The Theory of Constraints Critical Chain Management using MS Project 2010 and ProChain

Variability Is A Fact Of Life

Presentation Delivered by:
Gerald Leonard, PMP, MCTS, CQIA, ITIL

Objective

- Define “Theory of Constraints Critical Chain Management?”
- What are the core issues TOC CCPM must resolve?
- The Difference between the WBS and Project Network and why we need both.
- Difference between Critical Path and Critical Chain Project Management
- Project Synchronization and Staggering
- Understanding tasks variability and buffer management
- Aligning Behavior to increase execution velocity
- Demo of MS Project 2010 and ProChain

- TOC Overview
- Demo
- Summary

What is the Theory of Constraints?

Organizational Core Issues

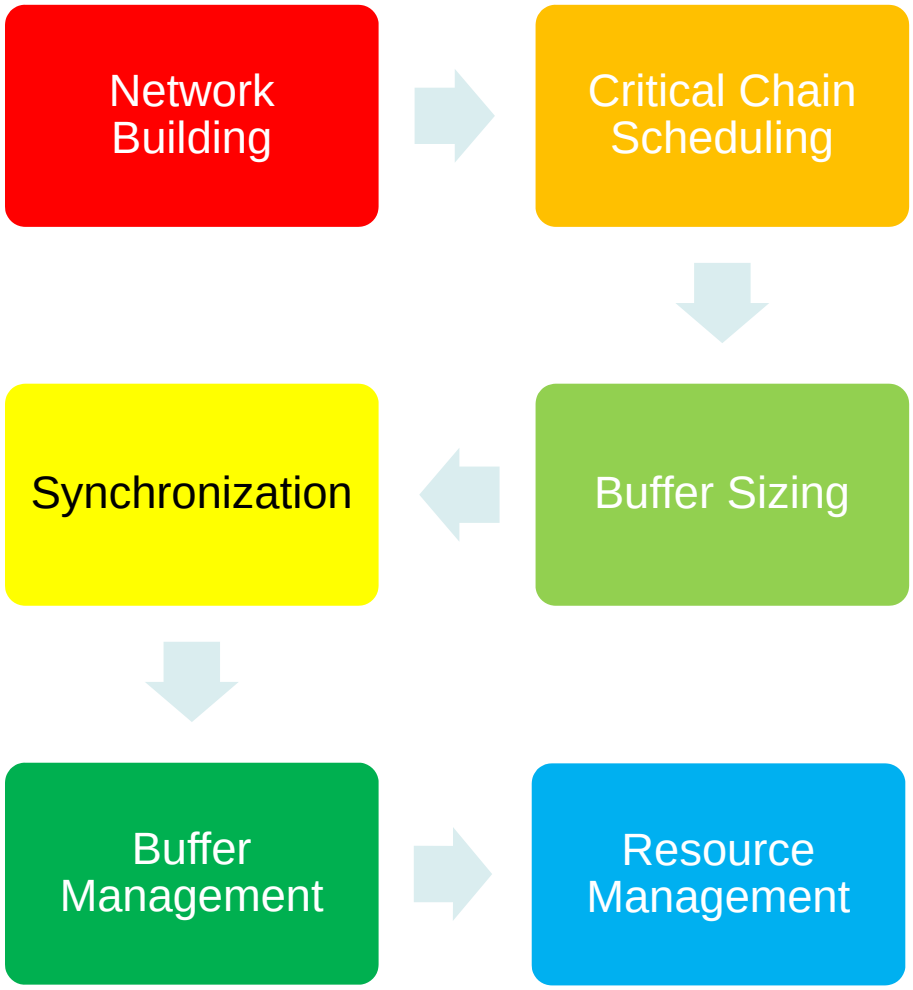
- Too much concurrent demand in the same window of time.
- Bad Multi-tasking
- Safety time in current tasks is wasted
- Conflicting Priorities – Resource contention
- Behavior misalignment
  - Student Syndrome
  - Parkinson's Law
  - CYA (Assets)
  - 3 minute egg

What is Critical Chain Portfolio Management?

