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Make Your Schedule Work for You:
Six Tips to Maximize Schedule Performance
by Christa O'Brien and
Trevor Grindland

Make Your Schedule Work for You:
Six Tips to Maximize Schedule Performance [1, 2]

Christa O'Brien and Trevor Grindland

ABSTRACT

How many times have we sat in a schedule update meeting thinking to ourselves, "What is the point? This is just a paper exercise. We'll either complete the tasks to achieve a schedule milestone or miss it." Or how about, "This schedule doesn't reflect reality." Or, "All we are doing is documenting the schedule slips." Lastly, and a personal favorite, "The time I've spent creating and reviewing the schedule was time I could have been working to complete the schedule tasks."

That all ends now! This is not a traditional how-to-build-a-schedule discussion. We have created six tips to turn the schedule into a team's most lethal weapon as a program manager. By viewing the schedule as a tool and not an end-product, a program manager can shift the schedule paradigm from a check the box activity to input for a team's next program management steps. We will explore concepts and approaches each program manager and their team can implement to better utilize the schedule in their program management.

We have successfully implemented these tips on numerous programs with repeatable performance results. Now when we walk into a schedule meeting, we think "Yes! What am I going to learn today and roll back into my overall program guidance to a team?"

Introduction

Schedule, technical, and cost objectives are the essential cornerstones of any program. Without a properly managed schedule, key technical objectives or scope may be overlooked leading to product failures and design or test rework. Similarly, without a properly managed schedule, a team

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[1] *Editor's note: Second Editions are previously published papers that have continued relevance in today's project management world, or which were originally published in conference proceedings or in a language other than English. Original publication acknowledged; authors retain copyright. This paper was originally presented at the 15th UT Dallas PM Symposium in May 2023. It is republished here with the permission of the author and conference organizers.*

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is inefficient, lacking discipline, and delaying program completion which can drive negative cost and financial impacts.

A program manager has the privilege of driving the culture, mindset, and business discipline into a program team. By following these six tips, a program manager is now well equipped to turn the schedule into the most critical tool for managing a program.

The Six Tips are:

1. One-size Schedule Does Not Fit All

2. A Schedule is a Tool, Not a Deliverable

3. A Schedule is Not a Task List

4. Critical Path is a Risk Mitigation Tool

5. Scheduling is a Team Effort

6. Schedule is Key to Predictable Cost Management

Tip #1 One-Size Schedule Does Not Fit All

Every program manager knows that a schedule is one of three critical pillars to managing a program. With so many different types of schedules, how does a program manager evaluate and select the best schedule for their unique program? A program manager must not only evaluate the different types of schedules, but also understand the scope of a program, the size of resources, and the technical complexity to make the proper selection.

Let's begin by explaining the different types of schedules that are typically within a program manager's toolbox.

A *Single Page schedule* (Figure 1) is often used to provide a quick overview of a program. It contains all key milestones for a program. It also includes important summary-level efforts which are required to complete a program scope. This schedule type will not identify any dependencies, resource needs, or detailed tasks.

A *Gantt chart or resource-loaded schedule* (Figure 2) are very similar types of schedules. They both have a detailed list of tasks that are linked together. The linkage describes the dependency between given tasks. These schedule types easily generate a critical path to reach scope completion.

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Uniquely, a resource-loaded schedule has a resource allocated to each task. Resource is defined as cost, labor hours, or labor type. A resource-loaded schedule allows users to see a summary of resource needs spread over a specific duration, providing useful input for labor planning, budget planning, and cost management.

A *timeline chart* (Figure 3) is a single bar with identified chronological events. These types of schedules can be derived from a Gantt Chart, using tools like Microsoft Project, or can be built independently. The timeline chart does not show resource allocations, task duration, or task dependencies. It is, however, a valuable way to show key schedule commitments or past performance of unrelated tasks within a schedule.

