Project Management Institute

Practice Standard for Scheduling

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Preface

The *Practice Standard for Scheduling* has been developed as a complement to *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide*–Third Edition) in the Knowledge Area of Project Time Management. This practice standard describes the methods related to scheduling that are generally recognized as good practice for *most projects most of the time*. Good practice means that there is general agreement that the correct application of these skills, tools, and techniques can enhance the chances of success over a wide range of different projects. Good practice does not mean that the knowledge described should always be applied uniformly on all projects; *the project management team is responsible for determining what is appropriate for any given project*.

The project management community has strongly voiced the need for a standard to promote the development of sound schedules. In addition, the community asked for the capability to assess the adequacy of their schedules.

This practice standard is designed to provide project management practitioners, who are familiar with the *PMBOK® Guide*–Third Edition, with a summary of the benefits and advantages of a well-developed and maintained schedule model. This practice standard describes the hallmarks of a sound and effective project scheduling methodology, as well as providing quantifiable means for assessing the application of the provisions of this standard to a schedule model.

One of the most significant developments in the creation of this practice standard centered upon the clarification of the term *schedule*. It became apparent through the discussion process and the community feedback that there is significant support for the clarification of this terminology. For example, the legal precedence surrounding the term *schedule* results in this term having multiple meanings. However, the community requires the clarity that discrete terms provide.

The primary distinction that had to be made was between the tool that is commonly employed in schedule development and the output or product of the schedule development effort. Common practice has been to refer to a schedule as both: the whole program and database that is used to create a schedule; and the output of that process, namely the schedule itself. The *Practice Standard for Scheduling* defines the meaning of a schedule as two distinct terms, *project schedule* and, the newly added, *schedule model*. The terms *scheduling method*, and *scheduling tool* were introduced to link the process areas in the *PMBOK® Guide*–Third Edition with the high level process flow of schedule development. These terms are further developed in Chapter 2 and defined in the Glossary.

Thus, schedule development flows from the selection of an appropriate *scheduling method* followed by selection and use of a *scheduling tool*. Next, project-specific data is entered into the *scheduling tool* to produce the *schedule model*. From there, instances

of *project schedules* are produced for a wide range of uses. With these discrete terms, project management practitioners have the ability to trace the process areas from the *PMBOK® Guide*–Third Edition to the finished product.

This practice standard is consistent with the *PMBOK® Guide*–Third Edition. It also includes information from accepted project management practices from many industries. The Project Management Institute standards program will periodically update this standard as part of the overall planned evolution of PMI standards documents. Comments from project management practitioners are both requested and welcome. Within this standard, italicized words are defined in the Glossary or are used to identify other documents.

Chapter 1

Introduction

1.1 Why Scheduling?

Projects are generally complex endeavors and a plan is essential to guide the execution of the project. As progress is recorded on a project, the remaining work requires reassessment in light of the new information. Rarely does the execution of a project proceed as initially planned. In a typical project climate, a defined and refined scheduling process is required to predict, recognize, and address those factors and issues potentially affecting project performance.

The purpose of scheduling is to provide a ''roadmap'' that represents how and when the project will deliver the products defined in the project scope and by the project team. The dynamic nature of a project's execution is best served by a tool that allows for *modeling* of the plan and analysis due to the impact of progress and unforeseen developments.

The key to project success is to apply knowledge, experience, and intuition to a project plan, and then attempt to execute according to the plan. Scheduling is one of the basic requirements of project management planning and strategic analysis. Its main objective is to establish the time required for a project.

This supports the project in arranging funds on required dates, the mobilization of resources in a most cost efficient and cost saving manner, in establishing coordination within the project and with other projects, in the early detection of problems so that required actions can be implemented as necessary to achieve project strategic goals as planned. Also from a contractual point of view, the schedule is an important document used to record all delays and to analyze extensions of time and financial loss claims. Another objective is to provide a tool for what if analysis.

1.2 Overview

This *Practice Standard for Scheduling* describes schedule components and generally recognized good practices for schedule development. The proper use of the components and their practices will result in a schedule useable for planning, executing, monitoring, and communicating the delivery of the project scope to its stakeholders.

The purpose of scheduling is to represent the delivery of the project scope over time as defined by the project team. The schedule development process includes selecting a *scheduling method* and *scheduling tool,* followed by incorporating project

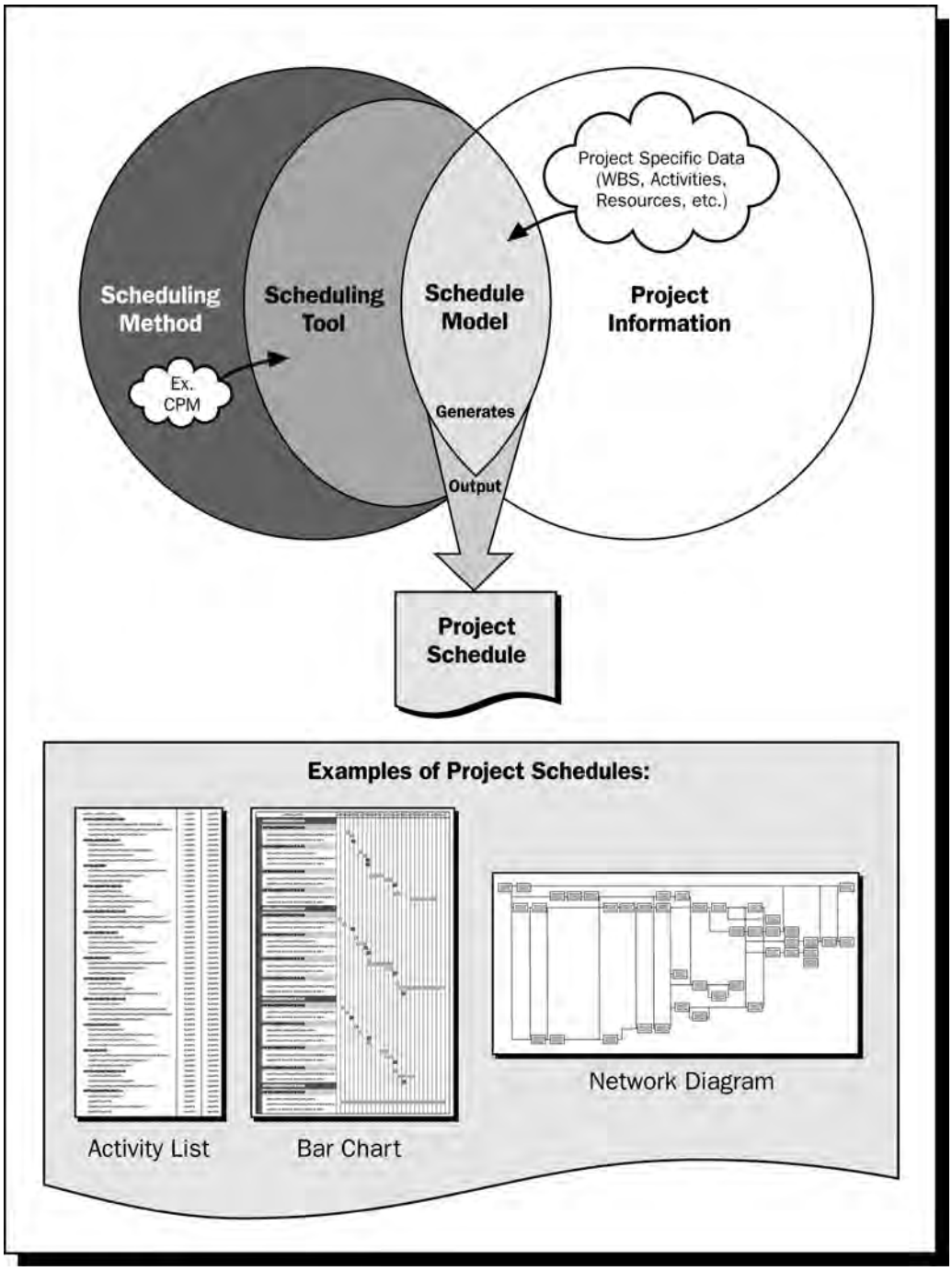

Figure 1-1. Scheduling

specific data within that *scheduling tool* to develop a project specific *schedule model*. The *project schedule model* is used to generate project schedule(s). See Figure 1-1 to better understand the interrelationships of the schedule development concepts and terminology. This process results in a model for project execution which reacts predictably to progress and changes. Once developed, the schedule model is regularly updated to reflect progress and changes, such as *scope* or schedule logic.

This standard provides an assessment tool that can be used to determine how well the components (see Chapter 4, Scheduling Components) of a given *schedule model* conform to the requirements and recommendations documented in this practice

standard. A conformance index (see Chapter 5) is developed by determining which components are used and how they are used within the *schedule model*. To conform to acceptable scheduling standard requirements, a *schedule model* must, at a minimum, contain all of the required core subset of components.

The inclusion of a component in the standard does not necessarily bear any relation to the issues of project size or complexity. The practice standard assumes that all *schedule models* have a core set of components, basic behaviors, and good practices that can be employed. Thus, project size and complexity only result in changes in scale, repetition, and timeliness of the core components. The *PMBOK® Guide*–Third Edition provides processes to address the factors regarding project size and complexity. In addition, ''generally recognized'' also assumes no significant differences between core components appropriate to scheduling practices within various industries. Industries may differ in the components they include beyond the required core components, with scale, repetition, and timeliness driving the remainder of the differentiation.

As practices evolve and develop within the project management community after the publication of this practice standard, the definition of ''generally recognized'' will also evolve. More components may be added to the core set and good practices should become less subjective.

1.3 Purpose

The primary purpose of the *Practice Standard for Scheduling* is to expand the information contained in the *PMBOK® Guide*–Third Edition, Project Time Management section (Chapter 6) into a standard. The ultimate goal of this practice standard is the production of *schedule models* that are of increasing value to the projects they represent.

Further, to properly address the needs voiced by the project management community, it was deemed essential to provide a means to assess the degree of conformance with this practice standard. In doing so, it establishes a core set of components that must be utilized in order to have a *schedule model* which meets a minimum acceptable degree of conformance.

1.4 Applicability

This practice standard is targeted at project management practitioners who are knowledgeable in the fundamentals of project scheduling. For the purposes of this practice standard, these practitioners will be known as schedulers. This practice standard is not intended to be an introduction to project scheduling, nor a how-to tutorial for developing *schedule models*.

It is a premise of this practice standard that the reader has a basic working knowledge of the project management process groups, Knowledge Areas, and other key concepts such as scope, time, cost, and risk management, as defined in the *PMBOK® Guide*–Third Edition. It is also necessary that there exists a Work Breakdown Structure (WBS) for the project, which conforms to the processes defined in the *PMBOK® Guide*–Third Edition, and the *Practice Standard for Work Breakdown Structures*–Second Edition, and that appropriate planning has occurred. As schedule development progresses, the scheduler may apply related practice standards such as the *Practice Standard for Earned Value Management*.

This practice standard is applicable to individual projects only, not portfolios or programs. However, because portfolios are collections of individual projects, any individual *schedule model* within those structures could make use of, and be evaluated according to, this practice standard.

Chapter 2

The Schedule Development Process

2.1 Schedule Development Process Overview

The Schedule Development process includes selecting a *scheduling method*, *scheduling tool*, incorporating project specific data within that *scheduling tool* to develop a project specific *schedule model*, and generating *project schedule(s)* (See Figure 2-1). This process results in a model for project execution which reacts predictably to progress and changes. Once developed, the *schedule model* is regularly updated to reflect progress and changes, in areas such as scope or logic.

During project planning, a process to develop a *schedule model* that meets the needs of the project and its stakeholders begins. Activities must be described uniquely, including a verb, at least one object, and any useful, clarifying adjectives. The resources required to complete each *activity* should be considered to determine the duration of each *activity*. *Constraint*s must not be used in the *schedule model* to replace schedule logic. Section 6.5.2 of the *PMBOK® Guide*–Third Edition provides information on tools and techniques that can be used to develop the *schedule model*. When the *schedule model* is complete, a baseline must be established to permit comparison of progress against the original plan. An overview of this process, including required good practices and components, is shown in Figure 2-2.

Here are some key points in the Schedule Development process:

- All information relating to time management of the project must be reviewed and serves as the basis for defining each *activity*.
- Each element of the project scope, as defined in the WBS, must be supported by an *activity*, or activities, that will result in the completion of that part of the project scope. Activities must be described uniquely, including a verb, at least one object, and any useful clarifying adjectives.
- Once the *activity list* is defined, the order in which the activities will be performed must be determined and recorded. Section 6.2.2 of the *PMBOK® Guide*–Third Edition lists several tools and techniques to accomplish the sequencing of activities.
- To avoid creating artificial or incorrect activity relationships, initial *activity sequencing* should be determined independent of resource availability. After initial *activity sequencing* is complete, discretionary dependencies, inserted to address resource availabilities, may be used during the Schedule Development process.

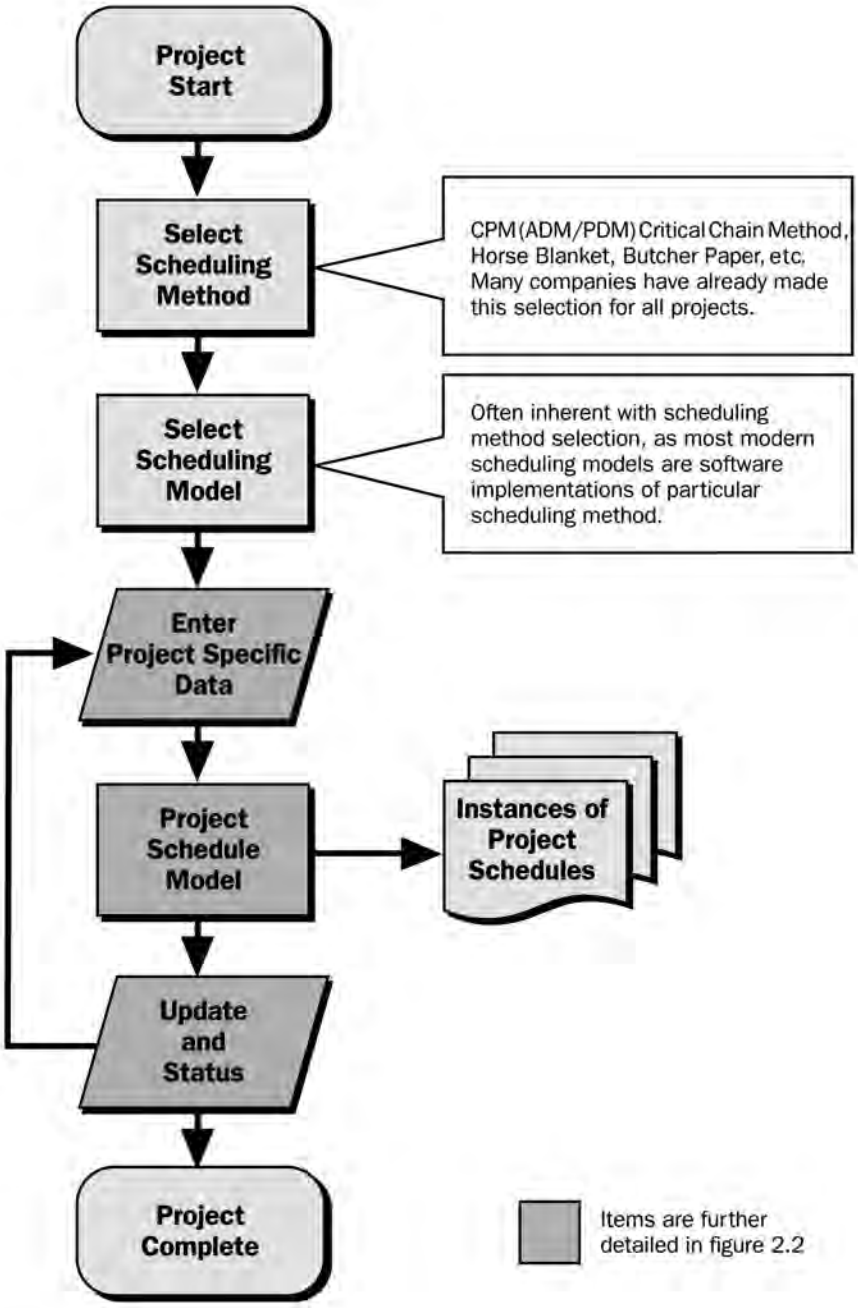

Figure 2-1. Schedule Development Process

- The resources required to complete each *activity*—including their availability and productivity—should be considered to determine the duration of each *activity*, whether or not the resources are actually applied to activities in the schedule model.
- The development of the *schedule model* must use the accumulated outputs from the *Activity Definition*, *Activity Sequencing*, *Activity Resources Estimating*, and *Activity Duration Estimating* processes.
- The *schedule model* must include at least two *milestone*s: project start and project finish.

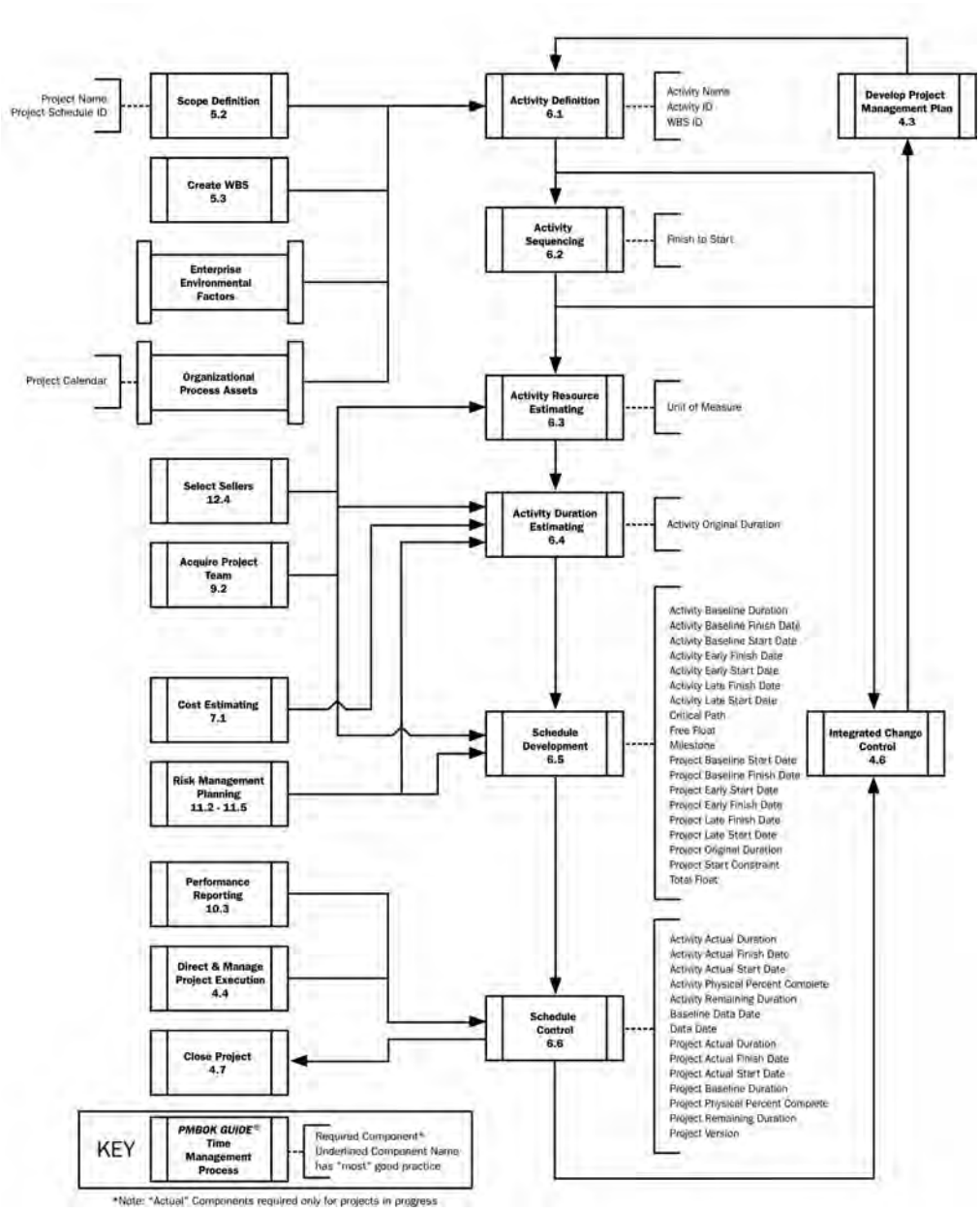

Figure 2-2. Scheduling Process Diagram

- The *schedule model* must be developed by linking each of the activities in accordance with the activity sequence and calculating activity early and late start and finish dates. This should be based on *activity duration*, resources, outside *constraint*s, network logic, and the validation of the assumptions used in the development. It must be possible to trace all activities in the *schedule model* from the *start milestone* to the *finish milestone* and back.
- *Constraint*s must not be used in the schedule model to replace schedule logic. Section 6.5.2 of the *PMBOK® Guide*–Third Edition provides information on tools and techniques that can be used to develop the schedule model.
- When the *schedule model* is complete, a baseline must be established to permit comparison of progress against the original plan.

- If the project has actually begun, the *schedule model* must be regularly updated with progress and changes in areas such as *scope* and logic to indicate the degree to which each *activity* has been completed, in terms of time and resources spent and the amount of time and resources required to complete each *activity*.
- Actual progress must be compared to the baseline plan. Any variation from this baseline plan, that exceeds predetermined user-defined threshold limits, shall be reported.
- Corrective actions or changes must be made as part of the Integrated Change Control process (Section 4.6 of the *PMBOK® Guide*–Third Edition), where the approval process is documented to reflect changes in actual project performance.

2.2 The Scheduling Method

Scheduling methods provide the framework within which schedule models are developed. One of the most common is the *critical path method* (CPM) (see Section 2.2.1 Critical Path Method); another scheduling method is Critical Chain.

The first step in the Schedule Development process is the selection of an appropriate method. Some organizations have chosen to standardize on a specific software tool. In this case, the *scheduling method* decision has already been made and does not need to be made again. Since it is the most commonly used method, this practice standard focuses on CPM.

2.2.1 Critical Path Method

The *Critical Path Method* (CPM) is a schedule network analysis technique (see Section 6.5.2.2 of the *PMBOK® Guide*–Third Edition) used to determine the minimum total project duration and the earliest possible finish date of the project as well as the amount of scheduling flexibility (the amount of float) in the schedule network. Early start and finish dates are calculated by means of a forward pass, using a specified start date. Late start and finish dates are determined by means of a backward pass, starting from a specified completion date. This date may be the project early finish date determined during the forward pass calculation or a target date.

To be practical, users should utilize the CPM calculation algorithms provided by their project management scheduling software. These tools automate the calculation of the mathematical forward pass and backward pass during the critical path analysis, generally using either the *Precedence Diagramming Method* (PDM), the *Arrow Diagramming Method* (ADM), or the *Critical Chain Method*.

To establish a meaningful *critical path*, it is necessary to develop a logic-based network of activities with empirically derived durations for execution in a realistic and practical manner. Therefore, there must not be any *open ends* other than the project start and finish *milestone*s. *Constraint*s must be restricted to those that represent external or internal conditions that cannot be feasibly accomplished with activity logic.

If overall resources and their availability are not considered, the *critical path method* calculation can sometimes produce unachievable schedules. To prevent this, resources should be identified and assigned, and resource leveling methods employed. *Resource lag* defines a fixed period of time that will occur between the start of the *activity* and the use of the resource.

2.3 The Scheduling Tool

The *scheduling tool* contains schedule components and the rules for relating and using the components to represent the process for completing a project. This is easily visualized by running a scheduling program and, before the addition of any activities or other project specific data, observing the various components in that tool which are available to build the *schedule model*.

The *scheduling tool* is used to assemble the *schedule model* and provide the means of adjusting various parameters and components that are typical in a modeling process. Typically, it includes the capability to:

- Select the type of relationship (such as finish-to-start or finish-to-finish)
- Add *lag*s and *lead*s between activities
- Apply resources and use that information along with resource availability to adjust the scheduling of activities
- Add *constraint*s where logic (precedence relationships with other activities) alone is not adequate to meet the project requirements
- Capture a specific schedule as a *baseline* or *target schedule*
- Change various parameters within the *schedule model* such as imposing a different project completion date in an attempt to shorten the overall project duration to analyze the impact that these changes would have on the project schedule
- Compare the most recent schedule against the previous one or against a target or baseline to identify and quantify trends or variances.

2.4 The Schedule Model

The introduction of project-specific data, such as the activities, durations, and resources, into the *scheduling tool* creates a *schedule model* that is specific to a particular project. This *schedule model*, in turn, is used to generate various sets of dates, depending on the intent of a specific modeling iteration. Thus the *schedule model* produces a *project schedule*, which contains the planned dates for completing project activities.

The *schedule model* provides a tool for analyzing alternatives. The project team utilizes the *schedule model* to predict outcomes and to compare changes in the model with the project team's expectations of the consequences of variation such as progress or scope.

The *schedule model* can be used to produce *critical path*s and instances of schedules, as well as other outputs such as resource profiles, task assignments, and records of accomplishment. It will provide time-based forecasts, reacting to inputs and adjustments made throughout the project's life cycle.

2.4.1 Schedule Risk Analysis Process

Schedule models will provide reliable predictions of dates and critical path only if the activity relationships (predecessor and successor) are clearly defined and the activity durations are known with a high degree of certainty.

Schedule risk analysis uses information about the uncertainty of activity durations, building on but also going beyond the well-constructed *schedule model* and the CPM process, to help answer the following questions:

- What is the likelihood of finishing the project as scheduled?

- How much contingency is needed to establish a completion date with a probability of success that is acceptable to the stakeholders?
- Which activities are the most likely to delay the project?
- What actions can be taken to control risks in the schedule?

If estimating activity durations involves a great deal of uncertainty, a commonly used technique is the application of a three-point estimate. These three points correspond to the values of activity optimistic duration, activity most likely duration, and activity pessimistic duration. In order to quantify uncertainty about the overall project duration, starting from the three-point estimate of every *activity*, PERT (which uses an approximation of Beta distribution function) can be employed. When information about a single activity duration is represented by more than three points (e.g., general probability function, PDF), or less than three points (e.g., uniform distribution function) or even when PERT assumptions do not apply (e.g., central limit theorem not applicable due to too few activities in the sequence), simulation tools can be employed (Monte Carlo simulation).

