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Project Wars:
Is The Only Way to Win the Game Not to Play?

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For the past year, our Roundtable meetings have been exploring various aspects of project management. The last two meetings dealt with the emergence of a new paradigm -- the application of Theory of Constraints to project management. Our feature article contrasts this approach with the traditional and documents the benefits it brings.

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One of my favorite movies was "War Games". In the movie, a top secret US Air Command computer was programmed to launch thermo nuclear warheads if given certain commands. A teenage computer whiz was able to hack into the computer and nearly started a world-wide thermonuclear war, thinking he was merely playing a computer game. The computer was programmed to have "logic" of nuclear war – anticipating the opposing forces moves under certain scenarios and reacting appropriately. The disaster was averted when the computer was taught to play tic-tac-toe. By playing this game, the computer learned that if each opponent made "logical" moves, the game could not be won; it would always end in a tie. Supposedly transferring this knowledge to thermonuclear war, the computer decided it was best not to play, since neither side could win in thermonuclear war – indeed, they would both lose.

The traditional method of Project Management is similar to thermonuclear war in that it is usually a lose – lose situation. Under the traditional system, there are unreasonable Project expectations, Project Managers (PMs) pitted against each other for the critical resources, and often lack of coordination/ prioritization from a corporate viewpoint. Within this system, if Management, Project Managers and Project Team Members (PTMs) all make logical decisions, everyone loses. PTMs, even when working long difficult hours, are constantly badgered by PMs to finish on time. The PMs in turn are badgered by Stakeholders to keep their specific

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projects moving toward finishing on time. Everyone works as hard as they can and yet the projects rarely finish when planned or within budget. If we were like the computer, we would choose to not play the game – to not do projects by the traditional method. Furthermore, if the computer could have been taught how to avoid thermonuclear war altogether, that would present a win – win solution. This paper proposes that Theory of Constraints (TOC) is the win – win solution for the Project Management Wars.

Most of the war in traditional Project Management can be traced to underlying processes and systems, and the human behavior responses to them. The major processes and systems causing the most havoc are Project Time Estimating, Priority Setting (or more precisely, the lack thereof), Resource Sharing across Projects, Project Goals, and Personnel Objective Setting. Due to space constraints, only Project Time Estimating will be addressed in this paper.

If you have worked in business on practically any project, you are familiar with the standard process for Project Time Estimating. The PM puts together a schedule, gives the PTMs a list of the tasks they are to perform, and asks them to provide time estimates. The PTMs now must choose their first lose – lose "battle strategy". Quote too short a time and spend extra hours or weekends trying to meet the quoted time, should any problems come up. Quote too long a time and incur verbal abuse, claims of sandbagging, and the inevitable shortening of the estimate anyway by the PM/Stakeholders. This interaction reveals a basic flaw within traditional Project Management – the PM/Stakeholders do not trust the PTMs to be truthful with their estimates, and the PTMs do not trust the PM/Stakeholders to accept their estimates as submitted. Therefore, the PTMs feel the need to pad the estimates (with enough safety to insure finishing on time, barring major "Murphy") and the PM feels compelled to cut them.

With all the PTMs padding their estimates, why aren't a large number of tasks (and Projects) finishing early? The answer is, they probably could (and under TOC often do). But what does it accomplish (for the individual) within traditional PM? Should a PTM turn in a task early, they will be accused of sand-bagging, and the next time they get to estimate task time, the PM will remind them of the last (padded) estimate they turned in. Also, there was a date in the schedule for turning this work in – what are the chances that the next person is ready to take it and begin their task early? So we find that very high percentages of tasks finish exactly on time (PTMs added enough padding to allow this to happen), a few finish late (Murphy strikes), and fewer still get turned in early (due to negative incentives). In almost all projects, the time lost due to late finishes is substantially greater than the time gained from early finishes. So as the project progresses, most tasks are finishing on time, but once in awhile, Murphy strikes and time is lost. The project struggles to stay on time and rarely is able to do so for the total project life. This is SOP for most projects within organizations, but is compounded greatly when there is a multi-project environment where resources are shared across several projects. The "Bad-Multitasking" that occurs within multiple project environments can be devastating, but space does not allow for a proper discussion of it here.