Lastly, the *milestone schedule* (Figure 4) is a very detailed schedule. The milestone chart is created by identifying all individual tasks required to complete a portion of the schedule. These tasks are restricted to only one resource type and/or decision point. Tasks are assigned durations and are typically no longer than a single day. A summary of the tasks could be included in a Gantt Chart.
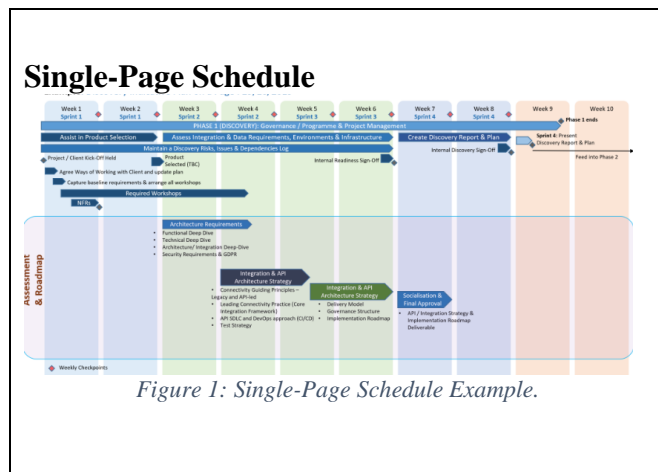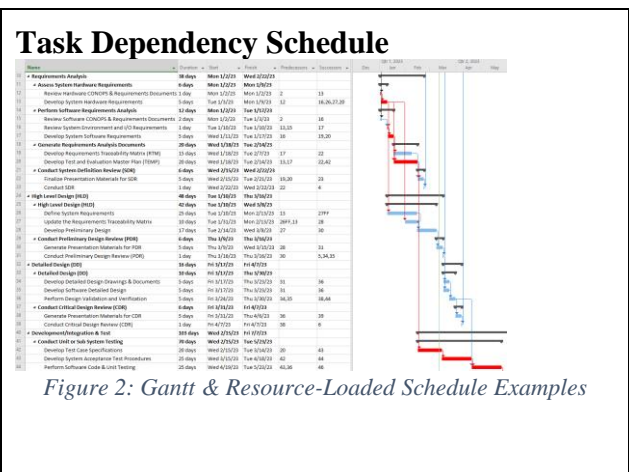

Figure 1: Single-Page Schedule Example.
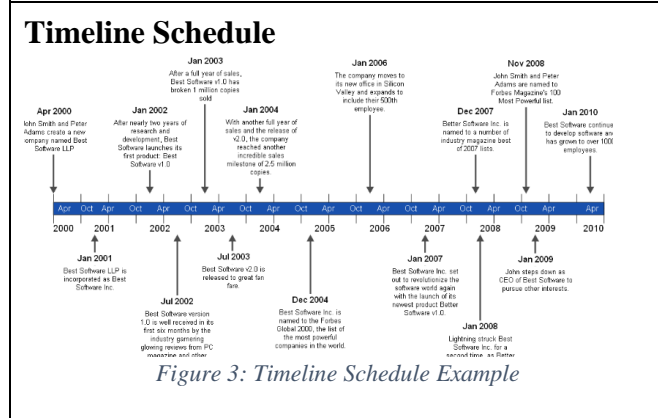

Figure 2: Gantt & Resource-Loaded Schedule Examples

Figure 3: Timeline Schedule Example

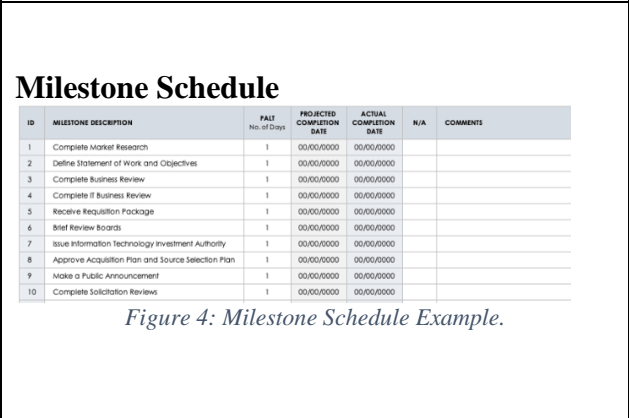*Figure 4: Milestone Schedule Example.*

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Figure *5* provides a description of each schedule type depicted above, use-case scenario definition, and alternative names that are often used for these schedules.

