

## Assessment item 2 — Individual case study

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**Due date:** See Moodle Website

**ASSESSMENT**

**Weighting:** 35%

**Length:** No set length

**All students must submit electronically**

**2**

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### Introduction and Student Guide

**This assessment item is to be completed individually.**

The case study simulates a project management scenario where the student takes on the role of project manager. The case information is not complete so where necessary students will have to **argue the pros and cons of any assumptions** they make. If necessary, students are expected to find relevant information in the academic literature to justify their answers and provide appropriate references.

The following information is provided to assist students to develop their assessment solution:

- Product development case description
- Specific assessment questions that must be answered
- Information regarding the submission of the assessment
- Marking guide

#### Important notes regarding assignment submission

1. You must aim to submit your assignment at least 1 hour before the due date. This will avoid unnecessary late penalties if you have any technical issues while submitting your assignment.
2. If you do have a problem uploading your assignment online and cannot get help from TASAC, make sure that you email your assignment files to your tutor before the due date. This will allow your tutor to view the work that was completed before the deadline. Note that you will also be required to submit the assignment online through Moodle.
3. Any drafts in Moodle **may** be automatically submitted by Moodle at the due date. However, you should **not** rely on this for your submission as this behaviour can change. Note that this also means you should not leave something uploaded as a draft if you do not want it to be submitted automatically at the due date. If you upload after the due date (this includes students with extensions) you must ensure that you press submit for marking or you may incur a late penalty.

#### Preparation for the assignment

1. You must complete the MP practicals 1 and 2 before you start this assignment.
2. You must also complete practical 3 before you attempt to add resources to your assignment.

*You are required to take your Microsoft Project practicals and this assignment to your tutorial/practical classes from week 3 onwards. The course is scheduled to commence the practicals in week 3 and you are expected to start work on this assignment in week 6 (or earlier).*

# Product Development Case Description

## Background

EagleEye is a new, small sized company that has won their first contract to develop and manufacture Drone Detection Devices (DDD). You are an employee of EagleEye and work as the Project Manager on the DDD project. The newly recruited key people involved in your project are:

- You are Mr. Project, the Project Manager.
- Ms. Engineer works in the field of product development and engineering.
- Mr. Marketing looks after marketing and product sales.
- Ms. Resource is the Human Resource Manager.
- Functional line managers in the fields of research, development and production.

Prior to the company's inception, you were a member of a small team of experienced software engineers conducting a technical feasibility study to investigate the tracking of unauthorised drone activity that occur near sensitive government infrastructure and military bases. Your study was successful and you have won a government contract to manufacture a small number of DDDs for a defence exercise. You and a few of your colleagues have formed a company to take advantage of this opportunity. Your colleagues agreed that you should be appointed as the project manager for the DDD Project.

EagleEye's intention is to use this first contract as a stepping stone to launch their manufacturing business in high-tech remote monitoring technology. Mr Marketing has reviewed ways to take advantage of the design and manufacturing processes to further advertise EagleEye's services. Other staff in the company asked questions and requested information before the project commences. This has prompted you to develop the milestone review checklist provided below.

## The Project Management Checklist for S1 Milestone

1. Are the marketing requirements agreed?
2. Are project targets agreed (e.g. schedule, features and quality)?
3. Is the product concept selected and well understood?
4. Are user product mock-ups circulated and reviewed with marketing?
5. Are the product and production technologies selected?
6. Have key components and suppliers been identified?
7. Has the supply chain impact of a new product been reviewed?
8. Is the project organisation agreed?
9. Is the project team established and when can they become operational?
10. Is any project teambuilding and leadership development required?
11. Is any technical training required for project members?
12. Is the project plan document reviewed within the project?
13. Is the MS project schedule reviewed?
14. Is the project budget established and approved?
15. Have the project risks been assessed, mitigated and reviewed?
16. What are the key risks and how are they mitigated?
17. Are the appropriate resources identified and allocated to the project?
18. Are key stakeholders identified?
19. What are the quality assurance activities required?
20. What are the quality metrics you propose to monitor and what are the control methods you plan to use in your project?

Your team have conceptualised a unique and novel product based on your technical feasibility study. The concept satisfies the requirements of the contract perfectly. The feasibility work carried out showed that the user requirements were sound and that the technical complexity of the development was relatively low. The contract requests 50 DDDs to be provided with the option to purchase an additional 50 at a later date. The contract allows for DDDs to be manufactured and sold to consumers, depending on demand. To minimise production and financial risks, EagleEye management has decided to produce only 100 DDDs in the first production run.