Schedule risk analysis should be used for projects where the standard CPM durations and critical paths are viewed as risky by stakeholders. Furthermore, the schedule risk analysis should, at minimum, address the risk event(s) identified as having a high probability and impact.

When used, schedule risk analysis must be based only on schedule models that include at least the minimum components required by this practice standard.

The activity optimistic duration and activity pessimistic duration represent the extremes of possible durations. The standard 3-point estimates (i.e., optimistic, most likely, and pessimistic) of duration for risk analysis should be made by those who will be performing the activities or by one who has experience performing similar activities. If past actual results on similar activities are available, they should be referred to while generating these risk range estimates.

2.5 The Project Schedule

A *project schedule*, in its simplest form, is a table of activities with the associated scheduled dates when activities and *milestone*s are to take place. In the project management profession, *project schedules* are used to guide the execution of the project as well as to communicate, both vertically and horizontally, to all participants and contributors to the project when certain activities and events are expected to happen.

In current project management practice, the term *schedule* is often used interchangeably to mean both the schedule model (typically a computerized CPM scheduling tool with project-specific data entered and calculated) and the activities with their associated dates. For clarity and consistency with the *PMBOK® Guide*–Third Edition, this practice standard defines the project specific data within the tool as a *schedule model* and the resulting list of activities with dates, based on the project specific data, as a *project schedule*. *Project schedules* can be presented in many ways, including simple lists, bar charts with dates, and network logic diagrams with dates, to name just a few.

Project schedules can take the form of an early start schedule, late start schedule, baseline schedule, resource-limited schedule, or target schedule. Other types of schedules are actually derivatives of these five basic schedules. Such derivatives include master schedules, milestone schedules and various summary schedules. The use of these terms may vary from project to project and company to company.

2.6 Maintenance

At regular intervals, as the project progresses, the *schedule model* must be updated. Schedule maintenance of a good schedule is comprised of two major processes.

First, the project team needs to report progress and performance on a predetermined, periodic basis (see Section 3.3.1.5). Objective reporting criteria, as well as the frequency of data reporting, needs to be established when the schedule is developed. Thus, from the onset, all project stakeholders will be aware of, and supportive of, the progress reporting requirements as defined in the project communications plan. Once the progress and performance are reported, the current project status can be compared to previous reporting periods, including the *baseline*.

Second, the project team needs to develop and maintain a process for *schedule model* changes. These changes can be the result of logic or scope revisions, but regardless of the source, the project team must plan for their occurrence. To assist in the development of a change control process, see Table 3-45 in the *PMBOK® Guide*–Third Edition for a mapping of Knowledge Areas to the Monitoring and Control Process group.

Chapter 3

Schedule Model Good Practices Overview

This chapter is designed to provide guidance on 'generally accepted good practices' for the development of an effective *schedule model*. It will link the discussion of the schedule development processes described in Chapter 2 to the scheduling components defined in Chapter 4. Although this chapter provides guidance, it is not the purpose of this standard to provide a comprehensive guide on how to develop a *schedule model*. For comprehensive instruction on developing a *schedule model*, please refer to courses and text books on the subject. The intent of this chapter is to provide an overview with examples of how scheduling good practices might be utilized.

3.1 Purpose of the Schedule Model

The purpose of the *schedule model* is to provide a useful 'road map' that can be used by the project manager and the project team to assist them in completing the project successfully. The schedule becomes a tool developed by the project team that reflects its vision of how the project will be performed. The *schedule model* reflects when activities are supposed to start and finish and reacts appropriately to changes in progress, scope, etc., as they are added to the *schedule model* over the life of the project. A well-developed *schedule model* is a dynamic tool that can be used to predict when the project work that remains to be completed can reasonably be expected to be accomplished. Simultaneously, it allows the project team to look at the performance of the project to date, and use that data to make more accurate projections about the future. Further, once the project completes, the project *schedule model* forms the basis for lessons learned activities and once updated becomes the foundation for similar projects in the future.

The *schedule model* describes the work to be done (what), the resource(s) required to do it (who), and the optimum sequence (activity starts, finishes, and relationships) in which the work should be undertaken (when). How to do the work is defined by other documents in the overall project plan as defined in the *PMBOK® Guide*–Third Edition. Establishing a realistic and achievable *schedule model* is one of the critical

initial actions in this process. Equally important is the regular reporting of status and updating of the *schedule model* to support the ongoing monitoring and controlling of progress as the project work is executed.

3.2 Designing the Schedule Model

The *schedule model* requires planning and design in the same way every project *deliverable* is planned and designed. To create a useful tool for controlling the progress of the project and communicating information regarding the planned work and progress, the project team needs to consider a number of factors and seek to optimize the outcome. Some of the key questions to consider are:

- What is an appropriate level of detail to use for the activities? Too much detail produces a confusing and overly large schedule model that is difficult and expensive to manage; too little detail means there is insufficient information for the ongoing control of the project. A simple qualitative guideline that can be used to determine if the level of detail is adequate is when an assigned person knows exactly what needs to be performed without having to rely on other sources for guidance.
- What is an appropriate cycle for gathering project status and updating the *schedule model*? The period between updates needs to be long enough for the information from the last update to have been issued to the project team and for the team to have had a chance to act on the new information prior to the next status.

The choice of cycle time is influenced by the rate of change in the project. For relatively stable, low-risk projects, a monthly or bimonthly status cycle may be appropriate. For volatile, high-risk projects, updates may be required at every change of shift or even hourly.

- Which 'time scale' should be used: minutes, hours, days, weeks or months? The optimum answer depends on the frequency of the control processes and the level of detail needed in the activities. However, time scales should remain consistent throughout the project schedule.
- What reporting requirements will the schedule need to fulfill? Understanding the types of reports needed from the *schedule model* to create an 'instance' of the project schedule provides guidance on the optimum coding structures that need to be built into the *schedule model*.

The development of a 'good schedule' is achieved through the consistent application of sound general practices. Experience gained over time will assist the scheduler in selecting optimum answers to the design questions.

3.3 Elements of Developing a Good Schedule

This section offers a general overview of the essential elements that must be considered by the project team when developing a good schedule. The good practices are shown for each component contained in the components list of this practice standard (the scheduler is strongly encouraged to review and understand all of the aspects associated with each component defined in Section 3.5).

3.3.1 Developing the Scheduling Framework

.1 Determining How the *Schedule Model* Will be Developed
At the outset, the project manager, in conjunction with the project team, should determine a development plan for the *schedule model*. The key considerations are: determining if rolling wave planning will be required (see Section 6.1.2.3 of the *PMBOK® Guide*–Third Edition), if the *schedule model* can be developed in its entirety, and determining the stakeholders whose input will be required as part of the schedule development process. The standard will refer to the person taking the lead in developing the *schedule model* as the scheduler.

.2 Understand the Full Scope of the Project
The scheduler needs to review and understand the project's scope documents with particular emphasis given to the WBS. These documents provide the background, information, and understanding needed to develop the *schedule model*. The goal of this process is to ensure that all aspects of the project scope have been adequately defined and included in the *schedule model*.

Activities in the schedule model represent the work that produces the *deliverables* or work packages identified in the WBS; thus, all work elements in the WBS should be directly traceable to a *schedule activity* or group of activities. Conversely, each *activity* should roll up into only one WBS element.

.3 Identify the Project and Schedule—Project Schedule ID
Every *schedule model* needs to have a unique name and identification number to identify the project. Each version of the *schedule model* needs to have a unique version number or ID. This is essential to allow the proper archiving of project documents and audit processes.

.4 Establish Project Calendars and Work Periods
The scheduler will determine, in concert with the project team, the work periods which be selected for the project. These work periods may be different for specific activities or portions of the project including resources. Some of the calendar issues to consider include:

- Number of working days in a week
- Number of shifts to be worked each day
- Number of hours to be worked each shift or day
- Any periods of scheduled 'overtime' work or non-working time (e.g., holidays).

These elements play a major role in determining the number and structure of the project calendars required for the schedule. The use of multiple calendars introduces significant complexity to the calculation of float and the critical path. However, while scheduling is simplified by the use of a single calendar, one calendar may be inadequate for managing the project.

Generally accepted practice is to use a default project calendar which is adequate and reasonable to perform the work, based on the project's normal working times. This project calendar then may be used as the primary or default calendar for the project activities. This allows the project team to establish and schedule different working periods or calendars, if needed on certain activities.

.5 Establish the Optimum Project Update Cycle
The project management team, using the expertise of the scheduler, should determine the appropriate frequency for performing updates and status against

the schedule. This includes determining at what point in the cycle the update will occur and how often the status will be reported. The update cycle should account for how management intends to utilize the data generated from the *schedule model*, including the timing of review meetings, management reporting requirements, and payment cycles which often are tied to updates. The key is to select a cycle time that provides management with an optimum level of control information without being overly burdensome on the people doing the reporting and analyzing, but should generally be one month or less. The optimum update cycle will vary with industry and project intent—from hourly updates for planned outage projects for manufacturing/production facilities to weekly or monthly updates for major construction or software development projects. The chosen update cycle has a direct relationship or bearing on the activity durations contained within the schedule.

.6 Designing an Effective Activity Coding Structure

A reasonable and useful code structure should be developed so that selecting, sorting, and grouping of the schedule data to facilitate the development and maintenance of the *schedule model*, as well as meeting the project reporting requirements, is easily accomplished. Well-designed code structures are also very helpful in analyzing project performance data by facilitating aggregation, selection, and sorting to highlight trends and anomalies.

A structured activity ID/numbering scheme may form part of the overall coding design. Using a structured numbering system may allow the users of the schedule to have a better understanding of how a particular *activity* fits into the bigger project picture by grasping the significance of the activity number itself. At a minimum, an activity number must be unique, and follow a scheme appropriate to the project.

Emphasis should be placed upon using a sound, well-conceived activity coding structure that is separate from the *activity identifier*. Activities can be coded with more than one code for each *activity*, each code holding a separate value, thus allowing outputs to be customized for different purposes. For example, codes can be used to identify project phases, subphases, location of work, and the responsible person or organization. The codes can be used alone or in multiple combinations. To achieve flexibility and enhanced functionality, most scheduling software supports multiple codes for each *activity*.

.7 Determining Resource Planning Requirements

If the schedule is to take resource availability into account, the resource pool available to the project needs to be determined together with any special resource calendars, skill sets, and availabilities. Resources used for scheduling purposes may be the same or a subset of the resources used for cost estimating (Sections 6.3 and 7.1 of the *PMBOK® Guide*–Third Edition).

Just as activity codes can be used to classify and organize activities, resource codes can be assigned to resources to classify resources according to organization, skill level or type, reporting structure, etc. And, just as Activity IDs should be structured into a meaningful scheme, Resource IDs should be similarly structured.

3.3.2 Developing the Baseline Schedule

.1 Define Milestones

Once the scheduler has a feel for the overall structure of the project data discussed previously, he or she can begin to lay out the project's *milestone*s. *Milestone*s will have zero duration, will be used as bench marks to measure progress against, and can also reflect the start and finish points for various project events or conditions. Generally, a *milestone* will represent the start or completion of a part of the project and/or may be associated with external *constraint*s, such as the completion of a deliverable or the receipt of an external input. As a minimum, each project must have a start *milestone* and finish *milestone*.

.2 Design the Project's Activities

The scheduler, in conjunction with the individuals responsible to perform the work of the project, can begin to create the list of activities that will need to be performed to complete the project. The characteristics of a well-designed *activity* include:

- The *activity* is a discrete element (or block) of work that is a tangible element of the project scope
- A single person should be responsible for performing the *activity*. This does not preclude the idea that multiple resources may be required to accomplish the *activity*, but it does require that a single entity is responsible for its performance. That person should be the same one who will report progress on the *activity*.
- Activities describe the work that must be accomplished. As such the description for each *activity* must start with a verb and contain a unique object. Adjectives may be helpful to clarify ambiguities. For example, ''Pour the wall foundation from *x* to *y*'' or ''Review Chapter 3 on terminology.'' Each *activity description* should be unique and leave no room for confusion, that is, it can be identified without ambiguity.
- The work represented by an activity should, once started, be capable of proceeding to completion without interruption (except for naturally occurring non-work periods in the calendar). If the work on an activity is suspended or delayed, it is often beneficial for the activity to be split into two or more activities at natural break points.
- The work contained in an activity should be scoped so that the activity's duration will be less than two times the update cycle (ideally never more than three times the update cycle). This allows the reporting of the start and finish of an activity within one or two update cycles, allowing management to focus on performance and corrective action if needed. Exceptions to this general rule are continuous activities, (e.g., summary activities such as boring a 2-mile long tunnel or paving several miles of highway), procurement activities where a single work item (e.g., fabricating and shipping a component to a remote site) can take significantly longer than three update cycles, or a level-of-effort activity such as administrative support. In these cases, the activity duration should simply reflect the anticipated time for the activity. Care must be given to level-of-effort tasks, because if they are equal to the length of the entire project, they may end up on or drive the critical path, which will obscure the more important workflow activities.

When complete, the activity list should describe 100% of the work required to complete the project, although not all activities necessarily need to be fully

detailed if rolling wave planning is being used. Rolling wave planning entails planning the near-term work in detail and presenting the future work at a summary level until the time for that work draws nearer.

.3 Design the Project's Logic

Connecting the activities and *milestone*s together with 'sensible' logic is the bedrock of any *schedule model*. The method of connection is defined as a relationship. Every activity and *milestone* except the first and last must be connected to at least one predecessor and one successor. With the exception of the start *milestone*, something must occur prior to an activity starting, and in turn, that activity must be totally or partially completed to allow another activity to start. Ensuring compliance with this practice will prevent the schedule from containing open ends, where activities or *milestone*s are missing predecessors or successors.

For most instances, each activity would finish prior to the start of its *successor activity* (or activities) (known as a finish-to-start (FS) relationship), but that is not always possible. If it is necessary to overlap activities, the scheduler may elect to use start-to-start (SS), finish-to-finish (FF) or start-to-finish (SF) relationships. Figure 3-1 provides examples of the four relationship types in CPM methodology. Whenever possible, the FS logic relationship should be used. If it is necessary to use any of the other types of relationships, the scheduler should use them sparingly and fully understand how the relationships have been implemented in the scheduling software being used. Ideally, the sequence of all activities will be defined in such a way that the start of every activity has a logic relationship to a predecessor and the finish of every activity has a logic relationship to a successor.

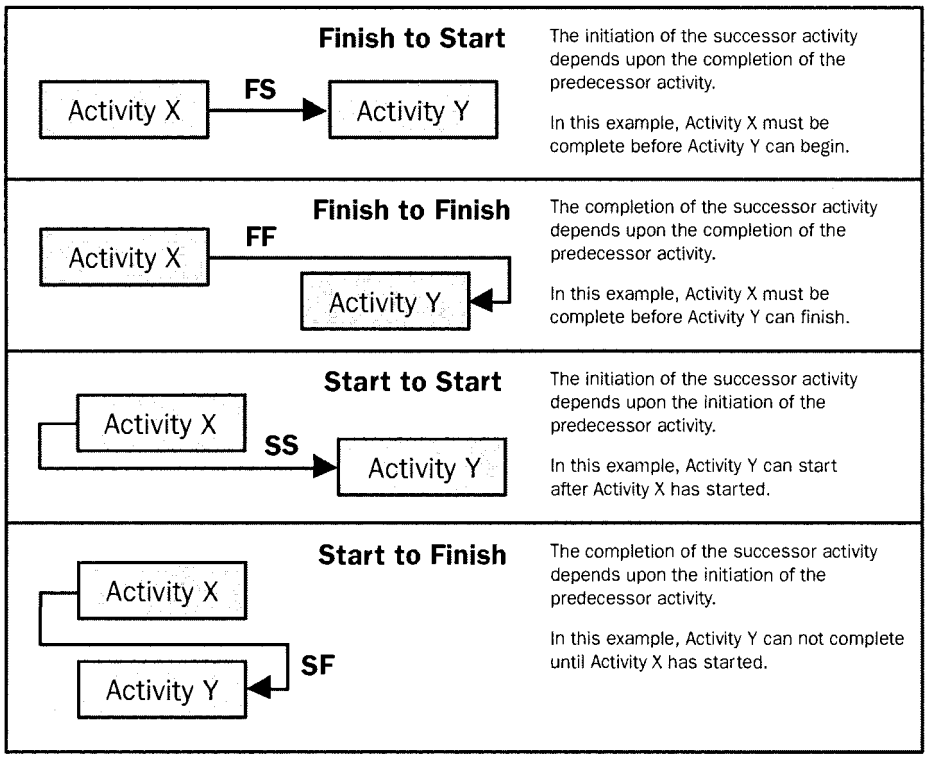

Figure 3-1. Relationship Type Examples

The scheduler may also assign *lag*(s) to some relationships. A *lag* imposes a delay between the preceding and succeeding activity. For example if an activity has a FS *lag* of 5, it would delay the start of the successor activity until 5 days after the *predecessor activity* has finished. The scheduler is cautioned to use *lag*s with care and understand their impacts. As a general rule, negative *lag*s should only be used when alternative logic is not practical.

Some schedulers may be tempted to use *lag*s to represent a period of time when work is actually occurring, such as review of a document before the next phase proceeds. It is recommended that these types of work be shown as activities in the *schedule model* instead of using a *lag*. When such activities are included, they could be coded to show that these are activities for which another party, for example, the client, is responsible. This practice allows for better control of the project and makes it easier to change the review duration, if necessary, compared to changing *lag* times.

Schedulers must be aware that when the project schedule model uses more than one calendar it may affect the calculated *lag* results. Additionally, understanding how different software packages utilize multiple calendars is extremely important.

It is also possible to assign *constraint*s to activities and *milestone*s which require the activity or *milestone* to start or finish at specific points in time. The scheduler is strongly encouraged to study the various types of *constraint*s that might be used and understand the effect and nuance their use has upon the schedule. The generally accepted practice is that *constraint*s and *lag*s should not be used to replace logic.

.4 Determining the Duration for Each Activity

The duration is an estimate of how long it will take to accomplish the work involved in the activity (quantity). In many cases, the number of resources that are expected to be available to accomplish an activity may determine the activity's duration. An increase or decrease to a driving resource allocated to the activity will have a direct effect on the duration (but this is not a simple 'straight line' relationship). Other factors influencing the duration are the type or skill level of the resources available to undertake the work, resource calendars, and the intrinsic nature of the work. Some activities (e.g., a 24-hour stress test) will take a set amount of time to complete regardless of the resource allocation.

While it is feasible to determine a duration for an activity at any time, generally accepted good practice recommends defining the activity first, then tying it logically into the overall schedule sequence and then focusing on how long it will take to accomplish the work. At this time, the relationship between the activity and other work in the schedule will be more easily appreciated; and resource flows, activity team sizes, and the like can begin to be determined.

.5 Analyzing the Schedule Output

Once complete, the *schedule model* will be comprised of a number of unique activities of varying durations with defined logic relationships. It provides the project team with information on what must be accomplished and the sequence required to accomplish the project deliverables. However, it still does not indicate when to do what. In order to acquire that information, the scheduling tool is activated to calculate the dates and other values within the *schedule model* according to the chosen *scheduling method.* Despite the speed of many computer programs, the scheduling function always requires three distinct processes for

'time analysis' and a fourth if resource smoothing or leveling is being used. The discrete steps are:

- A start date is assigned to the start *milestone*. Then moving throughout the network from activity to activity (from left to right) and in the sequence defined by the logical relationships, start and finish dates are assigned to each activity and *milestone,* as determined by the defined durations. This is called the forward pass. The start and finish dates on each activity are called the early dates and when the analysis reaches the end of the network it establishes the earliest possible finish date for the project.
- Next, a finish date is assigned to the end *milestone*. This could be the same date as the one calculated by the forward pass or a different date applied as a *constraint*. The analysis process then works back through the network from right to left until it arrives back at the start *milestone*, and another set of start and finish dates is assigned to each activity. This is called the backward pass and establishes the late dates for each activity and *milestone*.
- Float values are calculated by comparing the early and late dates as follows:
  - *Total float* is calculated by subtracting the early finish date from the late finish date (start dates can be used instead).
  - *Free float* is calculated by subtracting the early finish date of the activity from the earliest start date of the closest of its successors. *Free float* is never negative.
- Once the float values have been calculated, resource smoothing and/or leveling may be carried out to minimize resource over allocations or reduce the fluctuations in resource demand. If this process is to be done automatically, the scheduler needs to determine the processes and algorithms to be used. Most project management software packages have multiple options and settings that can have a significant impact on the resulting resource leveled schedule. Some schedulers may be tempted to do the resource leveling manually by adjusting the logic or adding *constraint*s to delay the start of certain activities. This is not a good practice as it interferes with the normal scheduling calculation.

.6 Approving the Schedule

The project team should be actively involved in reviewing the results of this initial scheduling process. The review should consider the analyzed project end date, *milestone* completion dates, and resource requirements (compared to resource availability) to determine the acceptability of the schedule. Where alterations are required, variations are made to the schedule logic, resource allocations and/or durations, and then the schedule is reanalyzed. The most often pursued alteration involves actions to reduce the overall duration of the schedule. The key techniques used to compress the schedule are 'crashing' and 'fast tracking' (see Section 6.5.2.3 of the *PMBOK® Guide*–Third Edition). These iterations continue until an acceptable project schedule is developed, one that all of the project stakeholders can agree with.

.7 Baselining the Schedule (see Section 6.5.3.3 of the ***PMBOK® Guide*–Third Edition**)

Once agreed upon, the first version of the schedule that is developmentally complete to be approved for capture or copied for future reference is called the project baseline schedule. This baseline becomes the benchmark against which project performance may be measured. It is a generally accepted practice that

every project should have a baseline schedule in place before the execution of the project work commences. Once the baseline has been approved, reports are distributed in accordance with the project's communication plan and changes are monitored and controlled through the integrated change control process.

.8 Maintaining the Schedule

Change is inevitable and every project will experience it. The last major component needed to ensure successful project execution is effective change control. The key is to determine how the project will approve and track change as it occurs throughout the project's life cycle. Change can occur simply by work progressing more quickly or slowly than planned, as well as when changes in other elements of the project occur (e.g., scope changes) and/or whether the project team decides to modify its approach to the project work.

The status/update process occurs on a regular basis determined during the project planning process. The steps involved in maintaining the schedule at each status/update are:

- Collect and record the actual status of the work at a predetermined date/time for the project. The information collected should include the actual start dates for all activities that have commenced and actual finish dates for all activities that have been completed during the reporting cycle. Where an activity is in progress, the amount of work accomplished and the time needed to complete the remaining work should be determined. Other information gathered at this time may include data on resource utilization and costs incurred. The data is collected as of a nominated date/time. This date/time is called the *data date* and is analogous to ''time now'' in earned value performance management (EVPM).
- Enter status information into the *schedule model* and re-analyze the remaining work to determine the project status. All incomplete work will be rescheduled to a date/time after the *data date*. Care should be taken, as many software tools allow actual dates to be applied to future work. Quality control practices should be in place to avoid this situation.
- Compare the newly updated *schedule model* outputs with the stored baseline and, where necessary, employ actions to lock in gains and/or recover losses (manage schedule variances). Due to the normal small variances in project execution from plan, variance thresholds may be used to determine which activities and conditions require reporting and/or further action. A commonly used date variance is the finish variance between early finish and baseline finish, which is usually expressed in units such as working days.
- Update the schedule with any agreed changes resulting from the overall change control process to ensure the *schedule model* represents 100% of the current work scope of the project. The updating and adjustment processes may need a number of iterations to maintain a *schedule model* that remains realistic and achievable.
- Distribute reports in accordance with the project's communication plan once the updated schedule has been confirmed to be accurate.
- Update the baseline if authorized scope changes have been incorporated into the updated *schedule model*.
- Maintain records that explain all changes in activity durations or logic as the alterations are being made in the schedule. Activity log notes are often used for this purpose. These records will provide valuable data if it becomes necessary to reconstruct what happened and why.

All of the good practices and elements described previously are also included within the details of each component contained within the *schedule model* components list as presented in Chapter 4. The scheduler must ensure a complete and thorough understanding of the various components in order to maximize the potential for their proper application and the development of a sound schedule.

Chapter 4

Scheduling Components

The following section provides a detailed cataloging of the potential components of a *scheduling tool*. Each entry includes five possible types of information related to each component, and indicates whether the component is considered to be **required** or **optional** by this standard. Required components must be present in a *schedule model* before a maturity assessment can be performed.

4.1 How to Use the Components List

A categorized components list appears in Section 4.2 (individual components, not categorized, are included at the end of the list under the heading ''miscellaneous''). A list of components, in alphabetical order, appears in Section 4.3. Below is an example of the format for each component within the component lists.

Component Name	Required or Optional Use	Manual or Calculated

Data Format:
Behavior:
Good Practices:
Conditional Note/Associated Component:
Definition:

4.1.1 Component Name

This data element contains the name of the component within a *scheduling tool*.

4.1.2 Required or Optional Use

This data element indicates whether the use of a component is required for a minimally conforming *schedule model*.

4.1.3 Manual or Calculated

This data element indicates whether the data within the component is manually entered or calculated by the *scheduling tool*.

4.1.4 Data Format

This data element describes how the data is formatted within the component as part of the *scheduling tool*.

4.1.5 Behavior

In the components list, this data element describes how the component reacts and/or enables reaction within the *scheduling tool*. Of note, all of the behavior descriptions start with a verb indicating the action.

4.1.6 Good Practices

In this list, ''good practices'' means that there is general agreement that the correct application of these skills, tools, and techniques can enhance the chances of success over a wide range of different projects. Good practice does not mean that the knowledge described should always be applied uniformly on all projects; *the project management team is responsible for determining what is appropriate for any given project.*

4.1.7 Conditional Note/Associated Component

This data element indicates whether this component's action is dependent on the state or action of another component.

4.1.8 Definition

This data element describes the overall use and function of the component within the *scheduling tool*. The definition provided here is from the Glossary.

4.2 Components: Categorized List

Calendar

Activity Calendar — Optional — Manual

Data Format: Date/Time
Behavior: The Activity Calendar may override the Project Calendar for those activities to which it is applied.
Good Practices:
Conditional Note/Associated Component:
Definition: Usually the *project calendar*, or another specifically defined *calendar* from the *calendar library*, assigned to the *schedule activity* which defines the *work periods* and *non-work periods* in calendar format. The activity calendar, on the schedule activities to which it is assigned, is used to replace the *project calendar* during *schedule network analysis.*

Project Calendar — Required — Manual

Data Format: Date
Behavior: Defines the default working periods for the project.
Good Practices: At the project level, this must constitute the primary or default calendar for the project.
Conditional Note/Associated Component:
Definition: A calendar of working days or shifts that establishes those *dates* on which *schedule activities* are worked and nonworking days that determine those dates on which schedule activities are idle. Typically defines holidays, weekends, and shift hours. The calendar initially assigned to schedule activities and resources. SEE ALSO Resource Calendar and Activity Calendar.

