White Paper

Executive Guide to Project Portfolio Management

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Introduction & Objectives

A company's goals, its strategy and its projects are as intertwined as the lives and emotions of a husband and wife. This white paper is a guide to senior management on how to dramatically increase their chance of meeting their organization's change goals through Project Portfolio Management. Project Portfolio Management (PPM) is a set of processes to authorize, activate, expedite and monitor projects with correct scope to meet organization improvement goals. If performed successfully, PPM will meet its key objective of measurably improving the return on investment (ROI) from an organization's projects.

This white paper contains the principals and best practices of PPM, backed up by research, case studies and many years of experience. To accomplish its primary objective of improved ROI, PPM must ensure that ***all three*** of the following activities are performed expertly:

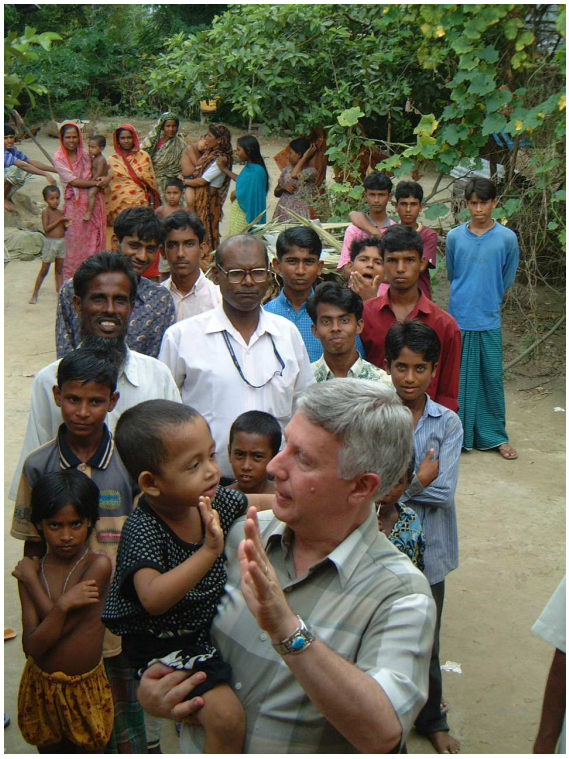

Figure 1 - Cross-Functional Project Alignment Speaking the Same Language

a. ***Choose the right project mix*** – i.e., choose those projects which will leverage the organization's precious resources to bring large, measurable value to the stakeholders

b. ***Ensure the correct scope*** – i.e., align projects and content *cross-functionally* (see figure 1) Many of today's projects have technical scope relevant to a single, functional area, but lack the organization-wide policy, measurement and content changes necessary to have a significant impact on organization goals.

c. ***Execute quickly, in the correct sequence*** – To accomplish this, people performing PPM must understand and convince the organization to adhere to the organization's project capacity. Any organization that is overloaded with too many projects sees a dramatic increase in resource multi-tasking or sharing with a devastating slowdown in project flow. Project durations climb exponentially. A second attribute of quick execution implies that PPM effectively monitors project execution to ensure that out-of-control situations are speedily recognized and acted upon.

Executive Challenges

Executives without effective PPM suffer from cross-functional resource conflicts with continual top management refereeing, poor or anemic organizational performance, and projects where the norm is to deliver late, over budget or not within scope. Most executives are aware of the need for drastic change in multi-project management practices, but many place the emphasis in the wrong place. Unfortunately, a great deal of such investment is misdirected into multi-year efforts to implement software tools and time sheets before dealing with the highest leverage points.

There are three common challenges that executives must overcome with the way that projects are sanctioned in most organizations.

i. Goals set by the senior executive are ***not measurably tied*** to projects. I.e., Even when a functional VP claims that a project is essential to meet a goal (which is almost always true), the ***percentage*** of the goal that the project will accomplish is often not identified or committed to. This is vital information for the Portfolio Manager to be able to assess the health of the portfolio.

ii. The collection of active projects is ***not tracked*** to see if it is meeting the goals (on time and magnitude of improvement promised). The author's experience is that many projects, even in multi-billion dollar companies, lack formal, valid resource-based project plans. Furthermore, even when the plans exist, they are often sitting on a shelf rather than being used as the performance base to judge the project.

iii. Organizations breed too ***many projects that are not sanctioned*** by any executive. In a June, 2004 research effort conducted by the author, this was a stated problem with 70% of respondents.

This paper discusses two important applications of PPM to address these executive challenges. They are derived from a powerful improvement methodology called Theory of Constraints. One application, "The 4x4 Process", deals with selecting projects that align with an organization's strategic goals and gaining the executive commitment to those projects. The second process deals with dramatically accelerating projects, so that the benefits to the organization are realized much sooner.

However, there is an important prerequisite to making these processes work. Therefore, before discussing them in detail, this white paper describes the necessary pillars to support all PPM processes.

Project Mix and Portfolio Management

A formal portfolio management and governance process is a **prerequisite** foundation for analyzing and improving the project mix. When considering an organization's project mix, two areas of analysis are very important. The first question is whether the projects will provide high leverage on the organization's precious project resources – people and capital – to generate measurable, bottom-line improvements within the coming year. The second question is one of portfolio balance.