Your team believes there might be a reduction in the Bill of Materials (BOM) for the new product from those previously provided during the technical feasibility study. However, you have not assessed any possible reductions at this stage. Regardless, you and your team believe that you can develop the product with the planned resources and within the timeframe requested in the contract. The sales launch deadline for the consumer market is to be advised (TBA).

## Milestones

The milestones your team will use are:

- A. S1 Project start (At this point the system architecture and feasibility study will be complete).
- B. D1 Design review complete (At this point the overall design will be complete. A go/no-go decision for material procurement will be made at this milestone).
- C. P1 Proto build start (An internal project review confirming that the first product prototype is able to be manufactured with the quality level expected.).
- D. P2 Proto build start (An internal project review confirming that the second prototype iteration is able to be manufactured with the quality level expected).
- E. D2 Final Design review complete (At this point the product quality is verified based on the product validation testing carried out on the last prototype. A go/no-go decision for production ramp-up is made).
- F. L1 Launch review (A go/no-go decision depending if all business areas are ready for market launch and 100 units are in stock). This is to be the end of the project schedule, i.e. when the 100 units are in stock.

The DDD system architecture has been used as the basis for the project organisation and the work breakdown structure. As the project manager you have accepted the tasks of creating the compiled project schedule and allocating resources.

From discussions with Mr. Electronics, Mr. Software, Mr. Mechanics, Mr. Test and Mr. Production, very experienced managers and engineers, you have obtained the following information:

1. A partially complete work break down structure (WBS), resource estimates and some dependencies provided in Table 1 below.
2. In addition, Mr. Production provided you with the Activity-In-the-Box (AIB) network diagrams in Figure 1. You will need to interpret the AIB network diagram to complete the WBS.

Note that the following abbreviations are used in the table:

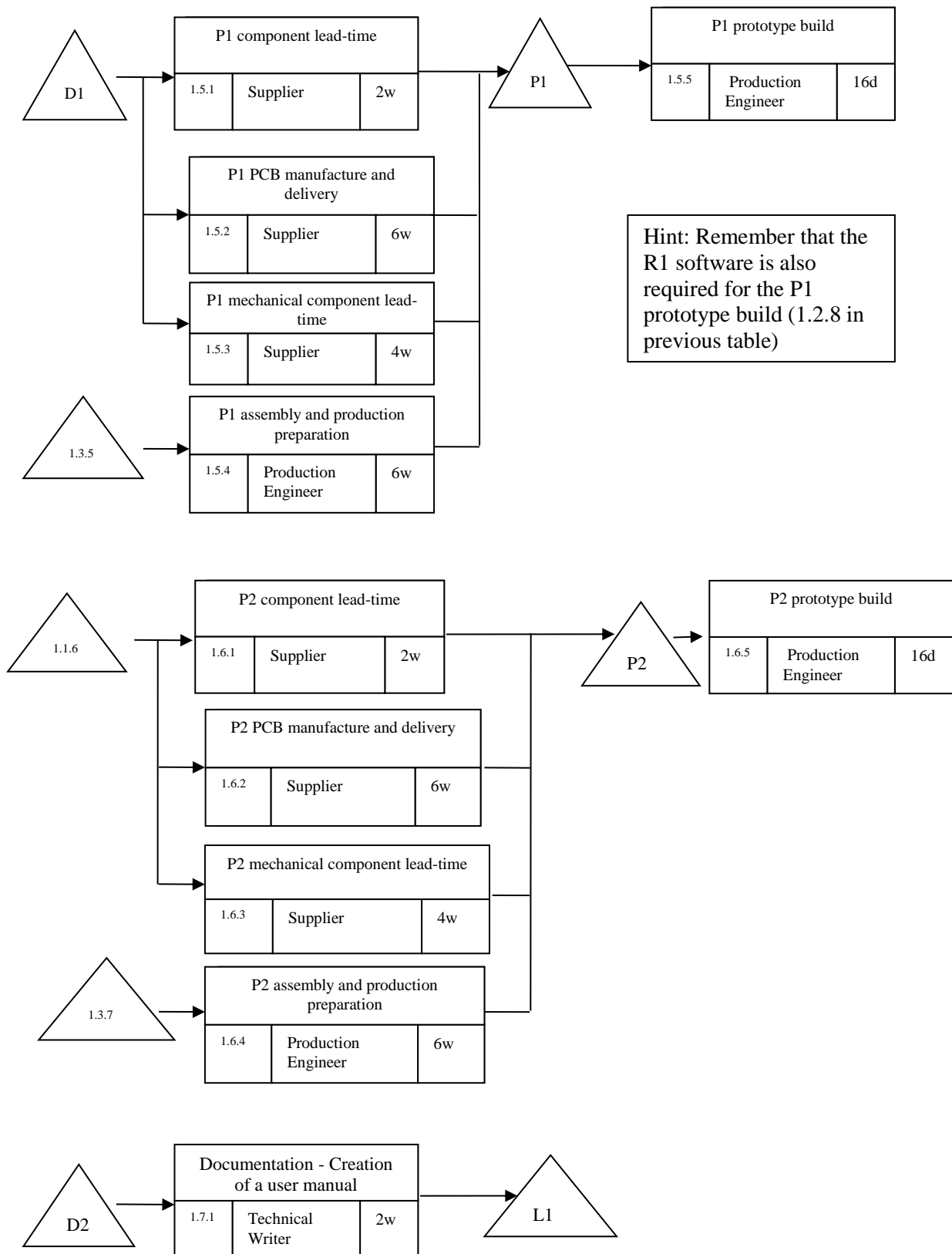
- Electronic Engineer (EE)
- Software Engineer (SE)
- Mechanical Engineer (ME)
- Test Engineer (TE)
- Production Engineer (PE)
- Technical Writer (TW)
- Printed Circuit Board (PCB)
- Electromagnetic Compliance (EMC)