Resource Calendar — Optional — Manual

Data Format: Date/Time
Behavior: Defines the time a resource is available for work.
Good Practices:
Conditional Note/Associated Component: Resource ID
Definition: A calendar of working days and nonworking days that determines those *dates* on which each specific *resource* is idle or can be active. Typically defines resource specific holidays and *resource availability* periods. SEE ALSO Project Calendar and Activity Calendar.

Constraint

As Late As Possible — Optional — Manual

Data Format: Alphanumeric
Behavior: Allows an activity to be scheduled so that it finishes on or before its late finish date.
Good Practices: Constraints must not be a replacement for schedule network logic. The As Late As Possible constraint should be used sparingly.
Conditional Note/Associated Component Project Finish Date
Definition: A constraint placed on an activity that will cause it to be scheduled to finish on the last date before the project finish date and without delaying successor activities.

As Soon As Possible — Optional — Manual

Data Format: Alphanumeric
Behavior: Allows an activity to be scheduled so that it finishes on its early finish date.
Good Practices: Constraints must not be a replacement for schedule network logic. The As Soon As Possible constraint should be used sparingly.
Conditional Note/Associated Component Project Start Date
Definition: A constraint placed on an activity that will cause it to be scheduled to finish on the earliest date after the project start date after any predecessor activities and without delaying successor activities.

Expected Finish — Optional — Manual

Data Format: Date
Behavior: Imposes a finish date on an activity that determines the remaining duration of the activity after it has been reported as started. The behavior of Expected Finish constraints are software application-dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Expected Finish constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A date constraint placed on both the *activity early and late finish dates* of an in-progress *schedule activity* that affects when the schedule activity can be scheduled for completion and is usually in the form of a fixed *imposed date*. This constraint requires the activity remaining duration to be set equal to the difference between the activity expected finish date and the *data date* to force the schedule activity to be scheduled to finish upon the imposed date.

Finish Not Earlier Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity prior to which the activity can not finish. The behavior of Finish Not Earlier Than is *scheduling tool* dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish Not Earlier Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Earlier Than constraint prevents the activity from being scheduled to finish earlier than the imposed date. ''Not earlier than'' constraints impact only the forward pass calculation and hence the early dates of a schedule activity.

Finish Not Later Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity prior to which the activity must finish. The behavior of Finish Not Earlier Than is *scheduling tool* dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish Not Later Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Later Than constraint prevents the activity from being scheduled to finish later than the imposed date. ''Not later than'' constraints impact only the backward pass calculation and hence the late dates of a schedule activity.

Finish On — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity on which it must finish.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish On constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish On constraint prevents the activity from being scheduled to finish earlier as well as later than the imposed date. Finish On constraints are a combination of a Not Earlier Than and Not Later Than constraints. These impact both the forward and the backward pass calculation and hence both early and late dates. This causes the schedule activity to have a zero *total float* while its predecessors and successors may have different total float values.

Mandatory Finish Date — Optional — Manual

Data Format: Date
Behavior: Mandates the finish date of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. Since this constraint overrides the CPM calculation, this component should not be used.
Conditional Note/Associated Component:
Definition: A finish date *constraint* placed on a *schedule activity* that sets both the *activity early and late finish dates* equal to a fixed *imposed date* and thereby also constrains the early start dates of the *network paths* logically following that schedule activity.

Mandatory Start Date — Optional — Manual

Data Format: Date
Behavior: Mandates the start date of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. Since this constraint overrides the CPM calculation, this component should not be used.
Conditional Note/Associated Component:
Definition: A start date *constraint* placed on a *schedule activity* that sets both the *activity early and late start dates* equal to a fixed *imposed date* and thereby also constrains the late finish date of the *network paths* logically preceding that schedule activity. Schedule calculations do not override this constraint. Therefore an imposed mandatory start sets the early dates for all paths leading to and the late dates on paths leading from the activity.

Project Start Constraint — Optional — Manual

Data Format: Date
Behavior: Provides the starting point for the forward pass calculation.
Good Practices: Every effort must be made to develop a Schedule Model that meets the Project Start Constraint. This effort should account for available resources and result in a Project Schedule with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the Project Start Constraint must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: A limitation or restraint placed on the *project early start date* that affects when the project must start and is usually in the form of a fixed *imposed date*.

Project Finish Constraint — Optional — Calculated

Data Format: Date
Behavior: Static, provides a ''not later than'' constraint to calculate the late dates for a project during the backward pass. This date may be earlier or later than the project finish date that is calculated from the forward pass.
Good Practices: Every effort must be made to develop a Schedule Model with non-negative Total Float. This effort should result in a Project Schedule with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the Project Finish Constraint must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: A limitation or restraint placed on the *project late finish date* that affects when the project must finish and is usually in the form of a fixed *imposed date*.

Start Not Earlier Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity prior to which the activity can not start. ''Not earlier than'' constraints impact only the forward pass calculation and hence the early dates of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start Not Earlier Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Earlier Than constraint prevents the schedule activity from being scheduled to start earlier than the imposed date.

Start Not Later Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity prior to which the activity must start. ''Not later than'' constraints impact only the backward pass calculation and hence the late dates of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start Not Later Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Later Than constraint prevents the schedule activity from being scheduled to start later than the imposed date.

Start On — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity on which it must start. These impact both the forward and the backward pass calculation and hence both early and late dates. This causes the activity to have a zero Total Float while its predecessors and successors may have different float values.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start On constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start On constraint requires the schedule activity to start on a specific date.

Duration

Activity Actual Duration — Required — Calculated

Data Format: Numeric
Behavior: Defines the length of time that has elapsed since the activity began.
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *activity actual start date* of the *schedule activity* and either the *data date* of the *project schedule,* if the schedule activity is in progress, or the *activity actual finish date,* if the schedule activity is complete.

Activity Baseline Duration — Required — Calculated

Data Format: Numeric
Behavior: Identifies the duration of the activity at the time the project plan was approved by the project stakeholders (Baseline Schedule).
Good Practices: Baseline duration should represent a specific target that is approved.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *activity baseline start date* and *activity baseline finish date* of a *schedule activity* as determined by its approved *project schedule baseline*.

Activity Original Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the schedule activity prior to reporting any progress on the activity.
Good Practices: A record should be maintained of how the duration was determined for future reference and revisions. Generally, durations should not exceed two or three reporting cycles.
Conditional Note/Associated Component:
Definition: The *activity duration* originally assigned to a *schedule activity* and not updated as progress is reported on the activity. Typically used for comparison with *activity actual duration* and *activity remaining duration* when reporting schedule progress. The *activity original duration* is normally developed with a reliance on historic data, specialists, resource availability, financial considerations, and volume of work to be performed. May also be called ''planned duration.''

Activity Remaining Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the activity as of the data date.
Good Practices: Once an activity begins but does not complete during a reporting cycle a determination must be made as to the duration that remains to complete the work.
Conditional Note/Associated Component: Depends on Resource Assignment and Activity Effort.
Definition: The total number of *work periods* in *calendar units*, (a) equal to the Original Duration for an activity that has not started or (b) between the *data date* of the *project schedule* and the *early finish date* of a *schedule activity* that has an *activity actual start date*. This represents the time needed to complete a *schedule activity* where the *work* is in progress.

Activity Target Duration — Optional — Calculated

Data Format: Numeric
Behavior: Describes the planned duration of an activity reflecting some desired outcome, which may be different than the baseline duration.
Good Practices:
Conditional Note/Associated Component:
Definition: The *estimated* total number of *work periods* in *calendar units*, needed to complete the *schedule activity* as determined by a specific *project target schedule*.

Activity Total Duration — Optional — Calculated

Data Format: Numeric
Behavior: Displays activity duration from start to finish.
Good Practices:
Conditional Note/Associated Component: Depends on Resource Assignment and Activity Effort.
Definition: The total number of *work periods* in *calendar units* to complete a *schedule activity*. For schedule activities in progress, it includes the *activity actual duration* plus the *activity remaining duration*.

Imposed Project Duration — Optional — Manual

Data Format: Numeric
Behavior: Identifies duration of the project as defined by the owner at project inception.
Good Practices: Every effort must be made to develop a *schedule model* with a calculated *project duration* that meets the *imposed project duration*. This effort should result in a *project schedule* with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the imposed duration must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: The work time units allowed to complete a project from the owners' perspective/ directive.

Project Actual Duration — Required — Calculated

Data Format: Numeric
Behavior: Defines the length of time that has elapsed since the project plan began.
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *project actual start date* of the project and either the *data date* of the project schedule, if the project is in progress or the *project actual finish date* if the project is complete.

Project Baseline Duration — Required — Calculated

Data Format: Numeric
Behavior: Identifies the duration of the project at the time the project plan was approved by the project stakeholders (baseline schedule).
Good Practices: Baseline duration should represent a specific target that is approved.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* needed to execute the approved *project schedule baseline** for the *project*.

Project Original Duration — Required — Calculated

Data Format: Numeric
Behavior: Duration of the project after the initial scheduling effort but before progress is reported.
Good Practices:
Conditional Note/Associated Component:
Definition: The initial *estimate* of the total number of *work* periods in *calendar units* needed to complete a *project*. The Project Original Duration is typically determined from the initial longest *network path* though the project.

Project Remaining Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the project from the data date.
Good Practices: Once a project begins but does not complete during a reporting cycle a determination must be made as to the duration that remains to complete the work.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units*, between the *data date* of the *project schedule* and the *project early finish date of a project* that has at least one *activity actual start date*. This represents the time needed to complete a *project* where the *work* is in progress.

Project Target Duration — Optional — Calculated

Data Format: Numeric
Behavior: Describes the planned duration of the project reflecting some desired outcome, which may be different than the baseline duration.
Good Practices:
Conditional Note/Associated Component:
Definition: The estimated total number of *work periods* in *calendar units*, needed to complete the project as determined by a specific *project target schedule*.

Project Total Duration — Optional — Calculated

Data Format: Numeric
Behavior: Displays duration of the project from start to finish
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* to complete a *project*. For a project in progress, it includes the *project actual duration* plus the *project remaining duration.*

Finish Date

Activity Actual Finish Date — Required — Manual

Data Format: Date
Behavior: Defines progress having been completed on activity.
Good Practices: Actual dates should be assigned to all actual finishes prior to the Data Date. Actual Dates replace Early and Late Dates.
Conditional Note/Associated Component: 100% Complete
Definition: The point in time work actually ended on the *schedule activity*.

Activity Baseline Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the approval of baseline finish of activity.
Good Practices: Baseline dates should represent a specific target that has been approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the completion of the *schedule activity* in an approved *project schedule baseline*.

Activity Early Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the early finish of the activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time when the uncompleted portion of the *schedule activity* can be completed.

Activity Late Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the late finish of the activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time when the *schedule activity* can be completed without violating a schedule *constraint* or delaying the *project end date*.

Activity Resource Leveled Finish Date — Optional — Calculated

Data Format: Date
Behavior: Defines the earliest finish for an activity based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned and resource over allocations exist, resource leveling must be used.
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity scheduled finish date* of a resource limited *schedule activity* in a *resource-limited schedule*.

Activity Target Finish Date — Optional — Manual

Data Format: Date
Behavior: Defines a point of obligation or a project goal.
Good Practices: Target schedules must be utilized; at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: A point in time established by schedule network analysis for completion of a *schedule activity* within a specific version of the *project schedule*.

Project Actual Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the actual finish of the project via the last activity finish date.
Good Practices:
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity actual finish date* of the last *schedule activity* in the *project*.

Project Baseline Finish Date — Required — Manual

Data Format: Date
Behavior: Defines the approval of the finish of the last activity as the baseline.
Good Practices: Baseline dates should represent a specific target that is approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the completion of the last *schedule activity* in an approved *project schedule baseline*.

Project Early Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the early finish of last activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time associated with the completion of the last *schedule activity* of the project.

Project Late Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the late finish of last activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time associated with the completion of the last *schedule activity* of the *project*.

Project Resource Leveled Finish Date — Optional — Calculated

Data Format: Date
Behavior: Defines the earliest finish for a project based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned, Resource Leveling should be used.
Conditional Note/Associated Component:
Definition: The end date of a project based on the consideration of resource availabilities, limitations, and quantities.

Project Target Finish Date — Optional — Manual

Data Format: Date
Behavior: Identifies a user defined date for the project to finish.
Good Practices: Target schedules must be utilized, and at least one must be designated as the Baseline.
Conditional Note/Associated Component:
Definition: The scheduler-selected point in time established by schedule network analysis for completion of a specific version of the *project schedule*.

Float

Free Float — Required — Calculated

Data Format: Numeric
Behavior: Represents the amount of time an activity can delay its early finish without impacting any successor activities early start. It is the difference between an activity's early finish date and the earliest start date of the closest of its successors. As progress is recorded, this value may change. This value will also change if remaining work logic or durations are revised.
Good Practices: Free Float may be used to provide an early indication of activity or schedule slippage.
Conditional Note/Associated Component:
Definition: The amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities. SEE ALSO Total Float (TF))

Total Float — Required — Calculated

Data Format: Numeric
Behavior: Represents the amount of time an activity can delay its finish without impacting the late finish of the project. It is computed as the difference between the late and early dates of the activity, calculated from the forward and backward passes respectively. As progress is recorded, value may change. This value will also change if remaining work logic or durations are revised.
Good Practices: Total float may be used to provide an early indication of project completion slippage by constraining the project finish milestone with a Finish On Constraint.
Conditional Note/Associated Component: Depends on the duration of the activities/tasks in the schedule, the level of detail described in the schedule, and the level of detail that is required to track.
Definition: The total amount of time that a *schedule activity* may be delayed from its *activity early start date* or ***activity early finish date*** without delaying the *project end date*, or violating a schedule *constraint*. Calculated using the *critical path method* technique and by subtracting the *activity early finish date* from the *activity late finish date*, with that difference expressed in *calendar units*. A total float value less than zero indicates that the activity late finish date is scheduled prior to the activity early finish date and the calculated critical path is not feasible. A total float value of zero or greater indicates the calculated critical path may be feasible and some schedule activities may be able to be delayed. SEE ALSO Free Float (FF).

Percent Complete

Activity Duration Percent Complete — Optional — Calculated

Data Format: Numeric (fractional)
Behavior: Represents the proportion of actual duration completed at a given point in time.
Good Practices: In the absence of earned value management, Duration Percent Complete should be used as an indication of activity progress. However, users must recognize that this is a very rough approximation of true progress, and its use in lieu of EVM is discouraged. Determining hours remaining and then calculating a percent complete is preferable if EVM cannot be used. This will focus the team on looking at the remaining work—not the work completed. The project manager should try to minimize the number of activities that will be scheduled this way.
Conditional Note/Associated Component: Practical means of assessing progress
Definition: An estimate, expressed as the percentage that the *activity actual duration* represents, of the *activity total duration* for a *schedule activity* that has *work* in progress.

Activity Physical Percent Complete — Required — Manual

Data Format: Numeric (fractional)
Behavior: Actual Duration/Total Duration.
Good Practices: For any started activity, the physical percent complete must be updated. The project scheduler should make a decision at the beginning of the project which method will be used for the duration of the project. There may be different methods to measure completeness. These include the earned value-based earning rules such as 50/50 rule, actual quantities, % complete, non-linear by milestone, etc., as well as gut-feel estimates by the people working the activity. Of these methods, EV-based percentage assessment is considered to be best as it tends to be much less subjective.
Conditional Note/Associated Component: Depending on the earning value.
Definition: An *estimate*, expressed as a percent, of the amount of *work* that has been completed on a *schedule activity*, measured in terms of either *physical work progress* or via the earning rules of *earned value management*.

Project Duration Percent Complete — Optional — Calculated

Data Format: Numeric (fractional)
Behavior: Defines progress of the project as a percentage of total expected project duration.
Good Practices:
Conditional Note/Associated Component:
Definition: An *estimate*, expressed as a percent, of the entire *project duration* that has been completed on the *project*.

Project Physical Percent Complete — Required — Calculated

Data Format: Numeric (fractional)
Behavior: Defines progress of the project as a percentage of physical work to be done. At the project level, this value is typically calculated, using earned value management techniques. As progress is recorded, the earned value at the activity level is calculated.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management*. Project Physical Percent Complete must be determined by dividing the summarized earned value units by the project budget in the same units.
Conditional Note/Associated Component: Requires use of earned value technique.
Definition: An *estimate*, expressed as a percent, of the amount of *work* that has been completed on the *project*, measured in terms of *physical work progress*.

Relationship

Finish to Finish — Optional — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be completed until the predecessor activity is completed.
Good Practices: All activities, except the first and last activities, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where completion of work of the successor activity cannot finish until the completion of work of the predecessor activity. SEE ALSO Logical Relationship.

Finish to Start — Required — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be started until the predecessor activity, or task is completed.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish.
Conditional Note/Associated Component:
Definition: The logical relationship where initiation of work of the successor activity depends upon the completion of work of the predecessor activity. SEE ALSO Logical Relationship.

Start to Finish — Optional — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be finished until the predecessor activity, or task is started.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where completion of the successor schedule activity is dependent upon the initiation of the predecessor schedule activity. SEE ALSO Logical Relationship.

Start to Start — Optional — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be started until the predecessor activity is started.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where initiation of the work of the successor schedule activity depends upon the initiation of the work of the predecessor schedule activity. SEE ALSO Logical Relationship.

Resource

Driving Resources — Optional — Manual

Data Format: Flag
Behavior: Identifies a resource as driving to control the duration of activities.
Good Practices: Driving Resources should be considered within the schedule.
Conditional Note/Associated Component:
Definition: *Resources* that are considered to have a direct impact on *activity duration* during *resource leveling*.

Resource Assignment — Optional — Manual

Data Format: Alphanumeric
Behavior: Connects a resource to an activity.
Good Practices: Resources should be identified and assigned. Resources must be considered for all activities whether the assignment is made or not.
Conditional Note/Associated Component:
Definition: The linkage of one or more *resources* to a *schedule activity* and identification of the amount of each resource that is needed to accomplish the *work* on that schedule activity.

Resource Availability — Optional — Manual

Data Format: Alphanumeric
Behavior: Establishes the normal and maximum levels of a resource that are available.
Good Practices: This value does not reflect the current and project resource assignments for the indicated resource.
Conditional Note/Associated Component:
Definition: The *dates* and number of *work periods* in *calendar units* that a given *resource* is available according to the appropriate *resource calendar*.

Resource Description — Optional — Manual

Data Format: Alphanumeric
Behavior: Describes with a short phrase the resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource Description must be used. All Resource Descriptions must be unique.
Conditional Note/Associated Component:
Definition: A phrase that describes a resource by type, role, or individual.

Resource ID — Optional — Calculated

Data Format: Alphanumeric
Behavior: Identifies the assigned resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource ID must be used. All Resource IDs must be unique.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each specific *resource* to differentiate that resource from other resources. The Resource ID is typically unique within any one *project*.

Resource Lag — Optional — Manual

Data Format: Numeric
Behavior: Defines the time from the start of the activity that a specific resource may begin work.
Good Practices: Resources should be identified and assigned. Resource Lags must only be used for an unchanging period of time that must occur between the start of the activity and the use of the resource.
Conditional Note/Associated Component:
Definition: The number of *calendar units* a *resource* is to wait after the *activity start date* before beginning *work* on the *schedule activity*.

Resource Leveling — Optional — Calculated

Data Format: Formula
Behavior: Presents the process of recalculating the scheduled dates, based on the availability of resources.
Good Practices: Resource leveling requires the assignment of resource limits or availabilities, as well as some prioritizing criteria to resolve resource conflicts. The most often used prioritizing criterion is total float. Often this leveling effort also includes financial considerations as well as the limits on physical resources of any kind.
Conditional Note/Associated Component:
Definition: Any form of schedule network analysis in which scheduling decisions (start and finish dates) are driven by resource constraints (e.g., limited resource availability or difficult-to-manage changes in resource availability levels).

Resource Library/Dictionary — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides a listing of resources that might be applied to activities in the schedule model.
Good Practices: Resources should be identified and assigned. A resource library or dictionary should be organized into some meaningful structure which might relate similar resources.
Conditional Note/Associated Component:
Definition: A documented tabulation containing the complete list, including resource attributes, of all *resources* that can be assigned to *project activities**. Also known as a resource dictionary.

Resource Rates/Prices | Optional | Manual

Data Format: Numeric
Behavior: Defines the cost per time unit for a specific resource.
Good Practices: Resources should be identified and assigned. If resources are assigned, Resource Rates/Prices should be used.
Conditional Note/Associated Component:
Definition: The unit *cost* rate assigned to a specific *resource*, including known rate escalations.

Resource Type | Optional | Manual

Data Format: Alphanumeric
Behavior: Indicates the classification of the resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource Type should be used.
Conditional Note/Associated Component:
Definition: A unique designation that differentiates a *resource* by *skills*, *capabilities* or other attributes.

Schedule Risk

Activity Cumulative Probability Risk Distribution | Optional | Manual

Data Format: Table of dates, numeric (fractional)
Behavior: Stores results of method used to quantify uncertainty based upon the chosen probability distribution function durations.
Good Practices: The risk analysis process should be used for projects where schedule variances could have a significant impact on project objectives
Conditional Note/Associated Component:
Definition: A table of *dates* and their associated cumulative probabilities of occurrence for *schedule activity* completion. Dates are derived using analytical techniques such as Monte Carlo calculations. When applied to the *project end date*, the value is equivalent to the Project Cumulative Probability Risk Distribution.

Activity Most Likely Duration | Optional | Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity under most typical situations.
Good Practices: Most Likely Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the most probable *activity duration*.

Activity Optimistic Duration | Optional | Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity assuming the best possible conditions.
Good Practices: Optimistic Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the shortest possible *activity duration*.

Activity Pessimistic Duration — Optional — Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity assuming the worst possible conditions.
Good Practices: Most Likely Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the longest possible *activity duration*.

Activity Risk Criticality Index — Optional — Calculated

Data Format: Numeric
Behavior: The probability of an activity to become a member of a critical path.
Good Practices: A risk analysis process should be used for projects where stakeholders believe there is high risk. Risk analysis is appropriate for projects where schedule variances have a significant impact on project objectives.
Conditional Note/Associated Component:
Definition: The probability that the *schedule activity* will be on a *critical path*.

Start Date

Activity Actual Start Date — Required — Manual

Data Format: Date
Behavior: Defines progress having been initiated on an activity.
Good Practices: Actual Dates must be assigned to all actual starts prior to the Data Date. Actual Dates replace Early and Late Dates.
Conditional Note/Associated Component: Progress must have been initiated prior to the current Data Date.
Definition: The point in time at which work actually began on the *schedule activity*.

Activity Baseline Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the approval of the baseline start date for activity.
Good Practices: Baseline dates should represent a specific target that has been approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the beginning of the *schedule activity* in an approved *project schedule baseline**.

Activity Early Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the early start of the activity.
Good Practices: Must be derived from the CPM calculations
Conditional Note/Associated Component:
Definition: The earliest possible point in time when the *schedule activity* can begin.

Activity Late Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the late start of the activity.
Good Practices: Must be derived from the CPM calculations
Conditional Note/Associated Component:
Definition: The latest possible point in time when the *schedule activity* can begin without violating a schedule *constraint* or delaying the *project end date*.

Activity Resource Leveled Start Date — Optional — Manual

Data Format: Date
Behavior: Defines the earliest start for an activity based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned and there is an over allocation of resources, Resource Leveling should be used.
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity scheduled start date* of a resource limited *schedule activity* in *a resource-limited schedule*.

Activity Target Start Date — Optional — Manual

Data Format: Date
Behavior: Defines a point of obligation or a project goal.
Good Practices: Target schedules must be utilized; at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: A point in time established by schedule network analysis for beginning the *schedule activity within a specific version of the project schedule.*

Project Actual Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the actual start of the project's first activity.
Good Practices:
Conditional Note/Associated Component: The first activity in the schedule model must have an actual start date applied.
Definition: The point in time associated with the *activity actual start date* of the first *schedule activity* in the *project*.

Project Baseline Start Date — Required — Manual

Data Format: Date
Behavior: Defines the approved project's first activity as the baseline start date.
Good Practices: Baseline dates should represent a specific target that is approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the start of the first task in an approved project schedule.

Project Early Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the early start of the project's first activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time associated with the beginning of the first *schedule activity* of the *project*.

Project Late Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the late start of the project's first activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time associated with the beginning of the first *schedule activity* of the *project*.

Project Resource Leveled Start Date — Optional — Calculated

Data Format: Dates
Behavior: Identifies the earliest activity start date as constrained by the resource availabilities.
Good Practices: Resources should be identified and assigned. If an assigned resource is limited, Resource Leveling should be performed.
Conditional Note/Associated Component:
Definition: The start date of a project based on the consideration of resource availabilities, limitations, and quantities.

Project Target Start Date — Optional — Manual

Data Format: Date
Behavior: Reflects contract obligation or project team decision.
Good Practices: Target schedules must be utilized, and at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: The scheduler-selected point in time established by schedule network analysis for beginning a specific version of the *project schedule.*

Variance

Date Variance — Optional — Calculated

Data Format: Numeric
Behavior: Quantifies departure from a date reference point.
Good Practices: The Date Variance of activities should be reviewed for trends at regular intervals to give early indications of schedule deviation and to determine if corrective action is required.
Conditional Note/Associated Component:
Definition: The difference between two selected dates. The variance is usually given in units such as work days.

Duration Variance — Optional — Calculated

Data Format: Numeric
Behavior: Quantifies departure from a duration reference point.
Good Practices: The Duration Variance of activities should be reviewed for trends at regular intervals to give early indications of schedule deviation and to determine if corrective action is required.
Conditional Note/Associated Component: Must maintain duration estimates to compare and calculate against.
Definition: SEE ALSO Activity Duration Variance and Project Duration Variance.

Miscellaneous

Activity Code — Optional — Manual

Data Format: Alphanumeric
Behavior: Indicates the classification of the task/activity.
Good Practices: Activity codes should be used to facilitate sorting, organizing, summarizing, and grouping.
Conditional Note/Associated Component:
Definition: One or more numerical or text values that identify characteristics of the work or in some way categorize the schedule activity that allows filtering and ordering of activities within reports.

