# Critical Success Factors in Critical Chain Project Management

**Wendell P. Simpson III, Ph.D., Senior Consultant, ProChain Solutions, Inc.**
**William Lynch, President and COO, ProChain Solutions, Inc.**

## Abstract

Critical Chain Project Management (CCPM) is being tried in a variety of organizations. While it is still early, some of the results from early applications have been eye-catching. This paper reports the results of interviews with managers and others closely involved in implementing CCPM. Lessons learned suggest there are a few simple steps an organization can follow to make great strides towards improved project performance through CCPM.

## Introduction

Critical Chain Project Management (CCPM) is getting some attention. It has only been a couple of years since the ideas behind CCPM first began to find their way into the mainstream. *Critical Chain* by Eli Goldratt appeared on the scene in 1997 and was the first book to organize and present the concepts behind CCPM (Goldratt 1998). Fashioned after his first book *The Goal*, *Critical Chain* is a novel about a college professor who helps three young managers discover an effective new approach to planning and executing their projects. *Project Management in the Fast Lane* by Robert Newbold followed closely on the heels of *Critical Chain* and detailed the methodology that has come to be known as CCPM. Newbold's book is designed to help managers better understand the concepts and provide them with guidelines and suggestions for implementing the ideas on their projects. While Goldratt and Newbold's books focus on single project applications, recent developments extend the concepts to multiproject organizations, providing a new methodology for synchronizing resources and improving performance across many projects. For the remainder of this discussion, we assume that the reader is already familiar with basic CCPM concepts (see Newbold 1998 for a good introduction to the concepts).

A number of organizations have wasted little time in trying out these new ideas. While it is still early, some of the following results have been eye-catching.

- A large semiconductor manufacturer completed construction of a new plant in eleven months (compared to their benchmark of twenty-nine months) while meeting spec and staying within 4 percent of the conventional budget.
- A small software developer applied CCPM to two crucial projects that were hopelessly behind schedule. To the astonishment of everyone in the company, they delivered both projects on time. Since that initial success, they have implemented the approach on all projects, increasing on-time performance to 90+ percent while simultaneously decreasing project cycle time by 50 percent.
- A large telecommunications company used CCPM to significantly reduce product development times while simultaneously increasing in on-time performance. The company now has hundreds of users of CCPM.
- The nonprofit group Habitat for Humanity used CCPM to shatter their own world record for building a house. They completed the house in 3 hours, 45 minutes—nearly 1 full hour faster than the old record, and they did it using only half of the people.

Not all applications have been universally successful. Others are waiting at the starting gate as managers find themselves interested in the approach but unsure of how to begin an implementation. If we are to help those who want to succeed in implementing CCPM, it is crucial that we begin the process of better understanding the experiences of those who have tried to implement CCPM.

## The Need for Research

Much of the recent discussion in project management circles seems to be centered on determining what's new about CCPM and what isn't. While some assert that the concepts are new and revolutionary, others insist CCPM is simply a repackaging of established concepts and can therefore safely be ignored. So who's right? We believe both are correct in many of their assertions. Much of CCPM is a repackaging of existing concepts, but there are some new and quite powerful tools and approaches included in the CCPM package. For instance, the concepts of using time buffers to determine path start times and buffer management to determine when to adjust priorities are additions to the body of knowledge. Also, we feel that the high-powered focus CCPM brings to achieving concrete, measurable application results is a refreshing shift of emphasis.

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We propose shifting the focus of the discussion. Rather than spend time deciding if the ideas are new or old, we advocate spending time investigating the improvements (and failures) claimed by those applying the CCPM approach. There is a great need for some basic research into this approach to project management. Some organizations using CCPM claim substantial improvements; others undoubtedly have had less success. We should try to better understand what successes have been achieved and determine the keys to success—what distinguishes the highly successful application from the less successful ones. Regardless of what we call it or if the ideas are new or old, an approach to project management in which users claim demonstrable, measurable improvements is worth our time to study and investigate.

The success factors we identify are based in the experiences of managers and consultants who have directly participated or led CCPM applications. A small data sample was gathered through a series of phone interviews conducted in the spring of 1999. The interview data was supplemented by more informal feedback we have received over the past eighteen months from the hundreds of users of our CCPM software and services. We make no claim that our findings are conclusive. On the contrary, we ask that they be treated as first-round findings and hope they serve, perhaps, as hypotheses to guide future more formal and structured investigations of CCPM.

## Characteristics of CCPM

What does a CCPM organization look like? While its still early, some of the distinguishing characteristics are becoming apparent. In order to better frame the discussion, we offer the following as a generic set of characteristics of a CCPM organization.

***1. Projects are planned using the Critical Chain methodology.***

- Projects have clearly defined goals.
- Each project has a task network that includes task times based on average work required and task resource requirements.
- The critical chain for each project is clearly identified.
- Project schedules are strategically buffered against uncertainty.
- There is a clear mechanism for controlling and deliberately pacing the start of new project work.

***2. Projects control is accomplished through buffer management***

- Remaining task durations (rather than completion percentages) are collected at regular intervals and used to compute amount of remaining buffer.
- Management reports showing buffer status are used to adjust task priorities.
- Rescheduling is the exception and accomplished only in the event of a severe project disruption.

***3. The work environment is characterized by focused effort.***

- Priorities are clear and relatively stable: critical chain tasks take top priority; other tasks are worked in a first-come, first-served sequence. Expedited tasks caused by buffer penetration are elevated in priority.
- Multitasking (frequent switching between tasks) is discouraged.
- Project tasks are performed in priority order, worked as quickly as possible (without sacrificing quality), and passed on to the next resource as soon as completed.
- The measurement system is synchronized to eliminate conflicts among managers.

