

## PS.07

# Project Planning—Then Scheduling

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**E**ffective project planning begins and ends with the efforts of the project team. How well the project team has developed the project plan contributes to the success or failure of the project.

The project schedule is one of many project management tools used to measure progress against the overall project plan. There are any numbers of reasons that projects do not complete as scheduled. Too often the blame is placed on the project schedule. The reality is that the project was probably not properly planned and subsequently that flawed plan was “interpreted” into a schedule to fit the project’s required completion date.

This presentation will focus on the necessary elements of project planning: Who? What? Where? When? And How? It also describes the actions required by the project team in order to translate that plan into a meaningful project schedule that serves as a management navigation tool to guide the project team toward successful project completion.

With this focus on the concepts and implementation of planning (who is involved in the planning, what is going to be done, where, when, and how the planning tasks should be accomplished) we first should answer the question of why we should plan projects.

## WHY PLAN?

Project participants have often considered the level of effort required in project planning as a waste of time [17]. However, research has shown that project performance is significantly improved when planning is successfully accomplished. The Construction Industry Institute (CII) chartered a team to determine the affect of pre-project planning on the success of projects. This CII Pre-Project Planning Research Team conducted a detailed study of 62 capital facility construction projects to determine how the effort expended on pre-project planning affected the success of the projects. “Analysis of the data indicated that pre-project planning is vital to project success and should be adopted as a best practice of corporate business organizations that perform capital facility construction projects [7].”

The CII study published in 1994 reported that the pre-project planning level of effort directly affects the cost and schedule predictability of the project. Using four significant variables of

Budget, Schedule, Design Capacity and Plant Utilization, the CII team had compared the project’s success to the project authorization estimate. “As the level of pre-project planning (increased), average project cost performance favorably decreased by as much as 20 percent; average schedule performance decreased (improved) by as much as 39 percent. Similarly, plant design capacity attained and facility utilization improved by about 15 percent. In addition, project scope changes tend to decrease as the level of pre-project planning effort increases [8].”

Based upon those percentages for project improvement, it would seem appropriate that project planning efforts would be a desired investment for all projects.

## WHAT IS THE PLAN? WHAT IS PLANNING?

A project plan is the documentation of the project planning efforts. The Project Implementation Plan (PIP) is a definitive document regarding the project scope, schedule and cost that is “implemented through the project’s functional plans and procedures: safety and health, environmental, engineering, procurement, construction, quality control, project controls, and automation [3].”

Project Plans exist under a variety of titles, based upon the size of the project. From large to small projects the plan titles may be: Project Management Plan; Construction Plan; Task Order Plan or Task Work Package. Regardless of the size of the project, the plan should be developed and organized in functional sections and the project planning team must review the overall plan to ensure that it is coordinated and consistent with the project goals and objectives. “A project plan supported by key project members and others who influence project destiny is fundamental for achieving project goals ... (and) should be presented in a simple document that includes project policies, philosophies, guidelines, responsibilities, and major milestone events [5].”

In his keynote address for the Fall 2003 Seminar at the East Tennessee Section of AACE International, Joel Koppelman, CEO of Primavera, quoted former US President and World War II Allied Commander Dwight D. Eisenhower as follows “I have always found that plans are useless, but planning is indispensable.” All too often, the project plan is a volume of paper compiled to meet a submittal requirement, and the “block is checked ... move

on.” Instead of getting lost in the assembly of the plan volume, the project planning team should have started with a blank sheet of paper and actively planned the project from beginning to end.

Pre-project planning is defined by CII as “the process of developing sufficient strategic information for owners to address risk and decide to commit resources to maximize the chance for a successful project [5].”

Planning as defined by AACE is “the determination of a project's objectives with identification of the activities to be performed, methods and resources to be used for accomplishing the tasks, assignment of responsibility and accountability, and establishment of an integrated plan to achieve completion as required [1].”

### WHO DOES THE PLANNING?

The project management professional organizations generally agree upon the required participation and responsibilities for project planning. Potential capital construction project participants include the Owner and Contractor Companies: the Project Manager, Project Engineer, Process Engineers, Lead Discipline Engineers, Project Team Members, Facility Operations and Maintenance Supervision. All of these project participants have distinct roles and responsibilities for successful project planning. The key members of the project planning efforts are the Owner, the Project Manager and the Project Planner/Scheduler.

### THE OWNER

Pre-project planning is an owner responsibility that must be tied closely to business goals. Consultants and other experts may be required to supplement the owner's staff in this process but the Owner cannot completely delegate the planning responsibility and must ensure that it is performed properly. Operations, business, and project management participants must be integrated into pre-project planning early in the process [6].