Activity Cost Component — Optional — Manual

Data Format: Alphanumeric.
Behavior: Provides additional breakdowns that can be assigned for a specific cost account within the project.
Good Practices: For accounting purposes, costs should be broken down into categories, such as direct, indirect, labor, material, equipment, etc.
Conditional Note/Associated Component:
Definition: A *component* of the *cost*, such as labor cost, equipment cost, and material cost.

Activity Cost Estimate — Optional — Manual

Data Format: Numeric
Behavior: An estimate of the cost of the activity, derived by adding all individual activity cost components.
Good Practices: The activity costs should be calculated by adding the individual activity cost components that have been assigned to the activity.
Conditional Note/Associated Component: Activity Cost Component
Definition: The *estimated cost** of the *schedule activity* that includes the *cost* for all *resources* required to perform and complete the activity, including all *cost types* and *cost components*.

Activity Effort — Optional — Manual

Data Format: Numeric
Behavior: Displays labor units required for an activity.
Good Practices: Resources should be identified and assigned. If a labor resource is identified, Effort must be assigned.
Conditional Note/Associated Component: Depends on Activity Duration and Resource Assignment.
Definition: The number of labor units required to complete a schedule activity or work breakdown structure component. Activity effort is usually expressed as staff hours, staff days, or staff weeks. Contrast with *duration*.

Activity ID — Required — Calculated

Data Format: Alphanumeric
Behavior: Identifies the schedule activity.
Good Practices: Must be a unique identifier which can be automatically generated or follows a numbering scheme appropriate for the project. It is helpful to assign a reasoned structure or ''coding'' to the Activity ID.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each schedule activity to differentiate that project activity from other activities. The Activity ID is typically unique within any one project schedule network diagram.

Activity Label — Required — Manual

Data Format: Alphanumeric
Behavior: Allows user-defined information to be recorded about the activity.
Good Practices: Phrase or label must start with a verb and a unique subject (noun/adjective).
Conditional Note/Associated Component:
Definition: A short phrase or label for each schedule activity used in conjunction with an activity identifier to differentiate that project schedule activity from other schedule activities. The activity description normally describes the scope of work of the schedule activity.

Activity Scope Definition — Optional — Manual

Data Format: Alphanumeric
Behavior: Allows user-defined information to be recorded about the work to be performed.
Good Practices: The Activity Scope Definition should be provided for each activity to further bound the work.
Conditional Note/Associated Component:
Definition: Documented narrative describing the *work* represented by the *activity*.

Assigned Quantity — Optional — Manual

Data Format: Numeric
Behavior: Represents the specific quantity of a resource assigned to an activity.
Good Practices: The assignment of resource quantities should consider the activity duration.
Conditional Note/Associated Component: Resource Assignment
Definition: The act of assigning the specific amount of a certain resource needed to perform the activity in the required duration.

Baseline Data Date — Required — Manual

Data Format: Date
Behavior: Defines the division between historical (baseline) and future progress periods.
Good Practices: The Baseline Data Date must not be modified at the time of reporting status. If the *scheduling tool* does not record this data, it must be stored in a user-defined field.
Conditional Note/Associated Component: Target schedule as defined by activity and project target dates
Definition: The *date* through which the project baseline and progress were determined and reported for analyses, such as scheduling and performance measurement. Sometimes used with a modifier such as project schedule, project scope, or project cost.

Critical Path — Required — Calculated

Data Format: Alphanumeric (list of activities)
Behavior: Identifies the activities that meet the logic defined by the above definitions.
Good Practices: To establish a meaningful Critical Path, it is necessary to develop logical and well defined activity relationships with empirically derived durations for executing all the project activities in a practical manner. Therefore, there must not be any open ends other than the project start and project finish. Constraints must be restricted to only those that represent external or internal events that cannot be effectively addressed with activity logic.
Conditional Note/Associated Component: Relationships defined for all activities.
Definition: Generally, but not always, the sequence of *schedule activities* determines the duration of the *project*. Generally, it is the longest path through the project. However, a critical path can end, as an example, on a *schedule milestone* that is in the middle of the project schedule and that has a finish-no-later-than *imposed date* schedule *constraint*. SEE ALSO Project Critical Path, Specified Critical Path, and Critical Path Method.

Custom Field — Optional — Manual

Data Format: Variable
Behavior: Provides meta information about other schedule model data.
Good Practices: The custom field can utilize any of the attribute types; alpha, alphanumeric, date, time, etc.
Conditional Note/Associated Component:
Definition: Data elements used as extended characteristic of schedule entities (e.g., Code, Field, Tag, etc.).

Data Date — Required — Manual

Data Format: Date
Behavior: Defines the division between historical and future progress periods.
Good Practices: The Data Date must be advanced at the time of reporting status, at regular intervals.
Conditional Note/Associated Component:
Definition: The *date* (including time of day) through which the *project* status and progress were last determined and reported for analyses, such as scheduling and performance measurements. It is the last past historical date. Sometimes called as-of-date. (Scheduler caution: some *project management software* used for scheduling treat the data date as the future date immediately after status is reported.)

Earned Value — Optional — Calculated

Data Format: Numeric
Behavior: Describes the budget that was allocated to the completed portion of the activity.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management.*
Conditional Note/Associated Component:
Definition: The value of work performed expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. This is also referred to as the budgeted cost of work performed (BCWP).

Estimate at Completion (EAC) — Optional — Calculated

Data Format: Numeric
Behavior: Provides a projection of the total cost of this activity at the point of completion.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management*.
Conditional Note/Associated Component:
Definition: The expected total cost of a schedule activity, a work breakdown structure component, or the project when the defined scope of work will be completed. EAC is equal to the actual cost (AC) plus the estimate to complete (ETC) for all of the remaining work. EAC = AC plus ETC. The EAC may be calculated based on performance to date or estimated by the project team based on other factors, in which case it is often referred to as the latest revised estimate. SEE ALSO Earned Value Technique (EVT), Estimate to Complete (EAC).

Estimate to Complete (ETC) — Optional — Calculated

Data Format: Numeric
Behavior: Estimates how much it will cost to complete this activity.
Good Practices: Can be found in the *Practice Standard for Earned Value Management*.
Conditional Note/Associated Component:
Definition: The expected cost needed to complete all the remaining work for a schedule activity, work breakdown structure component, or the project. SEE ALSO Earned Value Technique (EVT), Estimate at Completion (ETC).

Lag — Optional — Manual

Data Format: Numeric
Behavior: Static, modifies a logical relationship to impose a delay in the start or finish of the successor activity.
Good Practices: Lags must not be a replacement for schedule network logic or activities. Lags should be used sparingly. Lags must only be used for an unchanging period of time that must occur between one activity and another. A lag must not take resources.
Conditional Note/Associated Component:
Definition: A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a ten-day lag, the successor activity cannot start until ten days after the predecessor activity has finished. SEE ALSO Lead.

Lead — Optional — Manual

Data Format: Numeric
Behavior: Modifies a logical relationship to impose an acceleration in the start or finish of the successor activity. It can also be thought of as a ''negative'' lag.
Good Practices: Leads must not be a replacement for schedule network logic or activities. Leads should be used sparingly. Leads must only be used for an unchanging period of time that MUST occur between one activity and another. A lead must not take resources.
Conditional Note/Associated Component:
Definition: A modification of a logical relationship that allows an acceleration of the successor activity. For example, in a finish-to-start dependency with a ten-day lead, the successor activity can start ten days before the predecessor activity has finished. A negative lead is equivalent to a positive lag. SEE ALSO Lag.

Level — Optional — Manual

Data Format: Numeric
Behavior: Defines the granularity or levels of detail of the schedule or its presentation.
Good Practices: Regardless of the physical level depth of the overall schedule, it is recommended that the following level definitions be used: Schedule Levels.

1. *Level 1—Executive Summary*. This is a summary level schedule, usually only one page that will include the major contractual milestones and summary level activities.
2. *Level 2—Management Summary*. This is a more extensive summary level schedule, usually four to five pages that will include the level one and report on similar activities by area or capital equipment.
3. *Level 3—Publication Schedule*. This will be the level of detail used to support the monthly report. It will include all major milestones, major elements of engineering, procurement, construction, and start-up.
4. *Level 4—Execution Planning*. This supports the construction and commissioning teams in their overall planning of the project. All activities of over a week's duration should normally be shown. The Three Week Look-ahead Schedule is produced from Level Four and above.
5. *Level 5—Detailed Planning*. This level of detail will support the short-term planning for the field, normally for those activities of less than one-week duration. Workarounds and critical areas can be exploded here.

Conditional Note/Associated Component:
Definition: A *project team* specified rule for the relative granularity of *schedule activities* in the overall *schedule model*.

Milestone — Required — Calculated

Data Format: Flag and/or Graphical
Behavior: Identifies a significant event.
Good Practices: The milestone must have no resources and no duration. At a minimum a project start and finish milestone must be present in the schedule. Milestone indicator should be depicted as a diamond shape.
Conditional Note/Associated Component:
Definition: A significant point or event in the project. SEE ALSO Schedule Milestone.

Presentation — Optional — Manual

Data Format: Graphical
Behavior: Displays schedule data.
Good Practices:

1. A visual display of the schedule activities should be employed. If employed the bar chart should be used.
2. Outputs must depict the date upon which the output is generated.
3. Descriptions of the output and major items within the output must be included.
4. Outputs should show both progress and the current data date.
5. Any project network diagram should have as few logic crossover points as possible, while ensuring sufficient space to represent relationship lines.

Conditional Note/Associated Component:
Definition: The interface, usually a computer application, between a project management scheduler and the schedule model data.

Project Control Account — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides a means of focus for planning and monitoring purposes.
Good Practices: Must be performed in accordance with *Practice Standard for Work Breakdown Structures*.
Conditional Note/Associated Component:
Definition: A management control point where scope, budget (resource plans), actual cost, and schedule are integrated and compared to earned value for performance management. Control accounts are placed at selected management points (specific components at selected levels) of the work breakdown structure.

Project Cost Components — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides additional breakdowns that can be assigned for a specific cost account within the project.
Good Practices: For accounting purposes, costs should be broken down into such categories as direct, indirect, labor, material, equipment, etc.
Conditional Note/Associated Component:
Definition: Accounting elements used to integrate traditional chart of account line items with the project cost accounting structure.

Project Cost Estimate — Optional — Calculated

Data Format: Numeric
Behavior: Provides an estimate of the cost of the entire project summed from all individual parts.
Good Practices: The project costs must be calculated by summing the individual cost components that have been assigned to the project activities.
Conditional Note/Associated Component:
Definition: The *estimated cost** for the entire *project*.

Project Description — Optional — Manual

Data Format: Alphanumeric
Behavior: Describes with a short phrase, the project.
Good Practices: The project description should summarize the scope of work for the entire project.
Conditional Note/Associated Component:
Definition: Documented narrative summary of the *project scope statement*.

Project Manager — Optional — Manual

Data Format: Alphanumeric
Behavior: Shows the name of the Project Manager.
Good Practices: Should be displayed on all output.
Conditional Note/Associated Component:
Definition: The person assigned by the performing organization to achieve the project objectives.

Project Name — Required — Manual

Data Format: Alphanumeric
Behavior: Describes, in a short form, the project.
Good Practices:
Conditional Note/Associated Component:
Definition: A short phrase or label for each *project*, used in conjunction with the *project identifier* to differentiate a particular project from other projects in a *program*. Sometimes also known as project title.

Project Schedule ID — Required — Manual

Data Format: Alphanumeric
Behavior: Identifies the scheduled project.
Good Practices: Must be a unique identifier which can be automatically generated or follows a numbering scheme appropriate for the enterprise. It is helpful to assign a reasoned structure or ''coding'' to the Project Schedule ID.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each schedule model to differentiate that schedule model from others. Also known as project identifier.

Project Version — Required — Calculated

Data Format: Alphanumeric
Behavior: Indicates which revision of the model the schedule represents.
Good Practices: The version number should be incremented in a consistent manner as successive changes are made, resulting in different versions of the schedule.
Conditional Note/Associated Component:
Definition: A designation of the instance of a schedule. Examples include; as of date, revision number, agreed versioning codes, among others.

Summary Activity	Optional	Calculated

Data Format: Alphanumeric
Behavior: Inherits information for subordinate activities. May be expressed as a roll-up activity or hammock.
Good Practices: Must be used for vertical traceability and roll-up.
Conditional Note/Associated Component:
Definition: A group of related schedule activities aggregated at some summary level, and displayed/reported as a single activity at that summary level. SEE ALSO Subnetwork, Subproject.

Unit of Measure	Required	Manual

Data Format: Alphanumeric
Behavior: Provides quantifiable units for various components across the schedule.
Good Practices: Units of measure should be defined consistently throughout the schedule.
Conditional Note/Associated Component:
Definition: A designation of the type of quantity being measured, such as work-hours, cubic yards, or lines of code.

Update Cycle	Required	Manual

Data Format: Dates
Behavior: Defines the period for reporting status on the project.
Good Practices: The update cycles should be less than one month. A good practice to determine the length of update cycle is to tie the period to the duration of the project activities. The concept is to ensure that every activity within the current reporting period goes no longer than two update cycles without status.
Conditional Note/Associated Component:
Definition: The regular interval at which the project activities have their status reported to the current known state.

WBS Element ID	Optional	Manual

Data Format: Alphanumeric
Behavior: Maps the activity or task to the work breakdown structure of the project. Defines the ''parent element'' of the activity within the WBS.
Good Practices: May be found in the *Practice Standard for Work Breakdown Structures.*
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each *work breakdown structure (WBS)* element to differentiate a particular WBS from any other WBS element in a *program*.

4.3 Components: Alphabetized List

A

Activity Actual Duration	Required	Calculated

Data Format: Numeric
Behavior: Defines the length of time that has elapsed since the activity began.
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *activity actual start date* of the *schedule activity* and either the *data date* of the *project schedule,* if the schedule activity is in progress, or the *activity actual finish date,* if the schedule activity is complete.

Activity Actual Finish Date	Required	Manual

Data Format: Date
Behavior: Defines progress having been completed on activity.
Good Practices: Actual dates should be assigned to all actual finishes prior to the Data Date. Actual Dates replace Early and Late Dates.
Conditional Note/Associated Component: 100% Complete
Definition: The point in time work actually ended on the *schedule activity.*

Activity Actual Start Date — Required — Manual

Data Format: Date
Behavior: Defines progress having been initiated on an activity.
Good Practices: Actual Dates must be assigned to all actual starts prior to the Data Date. Actual Dates replace Early and Late Dates.
Conditional Note/Associated Component: Progress must have been initiated prior to the current Data Date.
Definition: The point in time at which work actually began on the *schedule activity*.

Activity Baseline Duration — Required — Calculated

Data Format: Numeric
Behavior: Identifies the duration of the activity at the time the project plan was approved by the project stakeholders (Baseline Schedule).
Good Practices: Baseline duration should represent a specific target that is approved.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *activity baseline start date* and *activity baseline finish date* of a *schedule activity* as determined by its approved *project schedule baseline*.

Activity Baseline Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the approval of baseline finish of activity.
Good Practices: Baseline dates should represent a specific target that has been approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the completion of the *schedule activity* in an approved *project schedule baseline*.

Activity Baseline Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the approval of the baseline start date for activity.
Good Practices: Baseline dates should represent a specific target that has been approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the beginning of the *schedule activity* in an approved *project schedule baseline**.

Activity Calendar — Optional — Manual

Data Format: Date/Time
Behavior: The Activity Calendar may override the Project Calendar for those activities to which it is applied.
Good Practices:
Conditional Note/Associated Component:
Definition: Usually the *project calendar*, or another specifically defined *calendar* from the *calendar library*, assigned to the *schedule activity* which defines the *work periods* and *non-work periods* in calendar format. The activity calendar, on the schedule activities to which it is assigned, is used to replace the *project calendar* during *schedule network analysis*.

Activity Code — Optional — Manual

Data Format: Alphanumeric
Behavior: Indicates the classification of the task/activity.
Good Practices: Activity codes should be used to facilitate sorting, organizing, summarizing, and grouping.
Conditional Note/Associated Component:
Definition: One or more numerical or text values that identify characteristics of the work or in some way categorize the schedule activity that allows filtering and ordering of activities within reports.

Activity Cost Component — Optional — Manual

Data Format: Alphanumeric.
Behavior: Provides additional breakdowns that can be assigned for a specific cost account within the project.
Good Practices: For accounting purposes, costs should be broken down into categories, such as direct, indirect, labor, material, equipment, etc.
Conditional Note/Associated Component:
Definition: A *component* of the *cost*, such as labor cost, equipment cost, and material cost.

Activity Cost Estimate — Optional — Manual

Data Format: Numeric
Behavior: An estimate of the cost of the activity, derived by adding all individual activity cost components.
Good Practices: The activity costs should be calculated by adding the individual activity cost components that have been assigned to the activity.
Conditional Note/Associated Component: Activity Cost Component
Definition: The *estimated cost** of the *schedule activity* that includes the *cost* for all *resources* required to perform and complete the activity, including all *cost types* and *cost components*.

Activity Cumulative Probability Risk Distribution — Optional — Manual

Data Format: Table of dates, numeric (fractional)
Behavior: Stores results of method used to quantify uncertainty based upon the chosen probability distribution function durations.
Good Practices: The risk analysis process should be used for projects where schedule variances could have a significant impact on project objectives.
Conditional Note/Associated Component:
Definition: A table of *dates* and their associated cumulative probabilities of occurrence for *schedule activity* completion. Dates are derived using analytical techniques such as Monte Carlo calculations. When applied to the *project end date*, the value is equivalent to the Project Cumulative Probability Risk Distribution.

Activity Duration Percent Complete — Optional — Calculated

Data Format: Numeric (fractional)
Behavior: Represents the proportion of actual duration completed at a given point in time.
Good Practices: In the absence of earned value management, Duration Percent Complete should be used as an indication of activity progress. However, users must recognize that this is a very rough approximation of true progress, and its use in lieu of EVM is discouraged. Determining hours remaining and then calculating a percent complete is preferable if EVM cannot be used. This will focus the team on looking at the remaining work—not the work completed. The project manager should try to minimize the number of activities that will be scheduled this way.
Conditional Note/Associated Component: Practical means of assessing progress
Definition: An estimate, expressed as the percentage that the *activity actual duration* represents, of the *activity total duration* for a *schedule activity* that has *work* in progress.

Activity Early Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the early finish of the activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time when the uncompleted portion of the *schedule activity* can be completed.

Activity Early Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the early start of the activity.
Good Practices: Must be derived from the CPM calculations
Conditional Note/Associated Component:
Definition: The earliest possible point in time when the *schedule activity* can begin.

Activity Effort — Optional — Manual

Data Format: Numeric
Behavior: Displays labor units required for an activity.
Good Practices: Resources should be identified and assigned. If a labor resource is identified, Effort must be assigned.
Conditional Note/Associated Component: Depends on Activity Duration and Resource Assignment.
Definition: The number of labor units required to complete a schedule activity or work breakdown structure component. Activity effort is usually expressed as staff hours, staff days, or staff weeks. Contrast with *duration*.

Activity ID — Required — Calculated

Data Format: Alphanumeric
Behavior: Identifies the schedule activity.
Good Practices: Must be a unique identifier which can be automatically generated or follows a numbering scheme appropriate for the project. It is helpful to assign a reasoned structure or ''coding'' to the Activity ID.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each schedule activity to differentiate that project activity from other activities. The Activity ID is typically unique within any one project schedule network diagram.

Activity Label — Required — Manual

Data Format: Alphanumeric
Behavior: Allows user-defined information to be recorded about the activity.
Good Practices: Phrase or label must start with a verb and a unique subject (noun/adjective).
Conditional Note/Associated Component:
Definition: A short phrase or label for each schedule activity used in conjunction with an activity identifier to differentiate that project schedule activity from other schedule activities. The activity description normally describes the scope of work of the schedule activity.

Activity Late Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the late finish of the activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time when the *schedule activity* can be completed without violating a schedule *constraint* or delaying the *project end date*.

Activity Late Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the late start of the activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time when the *schedule activity* can begin without violating a schedule *constraint* or delaying the *project end date*.

Activity Most Likely Duration — Optional — Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity under most typical situations.
Good Practices: Most Likely Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the most probable *activity duration*.

Activity Optimistic Duration — Optional — Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity assuming the best possible conditions.
Good Practices: Optimistic Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the shortest possible *activity duration*.

Activity Original Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the schedule activity prior to reporting any progress on the activity.
Good Practices: A record should be maintained of how the duration was determined for future reference and revisions. Generally, durations should not exceed two or three reporting cycles.
Conditional Note/Associated Component:
Definition: The *activity duration* originally assigned to a *schedule activity* and not updated as progress is reported on the activity. Typically used for comparison with *activity actual duration* and *activity remaining duration* when reporting schedule progress. The *activity original duration* is normally developed with a reliance on historic data, specialists, resource availability, financial considerations, and volume of work to be performed. May also be called ''planned duration.''

Activity Pessimistic Duration — Optional — Manual

Data Format: Numeric
Behavior: Identifies the length of time allocated to complete the schedule activity assuming the worst possible conditions.
Good Practices: Most Likely Durations should be used for schedule risk calculations.
Conditional Note/Associated Component:
Definition: The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the longest possible *activity duration*.

Activity Physical Percent Complete — Required — Manual

Data Format: Numeric (fractional)
Behavior: Actual Duration/Total Duration.
Good Practices: For any started activity, the physical percent complete must be updated. The project scheduler should make a decision at the beginning of the project which method will be used for the duration of the project. There may be different methods to measure completeness. These include the earned value-based earning rules such as 50/50 rule, actual quantities, % complete, non-linear by milestone, etc., as well as gut-feel estimates by the people working the activity. Of these methods, EV-based percentage assessment is considered to be best as it tends to be much less subjective.
Conditional Note/Associated Component: Depending on the earning value.
Definition: An *estimate*, expressed as a percent, of the amount of *work* that has been completed on a *schedule activity*, measured in terms of either *physical work progress* or via the earning rules of *earned value management*.

Activity Remaining Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the activity as of the data date.
Good Practices: Once an activity begins but does not complete during a reporting cycle a determination must be made as to the duration that remains to complete the work.
Conditional Note/Associated Component: Depends on Resource Assignment and Activity Effort.
Definition: The total number of *work periods* in *calendar units*, (a) equal to the Original Duration for an activity that has not started or (b) between the *data date* of the *project schedule* and the *early finish date* of a *schedule activity* that has an *activity actual start date*. This represents the time needed to complete a *schedule activity* where the *work* is in progress.

Activity Resource Leveled Finish Date	Optional	Calculated

Data Format: Date
Behavior: Defines the earliest finish for an activity based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned and resource over allocations exist, resource leveling must be used.
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity scheduled finish date* of a resource limited *schedule activity* in a *resource-limited schedule*.

Activity Resource Leveled Start Date	Optional	Manual

Data Format: Date
Behavior: Defines the earliest start for an activity based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned and there is an over allocation of resources, Resource Leveling should be used.
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity scheduled start date* of a resource limited *schedule activity* in *a resource-limited schedule*.

Activity Risk Criticality Index	Optional	Calculated

Data Format: Numeric
Behavior: The probability of an activity to become a member of a critical path.
Good Practices: A risk analysis process should be used for projects where stakeholders believe there is high risk. Risk analysis is appropriate for projects where schedule variances have a significant impact on project objectives.
Conditional Note/Associated Component:
Definition: The probability that the *schedule activity* will be on a *critical path*.

Activity Scope Definition	Optional	Manual

Data Format: Alphanumeric
Behavior: Allows user-defined information to be recorded about the work to be performed.
Good Practices: The Activity Scope Definition should be provided for each activity to further bound the work.
Conditional Note/Associated Component:
Definition: Documented narrative describing the *work* represented by the *activity*.

Activity Target Duration	Optional	Calculated

Data Format: Numeric
Behavior: Describes the planned duration of an activity reflecting some desired outcome, which may be different than the baseline duration.
Good Practices:
Conditional Note/Associated Component:
Definition: The *estimated* total number of *work periods* in *calendar units*, needed to complete the *schedule activity* as determined by a specific *project target schedule*.

Activity Target Finish Date	Optional	Manual

Data Format: Date
Behavior: Defines a point of obligation or a project goal.
Good Practices: Target schedules must be utilized; at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: A point in time established by schedule network analysis for completion of a *schedule activity* within a specific version of the *project schedule*.

Activity Target Start Date — Optional — Manual

Data Format: Date
Behavior: Defines a point of obligation or a project goal.
Good Practices: Target schedules must be utilized; at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: A point in time established by schedule network analysis for beginning the *schedule activity within a specific version of the project schedule.*

Activity Total Duration — Optional — Calculated

Data Format: Numeric
Behavior: Displays activity duration from start to finish.
Good Practices:
Conditional Note/Associated Component: Depends on Resource Assignment and Activity Effort.
Definition: The total number of *work periods* in *calendar units* to complete a *schedule activity*. For schedule activities in progress, it includes the *activity actual duration* plus the *activity remaining duration.*

As Late As Possible — Optional — Manual

Data Format: Alphanumeric
Behavior: Allows an activity to be scheduled so that it finishes on or before its late finish date.
Good Practices: Constraints must not be a replacement for schedule network logic. The As Late As Possible constraint should be used sparingly.
Conditional Note/Associated Component: Project Finish Date
Definition: A constraint placed on an activity that will cause it to be scheduled to finish on the last date before the project finish date and without delaying successor activities.

As Soon As Possible — Optional — Manual

Data Format: Alphanumeric
Behavior: Allows an activity to be scheduled so that it finishes on its early finish date.
Good Practices: Constraints must not be a replacement for schedule network logic. The As Soon As Possible constraint should be used sparingly.
Conditional Note/Associated Component: Project Start Date
Definition: A constraint placed on an activity that will cause it to be scheduled to finish on the earliest date after the project start date after any predecessor activities and without delaying successor activities.

Assigned Quantity — Optional — Manual

Data Format: Numeric
Behavior: Represents the specific quantity of a resource assigned to an activity.
Good Practices: The assignment of resource quantities should consider the activity duration.
Conditional Note/Associated Component: Resource Assignment
Definition: The act of assigning the specific amount of a certain resource needed to perform the activity in the required duration.

