The GPS Auto-navigation System Verification Project

【C1.1-Analysis Reports】

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Project Background

Hangzhou AUTONAV, Inc. is an organization whose main business is the production of high reliability auto guidance and navigation systems for various customers, from both the government as well as the private sector. They are known in the industry as excelling in technological sophistication and high reliability products.

In the Spring of 1997 the company launched development of a new product. The project for development of the product was called the IRIS project, which represented the movement by the company into very profitable and high growth areas of commercial navigation equipment. Different from all the project before, the aim of this project is to make a good profit and ensure reliability as well as technologically superior at the same time.

The project had been moving along well at the beginning, but there were some obvious discrepancies, which might lead to widespread complaint among customers if we did nothing.

Our job is to deal with five unique systems, which would receive a 'tear down' workmanship assessment and engineering design review to determine any product/manufacturing implications of defects identified in the workmanship review. The purpose of this operation is to prove that IRIS was a great system, capable of exceeding all field expectations for reliability.

Req I – Project Organization

1. Project Charter

1.1 General Introduction

Hangzhou AUTONAV, Inc. is an organization whose main business is the production of high reliability auto guidance and navigation systems for various customers, from both the government as well as the private sector. In 1997 we launched development of new product, which was going to be developed in project 'IRIS'. Different from all the project before, the aim of this project is to make a good profit and ensure reliability as well as technological superior at the same time.

1.2 Our Goals

prove that IRIS was a great system, capable of exceeding all field expectations for reliability through "tear down" workmanship assessment and severe engineering design review.

In our words, **try our best to avoid any potential product/manufacturing implications of defects.**

1.3 Our Scope of Work

a) Developing the project plan and schedule;
b) Conducting the reliability testing of the guidance systems;
c) Conducting the tear down audit and interpreting the results;(TIPS: 5 systems would receive a "tear down" workmanship assessment and engineering design review to determine any product/manufacturing implications of defects identified in the workmanship review.)
d) Reporting the results of the project to Senior Management.

1.4 Constraints

The direction from senior management is that a full customer briefing will be conducted in 3 weeks and senior management wants a pre-briefing of the results and recommended actions prior to that meeting with at least a week to develop the company position and strategy.

1.5 Project Team Structure

Title	Participants
Group Leader	*Zijin SHEN (Me)*
Members	*Gail YU, Tom HUANG, Jesse LIU and Pete DONG*

1.6 Our Roles

Participants	Role
Zijin SHEN (Me)	Project Manager
Gail YU	Manager of Quality Engineering
Tom HUANG	Manager of Design and Product Manufacturing
Jesse LIU	A Senior Engineer from Product Manufacturing
Pete DONG	A Senior Engineer from Administration responsible for Component Purchasing and Incoming Testing of Materials

1.7 Stakeholders

Clusters	stakeholders
Team members	*Gail YU*, Manager of Quality Engineering *Tom HUANG*, Manager of Design and Product Engineering *Jesse LIU*, A Senior Engineer from Product Manufacturing *Pete DONG*, A Senior Engineer from Administration
Inside	Senior Management
Outside	Customer

1.8 Time Schedule

Task	Deadline
a briefing in one week concerning your plan for the reliability testing	Week I
meeting to develop the company position and strategy	Week II
Primary tests result	Week II
a full customer briefing	Week III
Finish the tests	Week III

1.9 Budget

Each member of your project team has access to whatever resources they need to support the project. This is a top priority for the company and you have been assured that you will “get whatever you need to complete the project”.

2. Linear Responsibility Chart

Task	***Zijin SHEN***	***Gail YU***	***Tom HUANG***	***Jesse LIU***	***Pete DONG***
System review	2	3	1	2	3
Developing the project plan and schedule	1	3	2	2	3
conducting the reliability testing of the guidance systems	3	1	1	2	2
conducting the 'tear down' audit and interpreting the results	3	2	2	1	1
reporting the results of the project to Senior Management	1	2	2	2	2
KEY	***1 = Primary responsibility, 2 = Support/Work, 3 = Review and Final Approval***				

3. Stakeholder Analysis

3.1 Project Team

Name	Org.& Group	Role	Interest	Influence /importance	Expectation	Exception Management
Zijin SHEN	Reliability Engineering	Manager	High	Very High	The project can be done successfully.	Work as a member of project team
Gail YU	Quality Engineering	Manager	High	High	Make sure the quality of the product is good.	Work as a member of project team.
Tom HUANG	Design & Product Engineering	Manager	High	High	Finding and overcoming the shortcoming of the product	Work as a member of project team.
Jesse LIU	Product Manufacturing	Senior Engineer	High	High	To supprt the manufacturing of the product	Work as a member of project team.
Pete DONG	Component Purchasing and Incoming Testing of Materials	Senior Engineer	High	High	Responsible for purchasing and incoming testing of materials	Work as a member of project team.