Pre-project planning is a complex process that must be adapted to the business needs of the company. “Corporate goals and guidelines for both pre-project planning and the project must be well defined and aligned among project participants. Alignment requires involvement of operations, business, and project management personnel early in the pre-project planning process [7].” Key individuals must be empowered by their management to act on these business goals, as well as be accountable for their actions.

The various groups interviewed during the CII research investigation had a diversity of opinion about many areas concerning project success and pre-project planning effort. “This diversity of opinion should serve as a reminder to project participants that the objectives of the project are best achieved through a team-based blending of the project stakeholders [7].” Several techniques such as team building and partnering have been employed with various degrees of success in the efforts to align the goals and objectives of project team participants. Those techniques will not be addressed in this presentation.

### THE PROJECT MANAGER

According to Jim Lewis in his book, **The Fundamentals of Project Management**, the project manager's role is to:

- Facilitate the preparation of the project plan and Work Breakdown Structure (WBS)
- Facilitate the estimation of timelines and project phases
- Identify key project results and milestones
- Involve team members in the planning process, and
- Involve the client (Owner) in defining project goals and key results [15].

### THE PROJECT PLANNER/SCHEDULER

The AACE International **Recommended Practice No. 14R-90**, defines the role of the Project Planner/Scheduler in the planning process to accomplish the following:

- Establish a schedule development process to determine the scope of work, client dictated parameters, schedule hierarchy, division of project responsibility, schedule approval and requirements and distribution;
- Identify major activities to be performed and the preferred sequence in which they are to be accomplished;
- Establish an integrated plan to achieve completion as required; and
- Coordinate with project management to establish cost/schedule areas for the further definition of the scope of work [2].

The Project Planner/Scheduler supports the efforts toward the development of the project plan and translates the project plan into the project schedule. Other Project Management sources identify the Planner/Scheduler responsibilities as follows:

- Provide expertise to develop methodologies, techniques and tools for planning and scheduling;
- Provide direct support and expert consulting advice to project personnel regarding planning and scheduling;
- Ensure that required project planning and scheduling controls are appropriately implemented and maintained; and
- Assist the Project Manager with establishing realistic and achievable schedule baselines [18].

The project planning effort must be coordinated with these key project planning team members facilitating the development of the details about how everyone will work and communicate with each other, in order to ensure a clear understanding of how they will contribute to the future success of the project. The CII pre-project planning team recommended, “All pre-project personnel involved in the project construction process need to understand what activities occur, and what their roles and responsibilities are in the process [7].”

## WHEN TO PLAN THE PROJECT?

Project planning begins early and continues as the project moves through the various phases of the project life cycle from Project Conception through to Project Completion and Closeout. Rather than a straight-through process, it is best thought of as a planning cycle [16]. Even as the project progresses into the execution phase, it is essential to recognize that the plan is a living document and should be reviewed and revised as the project scope changes.

Companies need to authorize adequate time and resources for project planning to be accomplished successfully. Qualified and experienced personnel are required to provide inputs during the project planning process, conduct analysis, and make recommendations to the decision-makers.

The project team must be involved early and continuously until the project plan is completed and approved. The Project Manager must negotiate commitments from management for all project team members, equipment and assets to support the planning effort and the project.

The contractor construction companies should be brought into the pre-planning process early in order to provide expertise related to constructability, site and logistics planning, and project delivery methods. "Construction planning is a fundamental and challenging activity in the management and execution of construction projects [13]."

For construction projects "total project design should be completed to between 10 and 25 percent prior to project authorization. The development of a written project charter; project control guidelines; project execution approach; and participation of an adequate number of key organizations is essential to the success in pre-project planning [8]."

## HOW DO YOU PLAN?

Most Project Management professionals will agree that there is a basic five-step process involved in developing a project plan. Essential questions are answered during project planning:

- What? Technical objectives (Scope)
- How? Work Breakdown Structure (WBS)
- Who? Resource Commitment Organization Breakdown Structure (or OBS)
- When? Timeline then the Schedule later in the planning process
- How Much? Budget Estimate

That follows as the recommended sequence to develop the project plan:

- Define the Project Scope
- Establish the Work Breakdown Structure (WBS)
- Identify Resources (people and capital assets)
- Establish Timeline and Sequence of Deliverable Tasks
- Determine the budget for each component or group of tasks.

According to Knutson and Bitz "The act of listing tasks in a schedule or collecting costs in a cost report does not constitute project planning [14]." Integrated planning establishes the scope and level of responsibility and authority for all project team members. A variation of the five-step planning model proposed by Knutson and Bitz is shown as follows:

- Define the project
- Model the project (WBS and Sequence of Tasks)
- Estimate and Schedule the project
- Balance the Plan
- Approve and Publish the Plan [14]

Balance the Plan is a challenging step due to both limited resources within the project and other projects. This is where the project planner/scheduler will be a key interface with other project participants to ferret out the "hard" resource requirements and task sequences that could lead to the successful execution of the project plan.