B

Baseline Data Date — Required — Manual

Data Format: Date
Behavior: Defines the division between historical (baseline) and future progress periods.
Good Practices: The Baseline Data Date must not be modified at the time of reporting status. If the *scheduling tool* does not record this data, it must be stored in a user-defined field.
Conditional Note/Associated Component: Target schedule as defined by activity and project target dates.
Definition: The *date* through which the project baseline and progress were determined and reported for analyses, such as scheduling and performance measurement. Sometimes used with a modifier such as project schedule, project scope, or project cost.

C

Critical Path — Required — Calculated

Data Format: Alphanumeric (list of activities)
Behavior: Identifies the activities that meet the logic defined by the above definitions.
Good Practices: To establish a meaningful Critical Path, it is necessary to develop logical and well defined activity relationships with empirically derived durations for executing all the project activities in a practical manner. Therefore, there must not be any open ends other than the project start and project finish. Constraints must be restricted to only those that represent external or internal events that cannot be effectively addressed with activity logic.
Conditional Note/Associated Component: Relationships defined for all activities
Definition: Generally, but not always, the sequence of *schedule activities* determines the duration of the *project*. Generally, it is the longest path through the project. However, a critical path can end, as an example, on a *schedule milestone* that is in the middle of the project schedule and that has a finish-no-later-than *imposed date* schedule *constraint*. SEE ALSO Project Critical Path, Specified Critical Path, and Critical Path Method.

Custom Field — Optional — Manual

Data Format: Variable
Behavior: Provides meta information about other schedule model data.
Good Practices: The custom field can utilize any of the attribute types; alpha, alphanumeric, date, time, etc.
Conditional Note/Associated Component:
Definition: Data elements used as extended characteristic of schedule entities (e.g., Code, Field, Tag, etc.).

D

Data Date — Required — Manual

Data Format: Date
Behavior: Defines the division between historical and future progress periods.
Good Practices: The Data Date must be advanced at the time of reporting status, at regular intervals.
Conditional Note/Associated Component:
Definition: The *date* (including time of day) through which the *project* status and progress were last determined and reported for analyses, such as scheduling and performance measurements. It is the last past historical date. Sometimes called as-of-date. (Scheduler caution: some *project management software* used for scheduling treat the data date as the future date immediately after status is reported.)

Date Variance — Optional — Calculated

Data Format: Numeric
Behavior: Quantifies departure from a date reference point.
Good Practices: The Date Variance of activities should be reviewed for trends at regular intervals to give early indications of schedule deviation and to determine if corrective action is required.
Conditional Note/Associated Component:
Definition: The difference between two selected dates. The variance is usually given in units such as work days.

Driving Resources — Optional — Manual

Data Format: Flag
Behavior: Identifies a resource as driving to control the duration of activities.
Good Practices: Driving Resources should be considered within the schedule.
Conditional Note/Associated Component:
Definition: *Resources* that are considered to have a direct impact on *activity duration* during *resource leveling*.

Duration Variance — Optional — Calculated

Data Format: Numeric
Behavior: Quantifies departure from a duration reference point.
Good Practices: The Duration Variance of activities should be reviewed for trends at regular intervals to give early indications of schedule deviation and to determine if corrective action is required.
Conditional Note/Associated Component: Must maintain duration estimates to compare and calculate against.
Definition: SEE ALSO Activity Duration Variance and Project Duration Variance.

E

Earned Value — Optional — Calculated

Data Format: Numeric
Behavior: Describes the budget that was allocated to the completed portion of the activity.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management.*
Conditional Note/Associated Component:
Definition: The value of work performed expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. This is also referred to as the budgeted cost of work performed (BCWP).

Estimate at Completion (EAC) — Optional — Calculated

Data Format: Numeric
Behavior: Provides a projection of the total cost of this activity at the point of completion.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management.*
Conditional Note/Associated Component:
Definition: The expected total cost of a schedule activity, a work breakdown structure component, or the project when the defined scope of work will be completed. EAC is equal to the actual cost (AC) plus the estimate to complete (ETC) for all of the remaining work. EAC = AC plus ETC. The EAC may be calculated based on performance to date or estimated by the project team based on other factors, in which case it is often referred to as the latest revised estimate. SEE ALSO Earned Value Technique (EVT), Estimate to Complete (EAC).

Estimate to Complete (ETC) — Optional — Calculated

Data Format: Numeric
Behavior: Estimates how much it will cost to complete this activity.
Good Practices: Can be found in the *Practice Standard for Earned Value Management.*
Conditional Note/Associated Component:
Definition: The expected cost needed to complete all the remaining work for a schedule activity, work breakdown structure component, or the project. SEE ALSO Earned Value Technique (EVT), Estimate at Completion (ETC).

Expected Finish — Optional — Manual

Data Format: Date
Behavior: Imposes a finish date on an activity that determines the remaining duration of the activity after it has been reported as started. The behavior of Expected Finish constraints are software application-dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Expected Finish constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A date constraint placed on both the *activity early and late finish dates* of an in-progress *schedule activity* that affects when the schedule activity can be scheduled for completion and is usually in the form of a fixed *imposed date*. This constraint requires the activity remaining duration to be set equal to the difference between the activity expected finish date and the *data date* to force the schedule activity to be scheduled to finish upon the imposed date.

F

Finish Not Earlier Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity prior to which the activity can not finish. The behavior of Finish Not Earlier Than is *scheduling tool* dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish Not Earlier Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Earlier Than constraint prevents the activity from being scheduled to finish earlier than the imposed date. ''Not earlier than'' constraints impact only the forward pass calculation and hence the early dates of a schedule activity.

Finish Not Later Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity prior to which the activity must finish. The behavior of Finish Not Earlier Than is *scheduling tool* dependent.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish Not Later Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Later Than constraint prevents the activity from being scheduled to finish later than the imposed date. ''Not later than'' constraints impact only the backward pass calculation and hence the late dates of a schedule activity.

Finish On — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the finish of an activity on which it must finish.
Good Practices: Constraints must not be a replacement for schedule network logic. The Finish On constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish On constraint prevents the activity from being scheduled to finish earlier as well as later than the imposed date. Finish On constraints are a combination of a Not Earlier Than and Not Later Than constraints. These impact both the forward and the backward pass calculation and hence both early and late dates. This causes the schedule activity to have a zero *total float* while its predecessors and successors may have different total float values.

Finish to Finish — Optional — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be completed until the predecessor activity is completed.
Good Practices: All activities, except the first and last activities, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where completion of work of the successor activity cannot finish until the completion of work of the predecessor activity. SEE ALSO Logical Relationship.

Finish to Start | Required | Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be started until the predecessor activity, or task is completed.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish.
Conditional Note/Associated Component:
Definition: The logical relationship where initiation of work of the successor activity depends upon the completion of work of the predecessor activity. SEE ALSO Logical Relationship.

Free Float | Required | Calculated

Data Format: Numeric
Behavior: Represents the amount of time an activity can delay its early finish without impacting any successor activities early start. It is the difference between an activity's early finish date and the earliest start date of the closest of its successors. As progress is recorded, this value may change. This value will also change if remaining work logic or durations are revised.
Good Practices: Free Float may be used to provide an early indication of activity or schedule slippage.
Conditional Note/Associated Component:
Definition: The amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities. SEE ALSO Total Float (TF)).

I

Imposed Project Duration | Optional | Manual

Data Format: Numeric
Behavior: Identifies duration of the project as defined by the owner at project inception.
Good Practices: Every effort must be made to develop a *schedule model* with a calculated *project duration* that meets the *imposed project duration*. This effort should result in a *project schedule* with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the imposed duration must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: The work time units allowed to complete a project from the owners' perspective/ directive.

L

Lag | Optional | Manual

Data Format: Numeric
Behavior: Static, modifies a logical relationship to impose a delay in the start or finish of the successor activity.
Good Practices: Lags must not be a replacement for schedule network logic or activities. Lags should be used sparingly. Lags must only be used for an unchanging period of time that must occur between one activity and another. A lag must not take resources.
Conditional Note/Associated Component:
Definition: A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a ten-day lag, the successor activity cannot start until ten days after the predecessor activity has finished. SEE ALSO Lead.

Lead — Optional — Manual

Data Format: Numeric
Behavior: Modifies a logical relationship to impose an acceleration in the start or finish of the successor activity. It can also be thought of as a ''negative'' lag.
Good Practices: Leads must not be a replacement for schedule network logic or activities. Leads should be used sparingly. Leads must only be used for an unchanging period of time that MUST occur between one activity and another. A lead must not take resources.
Conditional Note/Associated Component:
Definition: A modification of a logical relationship that allows an acceleration of the successor activity. For example, in a finish-to-start dependency with a ten-day lead, the successor activity can start ten days before the predecessor activity has finished. A negative lead is equivalent to a positive lag. SEE ALSO Lag.

Level — Optional — Manual

Data Format: Numeric
Behavior: Defines the granularity or levels of detail of the schedule or its presentation.
Good Practices: Regardless of the physical level depth of the overall schedule, it is recommended that the following level definitions be used: Schedule Levels.

1. *Level 1—Executive Summary*. This is a summary level schedule, usually only one page that will include the major contractual milestones and summary level activities.
2. *Level 2—Management Summary*. This is a more extensive summary level schedule, usually four to five pages that will include the level one and report on similar activities by area or capital equipment.
3. *Level 3—Publication Schedule*. This will be the level of detail used to support the monthly report. It will include all major milestones, major elements of engineering, procurement, construction, and start-up.
4. *Level 4—Execution Planning*. This supports the construction and commissioning teams in their overall planning of the project. All activities of over a week's duration should normally be shown. The Three Week Look-ahead Schedule is produced from Level Four and above.
5. *Level 5—Detailed Planning*. This level of detail will support the short-term planning for the field, normally for those activities of less than one-week duration. Workarounds and critical areas can be exploded here.

Conditional Note/Associated Component:
Definition: A *project team* specified rule for the relative granularity of *schedule activities* in the overall *schedule model*.

M

Mandatory Finish Date — Optional — Manual

Data Format: Date
Behavior: Mandates the finish date of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. Since this constraint overrides the CPM calculation, this component should not be used.
Conditional Note/Associated Component:
Definition: A finish date *constraint* placed on a *schedule activity* that sets both the *activity early and late finish dates* equal to a fixed *imposed date* and thereby also constrains the early start dates of the *network paths* logically following that schedule activity.

Mandatory Start Date — Optional — Manual

Data Format: Date
Behavior: Mandates the start date of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. Since this constraint overrides the CPM calculation, this component should not be used.
Conditional Note/Associated Component:
Definition: A start date *constraint* placed on a *schedule activity* that sets both the *activity early and late start dates* equal to a fixed *imposed date* and thereby also constrains the late finish date of the *network paths* logically preceding that schedule activity. Schedule calculations do not override this constraint. Therefore an imposed mandatory start sets the early dates for all paths leading to and the late dates on paths leading from the activity.

Milestone — Required — Calculated

Data Format: Flag and/or Graphical
Behavior: Identifies a significant event.
Good Practices: The milestone must have no resources and no duration. At a minimum a project start and finish milestone must be present in the schedule. Milestone indicator should be depicted as a diamond shape.
Conditional Note/Associated Component:
Definition: A significant point or event in the project. SEE ALSO Schedule Milestone.

P

Presentation — Optional — Manual

Data Format: Graphical
Behavior: Displays schedule data.
Good Practices:

1. A visual display of the schedule activities should be employed. If employed the bar chart should be used.
2. Outputs must depict the date upon which the output is generated.
3. Descriptions of the output and major items within the output must be included.
4. Outputs should show both progress and the current data date.
5. Any project network diagram should have as few logic crossover points as possible, while ensuring sufficient space to represent relationship lines.

Conditional Note/Associated Component:
Definition: The interface, usually a computer application, between a project management scheduler and the schedule model data.

Project Actual Duration — Required — Calculated

Data Format: Numeric
Behavior: Defines the length of time that has elapsed since the project plan began.
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* between the *project actual start date* of the project and either the *data date* of the project schedule, if the project is in progress or the *project actual finish date* if the project is complete.

Project Actual Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the actual finish of the project via the last activity finish date.
Good Practices:
Conditional Note/Associated Component:
Definition: The point in time associated with the *activity actual finish date* of the last *schedule activity* in the *project*.

Project Actual Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the actual start of the project's first activity.
Good Practices:
Conditional Note/Associated Component: The first activity in the schedule model must have an actual start date applied.
Definition: The point in time associated with the *activity actual start date* of the first *schedule activity* in the *project*.

Project Baseline Duration — Required — Calculated

Data Format: Numeric
Behavior: Identifies the duration of the project at the time the project plan was approved by the project stakeholders (baseline schedule).
Good Practices: Baseline duration should represent a specific target that is approved.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* needed to execute the approved *project schedule baseline** for the *project*.

Project Baseline Finish Date — Required — Manual

Data Format: Date
Behavior: Defines the approval of the finish of the last activity as the baseline.
Good Practices: Baseline dates should represent a specific target that is approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the completion of the last *schedule activity* in an approved *project schedule baseline*.

Project Baseline Start Date — Required — Manual

Data Format: Date
Behavior: Defines the approved project's first activity as the baseline start date.
Good Practices: Baseline dates should represent a specific target that is approved.
Conditional Note/Associated Component: The development of the schedule model supports establishment and approval of an analysis point.
Definition: The point in time associated with the start of the first task in an approved project schedule.

Project Calendar — Required — Manual

Data Format: Date
Behavior: Defines the default working periods for the project.
Good Practices: At the project level, this must constitute the primary or default calendar for the Project.
Conditional Note/Associated Component:
Definition: A calendar of working days or shifts that establishes those *dates* on which *schedule activities* are worked and nonworking days that determine those dates on which schedule activities are idle. Typically defines holidays, weekends, and shift hours. The calendar initially assigned to schedule activities and resources. SEE ALSO Resource Calendar and Activity Calendar.

Project Control Account — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides a means of focus for planning and monitoring purposes.
Good Practices: Must be performed in accordance with *Practice Standard for Work Breakdown Structures*.
Conditional Note/Associated Component:
Definition: A management control point where scope, budget (resource plans), actual cost, and schedule are integrated and compared to earned value for performance management. Control accounts are placed at selected management points (specific components at selected levels) of the work breakdown structure.

Project Cost Components — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides additional breakdowns that can be assigned for a specific cost account within the project.
Good Practices: For accounting purposes, costs should be broken down into such categories as direct, indirect, labor, material, equipment, etc.
Conditional Note/Associated Component:
Definition: Accounting elements used to integrate traditional chart of account line items with the project cost accounting structure.

Project Cost Estimate — Optional — Calculated

Data Format: Numeric
Behavior: Provides an estimate of the cost of the entire project summed from all individual parts.
Good Practices: The project costs must be calculated by summing the individual cost components that have been assigned to the project activities.
Conditional Note/Associated Component:
Definition: The *estimated cost** for the entire *project*.

Project Description — Optional — Manual

Data Format: Alphanumeric
Behavior: Describes with a short phrase, the project.
Good Practices: The project description should summarize the scope of work for the entire project.
Conditional Note/Associated Component:
Definition: Documented narrative summary of the *project scope statement*.

Project Duration Percent Complete — Optional — Calculated

Data Format: Numeric (fractional)
Behavior: Defines progress of the project as a percentage of total expected project duration.
Good Practices:
Conditional Note/Associated Component:
Definition: An *estimate*, expressed as a percent, of the entire *project duration* that has been completed on the *project*.

Project Early Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the early finish of last activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time associated with the completion of the last *schedule activity* of the project.

Project Early Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the early start of the project's first activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The earliest possible point in time associated with the beginning of the first *schedule activity* of the *project*.

Project Finish Constraint — Optional — Calculated

Data Format: Date
Behavior: Static, provides a ''not later than'' constraint to calculate the late dates for a project during the backward pass. This date may be earlier or later than the project finish date that is calculated from the forward pass.
Good Practices: Every effort must be made to develop a Schedule Model with non-negative Total Float. This effort should result in a Project Schedule with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the Project Finish Constraint must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: A limitation or restraint placed on the *project late finish date* that affects when the project must finish and is usually in the form of a fixed *imposed date*.

Project Late Finish Date — Required — Calculated

Data Format: Date
Behavior: Defines the late finish of last activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time associated with the completion of the last *schedule activity* of the *project*.

Project Late Start Date — Required — Calculated

Data Format: Date
Behavior: Defines the late start of the project's first activity.
Good Practices: Must be derived from the CPM calculations.
Conditional Note/Associated Component:
Definition: The latest possible point in time associated with the beginning of the first *schedule activity* of the *project*.

Project Manager — Optional — Manual

Data Format: Alphanumeric
Behavior: Shows the name of the Project Manager.
Good Practices: Should be displayed on all output.
Conditional Note/Associated Component:
Definition: The person assigned by the performing organization to achieve the project objectives.

Project Name — Required — Manual

Data Format: Alphanumeric
Behavior: Describes, in a short form, the project.
Good Practices:
Conditional Note/Associated Component:
Definition: A short phrase or label for each *project*, used in conjunction with the *project identifier* to differentiate a particular project from other projects in a *program*. Sometimes also known as project title.

Project Original Duration — Required — Calculated

Data Format: Numeric
Behavior: Duration of the project after the initial scheduling effort but before progress is reported.
Good Practices:
Conditional Note/Associated Component:
Definition: The initial *estimate* of the total number of *work* periods in *calendar units* needed to complete a *project*. The Project Original Duration is typically determined from the initial longest *network path* though the project.

Project Physical Percent Complete — Required — Calculated

Data Format: Numeric (fractional)
Behavior: Defines progress of the project as a percentage of physical work to be done. At the project level, this value is typically calculated, using earned value management techniques. As progress is recorded, the earned value at the activity level is calculated.
Good Practices: Must be performed in accordance with *Practice Standard for Earned Value Management*. Project Physical Percent Complete must be determined by dividing the summarized earned value units by the project budget in the same units.
Conditional Note/Associated Component: Requires use of earned value technique.
Definition: An *estimate*, expressed as a percent, of the amount of *work* that has been completed on the *project*, measured in terms of *physical work progress*.

Project Remaining Duration — Required — Manual

Data Format: Numeric
Behavior: Defines the length of time allocated to complete the project from the data date.
Good Practices: Once a project begins but does not complete during a reporting cycle a determination must be made as to the duration that remains to complete the work.
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units*, between the *data date* of the *project schedule* and the *project early finish date of a project* that has at least one *activity actual start date*. This represents the time needed to complete a *project* where the *work* is in progress.

Project Resource Leveled Finish Date — Optional — Calculated

Data Format: Date
Behavior: Defines the earliest finish for a project based on resource limitations.
Good Practices: Resources should be identified and assigned. If resources are assigned, Resource Leveling should be used.
Conditional Note/Associated Component:
Definition: The end date of a project based on the consideration of resource availabilities, limitations, and quantities.

Project Resource Leveled Start Date — Optional — Calculated

Data Format: Dates
Behavior: Identifies the earliest activity start date as constrained by the resource availabilities.
Good Practices: Resources should be identified and assigned. If an assigned resource is limited, Resource Leveling should be performed.
Conditional Note/Associated Component:
Definition: The start date of a project based on the consideration of resource availabilities, limitations, and quantities.

Project Schedule ID — Required — Manual

Data Format: Alphanumeric
Behavior: Identifies the scheduled project.
Good Practices: Must be a unique identifier which can be automatically generated or follows a numbering scheme appropriate for the enterprise. It is helpful to assign a reasoned structure or ''coding'' to the Project Schedule ID.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each schedule model to differentiate that schedule model from others. Also known as project identifier.

Project Start Constraint — Optional — Manual

Data Format: Date
Behavior: Provides the starting point for the forward pass calculation.
Good Practices: Every effort must be made to develop a Schedule Model that meets the Project Start Constraint. This effort should account for available resources and result in a Project Schedule with a level of risk acceptable to all stakeholders. If this is not accomplished, the stakeholder defining the Project Start Constraint must be informed and a mitigation plan agreed upon.
Conditional Note/Associated Component:
Definition: A limitation or restraint placed on the *project early start date* that affects when the project must start and is usually in the form of a fixed *imposed date*.

Project Target Duration — Optional — Calculated

Data Format: Numeric
Behavior: Describes the planned duration of the project reflecting some desired outcome, which may be different than the baseline duration.
Good Practices:
Conditional Note/Associated Component:
Definition: The estimated total number of *work periods* in *calendar units*, needed to complete the project as determined by a specific *project target schedule*.

Project Target Finish Date — Optional — Manual

Data Format: Date
Behavior: Identifies a user defined date for the project to finish.
Good Practices: Target schedules must be utilized, and at least one must be designated as the Baseline.
Conditional Note/Associated Component:
Definition: The scheduler-selected point in time established by schedule network analysis for completion of a specific version of the *project schedule*.

Project Target Start Date — Optional — Manual

Data Format: Date
Behavior: Reflects contract obligation or project team decision.
Good Practices: Target schedules must be utilized, and at least one must be designated as the baseline.
Conditional Note/Associated Component:
Definition: The scheduler-selected point in time established by schedule network analysis for beginning a specific version of the *project schedule*.

Project Total Duration — Optional — Calculated

Data Format: Numeric
Behavior: Displays duration of the project from start to finish.
Good Practices:
Conditional Note/Associated Component:
Definition: The total number of *work periods* in *calendar units* to complete a *project*. For a project in progress, it includes the *project actual duration* plus the *project remaining duration.*

Project Version — Required — Calculated

Data Format: Alphanumeric
Behavior: Indicates which revision of the model the schedule represents.
Good Practices: The version number should be incremented in a consistent manner as successive changes are made, resulting in different versions of the schedule.
Conditional Note/Associated Component:
Definition: A designation of the instance of a schedule. Examples include; as of date, revision number, agreed versioning codes, among others.

R

Resource Assignment — Optional — Manual

Data Format: Alphanumeric
Behavior: Connects a resource to an activity.
Good Practices: Resources should be identified and assigned. Resources must be considered for all activities whether the assignment is made or not.
Conditional Note/Associated Component:
Definition: The linkage of one or more *resources* to a *schedule activity* and identification of the amount of each resource that is needed to accomplish the *work* on that schedule activity.

Resource Availability — Optional — Manual

Data Format: Alphanumeric
Behavior: Establishes the normal and maximum levels of a resource that are available.
Good Practices: This value does not reflect the current and project resource assignments for the indicated resource.
Conditional Note/Associated Component:
Definition: The *dates* and number of *work periods* in *calendar units* that a given *resource* is available according to the appropriate *resource calendar*.

Resource Calendar — Optional — Manual

Data Format: Date/Time
Behavior: Defines the time a resource is available for work.
Good Practices:
Conditional Note/Associated Component: Resource ID
Definition: A calendar of working days and nonworking days that determines those *dates* on which each specific *resource* is idle or can be active. Typically defines resource specific holidays and *resource availability* periods. SEE ALSO Project Calendar and Activity Calendar.

Resource Description — Optional — Manual

Data Format: Alphanumeric
Behavior: Describes with a short phrase the resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource Description must be used. All Resource Descriptions must be unique.
Conditional Note/Associated Component:
Definition: A phrase that describes a resource by type, role, or individual.

Resource ID — Optional — Calculated

Data Format: Alphanumeric
Behavior: Identifies the assigned resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource ID must be used. All Resource IDs must be unique.
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each specific *resource* to differentiate that resource from other resources. The Resource ID is typically unique within any one *project*.

Resource Lag — Optional — Manual

Data Format: Numeric
Behavior: Defines the time from the start of the activity that a specific resource may begin work.
Good Practices: Resources should be identified and assigned. Resource Lags must only be used for an unchanging period of time that must occur between the start of the activity and the use of the resource.
Conditional Note/Associated Component:
Definition: The number of *calendar units* a r*esource* is to wait after the *activity start date* before beginning *work* on the *schedule activity*.

Resource Leveling — Optional — Calculated

Data Format: Formula
Behavior: Presents the process of recalculating the scheduled dates, based on the availability of resources.
Good Practices: Resource leveling requires the assignment of resource limits or availabilities, as well as some prioritizing criteria to resolve resource conflicts. The most often used prioritizing criterion is total float. Often this leveling effort also includes financial considerations as well as the limits on physical resources of any kind.
Conditional Note/Associated Component:
Definition: Any form of schedule network analysis in which scheduling decisions (start and finish dates) are driven by resource constraints (e.g., limited resource availability or difficult-to-manage changes in resource availability levels).

Resource Library/Dictionary — Optional — Manual

Data Format: Alphanumeric
Behavior: Provides a listing of resources that might be applied to activities in the schedule model.
Good Practices: Resources should be identified and assigned. A resource library or dictionary should be organized into some meaningful structure which might relate similar resources.
Conditional Note/Associated Component:
Definition: A documented tabulation containing the complete list, including resource attributes, of all *resources* that can be assigned to *project activities**. Also known as a resource dictionary.

Resource Rates/Prices — Optional — Manual

Data Format: Numeric
Behavior: Defines the cost per time unit for a specific resource.
Good Practices: Resources should be identified and assigned. If resources are assigned, Resource Rates/Prices should be used.
Conditional Note/Associated Component:
Definition: The unit *cost* rate assigned to a specific *resource*, including known rate escalations.

Resource Type — Optional — Manual

Data Format: Alphanumeric
Behavior: Indicates the classification of the resource.
Good Practices: Resources should be identified and assigned. If a resource is identified, the Resource Type should be used.
Conditional Note/Associated Component:
Definition: A unique designation that differentiates a *resource* by *skills*, *capabilities* or other attributes.

S

Start Not Earlier Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity prior to which the activity can not start. ''Not earlier than'' constraints impact only the forward pass calculation and hence the early dates of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start Not Earlier Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Earlier Than constraint prevents the schedule activity from being scheduled to start earlier than the imposed date.

Start Not Later Than — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity prior to which the activity must start. ''Not later than'' constraints impact only the backward pass calculation and hence the late dates of an activity.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start Not Later Than constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Later Than constraint prevents the schedule activity from being scheduled to start later than the imposed date.

Start On — Optional — Manual

Data Format: Date
Behavior: Imposes a date on the start of an activity on which it must start. These impact both the forward and the backward pass calculation and hence both early and late dates. This causes the activity to have a zero Total Float while its predecessors and successors may have different float values.
Good Practices: Constraints must not be a replacement for schedule network logic. The Start On constraint should be used sparingly.
Conditional Note/Associated Component:
Definition: A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start On constraint requires the schedule activity to start on a specific date.

Start to Finish — Optional — Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be finished until the predecessor activity, or task is started.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where completion of the successor schedule activity is dependent upon the initiation of the predecessor schedule activity. SEE ALSO Logical Relationship.