3.2 Other Departments in Company

Name	Org.& Group	Role	Interest	Influence /importance	Expectation	Exception Management
James TAN	Engineering Department	Director	High	High	the Results and conclusions can support the reliability of	Frequent update and engage in the important decision

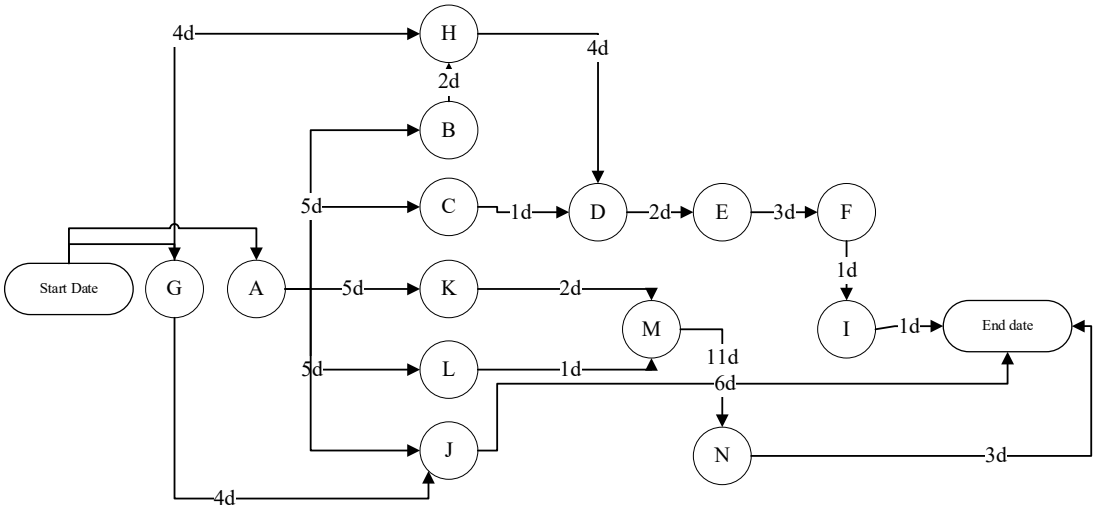
					the product.	
George YU	Engineering Department	Director	High	High	The project can be done successfully	Have meteting with other directors.
<other directors>		Director	High	Medium	Make the results of the audit indicate to be right.	Discussing the approach and results of the audit PRIOR TO the meeting with senior management.
<senior Management >		Senior Manger	High	Medium	The project can be done successfully	Listen to the report from diectors and managers, etc.

3.3 Customers

Name	Org.& Group	Role	Interest	Influence /importance	Expectation	Exception Management
Robert HOU	Purchasing Department	Customer	Very High	High	Full cooperation with Mr. HOU and his access to all data, procedures, testing, and inspection of hardware	Work with test team.

Req II – Network Planning for the Reliability Testing and Workmanship Auditing

1. Develop CPM Activity on Node Diagram



2. Develop CPM Activity on Node Diagram

From this diagram, we can easily figure out that the critical path of this project is:

$$A \rightarrow K \rightarrow M \rightarrow N$$

And we can calculate that the ***duration*** of this path is **5 + 2 + 11 + 3 = 21.**

3. What conclusions can you draw from the CPM diagram?

From such a CPM diagram, I can draw these conclusions:

- Obviously, Task A and Task G should be done first, since they are the predecessors of all other tasks else. Only if we finish A & G can we start for other Task.
- Some Task, such as BCKLJ, can be done concurrently to make the process more efficient;
- The total cost of the critical path largely depends on the time we cost on Task M, since it will take us 11 days to finish. So if we can do Task M much faster, our efficiency will increase.

- When we are working on big task such as M, we can deal with some small tasks, such as DEFI concurrently to improve efficiency.

4. Discuss the assumptions, limitations, and implications for using the CPM as an approach for scheduling this project?

4.1 Assumptions

- we can use CPM as an approach when we need to assert the time schedule of activities having sequential relationship.
- it identifies the most critical elements in the project.
- Each element has a time attribute.
- If we want to use CPM, we must assume that we know time and source used by each event and relationships among each event.