To leverage project resources, a portfolio manager must understand the overall "business" of the organization. Every organization has one major constraint – one area which, more than any other, limits the performance of the organization. In this sense, an organization is like a chain, with one weakest link. Leverage is based on finding and improving the weakest link of the organization. The weakest link can be anywhere in the supply chain – with suppliers who cannot provide enough resource (materials or people), internally, e.g., in production or operations, engineering, I.T., in the distribution channels, in retail or in the market (end customer).

For most for-profit organizations (about 70%), the author has found their constraint to be in the market. This means that the organization has enough internal capacity to handle more business. To have dramatically better results, what they need are more customers who will buy from them. Given this scenario, a healthy project portfolio should have an ***imbalance (see figure 2)***. The project mix should include a disproportionately larger number of projects to address the market constraint. In the author's experience, many organizations in this situation have a large number of sales campaign projects, but few real market research projects to understand the deeper needs of their clients and markets enough to overcome their constraint.

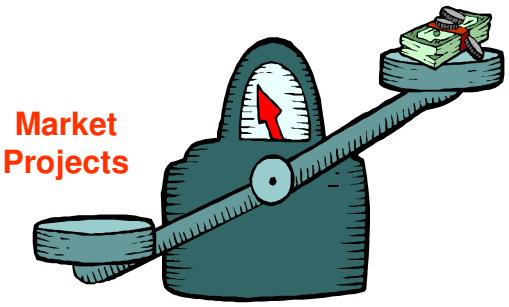

Figure 2 A Healthy Portfolio Imbalance

Many project portfolios have significant information technology components. To know that the I.T. projects in the portfolio are correct, the portfolio manager must be able to answer six questions about these projects[1]. For example, what current technological limitation does the organization or its customers have that the new technology will remove? If the limitation is removed, what impact will that have on the organization's bottom line? When these questions are asked, rigorously, it is surprising to find how few of the currently active I.T. projects really make sense for an organization.

Since I.T. resources are often badly multitasked, working on far too many projects, the organization can achieve a much higher return on the I.T. investment by focusing these resources on those few areas that will address the organization's constraint. In many organizations, the focus on deeper customer needs suggests a different answer in terms of I.T. projects. For example, many organizations have poor systems in their supply chain (relying on forecasts rather than pull systems, for example), inadequate Customer resource management systems and poor customer service systems.

If an organization does not have the correct balance of projects, with focus on meeting important customer needs, then the project portfolio often contains many projects focused on greater internal efficiencies. Without increased sales and profits, greater internal efficiencies often require layoffs to translate those efficiencies into bottom line savings. The result, for project management, is that many people become less enthusiastic about working on projects.

Therefore, the second area of analysis of the project mix is vital. The portfolio manager must examine portfolio balance in the following areas:

[1] See Gerald I. Kendall, *Viable Vision*, J. Ross Publishing, 2004, Boca Raton FL for a full discussion of the I.T. implications of projects and the six questions.

- Focus on market and customer needs vs. focus on internal improvements. If the company has cash flow or other financial issues, then internal improvements might be the desired "imbalance". Otherwise, a portfolio manager should be sensitive to a portfolio that has too little market side initiatives
- Short term vs. long term. Often, too many projects spend money this fiscal year without bringing benefits until the next fiscal year, or sometime far into the future. This is a huge red flag. Who knows what will happen 1-2 years from now? The portfolio manager should be asking the tough questions, relative to project benefits and why they can't happen sooner.
- Research vs. development. To have a secure future, every organization must invest some of their project resources into research. Such projects need to focus on market research, experimentation with new methods, tools and processes, training and human development, motivation and other areas.
- Which organization ***assets*** are project dollars and human resources focused on? Assets are not just capital investment. They include those assets that are strategic to the company's future. For example, web site, customers, external sales agents, distribution channels. The portfolio manager should look at the distribution of project investments to the organization's strategic assets, and determine whether or not the distribution makes sense, relative to the top 5 assets.
- Sponsorship from I.T. vs other functional areas. In many organizations, the author has witnessed over 70% of the projects in the portfolio sponsored by IT. This is a red flag indicating a lack of balanced ownership of project initiatives. It signifies that functional heads are not holding ownership, and therefore ultimate responsibility, for bottom line results.

Three PPM Roles

To have an effective Project Portfolio Management System, there are three distinct roles that an organization must formally define:

- **Governance** – This executive role is one of decision making, usually conducted by top management teams. In some of the most effective implementations that this author has evaluated, this role includes the "C" level executives (CFO, CEO, COO, CIO) who meet bi-weekly or monthly. Decisions include:
  - *Which projects to approve/reject*
  - *When to activate projects*
  - *How many projects to activate*
  - *Due dates for projects*
  - *Criteria for project proposals*
  - *Priorities*
  - *Resource allocation, including capital expenditure, people and operating expense budget*
  - *Project reviews, with approval for a project to proceed to the next stage or killing the project, or approval/rejection of project improvement plans*

- *Investment in project management methodology and tools*

- **Management** – Relative to PPM, management's job is to ensure that the project management system is "in control". According to the late guru W. Edwards Deming, a system is in control when the goals of the system can be predictably met better than 95% of the time. Every project has three distinct goals – to be delivered on time, on budget and within scope, according to original commitments (not the 10th revision to a due date!). This role includes providing the Project Management processes for planning and execution to deliver projects according to their goals. Usually, this is done by a Project Management Office or similar organization. Where such an office does not exist, this role will fall on the project portfolio management person(s).