The next illogical strategy in the Project War that traditional Project Management employs is the loss of the "Time Estimate". When the estimates were first gathered to be placed within the Project Schedule they were just that, estimates. Once the times are in the schedule and the Project begins, they are no longer estimates; they become " "set", "must finish on" dates. But the time to complete each task IS an estimate and WILL vary. Yet, the schedule does not allow variation, so each task is driven to finish "on time". The implied logic is that if each task finishes on time, the milestones will finish on time and the Project will finish on time. But a more basic logic is in effect here – the simple logic that the tasks cannot be predicted in advance with enough certainty to insure every task is "on time". Many mathematical simulations (i.e., Monte Carlo) have been added to Project Management tools in recent years to alleviate this problem, but they have generally proven ineffective.

Another lose-lose strategy within standard Project Management is the setting of the Project End Date to coincide with the end of the original Critical Path (CP). Since the individual tasks in the CP are ESTIMATES, how can we expect the end date of that path to be "Must Finish On"? And as anyone who has worked projects knows, the CP of the Project changes just about as often as the schedule status is reviewed, so the final CP is often not the same as the original CP.

To sum up our Project War, we employ a strategy whereby we ask PTMs for time estimates which we don't believe and don't intend to use without cutting. We ignore the fact that what we got were estimates

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and we "set" them in concrete into the schedule. We compound this error and "set" the Project End Date to coincide with the (original) CP end date. We badger each PTM to meet their date in the schedule, and the Stakeholders badger the PM to keep the project on schedule. And in the multiple project environment, we do this for a number of projects which share critical resources, bringing substantially greater variation into the system - *a system where variation is not allowed nor planned for.* In general, we can say we have a system where "Nobody trusts anyone, everyone has to be prodded or threatened to do their work, and we expect certainty out of a system that is rift with variation". Very logical indeed.

The Theory of Constraints strategy in fighting this Project War is to attack (solve) the true logic within the system. Since there WILL be variation in the project tasks, TOC expects variation in those tasks. Since the Project End Date is dependent on the individual tasks and will itself vary, TOC accounts for this by "bounding" the End Date. Additionally, TOC trusts the resources (PTMs) doing the work to be the most knowledgeable of how long the work will take, and it gives PMs and Stakeholders analysis tools that allow them to prioritize Projects and assign resources so that they can do their work without needing to be badgered.

Winning the Project War:

Let's look at the various battle strategies we've discussed and see the alternate strategies that TOC employs. We talked earlier about the padding/cutting battle strategy. The main reason for the padding is that the PTMs know only one time will go into the schedule and they darn sure better be able to finish by that time. PMs/Stakeholders also know only one time will go into the schedule, and that time better be as short as possible. Hence the conflict. TOC resolves this battle by allowing the PTM to enter both an expected (midpoint) time and a safe (padded) time. This recognizes the true logic that the Tasks will vary and that Murphy may strike. While the shorter (midpoint) times go into calculating the Critical Chain (CC, similar to CP but also takes Resource Dependencies into account), the safe times are used in calculating a Project Buffer. The Project Buffer will be added to the CC to form the total Project duration and determine the Project End Date (more on Project Buffers shortly).

In TOC, every Task is expected to vary. Yes, there is a duration time in the schedule for each task (the shorter, midpoint time). But the PTMs are not required to meet them. They are asked to begin their task as soon as the dependencies are met and to work the task in an efficient manner. A key point is that there are no Due Dates in the schedule for the individual tasks. The PTM is not driven to meet a date. They are expected to do their job and do it efficiently, without badgering. Don't worry, the PTMs cannot sit back and play video games all day, there are still weekly project status meetings and the PTMs must report their progress at these. The only real difference is that the PMs/Stakeholders are not constantly hounding the PTMs to meet a date (because there isn't one).

For this aspect of TOC to work well, PTMs must give reasonable midpoint times. This usually takes some proving in time whereby the PTMs see that the PM/Stakeholders indeed will not badger them to meet a date. Then there is no reason for the PTM to give padded times for midpoint times or to give grossly overstated safe times. They learn that the best approach for the Team/Project is to give as accurate as possible midpoint and safe times.

