Members
- Customer
- Stakeholders
- Project Sponsor

The Project Management Process Groups

This section lists the various project-related documents and activities against the PMBOK process groups. Since we cannot actually implement our design, we will primarily focus on the project plan, and produce the documents marked with asterisks..
See this as a 'master list' from which we can pick and choose.

Initiating Process Group

1. Project Concept Document/Business case *
2. Project Feasibility Study *
3. Project Charter *

We could add a Stakeholder Management Plan here, because of possible 'political sensitivities'. The PM Docs template for that can be found in the Initiation Phase folder on the PM Docs website (see section 4).

Project Planning Process Group

1. Kick-off meeting
2. Integrated Management Control Plan *
    a. Scope Management Plan *
    b. Schedule (Time)Management Plan *
    c. Cost (Budget) Management Plan *
    d. Quality Management Plan *
    e. Procurement (and Contract) Management Plan *
    f. Staffing (Human Resources) Management Plan *
    g. Communication Management Plan *
    h. Risk Management Plan *
    i. Change Management Plan *
3. Project Scope Statement (Project Statement of Work)*
4. Work Breakdown Structure *

5. Organizational Breakdown Structure
6. Responsibility Assignment Matrix
7. (a) Project Schedule and Calendar *
   (b) Project Schedule Network Diagrams (PERT, Gantt)*
8. Project Budget *
9. Performance Measurement Baseline
10. Earned Value Measurement

Project Execution Process Group

1. Direct and Manage Project execution
2. Perform Quality Assurance
3. Acquire & Develop the Project Team
4. Information Distribution
5. Produce Procurement Documentation and Execute Procurement Actions

Project Monitoring And Controlling Process Group

1. Monitor and Control Project Work
2. Integrated Change Control
3. Perform Quality Control
4. Performance Reporting
5. Risk Monitoring and Control
6. Contract Administration

Closing Process Group

1. Administrative Closure
2. Contract Closure
3. Documentation of Lessons Learned
4. Celebration of Project Success

The Project Plan

The elements in Section 5 marked '*' essentially comprise the Project Plan. Some people call this a 'Project Quality Plan' but it is a confusing name as it sounds almost the same as the Quality Management Plan. So let's stick to 'Project Plan'.

Let's repeat those elements (the ones marked '*') here for clarity.

- Business Case
- Project Feasibility Study
- Project Charter
- Scope Management Plan
- Schedule Management Plan
- Cost Management Plan
- Quality Management Plan
- Procurement Management Plan

- Human Resources Management Plan
- Communication Management Plan
- Risk Management Plan
- Change Management Plan
- Project Scope Statement
- Work Breakdown Structure
- Project Schedule and Calendar
- Project Schedule Network Diagrams
- Project Budget

How do they fit together?
The slideshow by Will Brimberry (URL supplied earlier) gives a good overview as per the screenshot on the next page. By the way, do not get 'carried away' by all the acronyms in the PowerPoint presentation, as many of them pertain to the USGS.

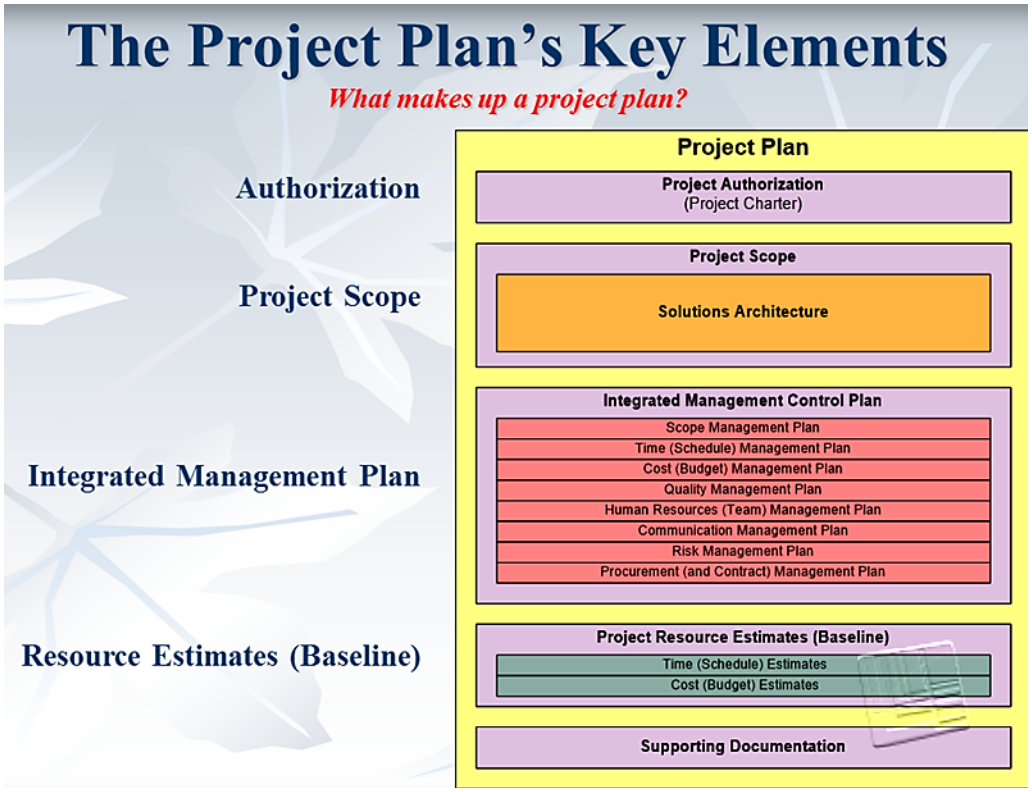
You will notice that the screenshot on the next page shows only the Project Charter under the heading of Authorization, and not the Business Case or the Feasibility Study. The reason for that is as follows.

The first step in the project execution is the creation of the Business Case ("why should we consider doing this, and, if it's worth doing for whatever reason then what alternatives do we have?").

If this results in a decision to proceed (albeit with care), the Project Feasibility Study is done ("is this do-able at all?").

If the answer is "yes", then the contents of the Business Case and the Project Feasibility Study are combined to form the Project Charter, which is essentially a formal authorization to proceed with the project. Hence only the latter document forms part of the formal Project Plan.

Incidentally, the FPE project will focus on delivering some infrastructure for 3rd world ('disadvantaged') communities, hence it is primarily based on humanitarian considerations and not on profit. Consequently you might have to edit the outline of your Business Case document somewhat.



Please note: because of time constraints we will not be producing the integrated management plan. It is, however, not a difficult process as the templates already exist.

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