Chapter 3

Project Planning

CONTENTS

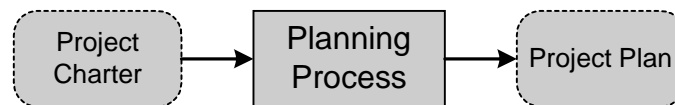This page intentionally left blank.

Chapter 3

Project Planning

3.1 Introduction

Great things do not simply happen. They must be brought to pass through effort. They must also achieve their initial existence in the minds of visionaries before they achieve physical reality. Projects do not often succeed without careful planning. Planning allows the project team to address the five critical factors that determine software program success or failure [1]:

- Quality
- Cost
- Schedule
- Performance
- Supportability

The purpose of planning is to take the project charter, along with the project objectives, and develop a multifaceted plan providing a framework and direction for accomplishing the project, including tasks, budget, schedule, change process, communications, and other various aspects of the project, shown in Figure 3-1. The project plan establishes common goals, expectations, terminology among the participants and stakeholders. To be successful, everyone must work on the same project – following the same plan.

```
 ┌─────────┐      ┌───────────┐      ┌────────────┐
 │ Project │ ───▶ │ Planning  │ ───▶ │Project Plan│
 │ Charter │      │ Process   │      │            │
 └─────────┘      └───────────┘      └────────────┘
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Figure 3-1 Project Planning

Planning is essential to controlling a project. Planning establishes a baseline with which to gauge progress. If the project begins to deviate from the plan, action can be taken to put the project back on track. Without planning, there is no control. [2]

An important purpose of the project plan is to have the project team go through the planning process. This allows the team to work together and rehearse the development of the project. They will evaluate risks, development life cycles, resource availability, budgets, and all significant tasks. They will encounter and solve problems, and get a feel for the work before actually beginning the development work itself. Planning is not the same as having a plan. It consists of an ongoing process by which changes are incorporated in to the project in an orderly manner.

3.2 Process Description

The planning process should be consistent with the life cycle appropriate to the project being performed. In other words, one size doesn't fit all. The activities of the planning process and the contents of the project plan will need to be tailored to the project. Figure 3-2 depicts a generic planning process. Some activities incorporate the output of other activities and must follow them in a sequence. Still other activities, including risk analysis and some not shown, can be performed in parallel.

A well-prepared project plan should minimize change. However, the planning process should extend in some degree beyond the Planning phase to allow necessary changes to be incorporated into the plan. Especially during the planning phase, feedback should exist between different activities to update earlier portions of the project plan according to new understanding gained with the later planning activities.

The activities of the planning process correspond to and produce various portions of the project plan.
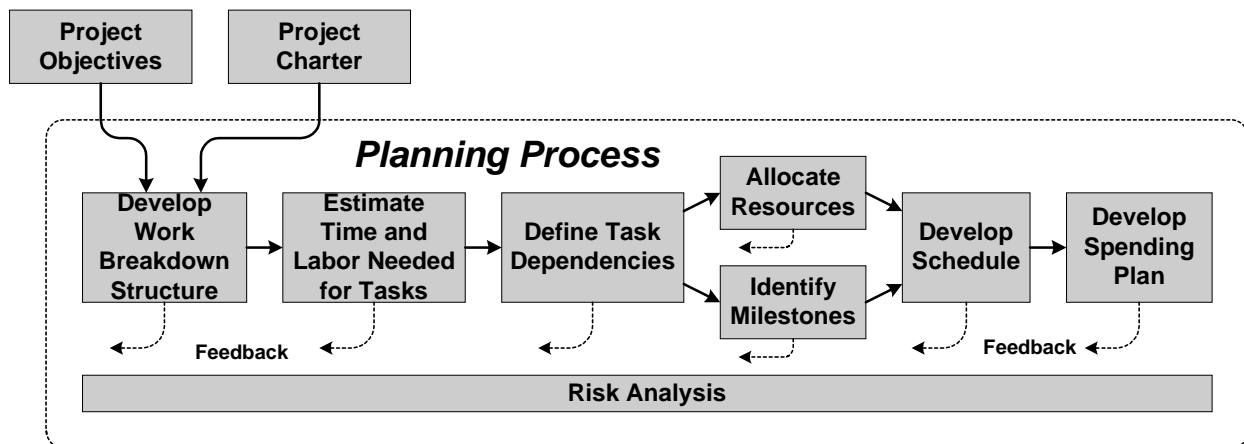
Figure 3-2 Project Planning Process

The project plan is the coordinated compilation of various sub-plans relating to different parts of the project. The following is a list of project plan elements:

- Project Charter
- Work Breakdown Structure
- Task Dependencies
- Network Diagram
- Schedule
- Communications Plan
- Risk Management Plan
- Documentation Plan
- Testing Plan

- Project Objectives
- Labor and Time Estimates
- Resource Allocation
- Assumptions and constraints
- Staffing Plan
- Configuration Management Plan
- Budget/Spending Plan
- Training Plan
- Metrics Analysis Plan