**Table 1- Work Breakdown Structure**

Activity	Description	Predecessor Relationships	Person days/weeks of effort (and type of resource required.)	Successor milestones
<b>1 Product development</b>				
1.1 Electronics				
1.1.1 PCB design	PCB design	S1	2 person-weeks of EE.	
1.1.2 Component selection	Selection of electronic components.	1.1.1	1 person-week of EE.	D1
1.1.3 P1 PCB design improvements	Electronic improvements to circuit diagram, component selection and layout.	1.1.1	4 person-weeks of EE.	D1
1.1.4 P1 electronics testing	Electronic verification tests with the use of the P1 prototypes.	1.1.3	1 person-week of EE.	P2
1.1.5 P2 PCB design improvements	Electronic improvements to circuit diagram, component selection and layout.	1.1.4	4 person-weeks of EE.	
1.1.6 P2 electronics testing	Electronic verification tests with the use of the P2 prototypes.	1.1.5	2 person-weeks of one EE.	D2
1.1.7 Thermal compliance testing	Verification that electronic heat generation and heat transmission through covers is acceptable.	1.1.5, P1 build complete, P2 build complete	7 person-days of EE.	D2
1.1.8 EMC compliance testing	Verification of compliance with electromagnetic compliance regulations.	1.1.7, P1 build complete, P2 build complete	9 person-days of EE.	D2
<b>1.2. Software</b>				
1.2.1 Prepare software specifications	Specification of the software functionality based on design requirements.	S1	18 person-days of SE.	D1
1.2.2 User interface improvements	Software development to simplify and create an intuitive interface	1.2.1	15 person-days of SE.	
1.2.3 Data storage additions	Software additions for data storage.	1.2.1	9 person-days of SE.	
1.2.4 Device to PC protocol development	Software for the communication protocol between the device and the PC.	1.2.1	9 person-days of SE.	
1.2.5 PC software improvements	Software additions or modifications for the PC software functionality to support the device functionality.	1.2.3, 1.2.4	15 person-days of SE.	
1.2.6 R1 software development	Creation of the R1 software release used for the P1 prototype build.	1.2.2, 1.2.3, 1.2.4, 1.2.5	4 person-days of SE.	
1.2.7 R1 release testing	Testing of the R1 release and identification of errors.	1.2.6	2 person-weeks of SE.	
1.2.8 R1 error correction	Software improvements for the R1 release	1.2.7	3 person-weeks of SE.	P1
1.2.9 R2 software development	Creation of the R2 software release used for the P2 prototype build.	1.2.8	4 person-days of SE.	
1.2.10 R2 release testing	Testing of the R2 release and identification of errors.	1.2.9, P1 build complete	2 person-weeks of SE.	
1.2.11 R2 error correction	Software improvements for the R2 release	1.2.10	3 person-weeks of SE.	
1.2.12 R2 interoperability testing	Testing of interoperability with 3 <sup>rd</sup> party accessory devices.	1.2.11	19 person-days of SE.	