- **Project Portfolio Management** – The person(s) undertaking this role provides information and recommendations to the governance group for improved ROI. They also monitor execution of projects. Usually, there is a close relationship between the person(s) responsible for strategic planning and the project portfolio manager. While strategic planners identify the ideas necessary to meet organization goals, the portfolio manager makes sure that there are corresponding programs and projects sufficient to accomplish those ideas. Further, the portfolio manager maps and tracks the project execution against the strategies and raises the red flag when there is danger of missing a goal. Finally, the portfolio manager also lets strategic planning know when the strategy is not practical relative to project resources available.

The remainder of this document describes two processes used to overcome the executive challenges of PPM – the 4x4 process and Multi-project Critical Chain. It examines how these processes can be implemented. Finally, some cases are discussed to show the changes from a traditional approach and the immediate effects on those organizations.

The 4x4 Strategic Planning Process

Many executives find it very difficult to define and execute a strategy that delivers on all key goals better than 95% of the time. One of the biggest factors that I have personally witnessed blocking predictability is incorrect and insufficient marketing strategy. Most organizations I have worked with encounter significant market constraints more than once in their history. Since the long-term health of most organizations depends on sustaining demand for their products and services, there must be correct and sufficient marketing projects among the active project mix to gain this health.

Aside from marketing, many projects are initiated in one function but are dependent on the full support of other functions to achieve meaningful results. For example, one enthusiastic VP of procurement was proud of his $1.3 million annual savings in material costs. At the same time, the factory could not produce enough product to meet the market demand. Due to problems with these new materials, the factory was experiencing machine stops which were costing $100,000 ***per day*** in lost production. Every two weeks, the company

was losing the annual procurement savings. The organization overall suffered the consequences of lack of synchronization between silos.

To summarize, we need the right project mix in order to predictably meet the company goals, short term and long term. This means the project mix must have the following characteristics:

- A direct, measurable link to the company's strategic plan and financial goals
- Synchronization across functions
- A healthy amount of marketing content

"Anyone who believes they can overcome emotion with logic has never been married". This is one of my favorite lines, from Dr. Eliyahu Goldratt's book, Theory of Constraints[2]. What it points out, so elegantly, is that a good, logical strategy does not sell itself inside an organization. Even the mention of the word 'strategy' arouses so much emotion, it is almost fun to witness the reactions, but only if you are from outside the organization.

Figure 3 Dr. Eli Goldratt

Goldratt (see figure 3), an Israeli physicist, is the inventor of the 4x4 process for creating a strategy containing the correct project mix. He is also the person most credited with advancing the knowledge of the improvement methodology called the Theory of Constraints (TOC), upon which the 4x4 process is based. Described by Fortune Magazine as "a guru to industry", and by Business Week as a "genius", Goldratt is the author of eight books on TOC.

In a formal study done by Mabin and Balderstone[3], professors at Victoria University, New Zealand, they found the following results of TOC initiatives, gathered from dozens of case studies investigated.

- Revenue/Throughput: Mean increase 63%
- Lead times: Mean reduction 70%
- Inventory levels: Mean reduction 49%
- Due-date performance: Mean improvement 44%

While many of these improvements were achieved in less than one year, sustainable improvement requires an organization-wide process. It also requires the full commitment and success of the entire top management team. But most CEOs that I work with tell me that it is rare to see even 25% of the ideas that people commit to actually get implemented. As Kim Allen, the former CEO of Scarborough Public Utilities, expressed it, "Every year, we would go off-site with the entire senior management team, and decide on the top 50 issues that we needed to address. The next year, we ended up with those same issues and another 25."

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[2] Eliyahu M. Goldratt, *Theory of Constraints,*North River Press, 1990, Great Barrington, MA

[3]Victoria J. Mabin and Steven J. Balderstone,*The World of the Theory of Constraints*, St. Lucie Press, 2000, Boca Raton

There is a saying that a smart person learns from their mistakes. A wise person learns from other people's mistakes. I hope you will choose wisdom. My first experience with applying the TOC methodology to company-wide strategy is described in a case study in my book, Securing the Future[4]. It describes how the diagnosis was correct, but the patient died. This is a perfect example of doing analysis and strategy correctly, from a technical point of view. The company was a high-technology company with an advanced and technically superior software solution. I was consulting with them. The correct core problems were identified. The solution was carefully thought out, and there was no question that it would overcome the core problems. The project plan to implement the 18 strategic ideas was solid. The only problem was that the analysis was mine, not the senior management's. The CEO did not fully buy in. Two years later, the company was bankrupt.

