CRITICAL CHAIN

PF2006: MANAGE EXECUTION, GET RESULTS.

RESULTS AND LESSONS LEARNED

Over the past three years, hundreds of managers have attended Realization's Project Flow conferences. From maintenance and repair to high-tech product development, they have implemented Critical Chain Execution Management to increase project speed, throughput and due-date performance.

We thank the following organizations for sharing their case studies at our conferences, and have compiled a summary of their results and lessons learned in this document.

Central Nuclear Almaraz Trillo

AFOTEC U.S. Air Force

Hamilton Beach/Proctor-Silex

Airgo Networks

Bosch Security Systems

Celsa Group

HP Digital Camera Group

DaimlerChrysler

U.S. Marine Corps

Duke Energy

Warner Robins Air Logistics Center

Edwards Airforce Base

eircom

Genencor International (Danisco)

Johann A. Krause, Inc.

Rapid Solutions Group

Lucent Technologies

Oklahoma City Air Logistics Center

U.S. Naval Shipyards

LSI Logic

Medtronic Europe

Medtronic

Northern Digital Inc.

Oregon Freeze Dry

Proctor & Gamble Pharmaceuticals

Skye Group

Valley Cabinet Works

U.S. Naval Aviation Depot Cherry Point

Realization® The Pioneer in Execution Management Systems™

EXECUTION MANAGEMENT RESULTS

	BEFORE	AFTER
Next Generation Wireless Technology Product Development Airgo Networks	Cycle time from first silicon to production for 1st generation was 19 months.	Cycle time from first silicon to production for 2nd generation was 8 months.
IT Projects Celsa Group	15 SAP functionality projects were completed per month.	SAP functionality project completions increased by 30% to 20 projects a month.
Automotive Product Development DaimlerChrysler	Cycle time for prototype builds was 10 weeks.	Cycle time for prototype builds is 8 weeks.
Telecommunications Network Design & Installation eircom, Ireland	On-time delivery less than 75%. Average cycle time was 70 days.	Increased on-time delivery to 98+%. Average cycle time dropped to 30 days.
Biotechnology Plant Engineering Genencor	20% projects on time.	87% projects on time. 15% immediate increase in throughput.
Home Appliances New Product Development Hamilton Beach/Proctor-Silex	34 new products per year. 74% projects on time.	Increased throughput to 52 new products in 1st year, and to 70+ in 2nd year, with no increase in head count. 88% projects on time.
Digital Camera Product Development HP Digital Camera Group	6 cameras launched in 2004. 1 camera launched in spring window. 1 out of 6 cameras launched on time.	15 cameras launched in 2005. 7 cameras launched in spring window. All 15 cameras launched on time.
ASIC Design Technology Development LSI Logic	74% projects on time for small projects. Major tool releases were always late.	85% of small projects on time. Major tools released on time for three years in a row.
Telecomm Switches Design, Development & Upgrades Lucent Technologies	300 to 400 active projects with 30+ deliveries a month. Lead times were long. On-time delivery was poor.	Throughput was higher by 45% per person. Lead times are 10~25% shorter. 90+% on-time delivery.
High Tech Medical Product Development Medtronic	1 software release every 6~9 months. Predictability was poor on device programs.	1 software release every 2 months. Schedule slips on device programs cut by 50%.
High Tech Medical Product Development Medtronic, Europe	Device projects took 18 months on average and were unpredictable.	Development cycle time reduced to 9 months. On-time delivery increased to 90%.
Food Preparation & Packaging Oregon Freeze Dry	72 sales projects completed per year.	171 sales projects completed per year. 52% increase in throughput dollars.
Marketing/Publishing Support Rapid Solutions Group	Projects were always late. Lead times were not acceptable.	On-time delivery improved by 30%. Lead times were reduced by 25%.
Garment Design Skye Group	Product ranges were late to market.	100% due-date performance. 30% reduction in lead times and sampling costs.

EXECUTION MANAGEMENT RESULTS

	BEFORE	AFTER
Custom Furniture Design and Manufacturing Valley Cabinet Works	Struggled to complete 200 custom furniture projects per year. Revenues were flat and business was just breaking even. A lot of firefighting in execution.	Completed 334 projects in 9 months. Revenues increased 88% and profits increased by 300% in the first year. Firefighting and thrashing eliminated.
Electrical Power Transmission, Engineer-to-Order ABB AG, Power Technologies Division	Throughput was 300 bays per year.	Throughput increased to 430 bays per year.
Automotive Assembly Systems, Engineer-to-Order * Projects vary from large fully automated assembly lines to small retooling projects. Johann A. Krause	70% of projects were late. High overtime and outsourcing.	Lateness reduced by 50%. 63% productivity gain. 15% more projects completed.
Nuclear Power Engineering Central Nuclear Almaraz Trillo	19 design evaluation and modification projects were completed per month.	Throughput increased by 25% to 24~30 projects per month.
Warfighter Systems Testing US Air Force Operational Test & Evaluation Center	Long cycle times. Low utilization of resources. Poor visibility on project slips.	30% reduction in cycle time measured over 900 projects. 30% improvement in resource utilization. 88% on-time delivery performance.
Aircraft Repair & Overhaul US Air Force Oklahoma City Air Logistics Center, B-1 Bomber Line	Turnaround time (TAT) 162 days. 7 aircrafts in repair cycle.	Turnaround time (TAT) reduced to 115 days. 4 aircrafts in repair cycle (3 returned to customer). Production output increased from 185 hours/day to 273. 1 1/2 dock spaces freed up.
Aircraft Repair & Overhaul US Air Force, Warner Robins Air Logistics Center, C5 Production Line	Turnaround time (TAT) 240 days. 13 aircrafts in repair cycle.	Turnaround time (TAT) 160 days. 7 aircrafts in repair cycle. 75% fewer defects.
Army Vehicles Maintenance & Repair US Marine Corps Logistics Base, Barstow, CA	Repair Cycle Time for MK48 was 168 days. RCT for LAV25 was 180 days. RCT for MK14 was 152 days. RCT for LAVAT was 182 days.	RCT for MK48 is 82 days. RCT for LAV25 is 124 days. RCT for MK14 is 59 days. RCT for LAVAT is 122 days.
Aircraft Repair & Overhaul US Naval Aviation Depot, Cherry Point	Average turnaround time (TAT) for H-46 aircrafts as 225 days. Average turnaround time (TAT) for H-53 aircrafts was 310 days; throughput was 23 per year.	Reduced H-46 TAT to 167 days, while work scope was increasing. Reduced H-53 TAT to 180 days. Delivered 23 aircrafts in six months; throughput of 46 per year.
Submarine Maintenance & Repair US Naval Shipyard, Pearl Harbor	Job Completion Rate = 94%. On-time delivery less than 60%. Cost per job was $5,043.	Job Completion Rate increased to 98%. Increased on-time delivery to 95+%. Reduced cost per job to $3,355, a 33% reduction. Overtime dropped by 49%, a $9M saving in the 1st year.

