

Assessment item 2 — Individual case study

Due date: 1:00pm AEST, Thursday, Week 11

ASSESSMENT

All students are to submit electronically – max file size is 2Mb.

Weighting: 35%

Length: No set length

2

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

Product Development Case Description

Background

CQVideo is a medium sized company that develops and manufactures industrial monitoring equipment. You are an employee of CQVideo and work as project manager in the product development department. The people involved in this case are:

- You are Mr. Project, the project manager.
- Mr. Product is the Director of Product Development.
- Ms. Marketing is the Director of Marketing and Portfolio Management.
- Ms. Resource is the Human Resource Manager.
- Functional line managers in the research and development department.
- Engineers and members of your project team.

You have been leading a small team of experienced engineers conducting a technical feasibility study to investigate if it is possible to modify one of the company's standard products to create a product variant to satisfy the needs of the mining industry. The M1 Milestone Concept Review will be held on Friday 5th September 2014. The project management milestone concept review checklist is provided below.

The Project Management Milestone Checklist for M1

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

The concept review is one of the milestones in the company's product development process.

The need for the new product has been identified by the marketing department lead by Ms. Marketing, Director of Marketing and Portfolio Management. Ms. Marketing provided your small project team with a product brief, outlining the special end user, sales and service requirements to supplement the requirements already established for the standard product. She also developed the business case for the product.

Your team have come up with a unique and novel product concept. The concept satisfies the new requirements perfectly. The feasibility work carried out showed that the user requirements were sound and that the technical complexity of the development was low.

Your team also estimates that there is a reduction in the Bill of Materials (BOM) for the new product although you have not assessed this at this stage.

You and your team believe that you can develop the product with limited resources and within the timeframe requested by Ms. Marketing. The sales launch deadline is to be advised (TBA).

Milestones

The milestones your team will use are:

- A. M1 Concept review complete (At this point the system architecture and feasibility study will be complete. A go/no-go decision for detailed design will be made at this milestone).
- B. M2 Design review complete (At this point the overall design will be complete. A go/no-go decision for procurement will be made at this milestone).
- C. P1 proto build start (An internal project review confirming that the product prototype is able to be manufactured with the quality level expected.).
- D. P2 proto build start (An internal project review confirming that the product prototype is able to be manufactured with the quality level expected).
- E. M3 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. M4 Launch review (A go/no-go decision depending if all business areas are ready for market launch and 50 units are in stock). This is to be the end of the project schedule, i.e. when the 50 units are in stock.

The system architecture of the product 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. Software, Mr. Mechanics, Mr. Electronics, Mr. Production and Mr. Validation, 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:

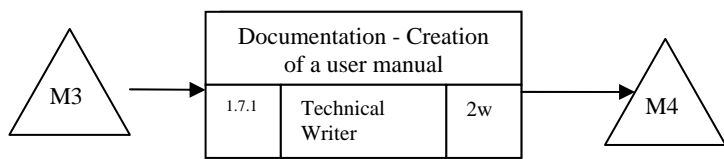
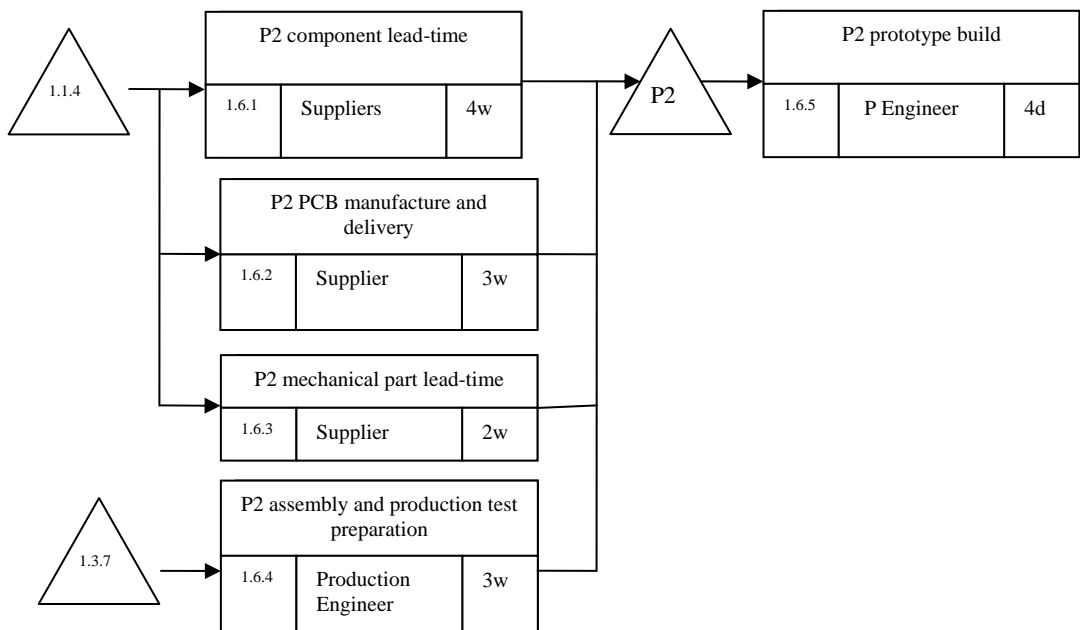
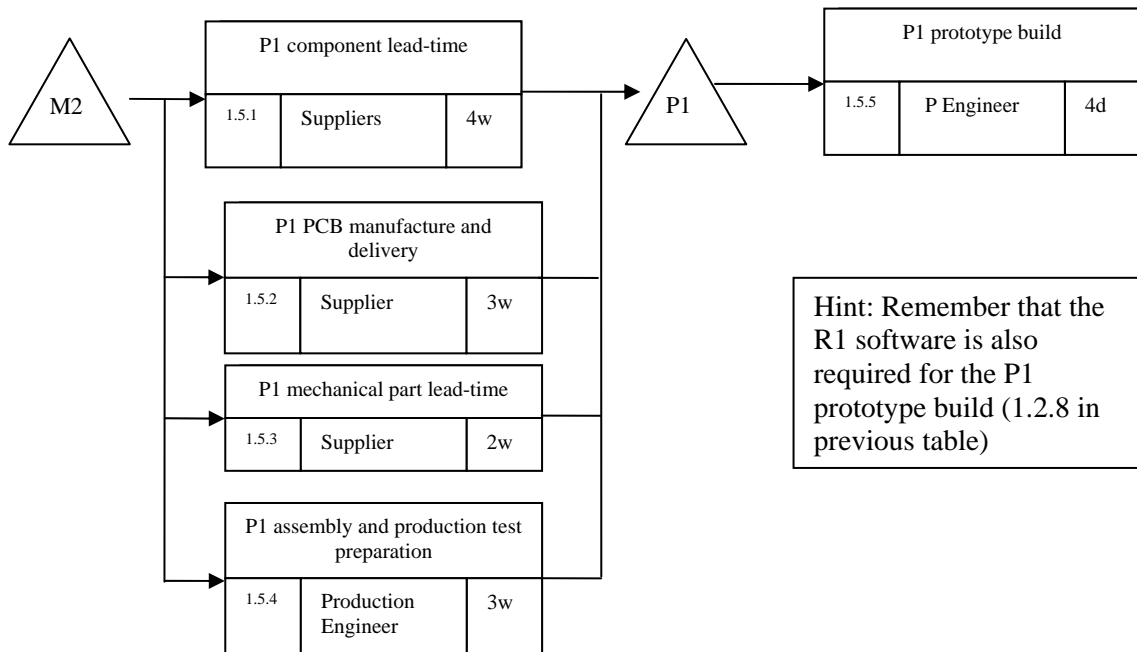
- Electronic Engineer (EE)
- Software Engineer (SW)
- Mechanical Engineer/Industrial Designer (ME)
- Test Engineer (TE)
- Production Engineer (PE)
- Technical Writer (TW)
- Printed Circuit Board (PCB)
- Electromagnetic Compliance (EMC)

Table 1- Work Breakdown Structure

Activity	Description	Predecessor(s) Relationships	Person days/weeks of effort (and type of resource required.)	To be completed at the following milestone
1 Product development				
1.1 Electronics				
1.1.1 PCB design	PCB design	M1	2 person-weeks of EE.	
1.1.2 Component selection	Selection of electronic components.	1.1.1	1 person-week of EE.	M2
1.1.3 P1 circuit design improvements	Electronic improvements to circuit diagram, component selection and layout.	1.1.1	2 person-weeks of EE.	M2
1.1.4 P1 electronics verification tests	Electronic verification tests with the use of the P1 prototypes.	1.1.3, P1 build complete	3 person-weeks of EE.	P2
1.1.5 P2 circuit design improvements	Electronic improvements to circuit diagram, component selection and layout.	1.1.4	1 person-week of EE.	
1.1.6 P2 electronics verification tests	Electronic verification tests with the use of the P2 prototypes.	1.1.5, P2 build complete	3 person-weeks of one EE.	M3
1.1.7 Thermal verification tests	Verification that electronic heat generation and heat transmission through covers is acceptable.	1.1.5, P1 build complete, P2 build complete	3 person-days of EE.	M3
1.1.8 EMC verification tests	Verification of compliance with electromagnetic compliance regulations.	1.1.7, P1 build complete, P2 build complete	3 person-days of EE.	M3
1.2. Software				
1.2.1 Software specifications and design	Specification of the software functionality based on user requirements.	M1	18 person-days of SE.	M2
1.2.2 User interface additions	Software additions due to modified menus and functional keys.	1.2.1	6 person-days of SE.	
1.2.3 Data storage additions	Software additions for data storage.	1.2.1	4 person-days of SE.	
1.2.4 Device to PC protocol additions	Software additions to the communication protocol between the device and the PC.	1.2.1	4 person-days of SE.	
1.2.5 PC software additions	Software additions/modifications to the PC software functionality to support the new device functionality.	1.2.3, 1.2.4	6 person-days of SE.	
1.2.6 R1 release creation	Creation of the R1 software release used for the P1 prototype build.	1.2.2, 1.2.3, 1.2.4, 1.2.5	3 person-days of SE.	
1.2.7 R1 release tests	Testing of the R1 release and identification of errors.	1.2.6	12 person-days of SE.	
1.2.8 R1 error correction and user interface improvements	Creation of the R1 software release used for the P1 prototype build.	1.2.7	18 person-days of SE.	P1
1.2.9 R2 release creation	Creation of the R2 software release used for the P2 prototype build.	1.2.8	3 person-days of SE.	
1.2.10 R2 release tests	Testing of the R2 release and identification of errors.	1.2.9, P1 build complete	12 person-days of SE.	
1.2.11 R2 error corrections	Correction of errors	1.2.10	18 person-days of SE.	
1.2.12 R2 interoperability tests	Testing of interoperability with 3 rd party accessory	1.2.11	9 person-days of SE.	