This list is by no means comprehensive. The actual content of a plan, as well as the levels of detail and formality, will depend on the type of project, the deliverables, whether the organization developing the plan is an acquisition or development organization, and requirements to be satisfied by the project. Some of the elements might be considered essential for one type of project and optional for another. Several of these plan elements are described below, while others are covered in greater detail in other chapters.

3.2.1 Project Initialization

3.2.1.1 Project Charter

The project charter should be developed by the tasking organization prior to the formation of a project team (e.g., before the planning phase.) The project charter serves as the starting point for the project plan. It describes why the project has been initiated, what the project will accomplish, how the product or service will be developed or provided, who is responsible to perform the work, and who benefit from the project products or services.

Charter Contents [3]

- <u>Title</u> – Descriptive but not too lengthy or verbose.

- <u>Purpose</u> – Defines the overall scope of the project.

- <u>Statement of Need</u> – Brief statement of the problem the project will solve, but not the solution.

- Expected Results – Description of what will be accomplished when the project is complete. Results must be measurable qualitatively or quantitatively.

- Assumptions – Includes conditions or ground rules which will govern the execution of the project, and which must be acknowledged for its successful completion.

- Roles and Responsibilities – Identify all key players involved with the project, along with their roles and responsibilities. This should include the project manager, the approving authority, and major supporting agencies.

- Authority Statement – Description of the level authority given to the project manager.

- Signature – Signatures of key project stakeholders acknowledging their agreement with the charter.

3.2.1.2 Project Objectives/Requirements

Project objectives and requirements are an essential part of the project plan because they define the overall purpose of the project. In a development effort where all requirements are known at the beginning this part of the plan would be well defined and detailed. In projects where requirements analysis is one of the development phases, the requirements would more likely be top-level, non-detailed objectives. Without some form of objectives there is nothing to plan for.

3.2.2 Project Flow

3.2.2.1 Work Breakdown Structure (WBS)

A work breakdown structure identifies the work to be done to complete the project. It is the key activity of the planning effort. The WBS, per MIL-HDBK-881, should be product-based, including hardware, software, and documentation. DoD programs usually represent the WBS as a hierarchical tree-structure like that shown in Figure 3-3, where level 1 is the overall program, level 2 consists of systems which make up the program, and level 3 is made of subsystems. It may also be represented in an outline form as shown in Figure 3-4. [3]
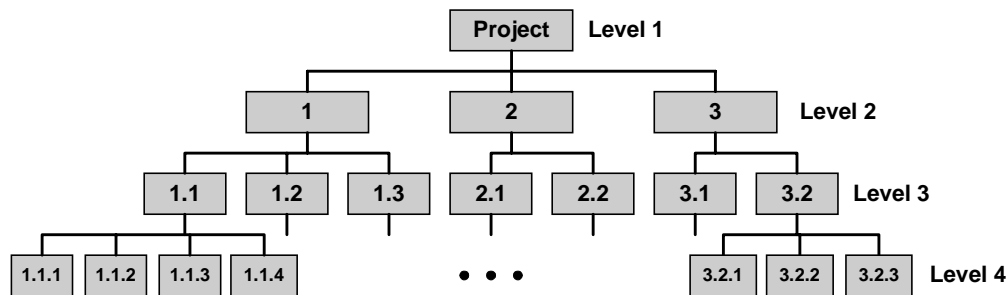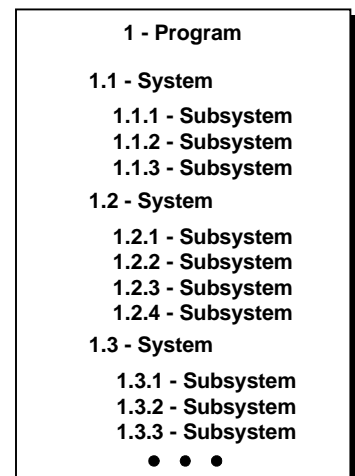

Figure 3-3 Tree Structure WBS

The levels used in the WBS should be appropriate for the project or program. Appendices B and H of MIL-HDBK-881 provide guidance for Electronic/Automated Software Systems and Common Elements respectively. The levels suggested are similar to the levels in this example.

- Level 1 – Total Program
- Level 2 – System
- Level 3 – Subsystem
- Level 4 – Software Build
- Level 5 – Configuration Item

The purpose of the WBS is to describe the whole project and the strategy for completing the project by dividing product into logical components. This makes it much easier to estimate costs, resources, and schedule, as well as assign work and manage the project. [3] Once the sub elements are known for all products, tasks and work activities can be defined to produce the products identified in the