LESSONS LEARNED

As in the previous years' conferences, it was exciting to hear so many speakers in Project Flow 2006 describe the remarkable improvements they have made in project performance.

All the speakers took time to describe their project operations, and how they have applied the three rules of critical chain. It is gratifying that such a wide range of organizations can benefit from *execution management*.

In his keynote, Dr. Eliyahu M. Goldratt (the inventor of Critical Chain) challenged us to amplify the benefits of superior execution by building a business strategy around it.

Following are the key points made by Dr. Goldratt and other speakers:

1. Performance gains come from managing differently, not from better visibility.

While buffer status is an effective way to monitor projects, managing execution is not about tracking buffers. Managing execution is about reducing the waste of multitasking and other interruptions, student syndrome and Parkinson's Law. This reduction results from changes made at three levels:

A. PIPELINE MANAGEMENT

The first major change is "WIP Reduction" and "Release Control".

When too many projects are happening at the same time, resources find themselves under pressure to work on more than one task and multi-tasking is unavoidable. Prolific bad multitasking significantly pushes out every project's delivery date.

Unfortunately, this is the situation that exist in most multi-project operations. Project managers start their projects as soon as possible, and then pressurize resources (to multitask).

Obviously the goal is not to start working on more projects; rather it is to complete more projects. Therefore we have to put some of the projects on hold (at least 25% in terms of work load), and establish the critical chain pipelining mechanism to decide when to release additional projects into execution.

B. PROJECT PLANNING

The second major change is structuring the project plans for tight execution.

Typically organizations create project plans to plan and track effort, rather than to define execution tasks and dependencies.

In addition, local safeties get built in to protect local commitments. Unfortunately these safeties only get wasted because of student syndrome and Parkinson's Law.

To realize gains, the goal has to be changed from meeting local commitments to finishing projects quickly. Project plans need to capture execution sequence and have global buffers instead of local safeties.

C. TASK MANAGEMENT

In addition to adopting buffer based priorities, Task Managers have to take responsibility for driving the task completions.

For fast paced execution, organizations have to adopt "Active Task Management" as the mode of operation, in which Task Managers use priorities to:

i) *Prepare for upcoming tasks.* It could range from making sure the needed approvals are there, to detailing out how the tasks will be done.

ii) *Check for "Remaining Duration" daily or semi-weekly.* During the checking of "Remaining Duration", they also identify issues that are blocking the tasks from making progress.

iii) *Make sure the issues are resolved in a timely manner.*

2. Improving execution is not only about catching up with the backlog, but also about building a competitive advantage.

As our customers in Construction, Equipment Manufacturing, IT, and Maintenance & Repair have found, when most suppliers don't deliver their projects on time; and late delivery has a significant impact on their clients; reliable due-date performance can be used to build a decisive competitive edge.

It requires effort, but if companies offer hefty penalties for delays; train their salespeople to sell a *reliability offer*; and implement safeguards against overloading their resources, they can not only win more clients but also charge premiums.

Dr. Goldratt also noted that while completing projects early does not always bring value to the client, in some of the cases it brings extraordinary value. Again it requires effort, but companies can substantially increase profits by relentlessly reducing lead times and training their salespeople to sell *early completion bonuses*.

3. Improvements do not have to be only one time.

Finally, as Oregon Freeze Dry, AFOTEC and others showed, improving execution does not have to be a one-time event. Successive improvements are possible, provided that improvement opportunities are continuously identified and properly prioritized.

Dr. Goldratt explained that the biggest damage - to the lead times and capacity utilization - is done by practices that cause the deepest penetrations to the projects' buffers. Therefore the prudent way to identify the most damaging practices is:

A. Record reasons for delay in task completions.

B. During "Buffer Management", identify the task that is penetrating the most into the project buffer, and the reasons for delays that have accumulated up to that task.

C. Do a *Pareto analysis* of the reasons for delays across all projects and address the top reasons.

When companies make process improvements in this manner, they can achieve even shorter lead times and much higher throughput than the initial implementation.

Complimentary DVD's of all the Project Flow presentations, including Dr. Goldratt's keynote, can be requested from ***dvd@realization.com***.