Unless the ideas are the CEO's and senior management team's 'babies', there is a very slim chance that they will ever be fully and quickly implemented. This requires much more than just discussion from the senior management team. It requires more than excellent facilitation. It even requires much more than having the entire senior management team in agreement with the strategy.

The 4x4 Process for developing an enterprise-wide strategy, and its umbrella called Viable Vision, bring together over twenty years of evolution of the Theory of Constraints. It came about after many other approaches failed to get lasting results, even when there were some spectacular isolated successes. The terminology describes two succinct parts. The first "4" of the 4x4 brings everyone to a common understanding of the organization as a whole, by spending four days on the cause-effect relationships that drive company transactions. The second "4" of the 4x4 builds the strategy.

Why does the 4x4 process work, where other approaches to developing and implementing strategy fail? This must happen because the 4x4 process overcomes some obstacles that other approaches do not. In describing the process, I will identify some of those obstacles, and describe how the process deals with them. These obstacles are not at all obvious to most people who try to tackle strategy using a traditional approach.

Core Conflict – The "Tilt" Obstacle

Members of the strategy team forcefully tilt the strategy toward one side of a problem that has haunted the company for a long time. This is a huge obstacle, because for years, either the CEO or some members of the team have continued to do this without permanently eliminating the problem. For example, in a recent 4x4 process that I facilitated, the core conflict was between being diverse and being selective. This distribution company, with many thousands of products in their warehouses, chose to grow their business by trying to become the single-source supplier for all of their customer's needs. In their industry, the products change very quickly. The number of products being offered to the market multiplies every year. Many products have a life of nine months or less. It was not practical for the distributor to inventory every manufacturer's item.

In this environment, you have customers constantly calling and asking for items that are not stocked. Even though the distributor may have a reasonable substitute, there are also many reasons why customers often can't or won't accept the substitute. If you don't have the right

[4]See the full case study in Securing the Future, Strategies for Exponential Growth Using the Theory of Constraints, Gerald I. Kendall, St. Lucie Press, 1998, Boca Raton

product in stock today, you have an excellent chance of losing the entire sale and also that customer's future business.

This side of the conflict drives diversity. Also, given a life cycle of six to twelve months for many of these products, a huge opportunity can be easily missed by failing to add some of these new products quickly. At the same time, the diversity also drives many undesirable effects. While the sales organization and the senior executive push diversity, it creates a marketing bottleneck in terms of the constant demand for new programs. It creates a huge transaction volume for the purchasing department, both in setting up new vendor relationships and contracts, and handling the additional purchasing paperwork. And the distribution center's job becomes more challenging, as they try to find space for all these new products. Also, let's not forget the finance department, who must constantly come up with more money for inventory of new products, many of which do not have successful track records.

The "tilt" occurs when one party dominates the strategy session, favoring strategies that lean to solving one side of a problem. In the example above, this could be the CEO or Sales VP, insisting on diversity, or it could be the CFO or VP Operations, demanding selectivity. Either way, the company loses if the core conflict is not permanently removed.

This name that I've given to the obstacle actually represents a collection of obstacles. For example, one of Dr. Goldratt's descriptions is "the impatient visionary". I haven't met a CEO yet who isn't impatient. The greater and more coherent their vision, often the more impatient they are and the more they lean to one side of the core conflict. Another version of this obstacle is where the strategy is also tilted, but toward the status quo. Dr. Goldratt's term for this is the conservative approach or compliancy, where the solution is nothing more than putting a little bit of polish on an existing compromise.

If the strategy will not produce a breakthrough for the company, why bother going through all the hard work? The tilt obstacle is really just a symptom of a much bigger problem. People do not see their organization as a whole, but rather through the biased and limited eyes of their silo or functional area. Therefore, even senior executives do not have full exposure to the cause-effect relationships across all functional areas. This deep level of understanding is needed in order to be able to execute innovative marketing strategies.

Overcoming the "Tilt" Obstacle

I have not found a better way to overcome all of the aspects of this obstacle, than by forcing every single member of the strategy-setting team to "drink from a fire hose" (this is how one of our clients described these sessions – see figure 4) for four solid days[5]. During these first four days of the 4x4 process, the senior management team proactively participates in up to eight formal presentations, interspersed with at least an hour of discussion and translation to their environment. The eight presentations cover:

- Operations (applies to any operation of any type of company)
- Finance and Measurements
- Project Management (focused on engineering, but applies to any projects in any organization)

[5] In practice, the first 4 days of a 4x4 can be broken down into 1 day segments, which are usually held once per week over a 4 week period.

- Distribution
- Marketing (bring the ducks to want the corn in your field)
- Sales (shoot the sitting ducks)
- Managing People
- Strategy

If the organization's key constraint is known in advance, then the 4x4 focuses much more time on that key constraint and the area that is expected to be the next constraint. For example, if the company cannot produce enough to meet their market demand, the 4x4 might spend 1or more days just on operations. When the operations issues are overcome, where will the next constraint be? If it will be in the market, then another day of the 4x4 would be focused on the market.

