

Scheduling Best Practices

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Planning versus Scheduling

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Understanding the distinction between planning and scheduling can best be approached by first defining management and briefly reviewing the functions of management, which includes planning - paramount of the functions. Most authorities define management as the establishment and maintenance of an internal environment in which people working together in groups can perform effectively and efficiently to attain group objectives. In addition to operational functions such as marketing, manufacturing, finance, engineering, construction, or some other endeavor, managers perform several functions which are common to all managers. These managerial functions are planning, organizing, staffing, directing, and controlling. These functions frequently overlap. For example, as group members plan to attain their objectives, they must often consider the adequacy of the organizational structure, staffing availability, or some other function of management.

A few examples of work product which come with the performance of the planning function include, a group's mission statement, definition of group objectives, policies, strategies, procedures, rules, programs, budgets, and schedules. Organization charts and job descriptions help focus a group, enabling it to attain predetermined goals and objectives. Meetings along with written and oral communication are essential to coordinate a group's efforts. Interpersonal skills and positive leadership qualities also come into play as members of a group give and receive direction toward the attainment of the group's mission. Finally, examples of mechanisms which a group would use to exercise the management control function would financial statements, waste rates, variance reports, or any data collection system which would measure the accomplishment of the group's objectives.

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Computerized scheduling by a general contractor on a typical construction project, using readily available scheduling software provides an illustrative example of the overlap of managerial functions.

Most design and construction projects pass through the following phases:

- Programming/Planning (Pre-Design)
- Design
- Bidding/Contract Negotiations
- Construction
- Post-Construction

For competitively bid construction projects, prudent general contractors typically begin the development of a schedule during the bid preparation phase. Price quotations and performance durations are obtained from preferred subcontractors for various major or specialty elements of the project. Cost and time estimates, for the remaining elements of the project are estimated by the general contractor and merged into the bid price and bid schedule. At this stage, the schedule is almost exclusively a planning tool to help determine if the project can be completed within the required time specified in the construction contract with the resources available. Bid schedules are often as simplistic as a series of lines on graph paper to represent the duration and rough sequencing of the project's major elements, such as Initial Sitework, Foundations, Concrete Slabs, Structural Steel, Masonry, Roofing, HVAC, Plumbing, Electrical, etc.

After the owner notifies the general contractor the submitted bid will be accepted, construction schedule development can begin in earnest and the overlap of managerial functions becomes more apparent. Ideally, the construction schedule will be a plan which organizes the tasks that must be accomplished in a logical sequence to successfully complete the objective in an efficient manner with available resources and conform to the framework prescribed by a contract, specifications, drawings, and other documents.

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Primavera Project Planner (Primavera), a widely used scheduling software for construction scheduling, will be used in this brief article to illustrate the overlap of managerial functions in a scheduling scenario. Primavera, and other similar scheduling software packages, are essentially relational databases. Records within the database contain information fields which can be related to other records and other fields.

Some fields are encoded in the software and are ready to accept information. These fields include activity duration, percent complete, predecessor and successor activities, calendars, financial data, resources, resource usage, constraints. The data entered into these fields is used to calculate the actual and forecasted financial and completion status of a project, as well as, the project's cash flow and timing of resource usage. After the schedule has been developed, managers can use this information to perform managerial functions such as controlling of a project, directing any necessary corrective action or resource application, and assessing the effectiveness of the schedule as a planning tool as the project progresses.

The Owner or Architect may require or the General Contractor may create their own customized fields and coding to aid various members of the project management team to analyze specific issues, focus their attention on elements relevant to them, or cross-reference activities to some other meaningful aspect of the project. Some examples of customized fields and their overlapping of managerial functions are described below:

- Responsibility – The purpose in establishing this field and coding structure is to assign the performance responsibility of their activity to one trade discipline or subcontractor. Schedules developed with this type of coding structure adhere to the key principle of unity of command, which is essential in the performance of the organizational function of management. Grouping activities by responsibility code enables managers to evaluate resource availability and activity sequencing.

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- Specification – Construction documents typically contain specifications, which assign a five digit coding structure, prescribed by the Construction Specifications Institute, to all elements of the project. Activities can be grouped by specification and cross-checked against the specification section to determine the completeness of the schedule or to identify issues requiring further clarification. The managerial functions of planning, organizing, and control managerial functions are enhanced with specification coding of activities.
- Geographical – Coding to define geographical areas of a project is essential. Some examples of geographical coding which should be incorporated into a schedule would be codes for structure/building, levels or floors, and elevations shown on construction drawings. Coding activities to reference the drawing where the activity is found is another example of geographical coding. Such a coding structure is essential to effectively group and organize activities.
- Functional – Coding for chilled water supply and return piping is an example of functional coding. Coding by systems, especially the starting up of systems is another example of functional coding.
- Type – Bulk commodity purchases and installation can be monitored with coding by type. For example, ductile iron pipe, stainless steel pipe, copper pipe and reinforced concrete pipe are examples of coding by type.
- Other – Codes may be established for a multitude of other project data. For example, codes can be established to permit material purchases to be tracked by vendor and purchase order. Codes can be assigned to inspectors or training instructors to permit better management of key personnel.

In conclusion, planning is not necessarily scheduling, but scheduling is planning, among other things. Planning encompasses a broader range of activities and work product than scheduling.

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However schedules developed with today's scheduling software can be indispensable in the performance of the planning function and facilitate performance of most, if not all, of the other functions of management.

This article is intended to serve as a general guide and should always be considered in combination with the needs of your specific project and the requirements of your contract. Your contract documents may contain specific requirements and directions that will take precedence over anything stated in any of these articles. We look forward to developing this dialogue with you over the coming months, and to provide you Warner's tips for best practices in scheduling.