Start to Start | Optional | Manual

Data Format: Alphanumeric (Activity ID)
Behavior: Static, binds two activities such that the successor activity can not be started until the predecessor activity is started.
Good Practices: All activities, except the first and last activity, must have at least one ''?S'' predecessor relationship and one ''F?'' successor relationship, where ''?'' can be either a S or F, regardless of any other relationships that may be present. (Where S = start and F = finish).
Conditional Note/Associated Component:
Definition: The logical relationship where initiation of the work of the successor schedule activity depends upon the initiation of the work of the predecessor schedule activity. SEE ALSO Logical Relationship.

Summary Activity | Optional | Calculated

Data Format: Alphanumeric
Behavior: Inherits information for subordinate activities. May be expressed as a roll-up activity or hammock.
Good Practices: Must be used for vertical traceability and roll-up.
Conditional Note/Associated Component:
Definition: A group of related schedule activities aggregated at some summary level, and displayed/reported as a single activity at that summary level. SEE ALSO Subnetwork, Subproject.

T

Total Float | Required | Calculated

Data Format: Numeric
Behavior: Represents the amount of time an activity can delay its finish without impacting the late finish of the project. It is computed as the difference between the late and early dates of the activity, calculated from the forward and backward passes respectively. As progress is recorded, value may change. This value will also change if remaining work logic or durations are revised.
Good Practices: Total float may be used to provide an early indication of project completion slippage by constraining the project finish milestone with a Finish On Constraint.
Conditional Note/Associated Component: Depends on the duration of the activities/tasks in the schedule, the level of detail described in the schedule, and the level of detail that is required to track.
Definition: The total amount of time that a *schedule activity* may be delayed from its *activity early start date* or ***activity early finish date*** without delaying the *project end date*, or violating a schedule *constraint*. Calculated using the *critical path method* technique and by subtracting the *activity early finish date* from the *activity late finish date*, with that difference expressed in *calendar units*. A total float value less than zero indicates that the activity late finish date is scheduled prior to the activity early finish date and the calculated critical path is not feasible. A total float value of zero or greater indicates the calculated critical path may be feasible and some schedule activities may be able to be delayed. SEE ALSO Free Float (FF).

U

Unit of Measure | Required | Manual

Data Format: Alphanumeric
Behavior: Provides quantifiable units for various components across the schedule.
Good Practices: Units of measure should be defined consistently throughout the schedule.
Conditional Note/Associated Component:
Definition: A designation of the type of quantity being measured, such as work-hours, cubic yards, or lines of code.

Update Cycle	Required	Manual

Data Format: Dates
Behavior: Defines the period for reporting status on the project.
Good Practices: The update cycles should be less than one month. A good practice to determine the length of update cycle is to tie the period to the duration of the project activities. The concept is to ensure that every activity within the current reporting period goes no longer than two update cycles without status.
Conditional Note/Associated Component:
Definition: The regular interval at which the project activities have their status reported to the current known state.

W

WBS Element ID	Optional	Manual

Data Format: Alphanumeric
Behavior: Maps the activity or task to the work breakdown structure of the project. Defines the ''parent element'' of the activity within the WBS.
Good Practices: May be found in the *Practice Standard for Work Breakdown Structures.*
Conditional Note/Associated Component:
Definition: A short unique numeric or text identification assigned to each *work breakdown structure (WBS)* element to differentiate a particular WBS from any other WBS element in a *program*.

Chapter 5

Conformance Index

5.1 Conformance Overview

The conformance index identifies the degree of compliance of a *schedule model* to this standard. The component list (Chapter 4) identifies those components that must be utilized to have a minimally acceptable *schedule model*. As conditions, circumstances and experience warrant, the use of additional, more advanced, optional components may be applied. Therefore, the conformance index of a *schedule model* would increase as more advanced components are utilized.

The concept of *schedule model* conformance allows an assessor, either the developer or another entity, to determine objectively how well the *schedule model* utilizes the basic scheduling components and concepts of a well-constructed *schedule model*. The components can be divided into two categories, required components and optional components, as shown in Appendix D. All of the *schedule model* components, represent scheduling concepts, behaviors, attributes, and good practices. *Schedule model* conformance is assessed by evaluating the existence and utilization of the various components defined by this practice standard. All required components must be grasped and applied in total to attain a minimum acceptable level of conformance. Once the minimum degree of conformance has been attained, greater degrees of conformance are achieved by the utilization of the optional schedule components. As a general rule, the use of optional components would be expected to be found in more advanced *schedule models*. *Schedule models* that do not fully employ the required components and their concepts are considered developmental and will be assessed as *does not meet minimum conformance standards*.

The *schedule model* conformance assessment process is designed to support manual assessment. This process evaluates the actual *schedule model* by looking for specific component markers and indicators to determine which specific components are present. When a component is present in the *schedule model,* a point is earned. The ratio of the number of points earned in relation to the total possible number of points that could be awarded represents the degree of conformance and is expressed as a percentage on the continuum from 0 to 100. The exception to this rule involves the required components. As stated above, if the required components are not fully utilized, then the *schedule model* does not meet minimum conformance standards. However, the assessor may continue to perform the evaluation for the purposes of developmental needs only. In this case, regardless of the ultimate number of points scored, the *schedule model* will not be marked up on the continuum because it does not meet

the minimum conformance standards. If this minimum threshold is achieved, then the ratio value is depicted on the continuum, or sliding scale, which moves upwards from left to right with the left side being the lowest (0) and the right the highest (100).

5.2 Conformance Assessment Process

Appendix D contains a list of the schedule components organized into required components and optional components. Utilizing the list in Appendix D, the assessor will determine if each required component is present in the *schedule model* being analyzed. The required components are those that are shown with an R. The scheduler should ensure that they fully understand the good practices associated with the components. If the particular ''Required'' component and any associated must good practice (i.e., described using the word ''must'' as opposed to the word ''should'' in the good practice description for the component.) are present in the *schedule model*, then a single point is earned. Of note, all of the points associated with the required component must be earned before an assessor can record a conformance score. Next, the assessor will review the optional components listed and, if they are present, will award the points as indicated. Each optional component also has a value of one, even though they are considered more advanced in complexity. The assessor determines a raw score by summing all earned points. *If all the points associated with the required components are not earned, then a final raw score cannot be registered.* Finally, the raw score is divided by the total maximum possible score. The resulting value is expressed as a percentage, and represents the conformance of the *schedule model*.

The use of more advanced optional components, without the complete utilization of all the required components, places the validity of the entire *schedule model* in question. Therefore, as stated previously, if the required components are not fully utilized, the conformance assessment process should be terminated.

Thus the basic intent of evaluating a *schedule model's* conformance has been accomplished and the assessor has determined where a given *schedule model* falls on the conformance continuum. The scheduler can then determine specific actions for moving farther along the conformance continuum, if desired or warranted. It is recognized that some *schedule models* will employ more advanced scheduling components than others, but all should meet the minimum requirements. It is the premise of this practice standard that the greater the conformance of the *schedule model* being used, the greater the likelihood of improved schedule performance. One final point of clarity is that it is the intention of the assessment to determine the presence of a component, but not its utilization, as evaluating utilization may introduce subjectivity into an otherwise objective assessment of *schedule model* conformance. The expectation is that as the profession and this practice standard evolves, the evaluation of utilization can be objectively performed.

Appendix A

Guidelines for a PMI Practice Standard

- Each practice standard provides guidelines on the mechanics (e.g., nuts and bolts, basics, fundamentals, step-by-step usage guide, how it operates, how to do it) of some significant process (input, tool, technique, or output) that is relevant to a project manager.
- A practice standard does not necessarily mirror the life-cycle phases of many projects. But, an individual practice standard may be applicable to the completion of one or more phases within a project.
- A practice standard does not necessarily mirror the Knowledge Areas within *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide*–Third Edition), although an individual practice standard will provide sufficient detail and background for one or more of the inputs, tools and techniques, and/or outputs. Therefore, practice standards are not required to use the name of any Knowledge Area.
- Each practice standard should include information on what the significant process is and does, why it is significant, how to perform it, when it should be performed, and, if necessary for further clarification, who should perform it.
- Each practice standard should include information that is accepted and applicable for most projects most of the time within the project management community. Processes that are generally restricted or applicable to one industry, country, or companion profession (i.e., an *application area*) may be included as an appendix for informational purpose, rather than as part of the practice standard. With strong support and evidence, an application area-specific process may be considered as an extension practice standard, in the same manner as extensions to the *PMBOK® Guide*–Third Edition are considered.
- Each practice standard will benefit from the inclusion of examples and templates. It is best when an example or template includes a discussion of its strengths and weaknesses. A background description may be necessary to put this discussion in the appropriate context. The examples should be aligned with the relevant information in the standard or its appendix and placed in proximity to that information.
- All practice standards will be written in the same general style and format.
- Each practice standard project will assess the need to align with or reference other practice standards.
- Each practice standard will be consistent with the *PMBOK® Guide*–Third Edition.
- Each practice standard is intended to be more prescriptive than the *PMBOK® Guide*–Third Edition.

Appendix B

Evolution of PMI's Practice Standard for Scheduling

Pre-Project

In early 2003, PMI began exploration for developing the first practice standard for project scheduling. Focus would be placed on single project scheduling, with close coupling to the time management section of the *PMBOK® Guide*. By May of 2003, the Standards Membership Advisory Group had developed an initial charter for the standard. The charter included the following characteristics for the standard:

- Provides guidelines on developing, using, and understanding project schedules.
- Is consistent with the *PMBOK® Guide*, expanding its concepts and techniques relating to Scheduling.
- Does not necessarily mirror the *PMBOK® Guide* processes, Knowledge Areas, and life-cycle phases, but does provide detail and background for one or more of the inputs, tools & techniques, or outputs.
- Is consistent with the *PMBOK® Guide* Glossary, providing additional entries relating specifically to scheduling.
- Describes the processes related to scheduling that are generally recognized as good practice for most projects most of the time.
- Is aligned with other PMI Practice Standards, and is interlinked with the material in appropriate sections of *PMBOK® Guide*–Third Edition.
- Is clear, complete, concise, and relevant to defining, developing, and maintaining project schedules.
- Includes information that is broadly accepted within the project management community.
- Assists individuals or organizations in judging the adequacy of a project schedule.
- Is written for project personnel and stakeholders.

In the summer of 2003, the project team was formed under the leadership of Douglas Clark, Project Manager, and Harold ''Mike'' Mosley, Jr. PMP, Deputy Project Manager. The project team would grow to include 179 members representing 20 countries.

Preliminary Work

In recognition that almost all scheduling is performed using computer software, the team decided early on to build a standard that could be used by both scheduling practitioners as well as scheduling software developers. However, the team further articulated a rule that all processes and tools must also be able to be accomplished using paper and pencil. The subsequent development of the components list is a direct result of these concepts and rules. Additionally, the team recognized that the concept of a one size fits all scheduling standard must have the flexibility to address size and complexity issues. Again, breaking scheduling into components, allowed the granularity and flexibility for a wide range of project types.

In early fall of 2003, representatives from the College of Scheduling, PMI Standards Department, and the Practice Standard Team met to discuss an issue with the term *schedule model*. The *PMBOK® Guide*–Third Edition introduced the term into the *PMBOK® Guide* glossary for the first time. The basic issue concerned the bifurcation of the term *schedule* to describe both the output presentation (a bar chart for instance) as well as all of the data that could produce output presentations (all of the task, dependency, and date information in a scheduling software product). The *PMBOK® Guide*–Third Edition team introduced the term *schedule model* to differentiate the output from the *model*. It was agreed that the practice standard team would take on a full evaluation of all terms relating to schedule. The team was to research, analyze, and then report (as part of the standard) the current practice standard for most projects most of the time.

By late summer of 2003, the core team was formed. Led by Doug Clark (Project Manager) and Mike Mosley (Deputy Project Manager), team members included Charles Folin, Marie Gunnerson, Tammo Wilkens, Don Green, Peter Dimov, Bethany Schoenick, Jennifer Read, Ken Cone, and Dave Hulett.

For the remainder of 2003 and most of 2004, the team focused on development of the components listing, as well as presentation and data gathering. The team presented findings to the College of Scheduling's first, second, and third annual conferences in 2004, 2005, and 2006, respectively. Core team members also presented and garnered feedback at chapter meetings across the country in 2004. Two opportunities to interact with the profession were utilized, via the Standards Open Working Sessions. The first was at the PMI Global Congress North America in Anaheim in 2004. In July 2005, the team presented to over 100 practitioners at a Standards Open Working Session in Orlando, Florida.

The Project Team website as well as the forums of the College of Scheduling website provided a venue for the discussion of various aspects of the standard's development, mostly focusing on the terms and their use. Mike Mosley provided regular liaison with the College of Scheduling Board, both to inform them of the status and project developments but to also solicit support and feedback.

The team quickly found four distinct camps in the discussion of the term schedule. There were traditionalists, typically expert schedulers, who could easily move between the definitions of schedule without concern. Within this group, were scheduling expert witnesses who rightfully indicated that the introduction of a new term might affect years of case law. Next were the modelers, typically either academics or people involved in software or technology, or expert schedulers influenced by technology. The third group comprised the rank and file every day project manager. Of note, the three former camps were vastly out numbered by the last and largest group, the new to scheduling group.

The evolution of the term schedule was at the core of the Project Team's research. Since the first issue of the *PMBOK® Guide*, the term had been defined without context in the profession, i.e., it was just a set of dates. This did not provide reference to the method of calculation, the data needed to formulate the dates, nor the nature of the output or work product provided by professional schedulers.

The traditionalists preferred to keep the term schedule, but let it have two meanings, or lexically speaking, two senses. The modelers obviously espoused the schedule as a model, as this group looked at a schedule more as a model of what was to happen or what was happening in the project rather than a traditional plan. The every day project managers and the new to scheduling groups wanted clarity. Both did not indicate a preference for resolution, yet both groups understood the tradeoffs involved.

The practice standard provided new definitions and new terms to be explicit in the various elements and phases of schedule development, implementation and execution. Through the team's effort, the exposure of the draft standard, and the appeals process; the terminology has been validated and provides a basis for the profession as it relates to time management.

Exposure and Consensus

The standard was submitted as an exposure draft in the fall of 2006. There were 347 comments. Of note, only 11 comments concerned changes to the terminology recommended by the team. The team's comment acceptance rate (comments accepted outright, and accepted with modifications) was among the highest ever for a PMI standard (77%). In February of 2007, the standard was presented to the Standards Consensus Body where it received unanimous approval.

Appendix C

Contributors to the Practice Standard for Scheduling

This appendix lists, alphabetically with groupings, those individuals who have contributed to the development and production of the Practice Standard for Scheduling. No simple list or even multiple lists can adequately portray all the contributions of those who have volunteered to develop the Practice Standard for Scheduling.

The Project Management Institute is grateful to all of these individuals for their support and acknowledges their contribution to the project management profession.

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Appendix D

Conformance Scoring

Table D-1 is used to support manual scoring of a schedule model. The first column provides the component name sorted first by the required components in priority order, followed by the optional components in alphabetical order. The second column lists the sub-elements of certain components, e.g., variance is subdivided into duration and date.

The required components are listed in the general order of implementation. The first items are considered predevelopment components, those that are selected prior to actually building the schedule model. The second set of components is the schedule model development components, followed by the maintenance or status reporting components. Of note, components that relate to in-progress schedules are not necessary when first building a schedule model, and only become required and a priority once the project actually starts.

The next column refers to the whether the component is required, *R* (a core component), or optional, *O* (an increasing conformance component).

Component	Sub-elements	Use
Pre-development		
WBS ID		O
Activity ID		R
Project Name		R
Project Schedule ID		R
Project Version		R
Calendar		
	Activity Calendar	O
	Project Calendar	R
	Resource Calendar	O
Data Date		R
Milestones		R
Development		
Project Start Constraint		O
Activity Label		R
Unit of Measure		R
Duration		
	Activity Original Duration	R
	Activity Remaining Duration	R
	Activity Actual Duration	R
	Activity Total Duration	O
	Activity Baseline Original Duration	R
	Activity Target Duration	O
	Project Original Duration	R
	Project Remaining Duration	R
	Project Actual Duration	R
	Project Total Duration	O
	Project Baseline Duration	R
	Project Target Duration	O
	Imposed Project Duration	O
Relationships		
	Finish to Start	R
	Start to Start	O
	Finish to Finish	O
	Start to Finish	O
Start Date		
	Activity Early Start Date	R
	Activity Late Start Date	R
	Activity Baseline Start Date	R
	Activity Target Start Date	O
	Activity Actual Start Date	R
	Activity Resource Leveled Start Date	O
	Project Early Start Date	R
	Project Late Start Date	R
	Project Baseline Start Date	R
	Project Target Start Date	O
	Project Actual Start Date	R
	Project Resource Leveled Start Date	O
Finish Date		
	Activity Early Finish Date	R
	Activity Late Finish Date	R
	Activity Baseline Finish Date	R
	Activity Target Finish Date	O
	Activity Actual Finish Date	R
	Activity Resource Leveled Finish Date	O
	Project Early Finish Date	R
	Project Late Finish Date	R
	Project Baseline Finish Date	R
	Project Target Finish Date	O
	Project Actual Finish Date	R
	Project Resource Leveled Finish Date	O
Float		
	Total Float	R
	Free Float	R
Critical Path		R
Baseline Data Date		R

(continued next page)

(continued)

Component	Sub-elements	Use
Maintenance and Status Reporting		
Percent Complete		
	Activity Physical Percent Complete	R
	Activity Duration Percent Complete	O
	Project Physical Percent Complete	R
	Project Duration Percent Complete	O
Update Cycle		R
Activity Code		O
Activity Cost Component		O
Activity Cost Estimate		O
Activity Effort		O
Activity Scope Definition		O
Assigned Quantity		O
Constraints		
	Finish Not Earlier Than	O
	Finish Not Later Than	O
	Finish On	O
	Mandatory Finish Date	O
	Mandatory Start Date	O
	Start Not Later Than	O
	Start Not Earlier Than	O
	Start On	O
	Expected Finish	O
	Project Finish Constraint	O
Custom Field		O
Earned Value		O
Estimate at Completion (EAC)		O
Estimate to Complete (ETC)		O
Lag		O
Lead		O
Level		O
Presentation		O
Project Control Account		O
Project Cost Components		O
Project Cost Estimate		O
Project Description		
Project Manager		O
Resources		
	Resource Assignment	O
	Resource Availability	O
	Resource Description	O
	Driving Resources	O
	Resource ID	O
	Resource Lag	O
	Resource Leveling	O
	Resource Library/Dictionary	O
	Resource Rates/Prices	O
	Resource Type	O
Schedule Risk		
	Activity Risk Criticality Index	O
	Activity Most Likely Duration	O
	Activity Optimistic Duration	O
	Activity Pessimistic Duration	O
	Activity Cumulative Probability Risk Distribution	O
Summary Activity		O
Update Cycle		O
Variance		
	Duration Variance	O
	Date Variance	O

Table D-1. Schedule Model Scoring

Glossary

Many of the words defined here have broader, and in some cases, different dictionary definitions.

The definitions use the following conventions:

- Terms used as part of the definitions and that are defined in the glossary are shown in *italics*.
  - When the same glossary term appears more than once in a given definition, only the first occurrence is italicized.
  - In some cases, a single glossary term consists of multiple words (e.g. control account).
- When synonyms are included, no definition is given and the reader is directed to the preferred term (i.e., see preferred term).
- Related terms that are not synonyms are cross-referenced at the end of the definition (i.e., see also related term).

Common Acronyms and Terms

Acronym	Term

AC
Actual Cost
USE Actual Cost (AC) (***PMBOK*® *Guide*–Third Edition**)

AD
Activity Description
USE Activity Description (AD) (***PMBOK*® *Guide*–Third Edition**)

ADM
Arrow Diagramming Method
USE Arrow Diagramming Method (ADM) (***PMBOK*® *Guide*–Third Edition**)

AF
Actual Finish Date
USE Actual Finish Date (AF) (***PMBOK*® *Guide*–Third Edition**)

AOA
Activity-on-Arrow (***PMBOK*® *Guide*–Third Edition**)

AON
Activity-on-Node (***PMBOK*® *Guide*–Third Edition**)

AS
Actual Start Date
USE Actual Start Date (AS) (***PMBOK*® *Guide*–Third Edition**)

CA
Control Account
USE Control Account (CA) (***PMBOK*® *Guide*–Third Edition**)

CPM
Critical Path Method
USE Critical Path Method (CPM) (***PMBOK*® *Guide*–Third Edition**)

DD
Data Date
USE Data Date (DD) (***PMBOK*® *Guide*–Third Edition**)

DU
Duration
USE Duration (DU or DUR) (***PMBOK*® *Guide*–Third Edition**)

DUR
Duration
USE Duration (DU or DUR) (***PMBOK*® *Guide* –Third Edition**)

EAC
Estimate at Completion
USE Estimate at Completion (EAC) (***PMBOK*® *Guide*–Third Edition**)

EF
Early Finish Date
USE Early Finish Date (EF) (***PMBOK*® *Guide*–Third Edition**)

ES
Early Start Date
USE Early Start Date (ES) (***PMBOK*® *Guide*–Third Edition**)

ETC
Estimate to Complete
USE Estimate to Complete (ETC) (***PMBOK*® *Guide*–Third Edition**)

EV
Earned Value
USE Earned Value (EV) (***PMBOK*® *Guide*–Third Edition**)

EVM
Earned Value Management
USE Earned Value Management (EVM) (***PMBOK*® *Guide*–Third Edition**)

EVT
Earned Value Technique
USE Earned Value Technique (EVT) (***PMBOK*® *Guide*–Third Edition**)

FF
Finish-to-Finish
USE Finish-to-Finish (FF) (***PMBOK*® *Guide*–Third Edition**)

FF
Free Float
USE Free Float (FF) (***PMBOK*® *Guide*–Third Edition**)

FS
Finish-to-Start
USE Finish-to-Start (FS) (***PMBOK*® *Guide*–Third Edition**)

LF
Late Finish Date
USE Late Finish Date (LF) (***PMBOK*® *Guide*–Third Edition**)

LS
Late Start Date
USE Late Start Date (LS) (***PMBOK*® *Guide*–Third Edition**)

OD
Original Duration
USE Original Duration (OD) (***PMBOK*® *Guide*–Third Edition**)

PC
Percent Complete
USE Percent Complete (PC or PCT) (***PMBOK*® *Guide*–Third Edition**)

PCT
Percent Complete
USE Percent Complete (PC or PCT) (***PMBOK*® *Guide*–Third Edition**)

PDM
Precedence Diagramming Method
USE Precedence Diagramming Method (PDM) (***PMBOK*® *Guide*–Third Edition**)

PF
Planned Finish Date (***PMBOK*® *Guide*–Third Edition**)

PM
Project Manager
USE Project Manager (PM) (***PMBOK*® *Guide*–Third Edition**)

PMB
Performance Measurement Baseline
USE Performance Measurement Baseline (PMB) (***PMBOK*® *Guide*–Third Edition**)

PMO
Project Management Office
USE Project Management Office (PMO) (***PMBOK*® *Guide*–Third Edition**)

PS
Planned Start Date (***PMBOK*® *Guide*–Third Edition**)

RD
Remaining Duration
USE Remaining Duration (RD) (***PMBOK*® *Guide*–Third Edition**)

SF
Scheduled Finish Date
USE Scheduled Finish Date (SF) (***PMBOK*® *Guide*–Third Edition**)

SF
Start-to-Finish
USE Start-to-Finish (SF) (***PMBOK*® *Guide*–Third Edition**)

SOW
Statement of Work
USE Statement of Work (SOW) (***PMBOK*® *Guide*–Third Edition**)

SS
Scheduled Start Date
USE Scheduled Start Date (SS) (***PMBOK*® *Guide*–Third Edition**)

SS
Start-to-Start
USE Start-to-Start (SS) (***PMBOK*® *Guide*–Third Edition**)

SV
Schedule Variance
USE Schedule Variance (SV) (***PMBOK*® *Guide*–Third Edition**)

TF
Target Finish Date
USE Target Finish Date (TF) (***PMBOK*® *Guide*–Third Edition**)

TF
Total Float
USE Total Float (TF) (***PMBOK*® *Guide*–Third Edition**)

TS
Target Start Date
USE Target Start Date (TS) (***PMBOK*® *Guide*–Third Edition**)

WBS
Work Breakdown Structure
USE Work Breakdown Structure (WBS) (***PMBOK*® *Guide*–Third Edition**)

Terms and Definitions

Activity. A component of work performed during the course of a project. SEE ALSO Schedule Activity

Activity Actual Finish Date. The point in time at which work actually ended on the *schedule activity*. SEE ALSO Actual Finish Date

Activity Actual Start Date. The point in time at which work actually began on the *schedule activity*.

Activity Actual Duration. The total number of *work periods* in *calendar units* between the *activity actual start date* of the *schedule activity* and either the *data date* of the *project schedule,* if the schedule activity is in progress, or the *activity actual finish date,* if the schedule activity is complete. SEE ALSO Actual Duration

Activity Attributes [Output/Input]. Multiple attributes associated with each *schedule activity* that can be included within the activity list. Activity attributes include activity codes, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements, imposed dates, constraints, and assumptions.

Activity Baseline Finish Date. The point in time associated with the completion of the *schedule activity* in an approved *project schedule baseline*. SEE ALSO Activity Current Finish Date

Activity Baseline Duration. The total number of *work periods* in *calendar units* between the *activity baseline start date* and *activity baseline finish date* of a *schedule activity* as determined by its approved *project schedule baseline*.

Activity Baseline Start Date. The point in time associated with the beginning of the *schedule activity* in an approved *project schedule baseline*. SEE ALSO Activity Current Start Date

Activity Box. A graphic object used to display *schedule activity* data in accordance with schedule *network logic*.

Activity Calendar. Usually the *project calendar*, or another specifically defined *calendar* from the *calendar library*, assigned to the *schedule activity* which defines the *work periods* and *non-work periods* in calendar format. The activity calendar, on the schedule activities to which it is assigned, is used to replace the *project calendar* during *schedule network analysis*. SEE ALSO Calendar Library

Activity Code. One or more numerical or text values that identify characteristics of the work or in some way categorize the schedule activity that allows filtering and ordering of activities within reports.

Activity Cost Estimate. The *estimated cost* of the *schedule activity* that includes the *cost* for all *resources* required to perform and complete the activity, including all *cost types* and *cost components*.

Activity Cumulative Probability Risk Distribution. A table of *dates* and their associated cumulative probabilities of occurrence for *schedule activity* completion. Dates are derived using analytical techniques such as Monte Carlo calculations. When applied to the *project end date*, the value is equivalent to the Project Cumulative Probability Risk Distribution.

