
Program Management



Turning Many Projects into Few Priorities with TOC

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The way to get something done is—quoting the well-known Nike footwear ad—to “just do it.” Focus on the task and get it done. For those who work in organizations that rely on programs of projects—multi-project environments where resources are shared across a number of projects—there are usually a lot of things that need to get done. An environment of many projects typically generates many priorities for project resources and managers alike and can make that focus difficult to achieve.

Division of attention multiplies task and project lead-time...

In an effort to take advantage of valuable new opportunities, multi-project organizations, more often than not, tend to launch projects as soon as they are understood, concurrently with existing projects, simultaneously with other new efforts, and unfortunately too often, without sufficient regard to the capacity of the organization. A common result is that the responsibility for sorting out an array of conflicting priorities often falls to project resources and their managers. One concern coming from this situation is that the resultant locally set priorities may not be in synch with each other or, more importantly, with the global priorities of the larger organization. A common result of trying to deal with this tug-of-war of multiple priorities is the practice of multitasking—assigning resources to more than one significant task during a particular window of time—to try to move all the projects along.

In addition, many project teams rely on early starts of projects and their paths of tasks to try to assure and achieve timely project completion. These early starts—also driven partially by the desire to see “progress” on all open projects—often translate to

additional pressure on resources to multitask between tasks and between projects. There is pressure to get started on a new task in the in-box, but we’re still working on another task. As a result, these practices of early starts and multitasking have been recognized as common practice in many organizations, and even institutionalized in project management software tools, which typically default to “ASAP” scheduling, and which offer “features” to apply “fractional resources” to tasks and to “split” tasks.

The question is, however, whether these early starts actually accomplish their desired effect. When multitasking is the result, the seemingly common sense belief that “the sooner you start, the sooner you finish” becomes questionable. True progress in a project happens only at the handoffs between resources, when the work completed by one resource allows another resource to start its work. To the extent that one project’s tasks are interrupted by work being performed on other projects’ tasks, the first project is delayed. The common practice of multitasking results in multiplying the time it takes to complete tasks, delaying true progress in projects. [See Exhibit 1]

If a resource divides its attention between different tasks before handing off task deliverables, all the projects involved will take longer than necessary because all of that resource’s successors on each project will have to wait longer than necessary due to time spent on other projects’ work. And if many resources in the organization become accustomed to working in this manner, then most projects will take significantly longer than necessary, in both their promise and their execution. The projects will also be impacted by the variability of not only their own tasks, but also of those associated with the other projects that are interleaved within them.

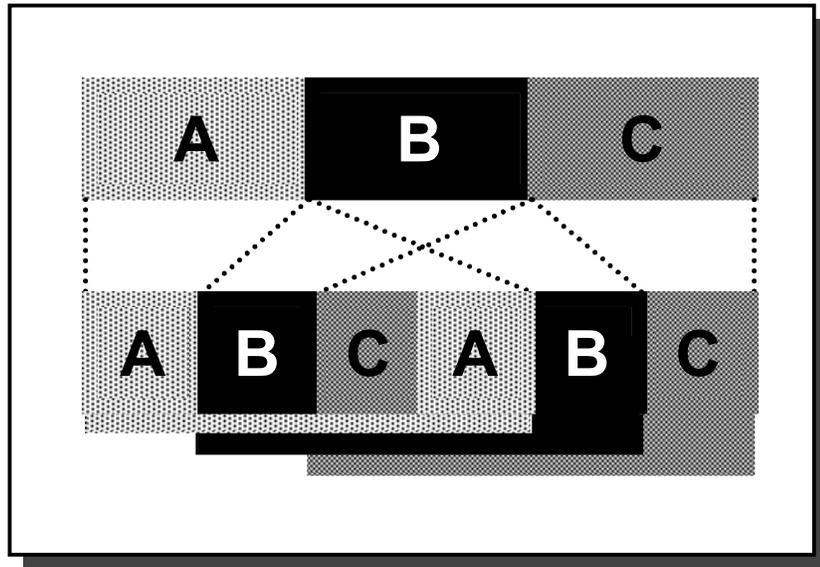
The pressures of these competing priorities result in the splitting of attention and energy, loss of focus, and inability to complete tasks and projects in a timely manner, or even within the time in which they were planned—at least without heroic efforts. This is not a desirable outcome for projects that want to keep their promises, or for organizations that need to reliably deliver projects in shorter and shorter intervals.

