

Critical Chain Execution Management

An Innovative Approach to Completing More Projects Faster

Is your Project demand outpacing your delivery capacity?

Since Project Management was introduced as a business system in the 1950's, it has morphed into a multi-billion dollar annual industry worldwide. The Gartner Group estimates that companies spend more than \$1 billion per year on Project Management software alone. Even with so much investment, each and every year, most projects, regardless of industry or type, are delivered either late, over budget, under scope or in some combination of these constraints.

Project Management is in a state of evolution and over the past 15 years has migrated from construction and manufacturing into virtually all other business sectors, especially the IT sector. The Project Management Institute (PMI) and the (British) Office of Government Commerce have attempted to enunciate 'Principles and Practices' of Project Management through the development of practice standards to encourage and guide the adoption of Project Management practices. These standards include PMI's Project Management Body of Knowledge (PMBOK)[®] and OGC's Projects in Controlled Environments (Prince2)[®]. In spite of these practice standards most organizations using Project Management as a business system appear to be constantly challenged to produce results as illustrated by the many studies available on the subject of Project Management success and failures

EXECUTION is a big problem in projects. That is why projects always seem overdue and over budget. One of the most highly regarded of the available studies on the phenomena of Project Success and Failure is the Standish CHAOS Report. In the most recently released 2009 Standish Report, <http://www.standishgroup.com/>, the results noted that the current project failure rate is the highest in over a decade (according to Standish measurement methods).

The 2009 project analysis summary:

- 32% Succeeded - delivered on time, on budget, with required features and functions
- 44% Challenged - late, over budget, and/or with less than the required features and functions
- 24% Failed - cancelled prior to completion or delivered and never used

So, *what is wrong with traditional Project Management?*

Traditional Project Management approaches assume a perfect world where requirements don't change, resources are available when needed, vendors deliver on time, and every task happens as planned. However, in reality, projects are full of uncertainties and variability. Resources are assigned multiple tasks, managers have a backlog of decisions to make, vendors deliver late and the best task estimates that are used in your Work Breakdown Structure are exactly that - "Estimates". Traditional Project Management has no viable process to deal with the uncertainties and variation encountered during project execution. The people who develop the task estimates and the resources that execute the tasks know this. That is why they build "safeties" into each and every task estimate to protect themselves from the interruptions they know are coming. They can't predict exactly how big these interruptions will be either, so the more uncertainty the bigger the safety!

The built in safeties aggregate and combine to make your actual project execution time at least twice as large as necessary. Just to deal with Interruptions!

Uncertainties are intrinsic to projects. The extent of uncertainties is what makes projects unique. These "interruptions" often consume more than 30% of a project's work time. As uncertainties strike, plans are impacted, especially in multi-project situations. People are pulled from one project to another to fix other projects' problems, or just to keep them busy. Priorities become unclear and people start multitasking. Delays compound across projects and throughout the organization. Managers are continually surprised by schedule slips. Focus shifts from delivering projects to explaining delays.

To get the slack out of the schedule and reduce the delays managers create a more meticulous plan. Of course, that only means they now have even more details to track and explain. Meanwhile at the individual resource level pressures from management to get more tasks done faster creates stress and unhappiness. Managers at every level, wary of all uncertainties and delays from their previous experience begin including safeties in their commitments before sending the revised plan upwards.

When projects run out of time, you experience more than just delays. There are cost overruns and, all too often, compromises in scope and quality. Consider the following:

- It is well accepted that the longer a project takes, the more resources it will consume.
- Once projects fall behind, expediting costs are often incurred.
- In project based businesses, time equals throughput. Simply put, the faster that a project gets completed, the sooner resources become available for the next project.
- For capital-intensive projects, the longer the project takes, the higher the cost of the tied-up money.
- There is no argument that processes and discipline are essential for ensuring that work gets done with high quality; BUT this goal is easily compromised when projects come under time pressures. Thus, having enough time is vital for Quality deliverables.
- The faster a projects finish, the faster its benefits start accruing.
- For IT projects as product life cycles continue to shrink in the face of new technology, faster time-to-market translates into larger market shares and a higher Return on Investment with a lower Total Cost of Ownership.

