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# *Execution Management: A Common Sense Approach to Doing More Projects Faster*

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*How to do more projects faster when even current projects are late and resources are overloaded?*

*It is difficult enough to deal with one project at a time; how to manage multiple projects with shared resources?*

*Can Critical Chain, a multi project management system based on the Theory of Constraints, be the answer?*

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In today's economy, businesses are demanding more than ever from their project organizations. For instance, highly competitive, fast moving sectors such as high tech and consumer goods demand that companies introduce more products, faster. In sectors such as pharmaceuticals, the challenges of new drug discovery are compounded by pressures of finding the 'blockbusters' that are the lifeline of the industry. Similarly, organizations specializing in maintenance, repair, and overhaul (MRO) face new requirements to increase asset utilization and cut costs.

In all of these cases, how you manage is pivotal in determining success or failure. Management is essential for marshalling the resources of multiple workgroups, performing dependent tasks. According to Gartner Group, organizations currently invest nearly \$2 billion annually on project management software alone.

Although a well-established discipline with roots dating back to the dawn of mass production, traditional project management practices all too often deliver projects late, over budget, and often with fewer features than initially promised. The costs of failure are significant, as organizations lose valuable market opportunities or jeopardize contracts.

## The Drawbacks of Traditional Project Management Practice

Numerous studies conducted over the years prove that existing project management practice is not very effective. A sampling of results is shown here.

- Over 80 percent of IT projects are delivered late and over budget. Nearly 60% of all IT projects are delivered with less functionality than originally promised. (Chaos Study, Standish Group, 2000)
- Over 85 percent of semiconductor industry engineering projects are delayed. (Numetrics Inc., 2001)
- Delays of 100 percent are typical for high tech projects, despite the use of project management tools. (University of California at Berkeley)
- 80 percent of all embedded systems projects are delivered late. (The Gansale Group, 2001)
- Of the ten largest defense procurement projects, 70 percent are delivered late and over budget. (National Audit Office, UK, Dec 2002)

There is a better way. In 1997, Dr. Eliyahu Goldratt introduced the first new approach to project management in over thirty years. Goldratt's approach provided the basis for organizations to make project execution more reliable. Realization has built Dr. Goldratt's innovations into an Execution Management System.

Using Realization's system, companies can manage projects more efficiently – reducing or eliminating the need to re-plan projects as contingencies arise. With more reliable project execution, companies can eliminate waste. They can deliver more projects faster, with better control, and become more responsive to customers.

### **Traditional mindset assumes a perfect world, which doesn't exist.**

In theory, if you create a good plan and follow it, your projects will get done on time. In reality, too many uncertainties hit you along the way: requirements change, technology fails, vendors do not deliver, work materializes slower than expected, approvals do not come on time and priorities change.

As uncertainties strike, plans go haywire. Especially in multi-project operations, people are constantly pulled from one project to fix other projects' problems. Priorities become unclear and people start multitasking. Delays compound. Managers complain about losing control. Your focus shifts from delivering projects to explaining delays.

In future projects, you are forced to create a more meticulous plan. Of course, that only means you now have even more details to track and explain. Managers at every level, wary of all uncertainties and delays from their previous experience, begin hiding safeties in their commitments before sending the plan upwards. Finally, everyone gives up on planning. Dictating commitments and managing by the seat of the pants looks more attractive.

# Execution Management: A Common Sense Approach to Doing More Projects Faster

It is tempting to fight uncertainties, but it is futile. Consider, for example, the following solutions:

- **Start measuring uncertainties:** Uncertainties, by definition, cannot be predicted. And even if you could somehow measure them, so what?
- **Detailed planning and tracking:** Uncertainties will still occur and plans will go obsolete even faster. Detailed planning and tracking only adds to chaos and administrative burden.
- **Individual time tracking/cost management:** This only encourages people to hide even more safeties, killing any chance that people will report early finishes.

Making project management software useful requires understanding how uncertainties affect projects, and crafting a solution to manage them.