Figure 4 The 4x4-First 4 Days

By the end of the first four days, each team member understands the cause-effect relationships that exist across their entire organization, and to a smaller extent, across the supply chain. *Only then* do they begin to understand why "tilting" does not work. They finally see why focusing on one side of a major problem yields, at best, a temporary solution. Of course, after this initial understanding is achieved, future strategic planning can be accomplished in much less time.

In our example above, the people on the team pushing for diversity realized that unbridled diversity has a huge price – excessive inventory, obsolete inventory, constant demand for more resources without the leverage. At the same time, the people pushing for selectivity discovered that it, too, has a huge price. Picking the wrong products to be selective with can destroy the company. Bypassing a huge opportunity for which the company has the resources and competitive advantage is crazy. Having more and more customers continually inquiring about a product that you do not have in stock, will eventually hurt customer loyalty. What both sides to the conflict see, through the examples in each of the above eight presentations, is a way out – a way to finally overcome the major problems permanently and safely, and to finally achieve the vision.

Fear of Focus Obstacle

In one company[6], another consultant had presented to the senior management team earlier that year, insisting that the company must focus on only *one* core problem. This scared the senior management team to such an extent that they decided, at that time, to not pursue their strategic planning using TOC. Coincidentally, one of their direct reports attended a public course that we were teaching. He liked our style, became convinced that the 4x4 approach was correct, and brought us in to present to their CEO and VPs.

[6] See Babcock & Wilcox case study, Gerald Kendall, *Advanced Project Portfolio Management*, J. Ross Publishing, 2003, Boca Raton

In this presentation, I used an example that I adapted from Dr. Goldratt's book, The Haystack Syndrome[7]. The example illustrates beautifully that any effort to improve, which is not focused on the constraint of the organization, does not provide the leverage, and often is a complete waste. What these executives heard, from this example, is that the 4x4 process focuses on the biggest leverage point of the company, with each functional area involved. No one functional area dominates the strategy. Who cares if there are one, two or three core problems? Why make this an issue?

In other words, the nature of the "overbearing" obstacle is that senior management will not commit to a strategy that they believe was developed around the loudest or the most influential functional area. Each executive has a major problem within their area of responsibility that troubles them deeply. If they believe that the strategy is too oriented to one functional area or executive, they simply will pay lip service to being committed, but will not carry through.

The 2nd 4 Days

This step marks the beginning of the second four days of the 4x4 process – the actual definition of the strategy. Every functional head brings an undesirable effect (UDE) to the table – the UDE that annoys them the most. We use this terminology (annoys) so that executives won't argue with each other about how important that UDE is. No one can tell a person what annoys them the most. The discussion and facilitation leadership in the first four days has developed everyone's intuition on where the biggest leverage point of the company is, based on current conditions. As a result, each functional area brings UDEs that they believe are directly connected to the company's constraints.

To make sure that they bring something real to the table, I put a qualifier on the characteristics of the UDE they must identify. They must identify the impact they believe will be achieved by removing the UDE, in terms of Throughput, Investment and Operating Expense.

Obviously, if the set of UDEs from the entire team is summed and the result is one percent improvement, then you can conclude that people are bringing their pet problems to the table, not the real issues to achieve breakthroughs. In this climate, it is very easy for one person to become overbearing and kill the entire effort. Therefore, supported by the CEO, we do not leave the second four days without strategy to address *each* functional head's UDE. The process allows the team to further analyze the entire collection of UDEs, to determine the underlying problems – the core problems.

Lack of Rigor Obstacle

Most strategies that I've seen in the past are collections of ideas without any rigor at all. Every good strategy must be able to answer the following questions:

- What are the specific, measurable goals that the strategy is designed to achieve?
- What are the major problems (UDEs) that must be overcome to achieve the goal(s)?
- What is the impact, in terms of Throughput, Investment, and Operating Expense of overcoming those problems?

[7] Eliyahu M. Goldratt, *The Haystack Syndrome*, North River Press, 1990, Great Barrnington, MA

- Why hasn't the organization been able to overcome the problems in the past?
- What idea(s) will *permanently* remove the entire collection of problems?
- What obstacles exist to implementing the entire collection of ideas?
- What condition must exist to tell us that we've overcome each of these obstacles?
- Who will take responsibility for implementing each idea?
- Who will project manage the overall strategy implementation?
- In what sequence must the ideas be implemented?
- How long will it take to overcome each of the obstacles and implement each idea?
- When will we start and when should we finish?

These are the questions that the second four days of answers. Each question is attacked methodically. Each question and answer must be documented.

"Lack of Discipline" Obstacle

Each organization usually has some unique obstacles to developing a good strategy, based on their past failures. The final plan to run a 4x4 process must take these into account. For example, in one company's past experience, they used outside consultants to facilitate the strategic planning. In each case, the consultant would stand up on their pedestal and beat their favorite drum of their favorite solutions, without fully understanding this specific company. Then they would disappear, and the strategy session became another intellectual exercise that provoked great thinking but no implementation.

The real obstacle was that most of the team members would not take the session seriously. They would think it was another flavor of the month. For this company, at the CEO's insistence, we overcame the obstacle by spending three days in advance of the 4x4, interviewing each senior team member, understanding their current situation, language and problems. We also committed, in advance, to ongoing consulting through implementation of the plan.