1.2.13 R2 interoperability error correction	Correction of errors	1.2.12	13 person-days of SE.	P2
1.2.14 R3 software development	Creation of the R3 (beta) software release.	1.2.13	4 person-days of SE.	
1.2.15 R3 release testing	Testing of the R3 (beta) release	1.2.14	2 person-weeks of SE.	
1.2.16 R4 final software development	Creation of the final software release	1.2.15	2 person-weeks of SE.	D2
<b>1.3. Mechanics</b>				
1.3.1 Industrial design	Design of the industrial housing for the device.	S1, Must be started in parallel with 1.1.1	3 person-weeks of ME.	
1.3.2 Durability testing	Durability and material testing for housing	1.3.1	4 person weeks of ME	
1.3.3 PCB modifications	Modifications of the PCB to fit the industrial design, new components and usability requirements.	1.3.1	4 person-weeks of ME.	
1.3.4 P1 mechanical CAD design	CAD design of mechanical plastic parts and metal parts for the device.	1.3.1	3 person-week of ME.	
1.3.5 Tolerance analysis	Analysis of the mechanical tolerance stacks for manufacturing and moulding capabilities.	1.3.2, 1.3.3, 1.3.4	1 person-week of ME.	D1
1.3.6 P1 physical layout optimisation	Physical optimisation of moulded plastic parts and sheet metal parts.	P1 build complete	3 person-week of ME.	
1.3.7 P2 mechanical modifications	Modification of moulding and sheet metal tools used for P2 parts.	1.3.6	4 person-weeks of ME.	P2
1.3.8 Final mechanical approval	Evaluation of P2 mechanical parts and approval of moulding and sheet metal tools used in part manufacture.	P2 build complete	2 person-weeks of ME.	D2
<b>1.4. Verification</b>				
1.4.1 Test plan development	Creation of a plan documenting what is to be tested.	S1	2 person-days of TE.	D1
1.4.2 Component testing	Test of key component reliability to various standard tests like drop and humidity.	After delivery of components (for P1) i.e. 1.5.1 ,1.4.1	21 person-days of TE	P1
1.4.3 Post assembly testing	Test of individual module functionality after assembly.	P1 build complete, 1.4.2	7 person-days of TE.	
1.4.4 System testing	Test of complete system.	1.4.3	9 person-days of TE.	P2
1.4.5 Product reliability testing	Test of product against reliability to various standard tests like drop and humidity and end user requirements.	1.4.4, P2 build complete	26 person-days of TE	
1.4.6 RA documentation	Creation of technical documentation for regulatory approvals.	1.4.5	7 person-days of TW.	
1.4.7 RA testing	Approvals from regulatory authorities.	1.4.6	14 days by regulatory authorities.	D2

**Figure 1 - Activity in Box Network Diagrams for Production**



## General Information

In addition to the work breakdown structure and AIB network diagram you have collected the following information.

- Assume that at the S1 concept review approval will be given to start the project and that the start date of the project schedule will be 27/03/17. (S1 milestone can be 27/03/17.)
- The company has a general holiday period between 10/4/17 to 17/4/17 and the 25<sup>th</sup> of April is the designated ANZAC Day holiday. For the purposes of the assignment, assume that there are no other holidays.
- Production ramp up to manufacture 100 units is estimated to take five (5) weeks after the D2 milestone. The production engineer is required for this task. Include this task as 1.8 on your schedule above the milestones. It should be a predecessor for L1.

## Available Resources

The maximum full time resources available for your project are:

Resource	\$/hour	Number Available
Electronics Engineer	\$120.00	1
Software Engineer	\$85.00	2
Mechanical Engineer	\$120.00	2
Test Engineer	\$115.00	1
Production Engineer	\$125.00	1
Technical Writer	\$70.00	1

All staff work a 40 hour week from Monday to Friday (i.e. a 5 day week with 8 hour days). All engineers can perform all the tasks within their engineering field (i.e. there are no differences in the abilities of the 2 software engineers compared to one another and similarly no difference between the abilities of the 2 mechanical engineers).

The duration of tasks cannot be reduced by adding multiple resources.

If the project is resourced as requested, your team is committed to producing only two prototype iterations to develop and validate the design.

*You know that there are items you did not address at the project workshop and that you may need to make some assumptions to complete your schedule and budget. Make sure that you list any assumptions you make at the beginning of your assignment submission and explain why you believe your assumptions are valid.*

## Assessment Part 1

For part 1 of the assessment you must complete the following tasks and questions. **Read all the questions before you commence the tasks.** The schedule is to be developed in an appropriately named Microsoft Project 2013 or 2016 file format (see below) and the questions are to be answered in an accompanying Microsoft Word document. As stated above, any assumptions must also be listed at the beginning of the Word document.