## How Uncertainties Affect Projects

Uncertainties affect projects adversely in three ways:

- **Cascade Effect:** Delays propagate but gains do not add up.
- **Multitasking:** People shuttle between tasks, killing productivity and stretching projects.
- **Human Behavior:** People at every level hide safeties in their commitments, but these safeties invariably get wasted because of procrastination and not reporting early finishes.

As the box on the right shows, uncertainties unleash a “cascade effect” in projects, whereby delays multiply but gains do not add up. Substantial time and capacity are lost as a result:

- **Projects lose time** because either all of the preceding activities have not finished, or the needed resources are working elsewhere.
- **Resources go idle** waiting for work to arrive. Such idling is often not visible because people can continue to fine-tune already completed work in the meanwhile.

As schedules start slipping, people are needed on **multiple projects at once**.

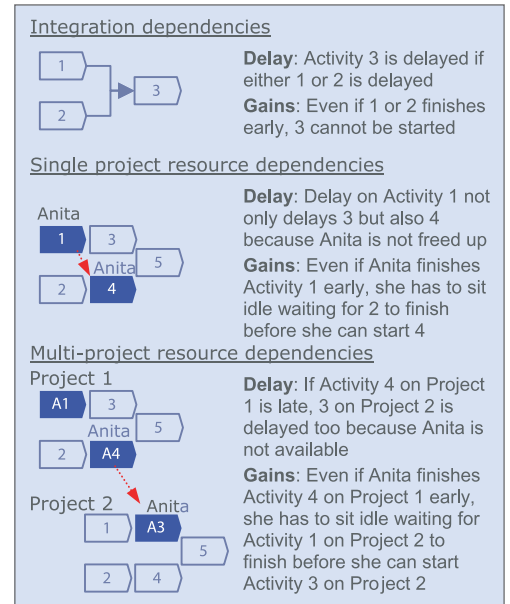
As people shuttle between tasks without completing any of them, (**multitasking**), the result is:

- **Durations stretch:** With parallel processing, each task takes longer.
- **Switching costs:** Extra capacity is needed for task set-up and set-down.
- **Concentration lapses:** Quality suffers when people cannot concentrate on one task at a time.

Finally, natural human behavior makes the situation worse. Having experienced constant delays and simultaneous pull from multiple projects, people quickly learn to hide safeties in their estimates. However, these safeties are invariably wasted because of:

- **Student syndrome:** Most of us have a natural tendency to procrastinate. With safeties embedded in our commitments, it only becomes more tempting to make a slow start.
- **Error-reporting:** People do not report early finishes because they are afraid that the next time these early finishes will become hard expectations.

### HOW DELAYS MULTIPLY, BUT GAINS DO NOT ADD UP



## Execution Management System: Managing Uncertainties in Projects

Execution Management is all about containing the adverse effects of uncertainties in projects. It is based on practical methods outlined by Dr. Eliyahu Goldratt in his book “Critical Chain”:

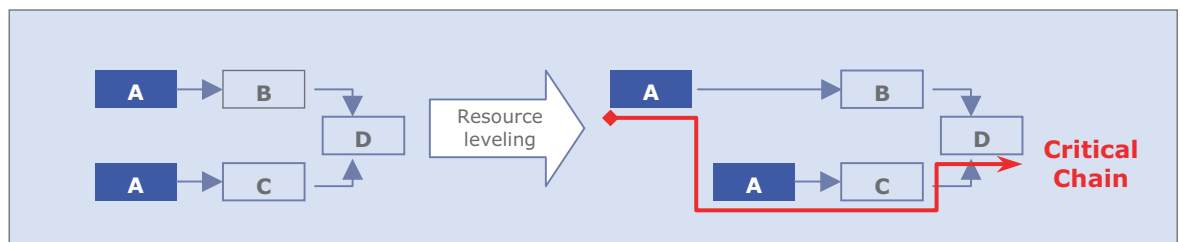
1. Make room for uncertainties with blocks of unscheduled time, called **buffers** in your plan. These buffers weaken the cascade effect by absorbing and lessening the shocks of uncertainties. Explicit buffers also encourage people to hide less safety in their commitments, which in turn reduces “student syndrome” and “error-reporting.”

Putting buffers in the plan does not make a project longer (it actually makes it shorter). With explicit buffers, people have less reason to hide safeties. Secondly, buffers are at the **end** of a series of tasks, and hence more efficient than safeties **within** each task.