Activity Current Finish Date. The current *estimate* of the point in time when the *schedule activity* will be completed, where the estimate reflects any reported work progress. SEE ALSO Activity Scheduled Finish Date; Activity Baseline Finish Date; Current Finish Date

Activity Current Start Date. The current *estimate* of the point in time when the *schedule activity* will begin, where the estimate reflects any reported work progress. SEE ALSO Activity Scheduled Start Date, Activity Baseline Start Date, and Current Start Date

Activity Description (AD). A short phrase or label for each *schedule activity,* used in conjunction with an *activity identifier* to differentiate a project schedule activity from other schedule activities. The activity description normally identifies the scope of work of the schedule activity. Sometimes also known as activity name or activity title.

Activity Definition [Process]. The process of identifying the specific *schedule activities* that need to be performed to produce the various project deliverables.

Activity Duration Estimating [Process]. The process of estimating the number of work periods that will be needed to complete individual schedule activities.

Activity Duration. The total number of work periods, in calendar units, between the *activity early start date* and the *activity early finish date* of a schedule activity. SEE ALSO Duration (DU or DUR)

Activity Duration Percent Complete. An estimate, expressed as the percentage that the *activity actual duration* is of the *activity total duration* for a *schedule activity* that has *work* in progress.

Activity Duration Variance. A quantifiable deviation, departure, or divergence away from a given *duration* for a *schedule activity*.

Activity Expected Finish Date. A date constraint placed on both the *activity early and late finish dates* of an in-progress *schedule activity* that affects when the schedule activity can be scheduled for completion and is usually in the form of a fixed *imposed date*. This constraint requires the activity remaining duration to be set equal to the difference between the activity expected finish date and the *data date* to force the schedule activity to be scheduled to finish upon the imposed date.

Activity Early Finish Date. The earliest possible point in time when the uncompleted portion of the *schedule activity* can be completed. SEE ALSO Early Finish Date

Activity Early Start Date. The earliest possible point in time when the *schedule activity* can begin. SEE ALSO Early Start Date

Activity Finish Date. A point in time associated with the completion of a *schedule activity* in a *project*. Usually qualified by one of the following: actual, baseline, current, early, expected, late, mandatory, scheduled, or target. SEE ALSO Finish Date

Activity Group. A *project team member*-selected set of *schedule activities,* sharing some common *activity attribute* that allows the activities to be grouped and reported or displayed separately, such as being divided in a graphic display from other activities with a horizontal line.

Activity Identifier. A short unique numeric or text identification assigned to each schedule activity to differentiate that project activity from other activities. Typically unique within any one project schedule network diagram.

Activity Label. A short phrase or label for each schedule activity used in conjunction with an activity identifier to differentiate that project schedule activity from other schedule activities. The activity description normally describes the scope of work of the schedule activity.

Activity Late Finish Date. The latest possible point in time when the *schedule activity* can be completed without violating a schedule *constraint* or delaying the *project end date*. SEE ALSO Late Finish Date

Activity Late Start Date. The latest possible point in time when the *schedule activity* can begin without violating a schedule *constraint* or delaying the *project end date*. SEE ALSO Late Start Date

Activity List [Output/Input]. A documented tabulation of *schedule activities* that shows the *activity description*, *activity identifier*, and a sufficiently detailed *activity scope definition* for the *work* so *project team members* understand what *work* is to be performed. The list may have additional *activity attributes*.

Activity Mandatory Finish Date. A finish date *constraint* placed on a *schedule activity* that sets both the *activity early and late finish dates* equal to a fixed *imposed date* and thereby also constrains the early start dates of the *network paths* logically following that schedule activity.

Activity Mandatory Start Date. A start date *constraint* placed on a *schedule activity* that sets both the *activity early and late start dates* equal to a fixed *imposed date* and thereby also constrains the late finish date of the *network paths* logically preceding that schedule activity.

Activity Name. SEE *activity description*.

Activity-on-Arrow (AOA). SEE Arrow Diagramming Method (ADM)

Activity-on-Node (AON). SEE Precedence Diagramming Method (PDM)

Activity Original Duration. The *activity duration* originally assigned to a *schedule activity* and not updated as progress is reported on the activity. Typically used for comparison with *activity actual duration* and *activity remaining duration* when reporting schedule progress. Normally developed by reliance on historic data, specialists, resource availability, financial considerations, and volume of work to be performed. May also be called planned duration.

Activity Physical Percent Complete. An *estimate,* expressed as a percent, of the amount of *work* that has been completed on a *schedule activity*, measured in terms of either *physical work progress* or by means of the earning rules of *earned value management*.

Activity Planned Finish Date. See Activity Scheduled Finish Date

Activity Planned Start Date. See Activity Scheduled Start Date

Activity Remaining Duration. The total number of *work periods* in *calendar units*, (*a*) equal to the *original duration* for an activity that has not started or (*b*) between the *data date* of the *project schedule* and the *early finish date* of a *schedule activity* that has an *activity actual start date*. This represents the time needed to complete a *schedule activity* where the *work* is in progress. See Also Remaining Duration

Activity Resource Estimating [Process]. The process of estimating the types and quantities of resources required to perform each schedule activity.

Activity Resource Leveled Finish Date. The point in time associated with the *activity scheduled finish date* of a resource limited *schedule activity* in a *resource-limited schedule*.

Activity Resource Leveled Start Date. The point in time associated with the *activity scheduled start date* of a resource limited *schedule activity* in *a resource-limited schedule*.

Activity Risk Criticality Index. The probability that the *schedule activity* will be on a *critical path*.

Activity Scheduled Finish Date. The point in time when work was scheduled to complete on a *schedule activity*. The activity schedule finish date is normally within the range of dates delimited by the *activity early finish date* and the *activity late finish date*. It may reflect *resource leveling* of scarce *resources*. Sometimes called activity planned finish date. See Also Activity Current Finish Date, Scheduled Finish Date

Activity Scheduled Start Date. The point in time when work was scheduled to begin on a *schedule activity*. The activity schedule start date is normally within the range of dates delimited by the *activity early start date* and the *activity late start date*. It may reflect *resource leveling* of scarce *resources*. Sometimes called activity planned start date. See Also Activity Current Start Date, Scheduled Start Date

Activity Scope Definition. Documented narrative describing the *work* represented by the *activity*.

Activity Sequencing [Process]. The process of identifying and documenting dependencies among schedule activities.

Activity Start Date. A point in time associated with the beginning of the *schedule activity* in a *project*. Usually qualified by one of the following: actual, baseline, current, early, late, scheduled, or target. See Also Start Date

Activity Target Date Variance. A quantifiable deviation, departure, or divergence away from a known *activity target start date* or *activity target finish date*.

Activity Target Duration. The *estimated* total number of *work periods* in *calendar units*, needed to complete the *schedule activity* as determined by a specific *project target schedule*.

Activity Target Finish Date. A point in time established by schedule network analysis for completion of a *schedule activity* within a specific version of the *project schedule*.

Activity Target Start Date. A point in time established by schedule network analysis for beginning the *schedule activity* within a specific version of the *project schedule*.

Activity Title. See Activity Description

Activity Total Duration. The total number of *work periods* in *calendar units* to complete a *schedule activity*. For schedule activities in progress, it includes the *activity actual duration* plus the *activity remaining duration*

Activity Type. A categorization designation that differentiates the discrete *schedule activities* that have different functions within the *schedule model*, such as, milestone, task, summary, level-of-effort, and dummy.

Actual Cost (AC). Total costs actually incurred and recorded in accomplishing work performed during a given time period for a schedule activity or work breakdown structure component. Actual cost can sometimes be direct labor hours alone, direct costs alone, or all costs including indirect costs. Also referred to as the actual cost of work performed (ACWP). (See Also, Earned Value Technique (EVT)

Actual Cost of Work Performed (ACWP). See Actual Cost (AC)

Actual Duration. The time in *calendar units* between the *actual start date* of the *schedule activity* and either the *data date* of the *project schedule* if the schedule activity is in progress or the *actual finish date* if the schedule activity is complete. See Also Activity Actual Duration and Project Actual Duration

Actual Finish Date. The point in time when work actually ended on a schedule activity. (Note: In some application areas, the schedule activity is considered ''finished'' when work is ''substantially complete.'') SEE ALSO Activity Actual Finish Date And Project Actual Finish Date

Actual Start Date. SEE Activity Actual Start Date and Project Actual Start Date

Actual Finish Date (AF). The point in time when work actually ended on a schedule activity. (Note: In some application areas, the schedule activity is considered ''finished'' when work is ''substantially complete.'')

Actual Start Date (AS). The point in time when work actually started on a schedule activity.

Application Area. A category of projects that have common components significant in such projects, but are not needed or present in all projects. Application areas are usually defined in terms of either the product (i.e., by similar technologies or production methods) or the type of *customer* (i.e., internal versus external, government versus commercial) or industry sector (i.e., utilities, automotive, aerospace, information technologies). Application areas can overlap.

Approve. The act of formally confirming, sanctioning, ratifying, or agreeing to something.

Arrow. The graphic presentation of a schedule activity in the arrow diagramming method or a logical relationship between schedule activities in the precedence diagramming method.

Arrow Diagramming Method (ADM) [Technique]. A schedule network diagramming technique in which schedule activities are represented by arrows. The tail of the arrow represents the start, and the head represents the finish of the schedule activity. (The length of the arrow does **not** represent the expected duration of the schedule activity.) Schedule activities are connected at points called nodes (usually drawn as small circles) to illustrate the sequence in which the schedule activities are expected to be performed. SEE ALSO Precedence Diagramming Method (PDM)

As-of Date. SEE Data Date (DD).

Assumptions [Output/Input]. Assumptions are factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration. Assumptions affect all aspects of project planning, and are part of the progressive elaboration of the project. Project teams frequently identify, document, and validate assumptions as part of their planning process. Assumptions generally involve a degree of risk.

Author. The originator, publisher, or responsible party of a *document, such as* a *schedule, estimate*, or analysis.

Backward Pass. The calculation of late finish dates and late start dates for the uncompleted portions of all schedule activities. Determined by working backwards through the schedule network logic from the project's end date. The end date may be calculated in a forward pass or set by the *customer* or sponsor. SEE ALSO Schedule Network Analysis

Bar. A rectangular shaped graphical display object used to represent the occurrence of a data component in a document, such as, a *schedule activity* in a *bar chart* whose length is determined by the activity start and end dates corresponding to the *timescale* used for the bar chart. Bars can overlap or be displayed side by side to indicate progress or *baselines*.

Bar Chart [Tool]. A graphic display of schedule-related information. In the typical bar chart, schedule activities or work breakdown structure components are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars. Also called a Gantt chart.

Baseline. The approved time phased plan (for a project, a work breakdown structure component, a work package, or a schedule activity), plus or minus approved project scope, cost, schedule, and technical changes. Generally refers to the current baseline, but may refer to the original or some other baseline. Usually used with a modifier (e.g., cost baseline, schedule baseline, performance measurement baseline, technical baseline). SEE ALSO Performance Measurement Baseline

Baseline Date. The *date* on which the current baseline was established. Sometimes used with a modifier such as, project schedule, project scope, or project cost.

Baseline Duration. SEE Activity Baseline Duration and Project Baseline Duration

Baseline Finish Date. SEE Activity Baseline Finish Date and Project Baseline Finish Date

Baseline Start Date. SEE Activity Baseline Start Date and Project Baseline Start Date

Budget. The approved estimate for the project or any work breakdown structure component or any schedule activity. SEE ALSO Estimate

Budgeted Cost of Work Performed (BCWP). SEE Earned Value (EV)

Calendar. A table or register of *dates* containing the days of each month and week in one or more years. In *project management,* each *date* may be identified as a time span for performing *work* (*work period*) or as a time span for not performing work including designated holidays (*non-work period*) and each date may be further subdivided into segments such as shifts, hours, or even minutes that may be designated as work periods or non-work periods. Usually used with a modifier such as, activity, fiscal year, Gregorian, project, program, or resource.

Calendar Library. A set of *calendars* that can be applied to the various *schedule activities* and *resources*. SEE ALSO Activity Calendar and Resource Calendar.

Calendar Unit. The smallest unit of time used in scheduling the project. Calendar units are generally in hours, days, or weeks, but can also be in quarter years, months, shifts, or even in minutes.

Change Control. Identifying, documenting, approving or rejecting, and controlling changes to the project baseline.

Component. A constituent part, element, or piece of a complex whole.

Constraint [Input]. The state, quality, or sense of being restricted to a given course of action or inaction. An applicable restriction or limitation, either internal or external to the project, that will affect the performance of the project or a process. For example, a schedule constraint is any limitation or restraint placed on the project schedule that affects when a schedule activity can be scheduled and is usually in the form of fixed imposed dates. A cost constraint is any limitation or restraint placed on the project budget such as funds available over time. A project resource constraint is any limitation or restraint placed on resource usage, such as what resource skills or disciplines are available and the amount of a given resource available during a specified time frame.

Control [Technique]. Comparing actual performance with planned performance, analyzing variances, assessing trends to effect process improvements, evaluating possible alternatives, and recommending appropriate corrective action as needed.

Control Account (CA) [Tool]. A management control point where scope, budget (resource plans), actual cost, and schedule are integrated and compared to earned value for performance measurement. Control accounts are placed at selected management points (specific components at selected levels) of the work breakdown structure. Each control account may include one or more work packages, but each work package may be associated with only one control account. Each control account is associated with a specific single organizational component in the organizational breakdown structure (OBS). Previously called a Cost Account. SEE ALSO Work Package

Corrective Action. Documented direction for executing the project work to bring expected future performance of the project work in line with the project management plan.

Cost. The monetary value or price of a project activity or component that includes the monetary worth of the resources required to perform and complete the activity or component, or to produce the component. A specific cost can be composed of a combination of cost components including direct labor hours, other direct costs, indirect labor hours, other indirect costs, and purchased price. (However, in the earned value management methodology, in some instances, the term cost can represent only labor hours without conversion to monetary worth.) SEE ALSO Actual Cost (AC), Estimate

Cost Type. A subdivision of the *cost* such as, direct cost, indirect cost, and fee.

Cost Component. A *component* of the *cost* such as, labor cost, equipment cost, and material cost.

Crashing [Technique]. A specific type of project schedule compression technique performed by taking action to decrease the total project schedule duration after analyzing a number of alternatives to determine how to get the maximum schedule duration compression for the least additional cost. Typical approaches for crashing a schedule include reducing schedule activity durations and increasing the assignment of resources on schedule activities. SEE ALSO Fast Tracking, Schedule Compression

Criteria. Standards, rules, or tests on which a judgment or decision can be based, or by which a product, service, result, or process can be evaluated.

Critical Activity. Any schedule activity on a critical path in a project schedule. Most commonly determined by using the critical path method. Although some activities are ''critical,'' in the dictionary sense, without being on the critical path, this meaning is seldom used in the project context.

Critical Chain Method [Technique]. A schedule network analysis technique that modifies the project schedule to account for limited resources. The critical chain method mixes deterministic and probabilistic approaches to schedule network analysis.

Critical Path. Generally, but not always, the sequence of *schedule activities* that determines the duration of the *project*. Generally, it is the longest path through the project. However, a critical path can end, as an example, on a *schedule milestone* that is in the middle of the project schedule and that has a finish-no-later-than *imposed date* schedule *constraint*. SEE ALSO Project Critical Path, Specified Critical Path, and Critical Path Method

Critical Path Method (CPM) [Technique]. A schedule network analysis technique used to determine the amount of scheduling flexibility (the amount of float) on various logical network paths in the project schedule network, and to determine the minimum total project duration. Early start and finish dates are calculated by means of a forward pass, using a specified start date. Late start and finish dates are calculated by means of a backward pass, starting from a specified completion date, which sometimes is the project early finish date determined during the forward pass calculation. SEE ALSO Critical Path

Current Finish Date. The current estimate of the point in time when a schedule activity will be completed, where the estimate reflects any reported work progress. SEE ALSO Scheduled Finish Date, Activity Current Finish Date, and Project Current Finish Date

Current Start Date. The current *estimate* of the point in time when a *schedule activity* will begin, where the estimate reflects any reported work progress. SEE ALSO Scheduled Start Date and Baseline Start Date, Activity Current Start Date, and Project Current Start Date

Customer. The person or organization that will use the project's product or service or result. SEE ALSO User

Data Date (DD). The *date* through which the *project* status and progress were last determined and reported for analyses, such as scheduling and performance measurements. It is the last past historical date. Sometimes called As-of-Date

Data Date Line. Vertical line from top to bottom of a graphical report such as a bar chart showing the *data date* in relationship to the *timescale* and *bars*.

Date. A term representing the day, month, and year of a calendar, and, in some instances, the time of day.

Decompose. SEE Decomposition

Decomposition [Technique]. A planning technique that subdivides the project scope and project deliverables into smaller, more manageable components, until the project work, associated with accomplishing the project scope and providing the deliverables, is defined in sufficient detail to support executing, monitoring, and controlling the work.

Deliverable [Output/Input]. Any unique and verifiable product, result, or capability to perform a service that must be produced to complete a process, phase, or project. Often used more narrowly in reference to an external deliverable, which is a deliverable that is subject to approval by the project sponsor or customer. SEE ALSO Product, Result, Service

Dependency. SEE Logical Relationship

Discipline. A field of work requiring specific knowledge and that has a set of rules governing work conduct (e.g., mechanical engineering, computer programming, cost estimating, etc.).

Document. A medium and the information recorded thereon, that generally has permanence and can be read by a person or a machine. Examples include project management plans, specifications, procedures, studies, and manuals.

Driving Resources. *Resources* that are considered to have a direct impact on *activity duration* during *resource leveling*.

Duration (DU or DUR). The total number of *work periods* (not including holidays or other nonworking periods) required to complete a *schedule activity* or *work breakdown structure component or project*. Usually expressed as work-hours, workdays or workweeks. Sometimes incorrectly equated with elapsed time. Contrast with *effort*. SEE ALSO Activity Duration and Project Duration

Duration Percent Complete. See Activity Duration Percent Complete and Project Duration Percent Complete

Duration Variance. See Activity Duration Variance and Project Duration Variance

Early Finish Date (EF). In the critical path method, the earliest possible point in time on which the uncompleted portions of a schedule activity (or the project) can finish, based on the schedule network logic, the data date, and any schedule constraints. Early finish dates can change as the project progresses and as changes are made to the project management plan. See Also Activity Early Finish Date and Project Early Finish Date

Early Start Date (ES). In the *critical path method*, the earliest possible point in time on which the uncompleted portions of a *schedule activity* (or the *project*) can start, based on the schedule *network logic*, the *data date*, and any schedule *constraints*. Early start dates can change as the project progresses and as changes are made to the *project management plan*. See Also Activity Early Start Date and Project Early Start Date

Earned Value (EV). The value of work performed expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. Also referred to as the budgeted cost of work performed (BCWP).

Earned Value Technique (EVT) [Technique]. A specific technique for measuring the performance of work for a work breakdown structure component, control account, or project. Also referred to as the earning rules and crediting method. See Also Actual Cost, Estimate at Completion (EAC), and Estimate to Completion (EVC)

Effort. The number of labor units required to complete a schedule activity or work breakdown structure component. Usually expressed as staff hours, staff days, or staff weeks. Contrast with Duration.

Enterprise. A company, business, firm, partnership, corporation, or governmental agency.

Estimate [Output/Input]. A quantitative assessment of the likely amount or outcome. Usually applied to project costs, resources, effort, and durations and is usually preceded by a modifier (i.e., preliminary, conceptual, feasibility, order-of-magnitude, definitive). It should always include some indication of accuracy (e.g., $\pm x$ percent).

Estimate at Completion (EAC) [Output/Input]. The expected total cost of a schedule activity, a work breakdown structure component, or the project when the defined scope of work will be completed. EAC is equal to the actual cost (AC) plus the estimate to complete (ETC) for all of the remaining work. EAC = AC plus ETC. The EAC may be calculated based on performance to date or estimated by the project team based on other factors, in which case it is often referred to as the latest revised estimate. See Also Earned Value Technique (EVT), Estimate to Complete (ETC)

Estimate to Complete (ETC) [Output/Input]. The expected cost needed to complete all the remaining work for a schedule activity, work breakdown structure component, or the project. See Also Earned Value Technique (EVT), Estimate at Completion (EAC)

Fast Tracking [Technique]. A specific project schedule compression technique that changes network logic to overlap phases that would normally be done in sequence, such as the design phase and construction phase, or to perform schedule activities in parallel. See Also Crashing, Schedule Compression

Finish Date. A point in time associated with a schedule activity's completion. Usually qualified by one of the following: actual, baseline, current, early, estimated, late, planned, scheduled, or target. See Also Activity Finish Date and Project Finish Date

Finish Not Earlier Than. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Earlier Than constraint prevents the activity from being scheduled to finish earlier than the imposed date. Not Earlier Than constraints impact only the forward pass calculation and hence the early dates of a schedule activity.

Finish Not Later Than. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish Not Later Than constraint prevents the activity from being scheduled to finish later than the imposed date. Not Later Than constraints impact only the backward pass calculation and hence the late dates of a schedule activity.

Finish On. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Finish On constraint prevents the activity from being scheduled to finish earlier as well as later than the imposed date. Finish On constraints are a combination of a Not Earlier Than and Not Later Than constraints. These impact both the forward and the backward pass calculation and hence both early and late dates. This causes the schedule activity to have a zero *total float* while its predecessors and successors may have different total float values.

Finish-to-Finish (FF). The logical relationship where completion of work of the successor activity cannot finish until the completion of work of the predecessor activity. SEE ALSO Logical Relationship

Finish-to-Start (FS). The logical relationship where initiation of work of the successor activity depends upon the completion of work of the predecessor activity. SEE ALSO Logical Relationship

Float. Also called slack. SEE ALSO Free Float (FF), Total Float (TF)

Forecasts. Estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast. Forecasts are updated and reissued based on work performance information provided as the project is executed. The information is based on the project's past performance and expected future performance, and includes information that could impact the project in the future, such as estimate at completion and estimate to complete.

Forward Pass. The calculation of the early start and early finish dates for the uncompleted portions of all network activities. SEE ALSO Backward Pass, Schedule Network Analysis

Free Float (FF). The amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities. SEE ALSO Total Float (TF)

Gantt Chart. SEE Bar Chart

Graph. A visual graphical display using lines and shapes to represent data values, such as project status or forecast information.

Hammock Activity. SEE Summary Activity

Imposed Date. A fixed date imposed on a schedule activity or schedule milestone, usually in the form of a ''start no earlier than'' and ''finish no later than'' date.

Input [Process Input]. Any item, whether internal or external to the project that is required by a process before that process proceeds. May be an output from a predecessor process.

Integrated. Interrelated, interconnected, interlocked, or meshed components blended and unified into a functioning or unified whole.

Integrated Change Control [Process]. The process of reviewing all change requests, approving changes, and controlling changes to deliverables and organizational process assets.

Lag [Technique]. A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a ten-day lag, the successor activity cannot start until ten days after the predecessor activity has finished. SEE ALSO Lead

Late Finish Date (LF). In the critical path method, the latest possible point in time that a schedule activity may be completed based upon the schedule network logic, the project completion date, and any constraints assigned to the schedule activities without violating a schedule constraint or delaying the project completion date. The late finish dates are determined during the *backward pass* calculation of the project schedule network. SEE ALSO Activity Late Finish Date, Project Late Finish Date

Late Start Date (LS). In the *critical path method*, the latest possible point in time that a *schedule activity* may begin based upon the schedule *network logic*, the project completion date, and any *constraints* assigned to the schedule activities without violating a schedule constraint or delaying the project completion date. The late start dates are determined during the *backward pass* calculation of the project schedule network. SEE ALSO Activity Late Start Date, Project Late Start Date

Lead [Technique]. A modification of a logical relationship that allows an acceleration of the successor activity. For example, in a finish-to-start dependency with a ten-day lead, the successor activity can start ten days before the predecessor activity has finished. A negative lead is equivalent to a positive lag. SEE ALSO Lag

Lessons Learned [Output/Input]. The learning gained from the process of performing the project. Lessons learned may be identified at any point. Also considered a project record, to be included in the lessons learned knowledge base.

Level of Effort (LOE). Support-type activity (e.g., seller or customer liaison, project cost accounting, project management, etc.), which does not produce definitive end products. It is generally characterized by a uniform rate of work performance over a period of time determined by the activities supported.

Leveling. SEE Resource Leveling

Logic. SEE Network Logic

Logic Diagram. SEE Project Schedule Network Diagram

Logical Relationship. A dependency between two project schedule activities, or between a project schedule activity and a schedule milestone. The four possible types of logical relationships are: Finish-to-Start; Finish-to-Finish; Start-to-Start; and Start-to-Finish. SEE ALSO Precedence Relationship, Finish-to-Finish (FF), Finish-to-Start (FS), Start-to-Finish, and Start-to-Start

Master Schedule [Tool]. A summary-level project schedule that identifies the major deliverables and work breakdown structure components and key schedule milestones. SEE ALSO Milestone Schedule

Medium. The type of material used to store a document. Media consist of hard-copy bound material, hard-copy unbound material, soft-copy material, electronic material, firmware, and software.

Methodology. A system of practices, techniques, procedures, and rules used by those who work in a discipline.

Milestone. A significant point or event in the project. SEE ALSO Schedule Milestone

Milestone Schedule [Tool]. A summary-level schedule that identifies the major schedule milestones. SEE ALSO Master Schedule

Most Likely Duration. The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the most probable *activity duration*.

Near-Critical Activity. A schedule activity that has low total float. The concept of near-critical is equally applicable to a schedule activity or schedule network path. The limit below which total float is considered near critical is subject to expert judgment and varies from project to project.

Network. SEE Project Schedule Network Diagram

Network Analysis. SEE Schedule Network Analysis

Network Logic. The collection of schedule activity dependencies that makes up a project schedule network diagram.

Network Path. Any continuous series of schedule activities connected with logical relationships in a project schedule network diagram.

Node. One of the defining points of a schedule network; a junction point joined to some or all of the other dependency lines. SEE ALSO Arrow Diagramming Method (ADM) and Precedence Diagramming Method (PDM)

Non-work Period. A *date* or part of a date identified as a time for not performing *work* including designated holidays. Each date may be further divided into calendar units, such as shifts, hours, or even minutes that may be designated as the specific non-work period.

Open End. An activity with no predecessor, successor, or both. There should be only two activities/milestones in a schedule with open ends: *project start* and *project completion*.