Schedule Type	Description	Use Cases	Alternative Names
Gantt Chart	Schedule that links tasks together to identify dependency and parallel paths.	When showing visual dependencies is critical. When Critical Path is needed.	Waterfall Schedule, Linked Schedule
Resource Loaded Schedule	Schedule that links tasks to identify dependency. Each task is loaded with the appropriate resource: labor hours, staffing requirements or cost.	Define Cost Management and Staffing Demands. When Critical Path is needed.	Integrated Master Schedule
Single-Page Schedule	High-level overview of the entire schedule with key tasks and milestones identified. It should fit within a single presentation slide.	Management Reviews, wherever high-level overview is most applicable	Plan on a Page, Placemat Chart
Timeline	Single bar that highlights key un-related events chronologically.	Customer brief, Retrospective review	
Milestone Schedule	Lowest-level tasks to be completed for any part of a project. Single day duration tasks.	Programs experiencing schedule delays, Agile type environments	Inch stone schedule, Daily Tracker

Figure 5:General Types of Schedules

Tip #2 A Schedule is a Tool, Not a Deliverable

On most programs, the customer will require a delivery of your program schedule. The delivery frequency is variable: one-time, weekly, monthly, and beyond. Program teams, if not careful, can start to view the schedule only as a deliverable. This means a program team only focuses on updating the schedule for a specific moment in time prior to delivery. When program teams start to view schedules only as deliverables, you develop a backward-looking program team. This type of mindset often prevents a program team from assessing future schedule risk or forecasting upcoming tasks.

However, if a program team adopts the mindset that the schedule is a tool, you start to create a forward-looking program team. To implement this, a program manager must develop a business rhythm centered around frequent schedule updates (as shown in Figure 6). The program team meets weekly to look forward at upcoming tasks and potential risks. The program manager and program team collectively work to identify mitigations against those risks, resulting in program priorities and urgent needs. Then the customer delivery simply becomes the latest program schedule.

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	Mon	Tues	Wed	Thurs	Fri
Week 1	Team Schedule Review; Resolve Key Milestone Impacts from Previous Week	Schedule Status Sheets Distributed		Team Submits Updates	Key Milestone Impact Reviewed
Week 2	Team Schedule Review; Resolve Key Milestone Impacts from Previous Week	Schedule Status Sheets Distributed		Team Submits Updates	
Week 3	Team Schedule Review; Resolve Key Milestone Impacts from Previous Week	Schedule Status Sheets Distributed		Team Submits Updates	
Week 4	Team Schedule Review; Resolve Key Milestone Impacts from Previous Week	Schedule Status Sheets Distributed		Team Submits Updates	Key Milestone Impact Reviewed / Schedule Delivered

Figure 6: Example Business Rhythm Calendar when Using Schedule as Tool.

Most successful programs set the following expectations with the team.

1. The program team will be required to participate and provide inputs to the schedule.

2. The program team submits updates offline.

3. The program team comes together to evaluate impacts to key milestone and critical path updates. During the meeting, the team will review the inputs, evaluate the impacts, and define mitigation paths.

Now you have a collaborative environment where a team is working together to solve problems.

Tip #3 A Schedule is Not a Task List

Often program managers can confuse the two without realizing it. Before diving into the differences between a schedule and a task list, it's critical to understand the definition of each:

Schedule: A procedural plan that indicates the time and sequence of each operation. (See Tip #1 for examples of schedules)

*Task List: A list of work to be done or undertaken. (*Figure 7*)*

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Figure 7: Task List Example

Both tools are critically important to program management, but they have very different purposes. A schedule is used to manage the sequence of events to achieve successful execution of overall scope. A task list can be a collection of activities that may or may not directly impact the execution of the overall scope, but is necessary to program management (i.e. scheduling team meetings, writing status reports, etc.).

What is the danger in running a program via task lists? After each day, there is no accountability for task deadlines or forethought of future tasks to be completed. Additionally, task lists typically fall into one of the following categories: open actions, key reminders, or critical tasks. A task list will always be out of context for the overall program schedule scope, resulting in potential false performance indicators.

For a program to be successful, it is critical that each schedule task is bound by a finite time duration and properly linked to a subsequent task.