4.2 Limitations

- CPM operates on the assumption that there is a precise known time that each activity in the project will take. But it is not realistic at all, since time is not fixed.
- CPM cannot be used as a dynamic controlling device.
- CPM time estimates are not based on statistical analysis.

4.3 Implications

- take 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. Besides, we can also easy to find out the critical path the this project.

Req III – PERT as a method to schedule the Project

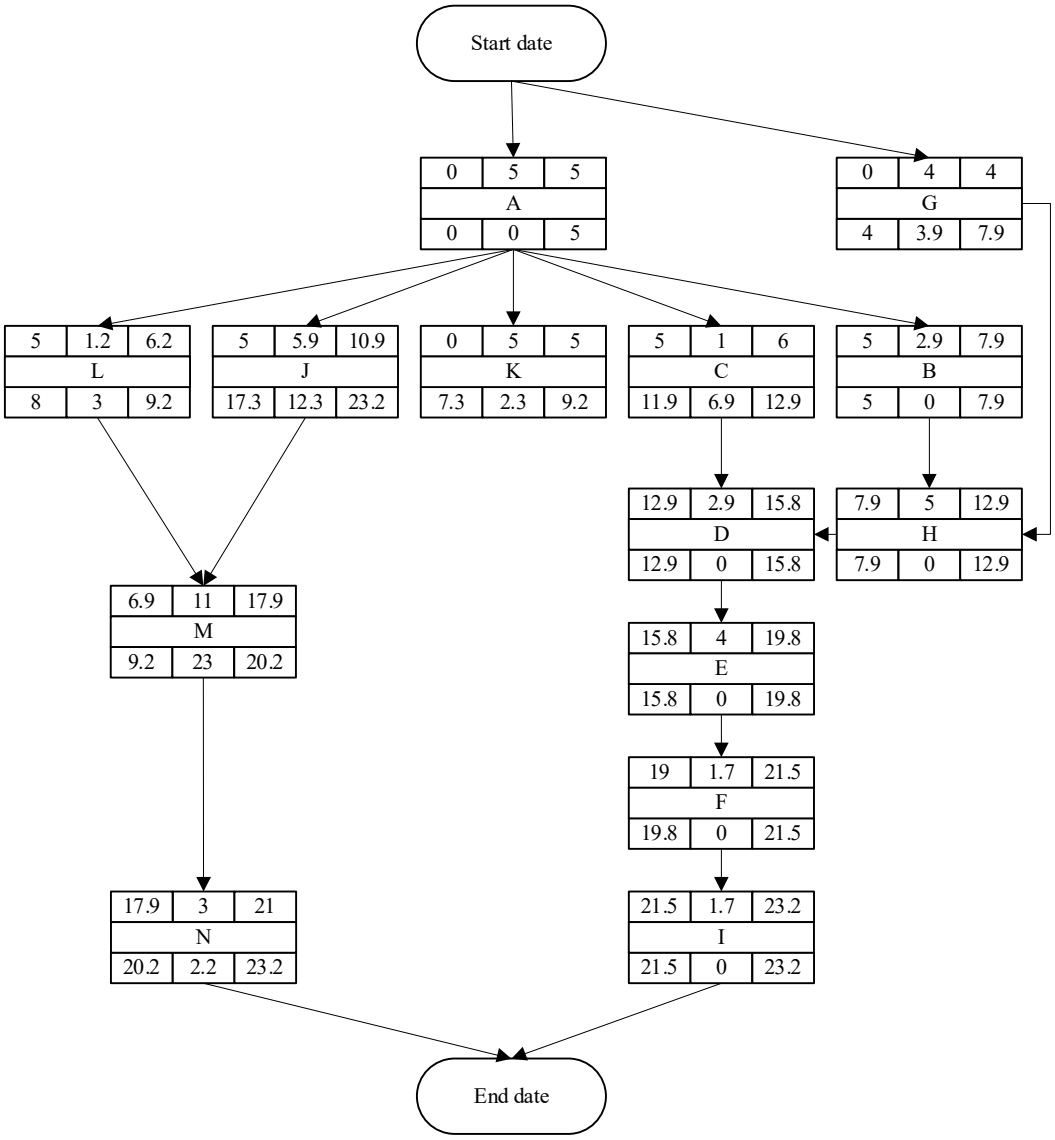
1. Develop a PERT Activity on Node diagram for the project