There is no shortage of great ideas – just a shortage of great implementations. Simply having every executive involved in developing a strategy falls way short of gaining commitment and buy- in. Each individual member of the strategy team must be intimately involved in inventing a part of the strategy. Each member must be intimately involved in the overall analysis, to such an extent that they realize that the strategy, as a whole collection of ideas, must be implemented *in its entirety*.

Dr. Goldratt, after many years, invented a brilliant, simple solution to overcome all of the obstacles that have existed to building both a good strategy and the commitment to implement it. The 4x4 process is not just a great idea. From personal experience, I can tell you that it works just as well with a 20-person company as it does with a multi-billion-dollar worldwide enterprise.

Accelerating Projects – Critical Chain Multi-Project Management

In a strategic planning session with a Fortune 500 company, my client agreed that their system was clogged with too many projects. In a drastic decision supported by the CEO, they agreed to deactivate 50% of their existing projects. In a conversation several months later, the VP of this company told me, "We didn't deactivate enough". A similar session with a major distributor highlighted hundreds of active projects, the majority of which had no sanctioning from any of the company's executives. No wonder the CEO had been frustrated for an entire year that the company's core issues were never addressed.

A few years ago, many organizations would have been thrilled if most projects were delivered on time, on budget and within scope. Today, the competitive challenge and increasing demands from customers are driving organizations to look for more. More projects must be completed, with drastic reductions in cycle time using the same resources.

If a project is initiated to have a positive effect on the organization, then the sooner the project is completed, the sooner the organization receives the benefits. Therefore, the constraint of any single project must be its cycle time (the time it takes for the project to complete). The constraint of the entire collection of projects of an organization must be the combined cycle time of all of the projects.

What causes project cycle times to be longer than necessary? What can an organization do to drastically cut the cycle times of all projects? What role must the executive play in order to have an impact on these cycle times? In the analysis of these issues, some surprising speculation surfaced. For example, in the single project environment, many team members and project managers firmly believe that executives are not giving them enough time to complete the work. When Dr. Goldratt analyzed this speculation in developing a new method of managing projects, called Critical Chain, he concluded that there is enough time embedded in project plans. But in most organizations, precious elapsed time is wasted to the extent of 50% or more.

Another current assumption is that it is important that every task be completed on time. This is how most team members are measured on projects. In Critical Chain, the assumption is very different. It is not important for every task to be completed on time. In fact, measuring people to finish their tasks according to a due date encourages behaviors that make projects take much longer. Therefore, the measurement of the team members must change dramatically from current criteria.

When analyzing how projects are handled across the entire organization, an interesting practice by senior executives is identified. In most organizations, senior functional managers sponsor (authorize and fund) projects. That functional executive considers their projects to be the most important work for the organization. Many of these projects are in conflict with each other. The conflict is not only over resources, but sometimes even over the interpretation of value to the overall organization.

Over the past several years, companies around the world have begun to test these assumptions using Critical Chain. When the methodology is understood in its entirety and followed rigorously, the results are worthy of being called a "breakthrough" in project management methodology. There are more and more public reports of double-digit percentage reductions in cycle time, while drastically increasing the number of projects completed in a year.

The Current Situation

Many projects finish either late, over budget or not within originally promised specifications. In other cases, in order to finish a project on time, overtime and use of subcontractors becomes necessary. In many organizations, these project goals come into conflict with each other. If you want to finish the project on time and within original specifications, the project manager is pressured to put more resources on the project, which will blow the budget. Alternatively, if completing on-budget is a primary goal, then there is huge pressure to extend the schedule or reduce the specifications.

It is amazing how similar the complaints about project management are across a wide spectrum of industries and sizes of organizations. The same complaints are heard in not- for-profit organizations, government and business. Here are some examples:

1. People who work on projects complain that they cannot complete each of the tasks of the project within the allotted time.
2. Many people believe that it's Murphy Law (unexpected problems) that causes the unpredictable results on projects. Almost every project receives several visits from Murphy. Not only does Murphy exist on projects, but Murphy is smart – he seems to attack at the worst possible time.
3. Sometimes, "important resources" that work on projects are idle, waiting for another resource to finish their work and hand it over.
4. Customers change their mind. As a result, the specifications for the project change, creating more work than was originally planned.
5. The resources that the project manager planned to use do not materialize. Sometimes, they are just late. Other times, they simply will not be available at all. As a result, the project manager is left with fewer resources than planned, or less qualified resources.
6. Project managers and resource managers frequently fight over priorities and resource allocations.

As long as these problems continue to plague projects, how can the executive team hope to get their strategies implemented with any kind of predictability? The implications are serious, relative to project mix. *If the executive team chooses a project mix that is good for their organization, but their project managers cannot implement the mix successfully, then the strategy itself is completely impractical.*

The fact that these problems have been around for many years, as evidenced by the wide body of project management literature that attempts to address them, suggests that we are not attacking the problems correctly. We are treating them as symptoms, much like a doctor with poor diagnostic skills treats patients. If you treat symptoms of a problem and not the disease, the symptoms typically recur, often within days or weeks.