Tip #4 Critical Path is a Risk Mitigation Tool

The Critical Path Method (CPM) is a technique of identifying tasks that are necessary for program completion and determining schedule flexibilities. This is the longest sequence of tasks that must be finished on time for a program to complete (Figure 8 shows example). Any delays in these tasks will delay the remainder of a program. However, purely identifying the critical path does not mitigate the schedule risk. CPM simply identifies these tasks that a program manager should look closely at to identify any mitigation actions.
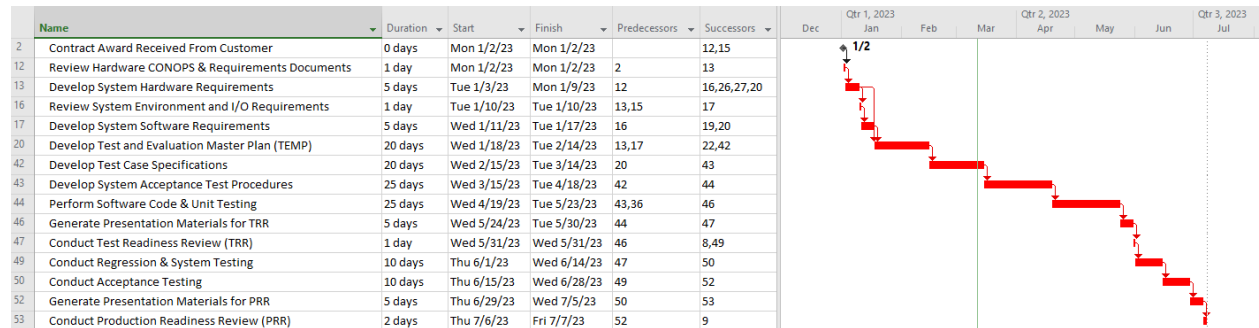
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	Name	Duration	Start	Finish	Predecessors	Successors
2	Contract Award Received From Customer	0 days	Mon 1/2/23	Mon 1/2/23		12,15
12	Review Hardware CONOPS & Requirements Documents	1 day	Mon 1/2/23	Mon 1/2/23	2	13
13	Develop System Hardware Requirements	5 days	Tue 1/3/23	Mon 1/9/23	12	16,26,27,20
16	Review System Environment and I/O Requirements	1 day	Tue 1/10/23	Tue 1/10/23	13,15	17
17	Develop System Software Requirements	5 days	Wed 1/11/23	Tue 1/17/23	16	19,20
20	Develop Test and Evaluation Master Plan (TEMP)	20 days	Wed 1/18/23	Tue 2/14/23	13,17	22,42
42	Develop Test Case Specifications	20 days	Wed 2/15/23	Tue 3/14/23	20	43
43	Develop System Acceptance Test Procedures	25 days	Wed 3/15/23	Tue 4/18/23	42	44
44	Perform Software Code & Unit Testing	25 days	Wed 4/19/23	Tue 5/23/23	43,36	46
46	Generate Presentation Materials for TRR	5 days	Wed 5/24/23	Tue 5/30/23	44	47
47	Conduct Test Readiness Review (TRR)	1 day	Wed 5/31/23	Wed 5/31/23	46	8,49
49	Conduct Regression & System Testing	10 days	Thu 6/1/23	Wed 6/14/23	47	50
50	Conduct Acceptance Testing	10 days	Thu 6/15/23	Wed 6/28/23	49	52
52	Generate Presentation Materials for PRR	5 days	Thu 6/29/23	Wed 7/5/23	50	53
53	Conduct Production Readiness Review (PRR)	2 days	Thu 7/6/23	Fri 7/7/23	52	9

Figure 8: Critical Path Example

CPM is a critical tool that a program manager can use to drive a program team to understand critical tasks, task dependencies, and mitigation activities that promote on-time program completion. Specific benefits of Critical Path analysis are listed below:

Improve Planning and Forecasting: A program manager, and the program team, inspect each task on the critical path to evaluate for schedule risk. If schedule risk is identified, the team will immediately see the overall schedule impacts and can start to brainstorm risk mitigation strategies. Questions the team should ask themselves when evaluating the critical path:

- Is there a risk to completing this task within the duration allocated or by its end date?

- Is there an opportunity for the task to complete early?

- Can two tasks be worked in parallel to mitigation schedule delays down the line?

Facilitate Effective Resource Management: A program manager can use the critical path to highlight task prioritization, thus providing insight into how and where to best deploy resources.

Cautionary note for program managers: The effectiveness of CPM results is highly dependent on schedule logic (task durations, task linkage/dependencies). If the program team did not exercise due diligence when defining the schedule logic, the critical path analysis may be inaccurate and unhelpful.

Another benefit of CPM is understanding secondary and tertiary critical paths. As a reminder, the critical path is the longest path of logically related tasks in the schedule network with the least amount of total float to the end deliverable or program completion. Float, or slack, is the maximum amount of time a task can be delayed without delaying the entire program. Tasks that are on the primary critical path will have the least amount of float. Tasks with positive float indicate they may be delayed without affecting a program completion date.