My experience in working projects and with PTMs makes me appreciate the above principle of TOC. I have found that most people want to do a fast effective job and to keep busy. Once in awhile you find a slacker, but they are usually quite rare. If a large number of your employees do not want to do the work, then you have basic management problems that must be corrected before attempting to undertake TOC.

Another erroneous strategy in the Project War that we looked at earlier was "Setting the End Date to be the end of the CP". We said the tasks that make up the CP will vary, so why expect the End Date not to vary? Indeed, TOC recognizes the true logic of variation and plans accordingly. TOC examines the entire Project Schedule and designates the CC. At first blush this time appears far too short for the Project (made up of midpoint times), and indeed it is. What is the probability that all the CC tasks will finish by the midpoint times (that Murphy won't strike sometime)? Quite low, one would think. Here TOC employs a proven mathematical technique, the "Root Sum Squared (RSS)" calculation, in conjunction with the "Aggregation of Events" probability principle.

Aggregation of Events recognizes the principle that if a number of related events can vary, the variation of the Total/Sum of the events is less than the sum of the variations of each event taken separately.

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The mathematical calculation that is employed is RSS. RSS states that the variation for the total of a number of related events can be found by taking the variation of each individual event, squaring that variation, adding it to the square of the variation of the other related events, and taking the square root of the result. While it may sound somewhat complicated, this principle is well founded and used extensively in tolerance build-up calculations for mechanical design.

TOC recognizes that the CC tasks are all related events, hence Aggregation of Events applies. The difference between the midpoint time and the safe time can be used to define the variation for each CC task. TOC uses RSS to calculate the total expected variation for the entire CC. The resulting duration is call the Project Buffer and is added to the CC to form the total Project Duration. By choosing the end date of the Buffer, you bound the end date of the Project to be within the total variation expected from all the CC tasks. Even with the Buffer added, the total Project Duration is almost always much shorter than when using traditional Project Management scheduling (most tasks in traditional scheduling would have been entered as the "safe" times, not the midpoint times).

PTMs working in TOC work their tasks and turn them in as soon as they are complete (no due date in the schedule). The next resource is expected to begin their tasks as soon as they can, to complete that task and turn it in as soon as it is finished. For those that finish by the midpoint, great, they used up no buffer at all for those that finish after the midpoint, not so great, but OK, since there is a Project Buffer on the end of the project to account for those tasks that do finish after the midpoint.

If your task estimates are even reasonably accurate, you will probably finish your project on or before the end of the buffer. As the project progresses, the amount of buffer used, compared with the amount of the project completed, serves as a very effective analysis tool for management to gauge project health. Companies employing TOC find that a substantial number of projects do finish Prior to the End Date and that the total project duration is greatly reduced (30% to 50% reduction typical). These same companies find that 90+ % of their projects finish by the End Date (get delivered on time).

As a final summation, with Traditional Project Management, Project Time Estimating is a War. Even though it is obvious that the PTMs and PMs/Stakeholders must work together for the project to be successful, they are aligned against one another. The PTMs must pad their estimates and the PMs/Stakeholders must cut them. Task Dates and Project End Dates are set as "firm" even though it is obvious they will vary. The PTMs' ability to work their task in a rapid, efficient manner is offset by the "logic" of the system. PMs/Stakeholders are expected to harass the PTMs to "ensure" they work their tasks. And all the while most projects still finish late and over budget. So, we choose not to use traditional Project Management and go with TOC instead. With TOC, Time Estimating becomes a collaborative effort between the PMs/Stakeholders and the PTMs. Entering a range of time for the task to finish (but no dates) allows the PTMs the breathing room they desire and takes away the negative impacts of finishing a task early (therefore, many more tasks are turned in early). The Buffer allows the PMs/Stakeholders a safety gap for the tasks that get hit by Murphy and gives them an effective analysis tool to gauge when the project is truly in trouble. Previous schedules that were one year traditionally planned projects become 9 months, and finish in 9 months – compared to the 15 months actual finish of the one year planned project.
Many companies are winning the Project War by using TOC. Shouldn't it be part of your battle plan?

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