What is the disease that is causing the sample problems listed above? The Theory of Constraints assumes that many of today's organizational diseases are those things that drive human behavior. There are three primary types of diseases – policies (or practices sanctioned by the company, written or unwritten), measurements and lack of skills. Goldratt stated, "Tell me how you measure me, and I will tell you how I will behave. If my measurements are unclear, no one can predict how I will behave, not even me!"

Today, there is one practice with projects that is very clear, which drives behavior leading to some of the problems mentioned above. Projects are "pushed" into the system, irrespective of the resources available to complete them in a timely manner. Functional executives, trying to meet their functional goals, and their senior functional managers, initiate new projects. However, the resources required are not limited to that one functional area, but rather cross-functional boundaries.

Each executive has quarterly and annual targets that they must meet. Therefore, they push the new projects into the system, and push as hard as they can to get priority placed on their projects over other already active projects. The work ethic that results is multitasking. People are split between multiple projects, or between a project and other day-to-day responsibilities.

Good vs. Bad Multitasking

When a person is working on several different things, estimating two weeks to do a two-day task is accepted. The assumption is that the person is juggling bits and pieces of that two-day task over the course of the two weeks. When a person estimates two weeks elapsed time to deliver something that they figure will take two days, they do not typically start on that task immediately. They work on those tasks that they consider more urgent. Therefore, they start working on the two-day task usually just before the output is due. As a result, any safety they may have included in the task estimate is gone.

When people are split between too many tasks, their priorities become unclear. No wonder there are so many fights over resources and between projects. When people are multitasked, it is typical for a project to take several hundred times longer than if the project were performed in a dedicated manner, with each resource dedicating themselves to one task.

In the 1950s, when Project Management techniques such as PERT and Critical Path Methodology first came into prominence, resources were dedicated to projects. Today's resources in almost every organization are multitasked (i.e., not dedicated to one project, but actively working on several or many).

Many executives believe that multitasking is a good thing. They are not entirely wrong. In many cases, if resources only worked on one project, they would have gaps in their workload, while they waited for other resources to test what they were doing or to give them the feedback necessary for them to continue their work.

In reality, if your objective is to reduce the combined cycle times of all projects, multitasking can be good or bad. For example, suppose a resource works on a task for a few days. They must then send the task to another resource to do further work and wait a full five days before the work returns to them for continuation. If they can complete another task in that interim five-day period, this is good multitasking.

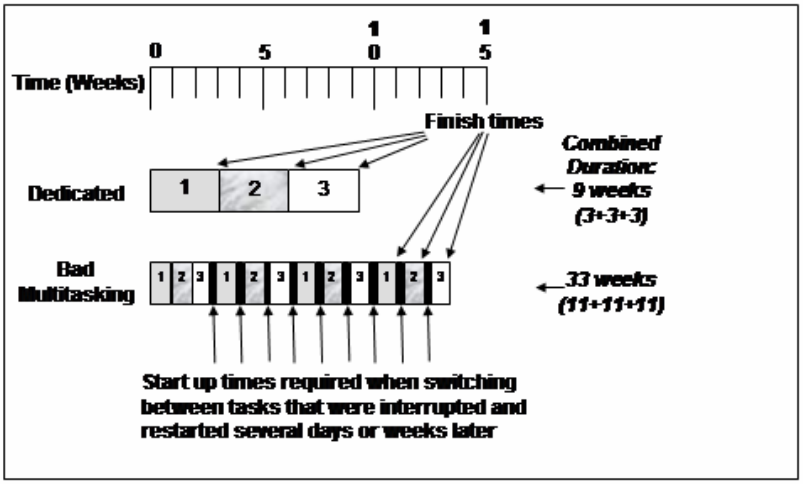

Figure 5 Three tasks on three projects
Effect of bad multitasking

In figure 5 above, assume that each project will deliver one million dollars to meet the organization's goals. Suppose that the same resource is working on three different tasks for the three projects. Each task, individually, would take about 3 working weeks, if the resource dedicated himself/herself to each individual task. Instead, the resource splits his/her time between the three tasks, working a few days on one task, then switching to the second task, then switching to the third task, and then back to the first task. The resource works this way until all three tasks are completed.

If the resource starts the first task, for example, on March 1st, and works on it totally dedicated to that one task, you would expect the resource to be finished around March 19th. However, due to the multitasking, the first task is not complete until late April.

The negative effect of this kind of multitasking is not only that each task takes a longer duration to complete. The fact is that when a person switches back to work on something that they haven't looked at in a while, there is often a "start- up" time to get their concentration back into that task. In some instances, this start- up time can be hours or days and also be very error-prone.

Therefore, the negative effect is worse than the three three-week tasks taking nine weeks to complete. Often, the impact is that each three-week task takes 40 or 50 days to complete. This is an excellent example of bad multitasking.

In the above example, while task 1 is taking this prolonged time period to complete, none of the following tasks in the project (the ones for which task 1 is a prerequisite) are making any progress. As a result, a project that could be complete and deliver benefits to an organization in a few weeks ends up taking months to complete. The organization waits

months to get the one million dollars from the first project, when it could have been delivered in one quarter of the time.