1. Mr. Marketing has asked you to use Microsoft Project to develop the project schedule. Note that he has also asked you to include the **milestones at the end** of the task list in your schedule.

Based on the information in the case study description above, use Microsoft Project to produce a “Part 1” schedule. Make sure that you:

- a) Include the milestones at the end of the task list.
- b) Include the resource allocation details on the schedule.
- c) Have an appropriate project name as the top of the task list and have all other tasks indented below this heading.
- d) Make sure that the holidays described in the “general information” are not included in the available working days for your project.
- e) Use the Microsoft Project software to make sure that the critical path(s) are automatically highlighted as **red bars** on the Gantt chart view of your schedule.

At this point there may be resource over allocation issues. **Do not** attempt to resolve these issues. **Save this version** of your schedule in **EagleEyePart1.mpp**. You will be required to submit this file as part of your assignment submission.

## Assessment Part 2

Create a copy of EagleEyePart1.mpp and rename the copy to EagleEyePart2.mpp. Use the EagleEyePart2.mpp file to answer the “Assessment Part 2” questions.

1. If there are any resource over-allocation issues, then resolve these in this new EagleEyePart2.mpp file. Note that you must resolve any resource over-allocation issues without the addition of any additional resources. **Save the “modified” version** of EagleEyePart2.mpp. You will also be required to submit this file as part of your assignment submission.
2. Answer the following questions on resolving resource issues in a Microsoft Word Document.
  - a) How did you/would you resolve any resource over-allocation issues without adding additional resources?
  - b) What impact did the resource constraints have on your schedule?
  - c) List any tasks that have changed on the critical path.



3. The project booking for the prototype builds (tasks 1.5.5 and 1.6.5) will have to be made six (6) weeks in advance of the prototype builds. This is the lead time required to include new builds in the manufacturing's master production schedule.  
The booking of the Regulatory Approval (RA) test house (task 1.4.7) must be made eight (8) weeks prior to Regulatory Approval testing.  
Include these booking dates as additional "milestones" (milestones have a 0 duration) in your schedule to show the latest date when you need to contact:
  - a) the production manager to ensure that the facilities are booked for the two prototype builds.
  - b) the RA test house to ensure that the facilities are booked for testing.
  - c) According to your schedule when is the latest date that you need to contact:
    - The production manager to book the facilities for the two prototype builds?
    - The RA house to book the facilities for the RA testing?

*Note that these additional milestones should be listed at the end of the milestones list and should be highlighted in **yellow** using the "background colour" icon on the task ribbon. This is to allow your marker to locate them easily.*

4. Write a memo to the director of product development, Ms. Engineer outlining:
  - a) the expected completion date of the project and the total project duration;
  - b) an explanation of the main factors that cause the project to require that length of time and suggest which tasks you would target to reduce the project duration;
  - c) the estimated labour cost of the project after the S1 concept review. Present the costs in a table showing the costs for the following:
    - Electronics
    - Software
    - Mechanics
    - Verification
    - Prototype 1 build
    - Prototype 2 build
    - Documentation
    - Production ramp up to 100 units
    - Total for the Project

Assume that you will send the project schedule as an attachment to the memo.

5. Risk management planning
  - a) Develop a risk assessment matrix for this project. You may use a table format similar to the table provided below. (maximum 4 risks. Do not use the examples provided in the text book)

Risk	Impact	Likelihood of occurrence	Degree of impact	Action trigger	Responsibility	Response plan
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- b) Actions to manage risks can be assigned into three categories. Describe these categories and provide an example for each. (maximum 500 words)
6. Communication is an essential component of project management and you have been asked to provide guidelines on the different meeting types and how to run effective project meetings.
  - a) Explain the purpose of the different meeting types often found in project management. (maximum 500 words)
  - b) Describe the process of how to run an effective meeting. (maximum 500 words)

7. You have been asked to recommend an organisational structure for the new company.
- a) Compare the advantages and disadvantages of each organisational structure type (You may use a table format similar to the table provided below. I have started you off with some project characteristics and feel free to add your own for comparison. You may need to conduct a bit of research to understand the differences between weak, balanced and strong matrix organisation structures);

Project characteristics	Organisational Structures				
	Functional	Matrix			Autonomous
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project manager's authority					
Resource availability					
Who controls the project budget					
Project manager's role					
Project management administrative staff					

- b) Select a structure you would recommend for your company and explain why you selected this structure. (maximum 500 words)
8. Organisational culture is very important for project success. What steps would you take to create a company culture that promoted project success? Provide examples of your solution. (maximum 500 words)

### Assessment Part 3

Ms. Engineer reviews your project schedule and requests that participation of one engineer from each of the following functions is required at the **P1 and P2 builds**: production, electronics, software and mechanics. **These additional resources will not change the task durations.** You will have to update your schedule as you agree with this proposal.