```
   1 - Program

1.1 - System
      1.1.1 - Subsystem
      1.1.2 - Subsystem
      1.1.3 - Subsystem
1.2 - System
      1.2.1 - Subsystem
      1.2.2 - Subsystem
      1.2.3 - Subsystem
      1.2.4 - Subsystem
1.3 - System
      1.3.1 - Subsystem
      1.3.2 - Subsystem
      1.3.3 - Subsystem
            • • •
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Figure 3-4 Outline WBS

WBS.

A well-developed WBS focuses attention on project objectives and allows the project team members to see the whole picture and where their responsibilities fit in. It also facilitates the following benefits: [3]

- Identifying tasks separately from the performing organizations.
- Identifying risks.
- Assigning responsibilities.
- Monitoring time, cost, and performance.
- Developing a network diagram and identifying the critical path or chain of activities.

Application

WBS development follows these steps: [3]

1. Divide the project into manageable pieces.

    – Subdivide major project deliverables into smaller components until they clearly indicate project activities.

    – Rule of thumb: A task need not be smaller than that which can be accomplished in one reporting cycle, usually a week.

    – The product decomposition and associated work activities should reflect the product development lifecycle and processes.

2. Identify the component/task dependencies.

3. Draw it as an outline, hierarchical chart format, or even yellow sticky notes.

4. Validate the work breakdown with key team members and stakeholders.

5. Document each element of the breakdown with its source.

6. Use the WBS, updating it as necessary with the change control process.

3.2.2.2 Network Diagram

The network diagram is usually produced in the form of a chart showing the project activities with their interdependencies. It shows the various activities as chains of events, indicating activity duration and what activities must precede others (see Figure 3-5.) The key feature of the network diagram is the critical path, which identifies the longest duration chain of activities on the project. This determines the minimum time in which the project can be completed. By carefully monitoring and managing critical path activities (an approach known as the *critical path method*) the project manager can be aware of, and perhaps avert, impact to the project schedule. Network diagrams are discussed in greater detail in Chapter 7, Time and Schedule Management.
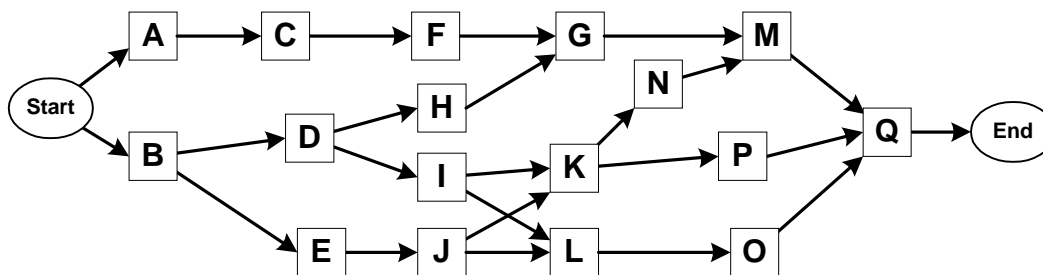

Figure 3-5 Example Network Diagram

3.2.2.3 Schedule

The project schedule describes when project activities start, how long they last, and when they should be finished. Key to developing an accurate schedule is having well defined work packages and task dependencies. A work package is a detailed task description, along with estimates of labor, materials, and time duration needed to perform it.

The task dependencies describe which tasks must precede others. These two inputs allow the scheduler to accurately develop a schedule which shows what should be happening at all times. The schedule should also indicate the critical path, or chain of events which determine the overall duration of the project. The schedule is usually in the form of Gantt charts and milestone charts. [4]

Scheduling is discussed in Chapter 7, Time and Schedule Management.

3.2.2.4   Communications Plan

Another element of the project plan is the communications plan. It identifies the different groups or individuals that must pass information between and among each other. It also defines the type of information being communicated and frequency. This should be documented for the higher levels of reporting, but should only be defined for the working levels as needed. Communications needs will change throughout the project and the plan will need to be modified.