Implications

Remember where the bad multitasking originated. It came as a result of executives pushing new projects into the system, irrespective of the capacity of the existing resources to do the work. If these assumptions about the real problems are correct, then executives must initiate changes to the way that projects are managed.

To the relief of many executives, the problem is *not* that the organization is trying to accomplish too much. They are just pushing too much work into the system at one time. It is like trying to get ten people through a revolving door at once. If you put the people through the door one or two at a time, all the people get through much more quickly.

There is another very serious implication. If an organization tries to schedule all projects according to the capacity of all resources, the whole process is doomed to become a nightmare. Projects, by definition, are things that are somewhat unique to the organization. Some projects involve thousands of tasks, each one of which has some uncertainty. It would be hopelessly complex to try to synchronize multiple projects and thousands of tasks across multiple resources, especially knowing that individual tasks can easily take much longer than estimated.

The Solution: Critical Chain

To overcome all of the problems mentioned above, we must introduce a project management methodology that:

- Moves the organization from a push system to a pull system, where new projects are initiated based on some simple criteria.
- Significantly reduces bad multitasking permanently.
- Will have full executive support, with the permanent resolution of many resource conflicts.

The answer is counter intuitive. If you want to get more work done, have less work in the system. Critical Chain introduces a method to stagger the collection of an organization's projects. The anchor mechanism, which has proven successful in a wide variety of organizations, is called the "critical resource".

The critical resource is defined as that resource which most impacts the cycle time of most, if not all, projects. Every collection of projects has one such resource. For many organizations, it is the resource in the final testing or consolidation stage of a project. In others, it is a resource within the Information Technology group.

If projects are staggered so that this critical resource is no longer overloaded, the implication for all other resources is that they will also not be overloaded. See figure 5.

The reported results from staggering projects are, pardon the pun, staggering. Lucent Technologies, for example, reported a 300% increase in the number of projects completed in a

year, after implementing Critical Chain[8]. There are several books available today that describe Critical Chain in varying levels of detail. The best introductory book is called Critical Chain[9], written by Dr. Goldratt.

Combining the Two Processes

If an organization combines the 4x4 process with Critical Chain management, what should the organization expect? As described above, one common thread is that all of the organizations discovered that they had many more projects active than the executives were aware of. While, for the most part, few if any of the projects were of zero value, many projects represented the pet interests of managers, rather than something that was supported by the entire executive team.

One company I worked with, an organization undertaking huge, multiyear projects in the energy industry, exceeded their goals in that year, increasing employment while their competitors were laying people off. Another company, in the aluminum industry, has met all of their revenue and profit targets in a year when the worldwide demand for aluminum is decreasing. A third company, a distributor in the communications industry, has achieved flat revenues in the past six months when the rest of the industry has been in a devastating downward spiral.

Summary

Executives must choose and execute the right projects to meet their goals. This is not a trivial job, since the choices are many and organizations' arteries are clogged today with too many projects. The work is simply not getting done quickly enough, and the results are devastating to organizations feeling the competitive threats and increasing customer demands.

There is a solution. The solution is part of a methodology called the Theory of Constraints, and includes two processes. The 4x4 process helps the organization select the right project mix to meet the organization's goals. It also gains the commitment of senior management to implement the complete strategy. Critical Chain allows the organization to implement the strategy by managing all of the organizations projects in a rational way. Early results show organizations completing many more projects, in shorter durations, and meeting the organization's goals in tough economic and competitive times.

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[8]Three complete case studies, including Lucent Technologies, are published in Dr. Harold Kerzner's 8th edition of his text, *Project Management, A System's Approach,* John Wiley & Sons, New York,2002.

[9]*Critical Chain*, Eliyahu M. Goldratt, 1997, North River Press, Great Barrington

About the Author:

Gerald I. Kendall, PMP, Principal, TOC International, is a noted expert at strategic planning and project portfolio management, with a top-down approach. As a management consultant, public speaker and facilitator, he serves clients worldwide. Mr. Kendall began his career with IBM as a systems engineer. After becoming an I.T. director, he broadened his experience in strategic planning, marketing, sales and operations.

He has worked with small and large multi-national firms as well as government and not-for-profit organizations, to better manage large-scale organizational change issues. Recent clients include Telstra, British American Tobacco, Raytheon, Babcock & Wilcox, Alcan Aluminum, Lockheed Martin and many others.

Gerald is certified by the TOC International Certification Organization (www.tocico.org) in all six disciplines of Theory of Constraints, and is a graduate and silver medal winner of McGill University. He is a member of the Project Management Institute.

Gerald is the author of *Viable Vision*, *Advanced Project Portfolio Management and the PMO* and *Securing the Future: Strategies for Exponential Growth Using the Theory of Constraints*. He is also the author of the chapter on Critical Chain in Dr. Harold Kerzner's book, *Project Management, A System's Approach, 8th edition* and the chapter on Project Portfolio Management for the American Management Association's Handbook of Project Management, 2nd edition.

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