You are now 1 week after the S1 milestone and the Chinese mechanical servo **supplier for task 1.5.3** has had to revise the delivery time. The delivery time has now greatly **increased to 8 weeks**, which is longer than the time required for the other components in the P1 build.

In addition, the mechanical engineer has reviewed the mechanical design specification and suggests the estimated time for the "**P2 mechanical modifications**" must be revised. This task is now estimated to require **an extra two weeks**.

Based on the additional information given above complete the following tasks:

1. Create a copy of EagleEyePart2.mpp and rename the copied file to EagleEyePart3.mpp. Amend the project schedule in EagleEyePart3.mpp incorporating the requests from Ms. Engineer, the change to the delivery time for the servo and the new estimated times for the software tasks. If necessary, resolve any resource over-allocation issues without adding any resources. You will also be required to submit this file (EagleEyePart3.mpp) as part of your assignment submission.

2. Describe the impact(s) of each of the following on the **project schedule**:
  - a. The additional resources required for the prototype builds.
  - b. The change in duration of the delivery time for the servo component.
  - c. The change in time for the P2 mechanical modifications.

**Explain your answers.**

3. Describe the impact(s) of each of the following on the **project budget**:
  - a. The additional resources required for the prototype builds.
  - b. The change in duration of the delivery time for the servo component.
  - c. The change in time for the P2 mechanical modifications.

**Explain your answers.**

4. These changes may have increased the total project budget. Are there any ways that the overall budget of this project can be reduced without removing any tasks or reducing product quality? (**Justify your answer.** Be specific and describe any tasks that you would target and what you might do that could reduce the cost of the project.) (Provide a minimum of two suggestions using a maximum of 500 words)

## Assumptions

You are free to make any assumptions necessary to complete the assignment. However, each assumption must be justified and stated clearly in your assessment Word document. Marks will be deducted for any unreasonable assumption or for stating an assumption and then ignoring it in your assignment.

## Submission of Assessment

The assignment is to be submitted as four separate files using the electronic assignment submission system that can be accessed from the assessment item 2 link on the course website. The four files to be submitted are:

1. A single Microsoft Word document with the assumptions and solutions to the questions for Parts 1, 2 and 3. Do not create a separate file for the memo question.
2. The three Microsoft Project files created for Part 1, 2 and 3. Please ensure that the Microsoft Project files are named according to the instructions in the assignment specification (EagleEyePart1.mpp, EagleEyePart2.mpp and EagleEyePart3.mpp).

## Marking Guide for Assessment item 2 – Individual Case Study

Assignment Question	Criteria	Marks available	Marks awarded
<b>Part 1</b>			
Q1	<p>The adequacy of the Project Schedule</p> <ul style="list-style-type: none"> <li>• Tasks; correct WBS; overall summary task; auto scheduling</li> <li>• Durations/effort</li> <li>• Resources allocated</li> <li>• Milestones</li> <li>• Predecessor relationships</li> <li>• Holidays</li> <li>• Critical path highlighted</li> </ul> <p>(may have resource over allocation at this point)</p>	7	
<b>Part 2</b>			
Q1	Resolved issues with over allocation in MPP	0.5	
Q2	(a-c) – dealing with resource constraints	1.5	
Q3	Dates of bookings (+ milestones)	1	
Q4	Appropriateness of the Written Memo and all information included and correct according to the schedule	3	
Q5	Risk assessment	4	
Q6	Meetings	4	
Q7	Organisational structure	3	
Q8	Organisational culture	4	
<b>Part 3</b>			
Q1	The adequacy of the amended Project Plan (+ ensure no resource over-allocation)	2	
Q2	Discussion of the impact of each of the changes on schedule + explain	1.5	
Q3	Discussion of the impact of each of the changes on budget + explain	1.5	
Q4	Reduce the project budget	2	
<b>TOTAL</b>		<b>35</b>	