What do we change to get more projects done faster?

Contrary to conventional wisdom, the key to good execution is not detailed planning and control, but coordinating execution priorities across the organization.

Conventional wisdom is based on a view that people slack off unless they are micromanaged. We disagree. Our experience is that poor execution is almost always synonymous with chaos and firefighting. In chaotic environments, people actually work much harder – the problem is that most of that work is wasted and does not translate into completing the project faster.

Critical Chain Execution Management is about bringing order to this chaos by changing the rules of managing. It is about managers having better control with less micromanagement. It is about doing projects faster and delivering them on time. According to Larry Bossidy, the renowned ex-CEO of AlliedSignal and Honeywell, "In winning organizations, everyone knows what to do and when". This is what Critical Chain delivers.

It's ALL about Synchronized Execution!

The key to doing more projects faster is not precise planning or tighter tracking, but synchronizing execution efforts.

Planning and tracking are necessary conditions, but alone do not deliver the desired results. They are actually non value added activities because they do not change the Project tasks one bit for delivery to the customer. And customers, if given a choice, would eschew all of these activities if they could be assured of getting a final quality product.

Why do the best laid plans tracked by the most sophisticated (expensive) project software and best trained (expensive) project controllers supervised by the absolute best (most expensive) Project Managers not help deliver projects on time and under budget?

BECAUSE: Even the most carefully prepared plans become obsolete within days. Task priorities become unclear (which tasks to do first) and unsynchronized (every department, every person starts prioritizing their tasks differently). Consequently a project is mostly waiting for one thing or another, leading to significant loss of time and capacity.

Critical Chain Execution Management - The Silver Bullet

A Critical Chain Execution Management System is the silver bullet that delivers results and lowers the resistance to change because of its unique ability to accommodate and manage uncertainties.

For the first time, managers can make project plans and execute them knowing they reflect the reality of their uncertain world. Of course, they still need basics like creating project plans, getting timely updates, and paying attention to resource availability. The difference is that by providing a means to accommodate and manage uncertainties Critical Chain Execution Management makes doing these activities practical and purposeful. For example:

- **No detailed planning upfront:** Only high-level requirements and activities are needed during initial planning.
- **Because there is no perfect analytical method of finding an absolute optimum task estimate and time spent trying to better estimates is better spent executing the actual work.**
- **The inherent uncertainty in estimates is much greater than the difference between the optimum and near-optimum ("good enough" solutions).**
- **No more re-planning cycles:** Even as uncertainties strike, project plans and due-dates remain valid. The burden of constant re-planning is removed.
- **No need to hide local safeties:** Explicit buffers are available to absorb and lessen the shocks of uncertainties. Critical Chain aggregates the safety time originally added to tasks into project buffers to protect project due-date performance.

- Buffers provide management visibility into actual project performance and help avoid wasting safety time through bad multitasking, student syndrome, Parkinson's Law and poorly synchronized integration.
- **Simple, meaningful updates:** Project participants only report how much more time they need to finish what they are working on.
- **Utility for project participants:** For the first time, project plans and progress updates can be used to dynamically synchronize priorities within and across projects.
- **Early warning signals:** Managers do not have to manage on the fly and fire fight on a daily basis. Monitoring project progress and health is accomplished through monitoring the consumption rate of the buffers. Delays show up immediately and mitigation plans can be made well in advance of their actual need.

If, after reading this you are thinking of the thirty eight reasons this won't work in your organization, you are not alone. Everyone asks the same questions. How can you do this in my world? And the answer is...

Implement **THREE** Rules, **NO MORE NO LESS**

All change management challenges fall under either achieving buy-in or establishing robust mechanics. It is very easy to waste a lot of energy in those areas by educating everyone thoroughly, tweaking data endlessly, customizing reports etc.