	devices.			
1.2.13 R2 interoperability error correction	Correction of errors	1.2.12	18 person-days of SE.	P2
1.2.14 R3 release creation	Creation of the R3 software release.	1.2.13	3 person-days of SE.	
1.2.15 R3 release tests	Testing of the R3 release	1.2.14	12 person-days of SE.	
1.2.16 R4 sales release creation	Creation of the software sales release	1.2.15	4 person-days of SE.	M3
1.3. Mechanics				
1.3.1 Industrial design	Design of the industrial design for the device.	M1, Must be started in parallel with 1.1.1	3 person-weeks of a ME/industrial designer.	
1.3.2 PCB outline modifications	Modifications of the PCB to fit the industrial design, new components and usability requirements.	1.3.1	2 person-weeks of ME.	
1.3.3 P1 mechanical CAD design	CAD design of mechanical plastic parts and metal parts for the device.	1.3.1	1 person-week of ME.	
1.3.4 Tolerance stack analysis	Analysis of the mechanical tolerance stacks compared to part tooling and moulding capabilities.	1.3.2, 1.3.3	1 person-week of ME.	M2
1.3.5 P1 mechanical part analysis	Physical analysis of moulded plastic parts and sheet metal parts.	P1 build complete	1 person-week of ME.	
1.3.6 P2 mechanical part modifications	Modification of moulding and sheet metal tools used for P2 parts.	1.3.5	2 person-weeks of ME.	P2
1.3.7 Mechanical tool 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.	M3
1.4. Verification				
1.4.1 Test plan creation	Creation of a plan documenting what is to be tested.	M1	1 person-days of TE.	M2
1.4.2 Component tests	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	12 person-days of TE	P1
1.4.3 Module tests	Test of module functionality after assembly.	P1 build complete, 1.4.2	3 person-days of TE.	
1.4.4 System integration tests	Test of integration of modules.	1.4.3	7 person-days of TE.	P2
1.4.5 Product validation tests	Test of product against reliability to various standard tests like drop and humidity and end user requirements.	1.4.4, P2 build complete	12 person-days of TE	
1.4.6 Technical Construction File compilation	Creation of documentation for regulatory approvals.	1.4.5	10 person-days of TW.	
1.4.7 Type approval and regulatory approval tests	Approvals from regulatory authorities.	1.4.6	21 days by regulatory authorities.	M3

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 M1 concept review approval will be given to start the project and that the start date of the project schedule will be 8/9/14. (M1 milestone can be 8/9/14.)
- The project booking of the proto builds (task 1.5.5 and 1.6.5) will have to be done at the latest two (2) weeks in advance of the build. This is the lead time required to include builds in the manufacturing's master production schedule. There is no need to include the booking on your schedule initially.
- The company has a general holiday period between 26/12/14 to 2/1/15 and the 6th of October is the designated Labour Day holiday. For the purposes of the assignment, assume that there are no other holidays.
- The booking of the Type Approval (TA) test house (task 1.4.7) has to be done 8 weeks prior to type approval. There is no need to include the booking on your schedule initially.
- Production ramp up to manufacture 50 units is estimated to take two (2) weeks after the M3 milestone. Include this task as 1.8 on your schedule above the milestones. It should be the predecessor for M4.