One of the key challenges of multi-project or program management therefore revolves around the avoidance of pressures on resources to multitask and the ability to assess and direct the most beneficial use of resources when there is apparent contention for their attention. To the extent that these can be addressed, a multi-project program will minimize the pain that is encountered in the interaction of projects fighting for shared resources.

Avoiding pressures to multitask...

The pressure to multitask comes from the combination of having more than one task in one's in-box and the lack of clear priority for the best use of one's attention. If there were a way of setting common sense priorities for the maximum benefit of the organization, it would make sense to all that we set aside some tasks to wait for the completion of the most critical. And if there were a way of reducing the queue of tasks waiting for a resource, there would be less need for assessing and resetting priorities. If we could systematically both provide clear priorities and minimize the queue, then the devastating impact of multitasking on projects and, more importantly, on organizational performance would be minimized.

Applying the management philosophy known as the Theory of Constraints (TOC) to the realm of project management provides a whole system view of the challenge. TOC suggests that components of the system being managed subordinate their efforts to the larger system of which they are a part. The management of tasks and the resources that perform them must subordinate to the needs of projects, and the management of projects must subordinate to the needs of the multi-project organization to which they



**Exhibit 1: From the point of view of the project, multi-tasking multiplies the time required to complete a task . . .
A and B are delayed with no gain for C.**

belong. The TOC-based solution for managing single projects, whether standalone or as part of a portfolio of projects, is known as *Critical Chain Scheduling and Buffer Management*. It provides part of the answer for priority aspect of the question “What should I work on?” which, if not addressed appropriately, drives multi-tasking behaviors in multi-project environments. (Goldratt, 1997; Newbold; Patrick)

A critical chain schedule removes the pressure of artificial task due dates from the concerns of project resources. It does this by recognizing that a schedule is only a model of our expectations and by aggregating and concentrating the safety that is typically embedded in individual tasks where it does the most good, in a system of *buffers* positioned to protect the promise of the project. [See Exhibit 2]

In the real world, we expect time variation in the execution of tasks—Murphy's Law has not yet been repealed (Patrick). Buffers are used to absorb that variation without distraction to the resource performing the task at hand, while at the same time protecting the truly critical promises of the project. The result is the elimination of meaningless intermediate task due dates and the detrimental pressures, behaviors, and practices associated with them. These include Parkinson's Law (“Work expands to fill the time allowed.”) and the Student Syndrome (Delaying the start of a task due to having more than enough time to accomplish it.).

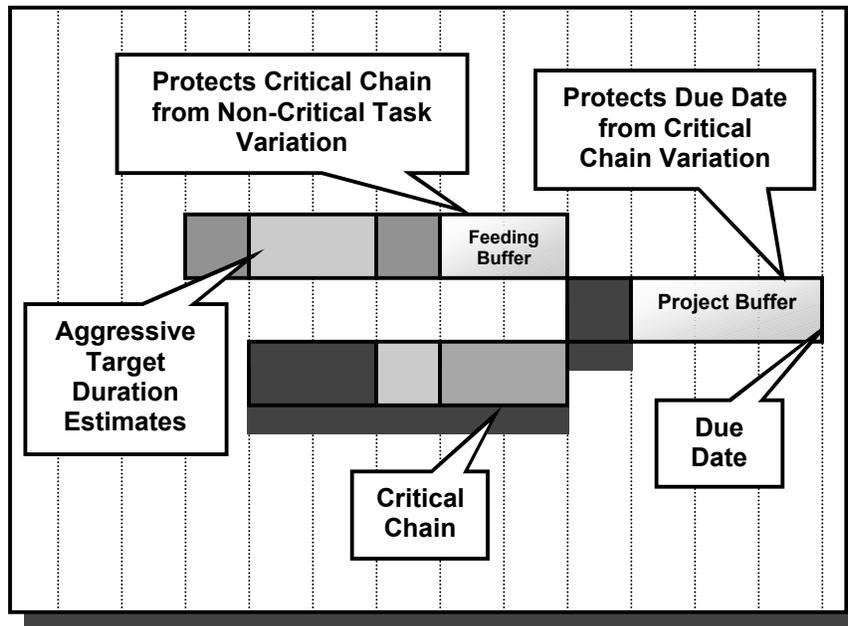


Exhibit 2: A Critical Chain Schedule

Buffers also effectively absorb deviations from the baseline critical chain model made up of target task durations from which significant safety has been removed. As long as there is sufficient buffer remaining, the project promise can, to some degree, be protected from distractions and disruptions, such as those from the need to use a planned resource on another, more jeopardized project or more critical task. If there is sufficient unconsumed buffer related to a task waiting for attention, a resource can hold off on picking it up and multitasking, and instead, maintain focus on the current task at hand until it's complete. The deliverable of the current task can be handed off before moving to the queued task, minimizing the set-down, set-up, and half-finished work that extends project lead-times when multitasking is the usual response.