3.2.2.5   Risk Management Plan

Knowing what risks the project faces and managing those risks is essential to successful completion of the project. While some problems come up unexpectedly, most risks can be foreseen and prepared for. A description of possible risks and a plan to avoid or minimize those risks is an essential part of the overall program plan.

Risk analysis and mitigation planning are covered in Chapter 5, Risk Management.

3.2.3   Project Allocations

3.2.3.1   Spending Plan/Budget

Costs information is needed to determine whether the project can be accomplished within the available budget. The important items to include in the spending plan are the costs for accomplishing the different tasks, the total cost of the project, and rate of spending for the different tasks and the whole project. This information will provide a baseline for the project manager to monitor and manage project costs.

Estimating costs and managing budgets are discussed in Chapter 6, Cost Management.

3.2.3.2   Resource Allocation

Projects cannot be performed without resources. The primary resource is usually labor. Other resources may include equipment, materials, transportation, offices, and other facilities such as test, manufacturing, printing, etc. Resource planning should identify what resources are needed in what quantity, and when and how long they are needed.

3.2.3.3   Configuration Management Plan

The configuration management plan defines the process and rules for establishing or baselining the system and for incorporating and documenting changes to the system being developed or to its components.

Configuration management is presented in Chapter 9.

3.2.4   Project Measurement

3.2.4.1   Metrics Analysis Plan

If you can't measure it, you can't manage it. The project measurement plan identifies the aspects of the project to be used as metrics and how those metrics are collected and used.

Measurement and metrics are covered in Chapter 8.

3.2.4.2   Test Plan

The project will include various types of testing throughout its development, integration, and acceptance activity. The test plan defines the testing objectives and strategies for the project. It should describe the testing phases, when testing is to be performed, by whom, and the types of testing to be performed, including unit, interface, integration, regression, system/functional tests, etc.

Testing is covered in chapter 13.

3.2.5   Signoff to Plan

Ideally, the project plan should be developed by representatives of the project team and all major stakeholders. Their input aids in providing a sense of ownership and getting them to support the plan. Where the plan cannot have everyone's input, it is still important to have written agreement from all interested parties to ensure everyone is working to the same plan and to have their support.

3.3 Planning Checklist

This checklist is provided as to assist you in developing a project plan. If you cannot check an item off as affirmative, you need to either rectify the situation or develop a contingency plan to solve problems that may arise.

Before Planning

❑   1. Have you published a list of contacts for all stakeholders and team members?

❑   2. Do you have adequate, unambiguous project objectives or requirements to work with?

❑   3. Do you have an action plan for developing the project plan, including a schedule and a responsibility matrix for participants in the planning activities.

❑   4. Do you know which activities depend on outputs from other activities?

❑   5. Have you documented the planning process?

❑   6. Have you documented all constraints and assumptions? [5]

❑   7. Do you have a written outline listing the contents of your project plan?

❑   8. Have you chosen computer based tools for planning and managing the project?

During Planning

❑   9. Are project developers included in the planning process wherever possible? [5]

❑   10. Are you avoiding *paralysis by analysis*, where things are studied to such a level of detail that action never takes place?

❑   11. Are you following your planning process?

❑   12. Are the defined tasks unambiguous?

❑   13. Does each task have a single point of responsibility?

❑   14. Can each task be performed by an individual or a single team?

❑   15. Is each task associated with a single, continuous time frame?

❑   16. Have you considered holidays, vacations, and training in your schedule and staffing plans? [5]

❑   17. Have you considered project management activities such as planning, meetings, and managing people? [5]

❑   18. Have you considered overhead time such as system down time, outages, or system repairs? [5]

After Planning

❑   19. Is your plan realistic, that is, achievable? [5]

❑   20. Are all stakeholders and participants committed to supporting the project objectives?

❑   21. Have all involved parties formally agreed with the project plan?

❑   22. Does your project scope or any of the objectives need to be modified?

❑   23. Have you documented lessons learned from the planning process?

3.4 Regulations

- MIL-HDBK-881: www.acq.osd.mil/pm/newpolicy/wbs/mil_hdbk_881/mil_hdbk_881.htm

3.5 References

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[2] Lewis, James P., *Fundamentals of Project Management*, Chapter 2, American Management Association, 1997.

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3.6 Resources

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- Strategic Planning: www.mapnp.org/library/plan_dec/str_plan/str_plan.htm

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