## DEFINE THE PROJECT SCOPE

Defining the project scope develops the framework for the project. To develop the project scope statement, the planning team must analyze the needs of the organization, the goals and priorities, and the overall objectives of the project. This step in the planning process will take the most effort and commitment of key upper management resources.

The CII Team further recommended in their pre-project planning process "to develop a Project Definition Package which involves: analysis of project risks; documenting project scope and design; defining the project execution approach; establishing project control guidelines; and then compile that as the Project Definition Package [9]." Success in defining the project scope and objectives and deliverables is essential to the ultimate success of the total project planning process.

## ESTABLISH THE WORK BREAKDOWN STRUCTURE (WBS)

The WBS displays and defines the structure of the project and relates the elements of work to each other and the desired project end product. A recent Project Management Institute (PMI) survey reported that the WBS was the preferred planning method for over 70 percent of the PMI survey respondents. However, that really is just establishing the framework of the project and is only one of the steps necessary for success of the project planning effort.

## ESTABLISH TIMELINE AND SEQUENCE OF TASKS

Before venturing further, the major project tasks must be placed (plotted) along a timeline in the sequence that must be accomplished for success. Key project milestones must be identified, and the plan must be analyzed within those events to deter-

mine if it can be successfully accomplished. Several iterations of this planning step may be required in order to align the planning timeline to the project completion objective.

Scheduling is the process of developing a list of the detailed activities that need to be accomplished for each of the project deliverables. The activities are organized in the logical sequence with the time (duration) and the estimated resources required to complete the activity.

“Construction planning (which establishes the major construction tasks, technology and construction methods for the project and) is the necessary forerunner to scheduling [13].” This planning timeline establishes the framework for the subsequent detailed scheduling, establishing durations, resources, and properly sequencing the activities that will result in the timely and efficient execution to reach successful project completion.

### IDENTIFY RESOURCES (PEOPLE AND CAPITAL ASSETS)

This phase of the project plan requires the organizations’ Human Resources involvement to determine whether the project will be able to successfully staff the project, and when those resources will be available. Capital assets (land, facilities, and equipment) required for successful project execution must also be identified in this step of the planning process.

### DETERMINE THE BUDGET FOR EACH COMPONENT OR GROUP OF TASKS

The last major step in the planning process is the preparation of the project’s estimated cost. Each of the project participants must be responsible for developing the estimated costs for their tasks or component of the project plan. These cost estimates must then be pulled together into the estimated budget or cost for the project. As with development of the planning timeline, this step will be an iterative process in order to balance the project budget to the pre-planning estimates. Appropriate sources of funding must be considered in this overall budgeting process.

### PROJECT PLAN APPROVAL

The project planning process consists of five basic steps that answer the questions about who, what, where, when and how related to the project. These five steps, when properly performed, will result in the development of a project plan that will maximize the potential for successful project execution. The final requirement is to obtain approval of the project plan. “Like the five blind men encountering different parts of an elephant, each of the numerous participants in the process of planning, designing, financing, constructing and operating physical facilities has a different perspective on project management for construction [13].” It is essential that all of the project participants have ample opportunity to review the complete plan and allow adequate time for management approvals of the final project plan.

As the CII study concluded, there is a positive, quantifiable relationship between effort expended during the pre-project planning phase and the ultimate success of a project. “The probability that a project will meet or exceed its (cost and schedule) goals increased as the level of effort in pre-project planning increases. The probability of project scope changes (after project authorization) also tends to decrease as the level of pre-project planning effort increases [8].”

It is important that the key project participants understand their roles and responsibilities in the project planning efforts. Their successful planning efforts will improve the potential for successful project execution. “Project success depends upon both effective planning and well managed execution [12].”

Owners should focus on organizing their pre-project planning efforts and understand that by not providing for this planning effort they are decreasing the probability of project success.

Project Managers should understand the importance of project planning in terms of project execution particularly with the extremely tight profit margins that currently exist in the construction industry. An **Engineering News Record** (ENR) advertisement published in early 1993 stated “... much of the job is something over which you have no control (i.e., specified materials, performance defined functions, etc.), but ... it is when you begin to PLAN ways and means of doing the job that you start to win or lose it. If you can do more quickly, with less lost motion, and possibly with fewer man hours to charge against the job—in other words—at a lower cost to you—you will have the edge you need ...”

All project participants must be aware of their required participation, understanding and commitment during the project planning phase, to improve the potential for the successful completion of the project. As Dinsmore described it “Planning is a means of getting things done, and not an end .... the process not only establishes what is to be done during the project’s implementation, but smooth the way to make it happen ... when performed jointly, planning clears communication channels and obligates participants to become more involved and committed to the success of the project [10].”

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