The buffers and the status of their consumption and replenishment during the reality of project execution also provide a clear, forward-looking indication of what chain of activities is in the greatest jeopardy of delaying the promise of a project. When a project buffer is sufficiently consumed to indicate heightened risk of the project promise, then it is clear that the priority for attention by resources should be adjusted to address the tasks associated with that project. Buffers can therefore provide clear direction for the most beneficial use of a resource's focused attention.

But even with these safeguards at the individual project and task level, the pressures to jump from a task on one project to another—to multitask across

projects—can still be overwhelming and distracting if resources are faced with an overflowing in-box of tasks clamoring for their attention.

This is due to the fact that if projects are pushed into an organization without regard to the system's capacity and capability, work-in-process (in the form of started, but unfinished projects) quickly clogs the system. The build-up of work-in-process creates queues of work that dilute and diffuse the time and attention of resources and management alike and often expand project lead times beyond the comfort zone. There is still pressure to multitask. It is therefore necessary to look beyond the individual projects, or even pairs of them, to the larger system encompassed by the

organization responsible for accomplishing many projects.

Synch or sink...

In addition to providing controls and measures for individual project status or determining priorities between projects, TOC, when applied to multi-project systems, also provides guidance on assessing the capacity of such systems and related mechanisms for the synchronized launch of projects.

When faced with assessing system capacity, many organizations typically go into a major data-collection and number-crunching exercise in an attempt to balance the availability of all resource types with the demand on the system. To support the scheduling and monitoring of projects, however, the required process is far simpler than that usual approach. TOC tends to focus on maximizing flow of work through a system rather than balancing capacity. This higher-level view of system capacity rather than resource capacity leads to the conclusion that it is enough to keep as little as one resource effectively utilized to manage and maximize the throughput of the system. Indeed, in order to do so, it is required that other resources have sufficient protective capacity to protect that throughput. (Goldratt, 1992)

Therefore, determining a starting point for synchronizing the flow of work through the system can simply involve identifying an aspect of the multi-

project system that can approximate its throughput potential. One possible candidate for this *synchronizer* might be a resource that is commonly used across projects and more heavily used relative to most other resources. (Jacob; Newbold)

The role of the synchronizer is to set the pace at which projects are launched into the system. They provide a stagger that is intended to allow overlap of project schedules, yet minimize peak loading on all resources and the pressure to multitask that is the usual result of these peak loads. Once a synchronizer has been identified, a *synchronization schedule* for the multi-project program can be put together that, combined with individual critical chain project schedules, will provide the basis for responsive, realistic and reliable project promises. To develop this schedule, projects are first assigned a *strategic precedence*. The priority against which projects will be serviced by the synchronizer is determined. When desired project commitments result in conflicts for synchronizer attention, the higher precedence project's synchronizer tasks are move earlier in time, along with the remainder of its schedule, minimizing the impact of lower precedence execution variability on higher precedence projects.

In addition to the ordering and staggering of projects provided by the synchronizer, the synchronization schedule must also take into consideration the fact that not all projects are consistent in the use of the synchronizer. This may result in occasional windows of time when the stagger is insufficient to protect other resources from peak loading and pressures to multitask. To prevent this situation, additional stagger is added between the projects in the form of a *capacity buffer*. Based on the expected variability of synchronizer work within the earlier project, the capacity buffer also provides a level of cross-project protection and time for recovery and other non-project uses for synchronizer resources.

The synchronization schedule therefore consists of the precedence ordered synchronizer tasks, capacity buffers whenever a synchronizer moves from one

project to another, and natural gaps that result from the actual demand placed on the synchronizer. These gaps are important aspects of the schedule, as they allow new projects' synchronizer tasks to be interleaved among already committed projects, enabling the organization to take on new opportunities without impacting existing project promises.