Available Resources

The maximum full time resources available for your project are:

Resource	\$/hour	Number Available
Electronics Engineer	\$125.00	1
Software Engineer	\$95.00	2
Mechanical Engineer	\$125.00	1
Test Engineer	\$100.00	1
Production Engineer	\$140.00	1
Technical Writer	\$75.00	1

All staff work a 40 hour week from Monday to Friday (i.e. a 5 day week with 8 hour days). The functional managers have assured you that the engineers are able to do 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).

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 A

For part A 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 2010 file (see below) and the questions are to be answered in a Word document. As stated above, any assumptions must also be listed at the beginning of the Word document.

1. Ms. Marketing has asked you to use Microsoft Project to develop the project schedule. Note that she 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 2010 to produce a “Part A” 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 before answering question 2. **Save this version** of your schedule in **CQVideoPartA1.mpp**. You will be required to submit this file as part of your assignment submission.

2. List the tasks that are on the critical path(s) of the project.
3. Create a copy of CQVideoPartA1.mpp in another file called CQVideoPartA2.mpp. If there were any resource over-allocation issues resolve these in this new CQVideoPartA2.mpp file. Note that you must resolve any resource over-allocation issues without the addition of any additional resources. **Save the “modified” version** of CQVideoPartA2.mpp. You will also be required to submit this file as part of your assignment submission.
 - 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?
4. Include additional “milestones” (tasks with 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 first prototype build.
 - b) the type approval test house to ensure that the facilities are booked for the type approval.
 - c) According to your schedule when is the latest date that you need to contact:
 - The production manager to book the facilities for the first prototype build?
 - The type approval house to book the facilities for the type approval?

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

5. Write a memo to the director of product development, Mr. Product outlining:
- the expected completion date of the project, assuming it commences at M1 (8/9/14);
 - the total duration of the project;
 - an explanation of the main factors that cause the project to require that length of time;
 - the estimated labour cost of the project after the M1 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 50 in stock
 - Total for the Project

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

6. What should the project manager do to manage risk in this project? Provide examples of your solution. (maximum 500 words)
7. Is there any way that the overall budget of the project can be reduced without removing any tasks? (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.) (maximum 500 words)
8. Describe what the project manager needs to do to ensure that the project runs smoothly and completes on time. Give a detailed answer describing procedures, processes and anything else that you believe is important both in general terms and specifically for this project. (maximum 500 words)
9. Are there any other project related supporting activities, plans, events or tasks that you might have overlooked? If they were overlooked describe how this could impact on the project. (Aim to identify and discuss at least two activities.) (maximum 500 words)
10. What should the project manager do to ensure product quality? (maximum 500 words)

Assessment Part B

Mr. Production reviews your project schedule and requests that build 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 M1 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 7 weeks**, which is longer than the time required for the other components in the P1 build.

In addition the mechanical engineer has completed the mechanical specification. However, this has meant that the estimated time for the “**P1 mechanical part analysis**” has had to be revised. This task is now estimated to require **an extra week**.

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

1. Create a copy of CQVideoPartA2.mpp in another file called CQVideoPartB.mpp. Amend the project schedule in CQVideoPartB.mpp incorporating the request from Mr. Production, 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 (CQVideoPartB.mpp) as part of your assignment submission.
2. Describe the impact(s) of each 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 P1 mechanical part analysis.**Explain your answers.**
3. Describe the impact(s) of each 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 P1 mechanical part analysis.**Explain your answers.**
4. Project changes can influence the schedule and budget of successor tasks in a project and this can also have a large impact on other project stakeholders. What steps could the project manager take to allow a smoother transition of project changes? Provide **two** specific suggestions in your answer.

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. The Word document with the assumptions and solutions to the questions for Part A and Part B.
2. The Microsoft project files created for Part A and Part B. Please ensure that the Microsoft Project files are named according to the instructions in the assignment specification (CQVideoPartA1.mpp, CQVideoPartA2.mpp and CQVideoPartB.mpp).

Marking Guide for Assessment item 2 – Individual Case Study

Assignment Question	Criteria	Marks available	Marks awarded
Part A			
Q1	The adequacy of the Project Schedule <ul style="list-style-type: none"> • Tasks; correct WBS; overall summary task; auto scheduling • Durations/effort • Resources allocated • Milestones • Predecessor relationships • Holidays • Critical path highlighted (may have resource over allocation at this point)	7	
Q2	Critical path tasks listed	1	
Q3	(a), (b) – dealing with resource constraints	2	
Q4	Dates of bookings (+ milestones)	1	
Q5	Appropriateness of the Written Memo and all information included and correct according to the schedule	4	
Q6	How to manage project risk	3	
Q7	Details on reducing the project budget	3	
Q8	Ensuring finished on time	3	
Q9	Overlooked “activities”	2	
Q10	How to ensure a quality product	3	
Sub Total Part A		29	
Part 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	Change management	1	
Sub Total Part B		6	
TOTAL		35	