Not all characteristics will be evident in all CCPM organizations, nor are all necessary to begin realizing improvements in performance. Each organization is unique and, therefore, might result in a slightly different set of characteristics. Also, the changes required to implement CCPM differ from one organization to another. What is needed in order to implement CCPM depends entirely on the starting point—the existing people, practices, policies, and mindsets that make up the organization. For instance, the changes needed in order to start creating critical chain schedules depend to some extent on whether the organization has experience using network-based scheduling. In the same way, the actions needed to change the work environment so that multitasking is discouraged are highly dependent on the current work environment and culture of the organization. In most organizations, managing according to the above characteristics would represent a significant change in how they do business.

## Critical Success Factors

We identified many elements that we believe correlate with success. These elements were either present in organizations that had achieved some degree of success or were absent in less successful applications. We group these elements into two success factors—leadership and implementation planning.

### Leadership Involvement

There is almost universal agreement that the top leadership of an organization is a critically important factor contributing to the success of CCPM. When we asked an experienced CCPM implementer to identify his top three success factors, he replied, "Leadership, leadership, and leadership." This is hardly a new or surprising finding—the need for top leadership involvement in a change process is well established (Kotter 1996), but one worthy of emphasis. Implementing the CCPM approach is change, and implementing change requires leadership.

How high up must you go in the organization? In our experience, the key is to gauge the changes needed in the work environment (see section 3 above: the work environment is characterized by focused effort). Engage the level of leadership that ensures the organization shifts to clear and stable priorities, to reduced multitasking, and to prompt task handoffs. Depending on the distribution of authority and the degree of change required, this can mean involving a fairly high level in the organization, such as Division Manager, General Manager, or Vice President.

What we mean by top leadership involvement is:

- *Leadership takes responsibility for change.* Leadership must engage in the change process early and must continue to lead the change until CCPM becomes common practice. We have seen implementations where leadership supports the change, but either does not participate actively or hands the responsibility off as the implementation progresses. Leadership must be involved to the point that they publicly take responsibility for the success of the change process.
- *Leadership participates in the change process.* There is a difference between support and active involvement. Too often leadership looks to pass the baton early in the change process to an individual or team lower in the organization with the expectation that they will "check in on the project" from time to time and lend support when needed. This is an understandable approach given the time pressures often placed on top leadership, but this withdrawal can doom the change process.
- *Leadership changes how they make decisions*. In order to lead the implementation, leadership must be out in front, changing how they do their work. True leadership must "walk the walk" if they are to expect their subordinates to make substantive changes. To expect subordinates to change without making changes themselves is foolish. One powerful way to lead the change is to change the information used to make decisions. In several organizations, the leadership has switched from task due date reporting to buffer reporting as the basis for weekly staff meetings. Decisions on resource allocation and priority setting were dependent on the status of the project buffers. This may indeed be the ultimate indicator of the degree of leadership commitment—are the measurements changed to align the organization with CCPM?

### Implementation Planning

Although it appears an obvious thing to do, it is surprising how many implementations are either poorly planned or not planned at all. Start the planning by realistically assessing the needs of the organization. Are projects taking too long? Is on-time performance a problem? Is multitasking causing the organization to lose productivity? If the implementation ignores the current state of the organization, only blind luck will cause it to succeed. Once the needs are correctly identified, determine the needed payoff. What is the value of meeting the needs? If long project durations are a problem, then you must estimate the value to the organization of completing projects in shorter periods of time. If due date performance is a problem, what is the value of increasing predictability? We know of one group that failed because the implementation goal of achieving shorter projects was not what the organization needed. The key in setting project objectives is to ensure that everyone believes the application will result in a win for them.

Once the project objectives are set, identify and schedule the tasks that are needed to achieve the objectives. The tasks often involve things like training, purchasing software, constructing networks, designing and issuing reports, and so on. We know of one project that is floundering because the implementers failed to look beyond the first few tasks required. After accomplishing the training, no thought had been given as to how to roll out the new capability. The delay has caused the project to lose precious momentum and credibility in the organization. Once the plan is set, don't lose sight of the project objectives. It is easy to get bogged down in the planning process. Change isn't needed everywhere; in fact, the opposite is usually true. The most successful implementations seem to be those that are focused on achieving only a handful of small but highly leveraged changes.

During project execution, be sure to stay focused on the critical chain tasks. Part of the planning should be determining the mechanisms that will be used to keep the focus on critical chain tasks. One organization attached a red chain to the door or cubicle of anyone working the critical chain, indicating that this person was not to be disturbed. Keeping everyone focused on the critical chain becomes more difficult when subcontractors or vendors per-

form the critical chain tasks. We know of two implementations that were minor failures (i.e., they failed to deliver the improvements that the group expected to achieve) because the majority of critical chain tasks were subcontracted and neither company had the mechanisms in place to influence how the work was being done. Don't pretend external organizations don't exist. One company started CCPM on two major projects. The first, a success, has been widely publicized. The second was a minor failure, largely because much of the responsibility for on-time delivery was delegated to external contractors. Although early in the project the implementation team considered alternative ways to get the subcontractors on board, nothing was done to make it happen. As it turned out, a lack of the contractor's understanding of Critical Chain resulted in long slips in the schedule. By the time the schedule could be straightened out, the project was significantly behind.

## Conclusions

We are just beginning to see the results of substantive efforts to applying the Critical Chain approach to project management. While we believe leadership and good planning are two important factors that determine the success of implementations, we feel more research is needed. We look forward to reading future papers that expand on our preliminary findings.

### References

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