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Understanding program schedule float is important because it allows a program manager to prioritize resources by identifying tasks with large positive float that may have flexibility to be postponed. Despite a team's best effort, programs always encounter issues, delays, or other circumstances that result in local task delay. Throughout the lifecycle of a program, the critical path will likely experience numerous iterations. Proactively understanding that float and non-primary critical paths are important metrics will allow a program to quickly pivot in task and resource prioritization to actively manage critical tasks and hold a program completion date.

The CPM methods described above are relatively qualitative in nature and are largely based on significant input from a team throughout the duration of a program. A program manager can quickly quantify risk associated with a critical path through the implementation of a Schedule Risk Assessment (SRA). An example of an SRA is shown below in Figure 9. This is an analysis that looks at the forecasted task finish date along with probabilities of finishing each task either early or late. A Monte Carlo analysis is performed using the input duration information, and the output is a probability of finishing a program milestone by a certain date (i.e. 80% probability of finishing within 1 month of baseline date). This analysis provides quick, critical information on the overall risk to a program schedule and offers a realistic understanding of the likelihood a program will finish by a certain date.
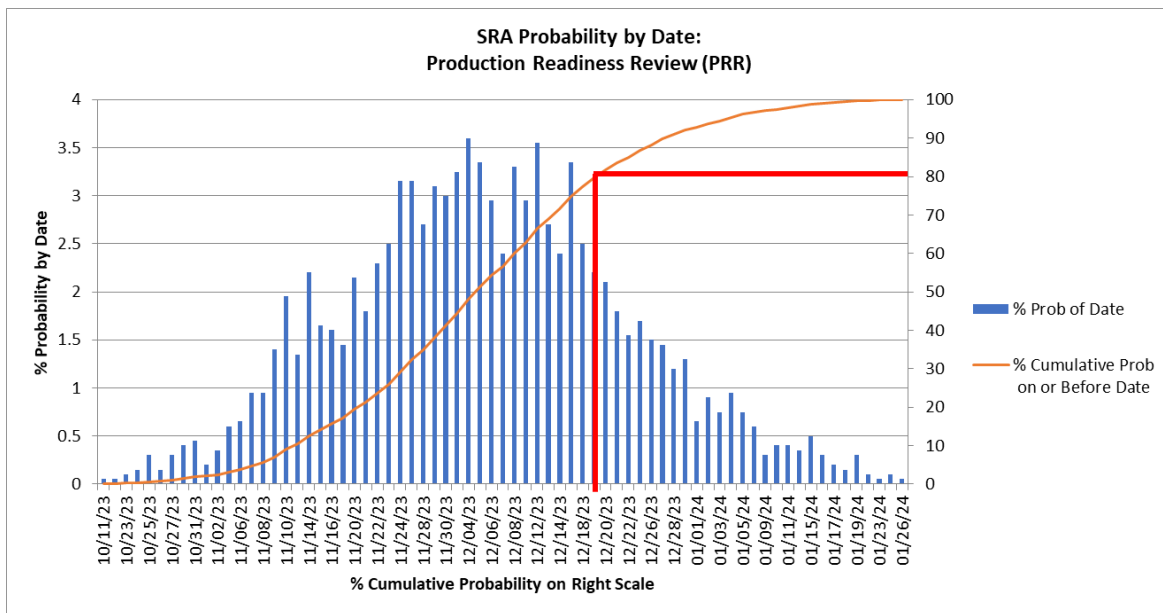

Figure 9: Example of a Schedule Risk Assessment (SRA)

Tip #5 Scheduling is a Team Effort

I can't tell you how many times I've seen a program operate with this mentality:

> *Program Manager to Lead, "What's the status with the schedule?"*
>
> *Lead, "I don't know. The planner manages the schedule, I execute the technical work."*
>
> *Program Manager, "Well how do you know you're on track?"*
>
> *Lead, "Last month's deliverable showed that I was still meeting my dates."*
>
> *Program Manager, "Has anything changed since last month in your work?"*
>
> *Lead, "Oh yeah. We had that failure and then the part came in late. A team is struggling to get a drawing released, but the testing on that part finished early."*
>
> *Program Manager, "How do you know you are still on track to meet the milestones?"*
>
> *Lead, "Oh, that's the scheduler's job. We'll find out in a couple weeks when we finish the schedule updates."*
>
> *Program Manager, "Oh boy"*

This is a prime example of a situation where a program team does not feel ownership of the schedule, resulting in a team's inability to determine if the delay has impacted another part of a program or the overall schedule. The quicker a team understands the cause-and-effect relationship of a given issue, the less time it takes to mitigate the schedule impact.

