C1.1

The GPS Auto-navigation System Verification Project

Requirement 1: Project Organization

(a) Develop an initial project

Project Name: The GPS Auto-navigation System Verification Project

Project Propose: Need to test 5 systems under operational conditions to support claims of reliability to convince the customer that the product design performance was stable and reliable. Also planning, conducting, and evaluating the engineering implications of the reliability test as well as the “tear down inspection”

Project Manager: Kang Jinhui, The Manager of Reliability Engineering

Project Members:

1. Gail YU, Manager of Quality Engineering
2. Tom HUANG, Manager of Design and Product Engineering
3. Jesse LIU, a senior engineer from Product Manufacturing
4. Pete DONG, a senior engineer from Administration responsible for component purchasing and incoming testing of materials.

Scope:

1. Design test plan and time arrangement
2. Guidance system reliability testing
3. Module decomposition audit and result of audit
4. Analysis test and result of audit
5. Submit a project summary report

Time Schedule:

1. A briefing in one week concerning your plan for the reliability testing
2. Meeting to develop the company position and strategy
3. Primary tests result
4. A full customer briefing
5. Finish the tests

(b) Develop a complete Linear Responsibility Chart

Task	PM	Gail YU	Tom HUANG	Pete DONG	Jesse LIU
Design test plan	1,2,6	3,6	3,6	4	4
Guidance system reliability testing	1,2,5	1,2,9	1,3,5	3,5	3,5
Module decomposition audit	1,2,5	1,2,9	1,3,5	1,3,5	3,5
Analysis test and result of audit	1,2,6	1,3,5	1,3,5	1,3,5	3,5
Submit a project	1,2,6	3,5	3,5	3,5	4

1 - responsibility

2 - supervision

3 - must be consulted

4 - may be consulted

5 - must be notified

6 - approval authority

(c) Complete a stakeholder analysis

1) Stakeholders in project team

Name	Organization	Role	Profit	Impact
Thomas GU	senior manager	director of marketing and sales	High	Medium
Peter WANG	senior manager	senior vice-president, director of product manufacturing	High	High
Jane YANG	senior manager	director inspection and test	Pretty High	High
Kang Jinhui	project team	the manager of reliability engineering	Pretty High	Pretty High
Gall YU	project team	manager of quality engineering	Pretty High	Pretty High
Tom HUANG	project team	manager of design and	Pretty High	High

		product engineering		
Jesse LIU	project team	senior engineer from product manufacturing	Pretty High	High
Pete DONG	project team	senior engineer from Administration responsible for component purchasing and incoming testing of materials.	Pretty High	High

2) Stakeholders from other apartments in company

Name	Organization	Role	Profit	Impact
James TAN	senior manager	direct of engineering	pretty high	pretty high
George WU	senior manager	project manager	pretty hign	pretty high

3) Stakeholders from customers

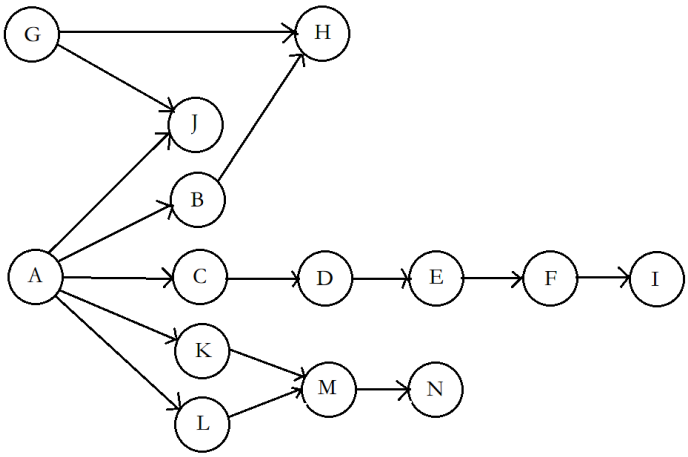
Name	Organization	Role	Profit	Impact
Robert HOU	customer representative	internal customer representative	high	medium

Requirement 2 Network Planning for the Reliability

Activities:

Task ID	Task Name	Duration (days)	Predecessor(s)
A	Reliability Testing Planning and Design	5	
B	Review of Audit Discrepancies	2	A
C	Joint Conference with Senior Management	1	A
D	Phase I Tear Down Inspection: Electrical and Mechanical Testing	2	C, H
E	Phase II Tear Down Inspection: Assembly, Components, and Fabrication	3	D
F	Analysis of Tear Down Audit Results	1	E
G	Tear Down Inspection Planning and Design	4	
H	Tear Down Inspector Briefing, Workspace Preparation, and Procedures Development	4	B, G
I	Reporting of Tear Down Audit Results	1	F
J	Production Procedures Audit and Evaluation	6	A, G
K	Reliability Test Preparations	2	A
L	Environmental Lab and Test Chamber Preparation	1	A
M	Operational Testing of Systems Under Full Load	11	K, L
N	Review, Analysis, and Reporting of Reliability Test Results	3	M

(a) Develop a CPM Activity on Node diagram for the project



(b) Determine the critical path and the duration of the critical path for the project

The critical path of this project is A→K→M→N.

Hence the total day would be cost is $5 + 2 + 11 + 3 = 21$ days.

(c) What conclusions can you draw from the CPM diagram?

A and G are predecessors of all events, so we need to do A and G first.

The duration of the critical path is 21 days. And we need to start from A and G、N、J, I is the end.

The main workload and cost concentrate on the reliability testing. Only to ensure the testing completed on time, the whole project cannot be postponed and the project's processing can be balanced by tracing the critical path.

(d) Discuss the assumptions, limitations, and implications for using the CPM as an approach for scheduling this project?

Assumptions

(1). we can use PM as an approach when we need to assert the time schedule of activities having sequential relationship.

(2). it identifies the most critical elements in the project. (3). Each element has a time attribute.

(3) CPM provides with the quickest (lower bound) time of finishing a project, since resources are infinite for every activity as you suggest.

Limitations

(1) the real-life project network often includes thousands of activities, which are extremely easy to omit when formulating the network map.

(2) the priority relationship between wages is not necessarily clear, and it is difficult to make drawings.

(3) The time of each activity often needs to be utilized. Probability distribution to estimate the point in time, possible deviations.

Implications

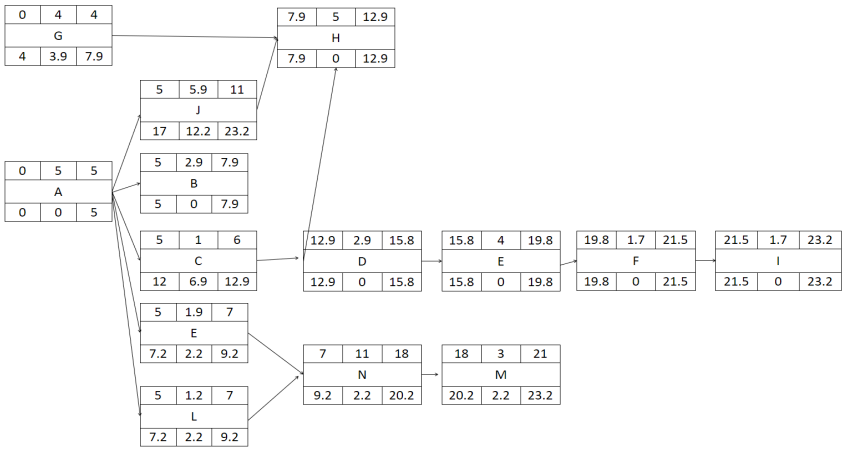
Taking advantage of CPM, we can know which task should be done first and which tasks should be done concurrently in order to increase the efficiency. It can also provide important help to the project, provide a graphical display of the project and its main activities, which provide quantitative information vital basis for identifying potential risk of project delays.

Requirement 3: PERT as a method to schedule the Project

PERT data:

Task ID	Optimistic Duration (days)	Most Likely Duration (days)	Pessimistic Duration (days)	Duration (days)	Predecessor (days)
A	4	5	6	6	--
B	1	2	8	8	A
C	1	1	1	1	A
D	1	2	8	8	C, H
E	3	3	9	9	D
F	1	1	5	5	E
G	3	4	5	5	--
H	3	4	11	11	B, G
I	1	1	5	5	F
J	4	6	7	7	A, G
K	1	2	2	2	A
L	1	1	2	2	A
M	10	11	12	12	K, L
N	2	3	4	4	M

(a) Develop a PERT Activity on Node diagram for the project (This diagram must specify the critical path and duration of the CP)



The critical path is A→B→H→D→E→F→I, and the duration of this critical path is 23.2. Hence maybe 24 days are needed to finish the project.