1.1 Average Duration Table

Task ID	**Avg. Duration(days)***	Optimistic Duration(days)	Most Likely Duration(days)	Pessimistic Duration(days)	Predecessor(s)
A	**5**	4	5	6	
B	**2.9**	1	2	8	A
C	**1**	1	1	1	A
D	**2.9**	1	2	8	C, H
E	**4**	3	3	9	D
F	**1.7**	1	1	5	E
G	**4**	3	4	5	
H	**5**	3	4	11	B. G
I	**1.7**	1	1	5	F
J	**5.9**	4	6	7	A, G
K	**1.9**	1	2	2	A
L	**1.2**	1	1	2	A
M	**11**	10	11	12	K, L
N	**3**	2	3	4	M

**** Keep one decimal place.***

1.2 Diagram



1.3 Critical Path

From this diagram, we can easily figure out that the critical path of this project is:

$$A \rightarrow B \rightarrow H \rightarrow D \rightarrow E \rightarrow F \rightarrow I$$

And we can calculate that the ***duration*** of this path is **23.2**, just as the diagram shows.

2. Construct a Table

Task	Duration	Early Start	Early Finish	Late Start	Late Finish	Slack	Activity Standard Deviation
A	5	0	5	0	5	0	0.3
B	2.9	5	7.9	5	7.9	0	1.2
C	1	5	6	11.9	12.9	6.9	0
D	2.9	12.9	15.8	12.9	15.8	0	1.2
E	4	15.8	19.8	15.8	19.8	0	1
F	1.7	19.8	21.5	19.8	21.5	0	0.7
G	4	0	4	3.9	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	5.9	5	10.9	17.3	23.2	12.3	0.5
K	1.9	5	6.9	7.3	9.2	2.3	0.2
L	1.2	5	6.2	8	9.2	3	0.2
M	11	6.9	17.9	9.2	20.2	2.3	0.3
N	3	17.9	20.9	20.2	23.2	2.3	0.3

3. What can you conclude about the project duration from analysis of the PERT network diagram?

- From the Diagram we can easily figure out that the critical path is ABHDEFI. Critical path means that those tasks are of greater priority than any other task, so we'd better finish those five tasks firstly;
- Another fact we can learn from critical path is that every node on critical path has a slack time of ZERO;
- It's much more effective to cut the duration in critical path to reduce the overall duration than cut the duration of any other path;

- We also discover that some tasks' slack time are very long. For example, C and J. Those tasks should be delayed to give resources to more demanding tasks.

4. What are the primary concerns that a PM must consider in using PERT for project scheduling?

- Knowing the working process of the project to make the more accurate description;
- Be able to more accurately estimate the time required for each activity resource in advance;
- Entire work process is divided into conditionally independent of each activity;
- Knowing the characteristics of the project itself, then decide whether to use PERT or not.
- When the resource allocation is in conflict, the resources of the activities on the non-critical path can be appropriately mobilized to support the activities on the critical path to ensure the completion progress of the project in the most effective way.
- Always pay attention to critical path.

Req IV – Risk Management

1. Discuss the statement made by James TAN

Well, from my perspective, James is partly right, since risk management do decrease the bad impact of potential project failure. It is known to us that project risk management is an important aspect of project management, which is one of the 10 knowledge areas in which a project manager must know.

However, we can't be superstitious about risk management. Nothing in this world is absolute. It is true that risk management can greatly reduce the possibility of project failure, and there is a certain stop-loss capability in the event of failure, but it does not completely eliminate project failure, because there is always an unexpected situation.

2. Identify primary sources of risk inherent in this project

- The tests are failed;
- The time schedule is too tight to catch;
- Customer isn't satisfied with the product and dismiss the contract;
- The product is learned by competitors who releases earlier than the company;
- My teammates and I are not skillful enough to finish this project;
- My teammates and I are not responsible enough to finish this project;

- My teammates and I can’t get enough support.
- Team member can’t stand the pressure and leaves;
- Customers refuse to accept our test results due to some reasons

3. develop and discuss the role that risk management can play in successful accomplishment of THIS project.

- Ensure management stability;
- Build a better understanding over the coming challenge;
- Improve company economic efficiency and reduce costs;
- Create a safe and stable production environment;
- Stimulate workers enthusiasm and creativity;
- Avoid the risk of loss or stop loss when failure occurs.