An essential step in avoiding this mentality is to establish a schedule baseline early in the program. The sooner the schedule is established, and the program team has full buy-in to the baseline, the better chance the program will meet or exceed schedule milestones.

To achieve full buy-in, the functional leads need to fully buy-in the schedule and help develop the task duration and dependency logic. Therefore, it's critical to engage both the schedule and program team early. Make sure to invite your scheduler to the program kickoff or involve them even earlier. Your schedule performance requires the full team!

Tip #6 Schedule is Key to Predictable Cost Management

The final tip to maximize schedule performance draws from the five previous topics. If a program is effectively managing a schedule, technical and cost management will follow. Schedule, technical, and cost objectives are the essential cornerstones of any program. Without a properly managed schedule, key technical objectives or scope may be overlooked leading to product failures

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and design or test rework. Similarly, without a properly managed schedule, a team is inefficient and lacking discipline, which could delay program completion and result in negative cost and financial impacts.

From a cost management perspective, inaccurate resource forecasting is a primary source of cost risk and growth. When the actual cost is larger than the estimated cost at a given period of time, this is considered a negative impact on the program. These differences negatively impact a program because 1) they indicated a low-level of confidence in the program team's ability to estimate and/or execute to a budget and 2) they do not accurately depict labor resource demands, which could cause a program to be over or understaffed.

Resource-loaded schedules are paramount to provide the most accurate estimate through completion, sometimes referred to as Estimate at Complete (EAC). Through this bottoms-up approach, all labor and material costs are correctly allocated and accounted for. Since the costs are directly tied to schedule tasks, all costs and resources shift in concurrence as tasks move, providing real-time feedback for both cost and resource planning.

Figure 10 provides comparative cost management data between a resource-loaded and a non-resource-loaded program. In the first chart, the budget was not accurately planned, resulting in unexpected cost increases. Whereas the second schedule shows that the actual costs were in line with the plan and met cost expectations.

Figure 10: Cost Performance Comparison of different Schedule Types

Managing a program with a resource loaded schedule ensures no tasks are misrepresented in terms of duration, time period, and level of effort (either labor hours or material dollars).

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CONCLUSION

Without a properly managed schedule, a team is inefficient, lacking discipline, and delaying program completion which drives adverse cost and financial impacts. By following these six tips, any program manager can unlock the power of a schedule and maximize program performance.

1. The most successful program managers acknowledge there are many different types of schedules. They understand how to select the most appropriate type for their program based on scope of the project, the number of resources, and the technical complexity.

2. A collaborative environment where a program team is fully engaged results from a program business rhythm centered on frequent schedule updates. The schedule now becomes a tool driving program priorities for the week and identifying where urgent risk mitigations are needed; it changes the mentality from a reactive to active mindset. The customer schedule delivery simply becomes the latest program schedule.

3. For a program to be successful, it is critical that each schedule task is bound by a finite time duration and properly linked to a subsequent task. Task lists typically fall in one of the following categories: open actions, key reminders, or critical tasks. A task list will always be out of context of the overall program schedule scope, resulting in false performance indicators. Don't confuse the two!

4. The Critical Path Method (CPM) is a critical tool a program manager can use to drive a program team to understand critical tasks, task dependencies, and mitigation activities that promote on time program completion. In that active schedule mindset, a program manager can evaluate all the tasks on the critical path: *Is the risk cost, technical, or resource driven? What is the likelihood of the task being delayed?* From here, a program manager can create mitigation plans for each risk and track on a recurring basis.

5. It is important the complete program team (functional leads, program manager, and schedule manager) is fully engaged in the schedule and bought into the baseline. The quicker a team understands the cause-and-effect relationship of a given issue, the less time it takes to mitigate the schedule impact.

6. From a cost management perspective, inaccurate resource forecasting is a primary source of cost risk and growth. Big shifts in cost forecast negatively impact a program because 1) they provide a low level of confidence in the estimate and a team's ability to execute to budget and 2) do not accurately depict labor resource allocations, which could cause a program to be over or understaffed. Proper schedule management is the primary driver of effective program performance.

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