To not get overwhelmed in the details we must remind ourselves that Critical Chain is about implementing three rules:

1. **Buffering:** Don't turn estimates into commitments. Shorten project plans, include 50% buffers.
2. **Pipelining:** Reduce Work in Process. Stagger project starts.
3. **Buffer Management:** Follow task priorities, don't waste buffers

It is impossible to implement these rules piecemeal. All three have to be implemented from the get-go, without compromise. Any concession will only show up as resistance to change or cumbersome mechanics. For example:

- Organizations doing large projects tend to implement Critical Chain one project at a time. They compromise the PIPELINING rule. When projects are not staggered, resource conflicts are bound to arise. Buffers get consumed and commitments are missed. Project Managers do not cut cycle times. Task Managers cannot follow task priorities. Very quickly, faith in the new system is lost.
- Many times organizations initially aim to just deliver projects on time without increasing speed and throughput. They compromise the BUFFERING rule (cycle times are not cut, but buffers are added).
- When cycle times are not cut, the PIPELINING rule also has to be compromised because staggering the projects would cause all due-dates to be pushed far out. When projects are not pipelined, BUFFER MANAGEMENT cannot be done. The entire system falls apart.

- Some managers compromise the BUFFER MANAGEMENT rule because they feel it is “micromangement”. In reality, without management, buffers get wasted which creates a feeling that shorter cycle times are unrealistic.

Sooner or later the organization reverts to its old ways (not staggering project starts; hiding safeties in project plans, and setting priorities ad hoc in execution).

Instead of reacting to symptoms when we hit roadblocks, it is better to diagnose which of the rules has been compromised and reinforce the three rules. Just as important as these rules is the Leadership’s support of the change in the work management rules.

Why Top Management Must Play an Active Role

Sponsorship is not enough. Even though a top managers’ role is to set policies and execution is delegated to middle managers, in successful change management implementations the top managers play a more active role for the first 6 to 12 months by:

1. Setting Aggressive Goals:
 - a. Only when aggressive goals are set do substantial improvements happen. An organization is more easily galvanized around ambitious goals than incremental improvements.
 - b. For example, though people were overloaded and projects running behind, HP Digital Camera group set an audacious target of going from 6 new cameras in a year to 15. They actually achieved their target, delivering all projects on time with an implementation that went live in six weeks.
2. Creating a Habit of Managing Buffers:
 - a. Close oversight by top management is necessary until Buffer Management becomes second nature.
3. Not Delegating the Implementation Until Transition is Complete:
 - a. Middle managers and frontline managers encounter policy obstacles that they cannot remove. Only senior managers can identify and eliminate such obstacles.
 - b. Only Senior Management can make this change one of the organizations top priorities. Quite simply it is too important to delegate, the benefits are too valuable to fail.

Critical Chain Execution Management – The Details

Planning

A Critical Chain Project Plan is created in much the same fashion as a Critical Path Project Plan. The plan is worked backward from a completion date with each task starting as late as possible. Two durations are entered for each task: a "best guess," or 50% probability duration, and a "safe" duration, which should have higher probability of completion (perhaps 90% or 95%, depending on the amount of risk that the organization can accept).

Resources are then assigned to each task, and the plan is resource leveled using the 50% estimates. The longest sequence of resource-leveled tasks that lead from beginning to end of the project is then identified as the critical chain. The justification for using the 50% estimates is that half of the tasks will finish early and half will finish late, so that the variance over the course of the project should be zero.

Recognizing that tasks are much more likely to take more rather than less time due to interruptions in the Individual Contributors day is what drives estimates to include huge safety margins of time. Once they are imbedded in your schedule at the task level these safeties will always be consumed. The reality is that no one knows how much interruption they will have from day to day. This is the direct cause of so much uncertainty and variability in a project. Parkinson's Law (i.e. "work grows to fill the allotted time") or Student syndrome (i.e. the urgency to complete a task increases as the due date approaches") will consume whatever amount of time the actual interruptions do not and the resulting cost and time will accrue to your project. Buffers are the antidote for this illness. "Buffers" are used to establish dates for deliverables and for monitoring project schedule and financial performance. The "extra" duration of each task on the critical chain—the difference between the "safe" durations and the 50% durations—is gathered together in a buffer at the end of the project.

Buffering (Rule number One) is used so that estimates do not become due dates.