The resultant rhythm of project launches [See Exhibit 3], its pace set by the capacity and capability of a commonly used and heavily loaded synchronizer resource, is well within the ability of less loaded

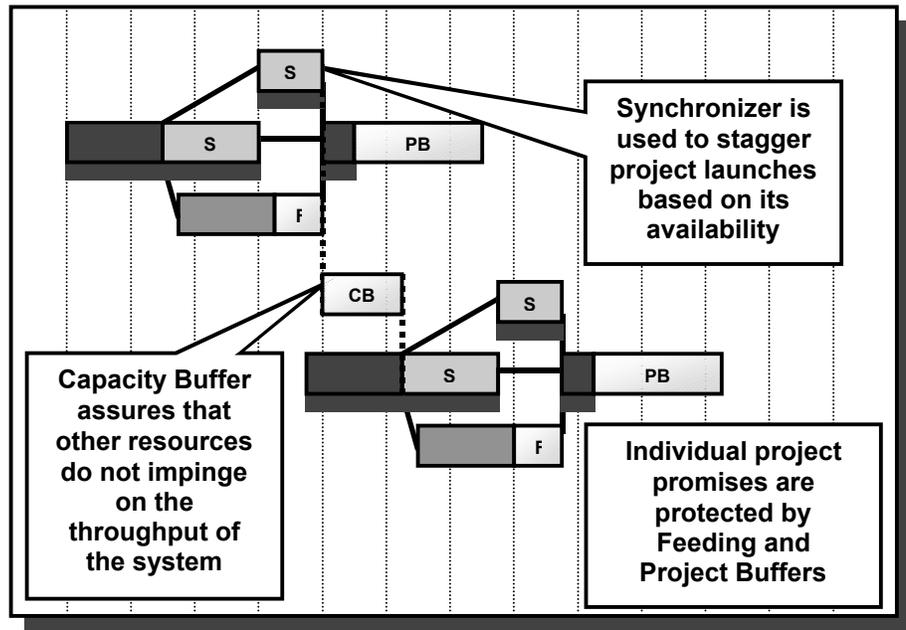


Exhibit 3: Staggering Projects Via a Resource-Based Synchronizer

resources to maintain. More importantly, combined with the individual critical chain schedules' systems of buffers, this synchronization schedule of projects allows resources and their projects to recover from delays and disruptions in a timely, rational, and non-heroic manner. Without synchronized project launches, the risk of sinking into a swamp of muddy priorities is too great for comfort.

Assign no task before its time...

In addition to a healthy respect and accommodation for inevitable variability in execution, and an emphasis on flow of throughput over balanced capacity, most applications of the Theory of Constraints also recognize that human behavior plays a major role in system performance. This leads to another fail-safe against non-productive multitasking built into the TOC-based approach to program management.

The particular behavior in question is the normal propensity to look ahead to and prepare for work coming down the pike. The problem with this behavior is that if a task is in a person's in-box while s/he is tending to another task, the temptation to pre-prepare for the next task could lead to distraction from the task at hand—resulting in multitasking and delay of project progress.

In order to avoid this behavior, when developing critical chain schedules for projects, resources identified with particular tasks are done so in terms of the skill required for the task, not in terms of particular people who actually perform those skills on the task. Actual assignment of personnel to tasks by resource managers should be held back until predecessor tasks are complete and the task is ready to start. With the synchronization schedule and its resultant protective capacity now available in most resource pools, resources will wait for tasks more than vice versa. This designed situation will now provide flexibility for assignment to appropriate available people and yield maximum flow of undistracted work through the system.

Summary—Many projects, a few clear priorities...

In PMI's A Guide to the Project Management Body of Knowledge, a program is defined as "... a group of projects managed in a coordinated way to obtain benefits not available from managing them individually." Most organizations that depend on the accomplishment of projects as a source of products, profits, or process improvements do so with shared resources that must be "managed in a coordinated way." In such a system, proficiency at managing single projects individually without proactively dealing with the interactions between them is not sufficient to assure the attainment of the goals of the organization. The system that really needs to be managed in most cases is greater than the sum of the single projects. It is a larger, complex system of projects, priorities, policies, and practices that guide the behaviors of managers and resources and requires consistent and coherent coordination for maximum effectiveness.

By applying the TOC prescription for multi-project/program management, an organization honors its priorities by scheduling its program through the strategically defined precedence of the synchronization schedule.

Project managers avoid unnecessary changes in priority by relying on buffers to absorb most of the

normal, expected variability in the execution of tasks and projects.

Resource managers find clear direction and priority for assignment of tasks in the status of the buffers, which indicate the best use for available resources to support the promises made by the organization.

And resources have a single priority—the current task to which they are assigned. Without the distraction of pressures to multitask or to meet false priorities of task due dates, they can concentrate on the task at hand and "just do it," do just it, and do it justice to assure a quality handoff, successful projects, and maximum throughput for the organization.

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