Optimistic Duration. The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the shortest possible duration.

Organization. A group of persons organized for some purpose or to perform some type of work within an enterprise.

Original Duration. The *activity duration* originally assigned to a *schedule activity* and not updated as progress is reported on the activity. Typically used for comparison with *actual duration* and *remaining duration* when reporting schedule progress. SEE ALSO Activity Original Duration, Project Original Duration

Output [Process Output]. A product, result, or service generated by a process. May be an input to a successor process.

Percent Complete (PC or PCT). An estimate, expressed as a percent, of the amount of work that has been completed on an activity or a work breakdown structure component.

Performance Measurement Baseline. An approved integrated scope-schedule-cost plan for the project work against which project execution is compared to measure and manage performance. Technical and quality parameters may also be included. SEE ALSO Baseline

Pessimistic Duration. The total number of *work* periods in *calendar* units assigned to perform the *schedule activity*, considering all of the variables that could affect performance, and is determined to be the longest possible *activity duration*.

Phase. SEE Project Phase

Physical Work Progress. The amount of work physically completed on the project or task. This may be different from the amount of effort or money expended on the project or task. Predetermined techniques of claiming physical work progress that were selected during project planning are used to credit *earned value* when work is partially complete at the time of progress reporting.

Planned Duration. SEE Activity Original Duration and Project Original Duration

Planned Finish Date (PF). SEE Scheduled Finish Date

Planned Start Date (PS). SEE Scheduled Start Date

Practice. A specific type of professional or management activity that contributes to the execution of a process and that may employ one or more techniques and tools.

Precedence Diagramming Method (PDM) [Technique]. A schedule network diagramming technique in which schedule activities are represented by boxes (or nodes). Schedule activities are graphically linked by one or more logical relationships to show the sequence in which the activities are to be performed. SEE ALSO Arrow Diagramming Method (ADM)

Precedence Relationship. The term used in the precedence diagramming method for a logical relationship. In current usage, however, precedence relationship, logical relationship, and dependency are widely used interchangeably, regardless of the diagramming method used. SEE ALSO Logical Relationship

Predecessor Activity. The schedule activity that determines when the logical successor activity can begin or end.

Procedure. A series of steps followed in a regular definitive order to accomplish something.

Process. A set of interrelated actions and activities performed to achieve a specified set of products, results, or services.

Product. An artifact that is produced, is quantifiable, and can be either an end item in itself or a component item. Additional words for products are materiel and goods. Contrast with result and service. SEE ALSO Deliverable

Product Scope. The features and functions that characterize a product, service or result. SEE ALSO Scope

Product Scope Description. The documented narrative description of the product scope.

Progressive Elaboration [Technique]. Continuously improving and detailing a plan as more detailed and specific information and more accurate estimates become available as the project progresses, and thereby producing more accurate and complete plans that result from the successive iterations of the planning process.

Project. A temporary endeavor undertaken to create a unique product, service, or result.

Project Actual Duration. The total number of *work periods* in *calendar units* between the *project actual start date* of the project and either the *data date* of the project schedule, if the project is in progress or the *project actual finish date*, if the project is complete. SEE ALSO Actual Duration

Project Actual Finish Date. The point in time associated with the *activity actual finish date* of the last *schedule activity* in the *project*. SEE ALSO Actual Finish Date

Project Actual Start Date. The point in time associated with the *activity actual start date* of the first *schedule activity* in the *project*.

Project Attributes. Multiple attributes associated with each unique *project* that can be included within the *schedule model*. Project attributes include, but may not be limited to *project identifier, project name, project description, project scope statement, project calendar,* and assigned resource calendars.

Project Baseline Duration. The total number of *work periods* in *calendar units* needed to execute the approved *project schedule baseline** for the *project*.

Project Baseline Finish Date. The point in time associated with the completion of the last *schedule activity* in an approved *project schedule baseline**. SEE ALSO Project Current Finish Date

Project Baseline Start Date. The point in time associated with the beginning of the first *schedule activity* in an approved *project schedule baseline**. SEE ALSO Project Current Start Date

Project Begin Date. The point in time set by the *project early start date* as determined by a *schedule network analysis* or as established by a *project start constraint*. Sometimes called project start date.

Project Calendar. A calendar of working days or shifts that establishes those *dates* on which *schedule activities* are worked and nonworking days that determine those dates on which schedule activities are idle. Typically defines holidays, weekends, and shift hours. SEE ALSO Resource Calendar and Activity Calendar

Project Completion Date. SEE Project End Date

Project Cost Estimate. The *estimated cost** for the entire *project*.

Project Critical Path. The longest schedule *network path* from the *project start date* or the current project *data date* to the *project finish date*. SEE ALSO Critical Path

Project Current Finish Date. The current *estimate* of the point in time when the last *schedule activity* in the *project* will be completed, where the estimate reflects any reported work progress. SEE ALSO Current Finish Date, Project Scheduled Finish Date, and Project Baseline Finish Date

Project Current Start Date. The current *estimate* of the point in time when the first *schedule activity* in the *project* will begin, where the estimate reflects any reported work progress. SEE ALSO Current Start Date, Project Scheduled Start Date, and Project Baseline Start Date

Project Description. Documented narrative summary of the *project scope statement*.

Project Duration. The total number of work periods in *calendar* units between the *project early start date* and *the project early finish date*. SEE ALSO Duration (DU or DUR)

Project Duration Percent Complete. An estimate, expressed as the percentage that the *project actual duration* is of the *project total duration* for a *project* that has *work* in progress.

Project Duration Variance. A quantifiable deviation, departure, or divergence away from a given *duration* for a *project*.

Project Early Finish Date. The earliest possible point in time associated with the completion of the last *schedule activity* of the project. SEE ALSO Early Finish Date

Project Early Start Date. The earliest possible point in time associated with the beginning of the first *schedule activity* of the *project*. SEE ALSO Early Start Date

Project End Date. The point in time set by the *project late finish date* as determined by a *schedule network analysis* or as established by a *project finish constraint*. Sometimes called project completion date.

Project Finish Constraint. A limitation or restraint placed on the *project late finish date* that affects when the project must finish and is usually in the form of a fixed *imposed date*.

Project Finish Date. A point in time associated with the completion of the last *schedule activity* in a *project*. Usually qualified by one of the following: actual, baseline, current, early, late, scheduled, or target. SEE ALSO Finish Date

Project Finish Variance. A quantifiable deviation, departure, or divergence from a known *schedule baseline finish date* or *project end date*. May be expressed as either a percentage or number of *work periods*.

Project Identifier. A short unique numeric or text identification assigned to each *project* to differentiate a particular project from other projects in a *program*.

Project Late Finish Date. The latest possible point in time associated with the completion of the last *schedule activity* of the *project*.

Project Late Start Date. The latest possible point in time associated with the beginning of the first *schedule activity* of the *project*.

Project Management Plan [Output/Input]. A formal, approved document that defines how the project is executed, monitored, and controlled. It may be summary or detailed and may be composed of one or more subsidiary management plans and other planning documents.

Project Management Software [Tool]. A class of computer software applications specifically designed to aid the project management team with planning, monitoring, and controlling the project, including: cost estimating, scheduling, communications, collaboration, configuration management, document control, records management, and risk analysis.

Project Management Team. The members of the project team who are directly involved in project management activities. On some smaller projects, the project management team may include virtually all of the project team members.

Project Manager (PM). The person assigned by the performing organization to achieve the project objectives.

Project Name. A short phrase or label for each *project*, used in conjunction with the *project identifier* to differentiate a particular project from other projects in a *program*. Sometimes also known as project title.

Project Original Duration. The initial *estimate* of the total number of *work* periods in *calendar units* needed to complete a *project*. Typically determined from the initial longest *network path* though the project.

Project Phase. A collection of logically related project activities, usually culminating in the completion of a major deliverable. Project phases (also called phases) are mainly completed sequentially, but can overlap in some project situations. Phases can be subdivided into subphases and then components; this hierarchy, if the project or portions of the project are divided into phases, is contained in the work breakdown structure. A project phase is a component of a project life cycle. A project phase is not a project management process group.

Project Physical Percent Complete. An *estimate*, expressed as a percent, of the amount of *work* that has been completed on the *project*, measured in terms of *physical work progress*.

Project Planned Finish Date. SEE Project Scheduled Finish Date

Project Planned Start Date. SEE Project Scheduled Start Date

Project Remaining Duration. The total number of *work periods* in *calendar units*, between the *data date* of the *project schedule* and the *project early finish date of a project* that has at least one *activity actual start date*. This represents the time needed to complete a *project* where the *work* is in progress. SEE ALSO Remaining Duration

Project Schedule [Output/Input]. The planned dates for performing *schedule activities* and the planned dates for meeting *schedule milestones*. This term is also used with a modifier, such as early, late, current, baseline, resource limited, milestone, or target to identify various instances of the project schedule. SEE ALSO, schedule model.

Project Schedule Network Diagram [Output/Input]. Any schematic display of the logical relationships among the project schedule activities. Always drawn from left to right to reflect project work chronology.

Project Scheduled Finish Date. The point in time when work was scheduled to complete on a project. The project scheduled finish date is normally within the range of dates delimited by the *project early finish date* and the *project late finish date*. It may reflect finish *resource leveling* of scarce *resources*. Sometimes called project planned finish date. SEE ALSO Project Current Finish Date, Scheduled Finish Date

Project Scheduled Start Date. The point in time when work was scheduled to begin on the *project*. The project scheduled start date is normally within the range of dates delimited by the *project early start date* and the *project late start date*. It may reflect start *resource leveling* of scarce *resources*. Sometimes called project planned start date. SEE ALSO Project Current Start Date, Scheduled Start Date

Project Scope. The work that must be performed to deliver a product, service, or result with the specified features and functions. SEE ALSO Scope

Project Scope Statement [Output/Input]. The narrative description of the project scope, including major deliverables, project objectives, project assumptions, project constraints, and a statement of work, that provides a documented basis for making future project decisions and for confirming or developing a common understanding of project scope among the stakeholders. The definition of the project scope – what needs to be accomplished.

Project Sponsor. SEE Sponsor

Project Stakeholder. SEE Stakeholder

Project Start Constraint. A limitation or restraint placed on the *project early start date* that affects when the project must start and is usually in the form of a fixed *imposed date*.

Project Start Date. A point in time associated with the beginning of the first *schedule activity* in a *project.* Usually qualified by one of the following: actual, baseline, current, early, late, scheduled, or target. SEE ALSO Start Date

Project Target Date Variance. A quantifiable deviation, departure, or divergence away from a known *project target start date* or *project target finish date*.

Project Target Duration. The estimated total number of *work periods* in *calendar units*, needed to complete the project as determined by a specific *project target schedule*.

Project Target Finish Date. The scheduler-selected point in time established by schedule network analysis for completion of a specific version of the *project schedule*.

Project Target Start Date. The scheduler-selected point in time established by schedule network analysis for beginning a specific version of the *project schedule*.

Project Team. All the project team members, including the project management team, the project manager and, for some projects, the project sponsor.

Project Team Members. The persons who report either directly or indirectly to the project manager, and who are responsible for performing project work as a regular part of their assigned duties.

Project Time Management [Knowledge Area]. Project Time Management includes the processes required to accomplish timely completion of the project. The Project Time Management processes include activity definition, activity sequencing, activity resource estimating, activity duration estimating, schedule development, and schedule control.

Project Title. SEE Project Name

Project Total Duration. The total number of *work periods* in *calendar units* to complete a *project*. For a project in progress, it includes the *project actual duration* plus the *project remaining duration.*

Project Work. SEE Work

Relationship Line. A *logical relationship* line drawn within a *project schedule network diagram* from one *schedule activity* to one or more other schedule activities indicating the type of logical relationship by the relative position of the beginning and end points of the line.

Remaining Duration (RD). The time in calendar units, (a) equal to the Original Duration for an activity that has not started or (b) between the data date of the project schedule and the finish date of a schedule activity that has an actual start date. This represents the time needed to complete a schedule activity where the work is in progress. SEE ALSO Activity Remaining Duration, Project Remaining Duration

Report Column. A vertical display area in the *document body* representing one data component or piece of information, such as a project group, *activity group,* or *resource group*.

Report Data Description. A short text description of a data *component* in the report.

Report Gridlines. Horizontal and vertical lines within a *document* corresponding to data *components,* such as *timescale* units or rows in a *bar chart*.

Report Row. A horizontal display area in the *document body* representing one data component or piece of information, such as an *activity group* or *resource group*.

Report Table. A display formatted in *report rows* and *report columns,* such as a *document* that presents time-scaled columnar schedule-related information.

Requirement. A condition or capability that must be met or possessed by a system, product, service, result, or component to satisfy a contract, standard, specification, or other formally imposed documents. Requirements include the quantified and documented needs, wants, and expectations of the sponsor, customer, and other stakeholders.

Resource. Skilled human resources (specific disciplines either individually or in crews or teams), equipment, services, supplies, commodities, budgets, or funds.

Resource Application. The percent of the *resource duration* that the assigned *resource* is estimated to apply to the *work* of the *schedule activity*.

Resource Assignment. The linkage of one or more *resources* to a *schedule activity* and identification of the amount of each resource that is needed to accomplish the *work* on that schedule activity.

Resource Attributes. Multiple attributes associated with each *resource* that can be included within the *resource library*. Resource attributes include *resource identifier*, *resource name*, *resource type*, *resource availability*, *resource rate*, resource code, *constraints,* and *assumptions*.

Resource Availability. The *dates* and number of *work periods* in *calendar units* that a given *resource* is available according to the appropriate *resource calendar*.

Resource Calendar. A calendar of working days and nonworking days that determines those *dates* on which each specific *resource* is idle or can be active. Typically defines resource specific holidays and *resource availability* periods. SEE ALSO Calendar Library, Project Calendar and Activity Calendar

Resource-Constrained Schedule. SEE Resource-Limited Schedule

Resource Dictionary. SEE Resource Library

Resource Duration. The number of *work periods* in *calendar units* the assigned *resource* is estimated to spend on executing the work of the *schedule activity*.

Resource Group. A *project team member* selected set of *resources* sharing some common *resource attribute* that allows those resources to be reported or displayed separately such as being grouped in a graphic display.

Resource Identifier. A short unique numeric or text identification assigned to each specific *resource* to differentiate that resource from other resources. Resource identifiers are typically unique within any one *project*.

Resource Lag. The number of *calendar units* a *resource* is to wait after the *activity start date* before beginning *work* on the *schedule activity*.

Resource Leveling [Technique]. Any form of schedule network analysis in which scheduling decisions (start and finish dates) are driven by resource constraints (e.g., limited resource availability or difficult-to-manage changes in resource availability levels). ALSO Resource-Limited Schedule and Schedule Network Analysis

Resource Library. A documented tabulation containing the complete list, including resource attributes, of all *resources* that can be assigned to *project activities.** Also known as a resource dictionary.

Resource-Limited Schedule. A project schedule whose schedule activity, scheduled start dates and scheduled finish dates reflect expected resource availability. A resource-limited schedule does not have any early or late start or finish dates. The resource-limited schedule total float is determined by calculating the difference between the critical path method late finish date and the resource-limited scheduled finish date. Sometimes called resource-constrained schedule. SEE ALSO Resource Leveling

Resource Name. A short phrase or label for each *resource* used in conjunction with a *resource identifier* to differentiate that resource from other resources. The resource name normally differentiates a resource by type, role, or individual.

Resource Planning. SEE Activity Resource Estimating

Resource Rate. The unit *cost* rate assigned to a specific *resource*, including known rate escalations.

Resource Type. A unique designation that differentiates a *resource* by *skills*, *capabilities* or other attributes.

Result. An output from performing project management processes and activities. Results include outcomes (e.g., integrated systems, revised process, restructured organization, tests, trained personnel, etc.) and documents (e.g., policies, plans, studies, procedures, specifications, reports, etc.). Contrast with product and service. SEE ALSO Deliverable

Role. A defined function to be performed by a project team member, such as testing, filing, inspecting, coding.

Schedule. SEE Project Schedule and SEE ALSO Schedule Model

Schedule Activity. A discrete scheduled component of work performed during the course of a project. A schedule activity normally has an estimated duration, an estimated cost, and estimated resource requirements. Schedule activities are connected to other schedule activities or schedule milestones with logical relationships, and are decomposed from work packages. SEE ALSO Activity

Schedule Analysis. SEE Schedule Network Analysis

Schedule Compression [Technique]. Shortening the project schedule duration without reducing the project scope. SEE ALSO Crashing and Fast Tracking

Schedule Control [Process]. The process of controlling changes to the project schedule.

Schedule Development [Process]. The process of analyzing schedule activity sequences, schedule activity durations, resource requirements, and schedule constraints to create the project schedule.

Schedule Level. A *project team* specified rule for the relative granularity of *schedule activities* in the overall *schedule model*.

Schedule Milestone. A significant event in the project schedule, such as an event restraining future work or marking the completion of a major deliverable. A schedule milestone has zero duration. Sometimes called a milestone activity. SEE ALSO Milestone

Schedule Model [Tool]. A dynamic representation of the project's plan for *executing* the project's *activities* developed by the *project team's* applying the *scheduling method* to a *scheduling tool* using *project specific data* such as *activity lists* and *activity attributes*. The schedule model can produce *critical paths* and instances of *project schedules*, as well as *resource* profiles, *activity* assignments, records of accomplishments, etc. and can provide time-based *forecasts*, by reacting to inputs and adjustments made throughout the *project's life cycle*. (Scheduling Method plus Scheduling Tool plus Project Specific Data equal Schedule Model) SEE ALSO Project Schedule

Schedule Network Analysis [Technique]. The technique of identifying early and late start dates, as well as early and late finish dates, for the uncompleted portions of project schedule activities. SEE ALSO Backward Pass, Critical Path Method, Critical Chain Method, and Resource Leveling

Schedule Performance Index (SPI). A measure of schedule efficiency on a project. It is the ratio of earned value (EV) to planned value (PV). The SPI = EV divided by PV. An SPI equal to or greater than one indicates a favorable condition and a value of less than one indicates an unfavorable condition. SEE ALSO Earned Value Technique (EVT)

Schedule Variance (SV). A measure of schedule performance on a project. It is the algebraic difference between the earned value (EV) and the planned value (PV). SV = EV minus PV. SEE ALSO Earned Value Technique (EVT)

Scheduled Finish Date (SF). The point in time when work was scheduled to finish on a schedule activity. The scheduled finish date is normally within the range of dates delimited by the early finish date and the late finish date. It may reflect resource leveling of scarce resources. Sometimes called planned finish date. SEE ALSO Current Finish Date, Activity Scheduled Finish Date, Project Scheduled Finish Date

Scheduled Start Date (SS). The point in time when *work* was scheduled to start on a *schedule activity*. The scheduled start date is normally within the range of *dates* delimited by the *early start date* and the *late start date*. It may reflect *resource leveling* of scarce *resources*. Sometimes called planned start date. SEE ALSO Current Start Date, Activity Scheduled Start Date, Project Scheduled Start Date

Scheduling Method. A *system* of *practices, techniques, procedures* and rules used by project scheduling schedulers. This *methodology* can be performed either manually or with *project management software* specifically used for scheduling.

Scheduling Tool [Tool]. A *tool* which provides schedule component names, definitions, structural relationships, and formats that support the application of a *scheduling method*.

Scope. The sum of the products, services, and results to be provided as a project. SEE ALSO Project Scope and Product Scope.

Service. Useful work performed that does not produce a tangible product or result, such as performing any of the business functions supporting production or distribution. Contrast with product and result. SEE ALSO Deliverable

Slack. SEE Total Float (TF) and Free Float (FF)

Specification. A document that specifies, in a complete, precise, verifiable manner, the requirements, design, behavior, or other characteristics of a system, component, product, result, or service and, often, the procedures for determining whether these provisions have been satisfied. Examples are: requirement specification, design specification, product specification, and test specification.

Specified Critical Path. The longest sequence of *schedule activities* in a *project team member* specified schedule *network path.* SEE ALSO Critical Path

Sponsor. The person or group that provides the financial resources, in cash or in kind, for the project.

Stakeholder. Person or organization (e.g., customer, sponsor, performing organization, or the public) that is actively involved in the project, or whose interests may be positively or negatively affected by execution or completion of the project. A stakeholder may also exert influence over the project and its deliverables.

Standard. A document established by consensus and approved by a recognized body that provides rules, guidelines, or characteristics for activities or their results, for common and repeated use, aimed at the achievement of the optimum degree of order in a given context.

Start Date. A point in time associated with a *schedule activity's* start, usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, target, *baseline*, or current. SEE ALSO Activity Start Date, Project Start Date

Start Not Earlier Than. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Earlier Than constraint prevents the schedule activity from being scheduled to start earlier than the imposed date.

Start Not Later Than. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start Not Later Than constraint prevents the schedule activity from being scheduled to start later than the imposed date.

Start On. A schedule *constraint* placed on the *schedule activity* that affects when a schedule activity can be scheduled and is usually in the form of a fixed *imposed date*. A Start On constraint requires the schedule activity to start on a specific date.

Start-to-Finish (SF). The logical relationship where completion of the successor schedule activity is dependent upon the initiation of the predecessor schedule activity. SEE ALSO Logical Relationship

Start-to-Start (SS). The logical relationship where initiation of the work of the successor schedule activity depends upon the initiation of the work of the predecessor schedule activity. SEE ALSO Logical Relationship

Statement of Work (SOW). A narrative description of products, services, or results to be supplied.

Status Date. A term whose meaning for status data reporting varies by the brand of *project management software* used for scheduling, where in some systems the status date is included in the past and in some systems the status date is in the future. SEE ALSO either Data Date or Time-Now Date

Subnetwork. A subdivision (fragment) of a project schedule network diagram, usually representing a subproject or a work package. Often used to illustrate or study some potential or proposed schedule condition, such as changes in preferential schedule logic or project scope. SEE ALSO Summary Activity

Subphase. A subdivision of a phase.

Subproject. A smaller portion of the overall project created when a project is subdivided into more manageable components or pieces. Subprojects are usually represented in the work breakdown structure. A subproject can be referred to as a project, managed as a project, and acquired from a seller. May be referred to as a subnetwork in a project schedule network diagram. SEE ALSO Summary Activity

Substantial Completion. The point when the *schedule network logic* and *deliverable* requirements of the *schedule activity* are satisfied and the *successor activities* can begin.

Successor. SEE Successor Activity

Successor Activity. The schedule activity that follows a predecessor activity, as determined by their logical relationship.

Summary Activity. A group of related schedule activities aggregated at some summary level, and displayed/reported as a single activity at that summary level. SEE ALSO Subproject and Subnetwork

System. An integrated set of regularly interacting or interdependent components created to accomplish a defined objective, with defined and maintained relationships among its components, and the whole producing or operating better than the simple sum of its components. Systems may be either physically process based or management process based, or more commonly a combination of both. Systems for project management are composed of project management processes, techniques, methodologies, and tools operated by the project management team.

Target Duration. SEE Activity Target Duration and Project Target Duration

Target Finish Date. SEE Activity Target Finish Date and Project Target Finish Date

Target Schedule. A schedule adopted for comparison purposes during schedule network analysis, which can be different from the baseline schedule. SEE ALSO Baseline

Target Start Date. SEE Activity Target Start Date and Project Target Start Date

Task. A term for work whose meaning and placement within a structured plan for project work varies by the application area, industry, and brand of project management software.

Team Members. SEE Project Team Members

Technique. A defined systematic procedure employed by a human resource to perform an activity to produce a product or result or deliver a service, and that may employ one or more tools.

Template. A partially complete document in a predefined format that provides a defined structure for collecting, organizing and presenting information and data. Templates are often based upon documents created during prior projects. Templates can reduce the effort needed to perform work and increase the consistency of results.

Three-Point Estimate [Technique]. An analytical technique that uses three cost or duration estimates to represent the optimistic, most likely, and pessimistic scenarios. This technique is applied to improve the accuracy of the estimates of cost or duration when the underlying activity or cost component is uncertain.

Time-Now Date. SEE Data Date

Timescale. A graduated marking of linear time, which displays time in specific units such as hours, days, weeks, months, quarters, or years. Timescales can show more than one unit of time. Usually shown above or below the data components within a document or electronic graphical display.

Tool. Something tangible, such as a template or software program, used in performing an activity to produce a product or result.

Total Duration. SEE Activity Total Duration and Project Total Duration

Total Float (TF). The total amount of time that a *schedule activity* may be delayed from its *activity early start date* or *activity early finish date* without delaying the *project end date*, or violating a schedule *constraint*. Calculated using the *critical path method* technique and determining the difference between the early finish dates and late finish dates. SEE ALSO Float, Free Float (FF)

Unit of Measure. A designation of the type of quantity being measured, such as work-hours, cubic yards, or lines of code.

User. The person or organization that will use the project's product or service. SEE ALSO Customer

Variance. A quantifiable deviation, departure, or divergence away from a known baseline or expected value.

Variance Threshold. A predetermined range of normal outcomes that is determined during the planning process and sets the boundaries within which the team practices management by exception.

Work. Sustained physical or mental effort, exertion, or exercise of skill to overcome obstacles and achieve an objective.

Work Breakdown Structure (WBS) [Output/Input]. A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables. SEE ALSO Work Package, Control Account (CA), and Contract Work Breakdown Structure (CWBS)

Work Breakdown Structure Component. An entry in the work breakdown structure that can be at any level.

WBS Element Identifier. A short unique numeric or text identification assigned to each *work breakdown structure (WBS) element or component* to differentiate a particular WBS element from other WBS elements. The WBS Element Identifier is typically unique within any complete work breakdown structure.

Work Package. A deliverable or project work component at the lowest level of each branch of the work breakdown structure. The work package includes the schedule activities and schedule milestones required to complete the work package deliverable or project work component. SEE ALSO Control Account (CA)

Work Performance Information [Output/Input]. Information and data, on the status of the project schedule activities being performed to accomplish the project work, collected as part of the direct and manage project execution processes. Information includes: status of deliverables; implementation status for change requests, corrective actions, preventive actions, and defect repairs; forecasted estimates to complete; reported percent of work physically completed; achieved value of technical performance measures; start and finish dates of schedule activities.

Work Period. A *date* or part of a date identified as a time for performing *work*. Each date may be further divided into calendar units, such as shifts, hours, or even minutes that may be designated as the specific work period.

Workaround [Technique]. A response to a negative risk that has occurred. Distinguished from contingency plan in that a workaround is not planned in advance of the occurrence of the risk event.

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