Finally, a baseline is established, which enables financial monitoring of the project. The project is then **Pipelined (Rule number Two) by predicting the estimated start date based on resource availability.**

Execution

When the plan is complete and the project ready to kick off, the project network is fixed and the buffers size is "locked" (i.e. their planned duration may not be altered during the project), because they are used to monitor project schedule and financial performance.

The resources on the critical chain are empowered by ensuring that they work on the critical chain task and nothing else; bad multitasking is eliminated. An analogy is drawn in the literature with a relay race. The critical chain is the race, and the resources on the critical chain are the runners. When they are running their "leg" of the project, they should be focused on completing the assigned task as quickly as possible, with no distractions or multitasking. In some case studies, actual batons are reportedly hung by the desks of people when they are working on critical chain tasks so that others know not to interrupt. The goal, here, is to overcome the tendency to delay work or to do extra work when there seems to be time.

Because task durations have been planned at the 50% probability duration, there is focus on the resources to complete critical chain tasks as quickly as possible, overcoming student's syndrome and Parkinson's Law. Management is empowered to help remove barriers for the resources so that tasks finish ASAP and not to hold the resources to artificial due dates. Since we know some tasks will finish early and some will finish late management focuses on only the tasks that are consuming buffer, removing barriers to task completion and managing tasks in priority number order based on which tasks are consuming the most buffer.

Monitoring

Monitoring is, in some ways, the greatest advantage of the Critical Chain method. Because individual tasks will vary in duration from the 50% estimate, there is no point in trying to force every task to complete "on time;" estimates can never be perfect. Instead, we monitor the buffers (**Buffer Management - Rule Number Three**) that were created during the planning stage. A chart or graph can be easily created and posted to show the consumption of buffer as a function of project completion. If the rate of buffer consumption is low, the project is on target. If the rate of consumption is such that there is likely to be little or no buffer at the end of the project, then corrective actions or recovery plans must be developed to recover the loss. When the buffer consumption rate exceeds some critical value (roughly: the rate where all of the buffer may be expected to be consumed before the end of the project, resulting in late completion), then management must take action to recover the buffer and keep the project on track.

Conclusion

Critical Chain Execution Management is not Incremental Continuous Process Improvement. It is, rather, Dis-Continuous Innovation. Its value is BIG. It is a game changer and is being successfully used by some savvy organizations as a strategic weapon in the business world. It will provide large dividends to innovative organizations who can manage the change. Critical Chain Execution Management is the first real innovation in Project Management since PERT. Federal Agencies such as The Department of Defense and the Department of Homeland Security have discovered that huge improvements in throughput and reductions in actual project cycle times are obtainable by using CCPM. Typically, CCPM case studies report 95% on-time and on-budget completion when CCPM is applied correctly. Mabin and Balderstone, in their meta-analysis of seventy-eight published case studies, found that implementing Critical Chain resulted in mean reduction in lead-times of 69%, mean reduction of cycle-times of 66%, mean improvement in due date performance of 60%, mean reduction in inventory levels of 50% and mean increases in revenue/throughput of 68%.

Bob McPherson, author of this document, is currently a Program Manager at Main Sail. Mr. McPherson has over 30 years of Project Management experience in Federal agencies and fortune 500 companies. Mr. McPherson has designed and executed Performance Management Improvement programs for dozens of organizations over the past thirty years. Mr. McPherson's most recent project was the implementation of Theory of Constraints and Critical Chain Project Management throughout the Naval Sea Systems Commands Shipyard Management Group. Other clients include Beloit Paper and Pulp; Bureau of Engraving and Printing, Department of Homeland Security, Duke Energy, Genentech, Honeywell Aerospace, JM Huber Wood Products, Naval Sea Systems Command, PepsiCo, Pharmacia, US Borax, US Navy, Naval Supply Systems Command, US Coast Guard. Mr. McPherson maintains current certifications in Project Management, Theory of Constraints, Lean, Six Sigma and Reliability Centered Maintenance. Mr. McPherson holds a Masters Degree in Human Resources and Organizational Development from Troy State University and Masters Certifications in Lean and Six Sigma from Villanova University.