2. As uncertainties create delays in execution, the buffer (or unscheduled time), gets used up. The system then calculates how much of the unscheduled time is still available for future uncertainties, and sets **forward-looking priorities for everyone**, including managers.

### Solution Details

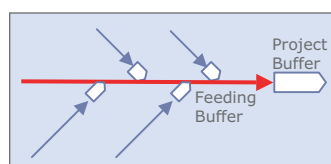
TYPES OF BUFFERS, WHERE THEY ARE PLACED



Buffers are placed at the end of a series of tasks to absorb cumulative delays on those tasks. A notion of Critical Chain – the longest sequence of activities in a project after resolving resource contentions within a project – is used to identify where buffers are placed:

■ **Feeding Buffers** are placed at the intersection of critical and non-critical chains. They protect the critical chain from shocks of uncertainties in non-critical chains.

■ **Project Buffers** are placed at the end of the critical chain. They protect the project due-date from shocks of uncertainties on the critical chain itself.



## Where buffers come from in practice

There are three common approaches:

- **Option 1 – Just do it:** Start with the due-date, put buffer (i.e. 1/3rd of task estimates) and then shrink task durations to fit the available time. Half of all the practitioners use this approach.
- **Option 2 – Take estimates from the management:** Experienced managers normally know how long it takes to finish a task. Around one-third of the practitioners use this approach.
- **Option 3 – Ask people** to provide estimates assuming they will be working on only one task and will not be penalized for exceeding the estimates.

## How to set forward looking priorities

During execution, project participants provide periodic estimates of how much longer it will take to finish their task in progress. With this simple information, taking only a minute or two to enter, the engine calculates a Buffer Index – the ratio of buffer consumed for a chain of tasks compared to the work completed in that chain – for each chain of tasks. The Buffer Index is then used to set forward-looking priorities for all managers:

- **Task Manager's Priorities:** Task managers get a report on all current and upcoming tasks across projects in order of priority. Highest priority is assigned to tasks that lie on chains with the highest Buffer Index.

Getting clear priorities reduces the pressure to multitask. The tendencies to procrastinate and not report early finishes are also curbed. A high index task on people's plates serves as a constant reminder to start quickly and also to immediately report completions.

- **Project Manager's Priorities:** Project managers get a list of all chains, along with the activities and Buffer Index of those chains. They can now focus on upcoming activities on the chains that have the highest index.

Also, the Buffer Index for the project is the same as the index for the "worst" chain. The project's index is also tracked over time to spot early trends.

## Results from the Field

Following are some of the examples of projects being run with Execution Management and the benefits being reaped by various organizations.

### 1. Forklift product & manufacturing development – NACCO Material Handling Group

The Counterbalance Development Center at NACCO Materials Handling in Portland, Ore. employs 200 design engineers. The group was asked to bring a new line of lift trucks to the market in a record time (design eight new products, produce, test for manufacturability, qualify suppliers, and set up production lines in under three years).

Given the strategic importance of the program, and the fact that the group had experienced persistent difficulty in delivering projects on time, the VP of Engineering decided to explore a more effective way to manage projects. After attending a seminar by Dr. Goldratt, and hearing of successes that other companies had managing uncertainties of projects, the key managers were convinced that the Execution Management would give them the results they needed.

They began the implementation in December of 2001. By the end of January 2002, they were executing the major program (8 products, 25 intermediate deliverables, 150 engineers, 3 manufacturing facilities and 10+ major suppliers).

#### Results

- Planned project length for the major program was reduced by 20%.
- The major program hit its first milestone as planned in December 2002. Furthermore, per managers' estimates, they were able to accomplish 40% more features for this milestone, compared to similar milestones in the past.

Management has also expanded the implementation to include all development projects.

### 2. Semiconductor product development – LSI Logic

LSI Logic is a leading ASIC (Application Specific Integrated Circuit) company; it undertakes projects to design customized chips for specific applications. Its Design Technology Development Group has more than 300 engineers who create IP, Libraries, and Tools and Technology. All have to be available on promised dates so that the company can design cutting edge chips, as per the customer requirements.