(b) Construct a table which identifies: Activity, duration, Early Start, Early Finish, Late Start, Late Finish, and Slack (Float), and Activity Standard Deviation (round to 1 decimal place)

Activity	Duration	Early Start	Early Finish	Late Start	Late Finish	Slack	Standard Deviation
A	5	1	5	0	5	0	0.3
B	2.8	5	7.9	5	7.9	0	1.2
C	1	5	6	11.9	12.9	6.9	0.0
D	2.8	12.9	15.8	12.9	15.8	0	1.2
E	4	15.8	19.8	15.8	19.8	0	1.0
F	1.7	19.8	21.5	19.8	21.5	0	0.7
G	4	1	4	4	7.9	3.9	0.3
H	5	7.9	12.9	7.9	12.9	0	1.3
I	1.7	21.5	23.2	21.5	23.2	0	0.7
J	5.8	5	11	17.2	23.2	12	0.5
K	1.8	5	7	7.2	9.2	2.2	0.2
L	1.2	5	7	7.2	9.2	2.2	0.2
M	11	7	18	9.2	20.2	2.2	0.3
N	3	18	21	20.2	23.2	2.2	0.3

*Stat with 1, in days

(c) What can you conclude about the project duration from analysis of the PERT network diagram?

The critical path is A→B→H→D→E→F→I, so we need to finish these five tasks at the highest priority.

According to analysis the PERT chart's critical path, we know that module decomposition audit and. result of audit is the key point of the project. Hence if we can control the time spend on module decomposition audit, it can be narrow the whole project's time

(d) What are the primary concerns that a PM must consider in using PERT for project scheduling?

The use of PERT for project management and scheduling mainly considers the uncertainty of time, and the focus is on the control of time. Under the premise of known optimistic time, pessimistic time and the most probable time, the expected time is calculated through the formula

$$t_e = \frac{a + 4m + b}{6}$$

where

$t_e =$ expected time
$a =$ optimistic time estimate
$m =$ most likely time estimate
$b =$ pessimistic time estimate

to determine the critical path.

Requirement 4: Risk Management

(a) Discuss the statement made by James TAN

James Tan's judgment is incomplete.

The main purpose of risk management is to identify and control risks in the project management process. Risk management can be effectively carried out through five strategies of risk transfer, prevention, avoidance, reduction and utilization.

There are risks in any project. Risk is a kind of uncertainty. Risk may lead to the failure of the project. Effective risk management can reduce this possibility. But project failures are not necessarily caused by risk factors.

Therefore, risk management cannot completely eliminate the possibility of project failure. But it can effectively reduce such possibility.

(b) Identify primary sources of risk inherent in this project

Time risk. Wrong estimation of time or resource availability; poor management of allocation of floating time or time difference

Cost risk. Although the company’s executives promised not to consider costs, they did not specify the specific cost ceiling

Human resources risks. Unscientific project organization and division of responsibilities, absence of personnel, etc.

Technical risks. Lack of training, insufficient understanding of methods, tools and technologies, insufficient experience in the application field, new technologies and development methods, methods that cannot work correctly

Communicate related risks. Including common issues with customers, executives and team members

Property risk. Including losses to property as a result of perils, like fire or theft, and hazards.

Personal risk. Including the loss of life or loss of income because of a sickness, disability, or unemployment.

(c) Develop and discuss the role that risk management can play in successful accomplishment of THIS project

Help the project manager to develop a practical project schedule.

Help company executives better understand the project (from cost considerations).

Help the project manager to manage and allocate resources better, give full play to the abilities of each team member, and complete the project efficiently.

Help the project manager to foresee the technical difficulties in the project and implement the company's internal resource deployment in advance to overcome technical difficulties, so that the project can proceed smoothly.

Help to promote communication between project managers and company executives, customers and team members, clarify needs, report progress, and achieve early detection and early reporting of problems, early prevention and early resolution.