The group tested the critical chain concepts on small projects using customized software developed in-house and was encouraged by the results. They bought the Execution Management System to expand the implementation to include all projects and gain the full range of benefits.

They have been able to realize improvements throughout the development design chain. First, a project plan is constructed with aggressive task estimates and pooled buffers. Second, a "firm" date is committed after checking for the availability of resources across projects. Third, when projects are in execution, buffers are monitored and used to set priorities. Even the executive reviews are based on buffers and focused on tasks that are consuming buffers.

- Over 90% of projects in the library development group now finish within 2 weeks of planned dates.

- Customer relationships have improved since buffers allow the development group to update customers on expected delays – should there be any – sooner rather than later.
- There has been an overall improvement in throughput, as measured by the increased complexity of designs/ features sets that can be handled with the same resources.

### **3. Capital equipment maintenance – United States Marine Corps Materiel Command**

The mission of the Materiel Command is to provide the highest level of materiel readiness to the United States Marine Corps. Key customers include U.S. Marine Corps, U.S. Army, U.S. Air Force, U.S. Navy, FBI, Arizona National Guard and Foreign military sales. Its two maintenance centers in Albany Georgia and Barstow California perform depot level repair on track and wheeled vehicles. These maintenance centers are a critical link in the readiness supply chain – one extra day in repair means the vehicle is not available for field duty for that day. As a result, their customers demand quick turnarounds, on-time delivery, and competitive prices. This creates a constant pressure to improve.

The leadership team was looking for the next source of quantum gains in speed and efficiency of delivering projects and heard how a new approach was delivering impressive results in other defense organizations. Leadership found the new approach simple and powerful and they decided to introduce it.

#### **Results**

- Within 3 months of starting the implementation, cycle times were reduced by 50%.
- Since vehicles now spend much less time in repair shops, there is a 5-10% increase in the effective capacity of the vehicle fleet (vehicles in the field duty).
- Throughput from the depots has more than doubled without adding resources.

The solution has since been adopted by more maintenance centers in the US Navy.

### **4. Construction projects – SheaHomes**

SheaHomes is a general contractor that develops land and coordinates the building of homes. Its Phoenix division sells approximately 2000 houses per year. Being a general contractor, SheaHomes uses a network of partners for all the work but assumes the risk and rewards of the timely completion of houses.

Coordinating resources and work across multiple trade partners is complex. Partners support multiple projects across multiple sites and even multiple contractors. As uncertainties occur on one site (be it weather, customer demands or any other reason), partners need to respond – which often requires pulling resources from elsewhere.

The new approach to managing project uncertainties was introduced to the executives. After a two-day assessment, they gave it a guarded yes – the concept was sound and compelling but yet to be proven in construction. Implementation began in late 2000, and the target was to reduce cycle time from a current 91 days to 60.

#### **Results**

- Cycle time was reduced from 91 days to 56 at the first site. As implementation has been expanded to other sites, a 20-30% reduction in cycle time has been consistently achieved.
- Savings in interest costs from the first site alone paid for the investment many times over.



## 5. Pharmaceutical product development and plant engineering – Pharmacia

Pharmacia executives came to know of the new approach for managing project uncertainties. Having spent substantial money in traditional project management tools and not getting the promised results, they were skeptical that there was a solution that could work. However, they liked the common sense logic of the solution and decided to give it a try.

Pharmacia first implemented the solution in their clinical supplies at Kalamazoo to test the concept. Although it is a small link in the overall drug development chain, it is a crucial link. A delay here quickly propagates as the doctors and researchers cannot conduct clinical trials. The area was plagued by long lead times – typically 8-12 weeks between the initial request for clinical packaging and the actual start of the studies – and low throughput. On-time delivery was 48%. Package rate was only 20 per month while active studies per month had climbed to 65.

### Results

- Lead times were reduced from 8 weeks to 3 weeks.
- Due-date delivery improved from 48% to over 90%.
- The package rate more than doubled, from 20 to 50 studies a month.

Seeing such results, implementation was expanded to a clinical supply operations facility in Italy and a research function in Chicago.

## Getting Started on Execution Management

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