The TOC solution for planning, scheduling and managing performance in a project environment. It is applied in both single project and multi project environments where resources are shared across several different projects concurrently. (TOCICO Dictionary, 1st edition, 2007)

The longest string of work in a schedule, taking into account all tasks and resources dependencies.

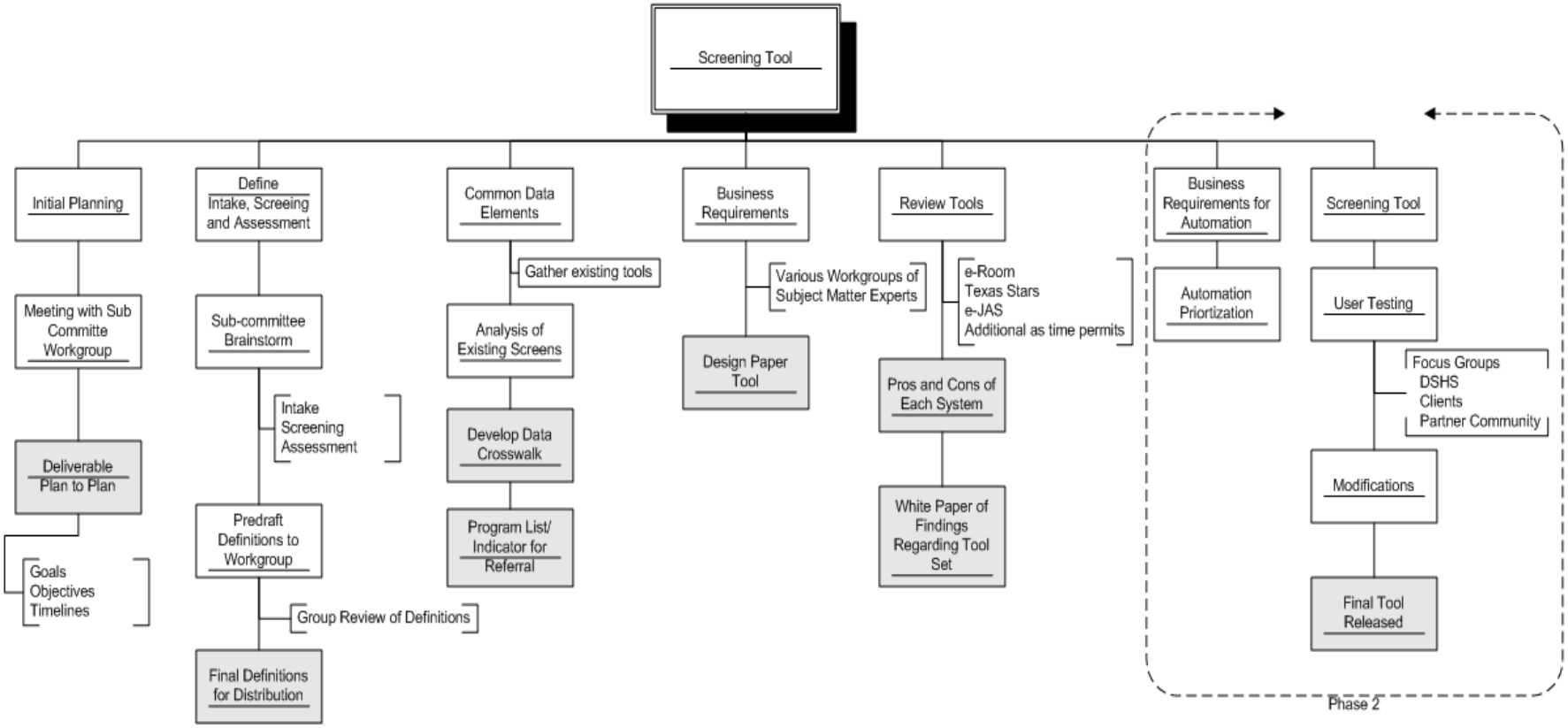
Theory of Constraint: Critical Chain Process



The Difference between the WBS and Project Network

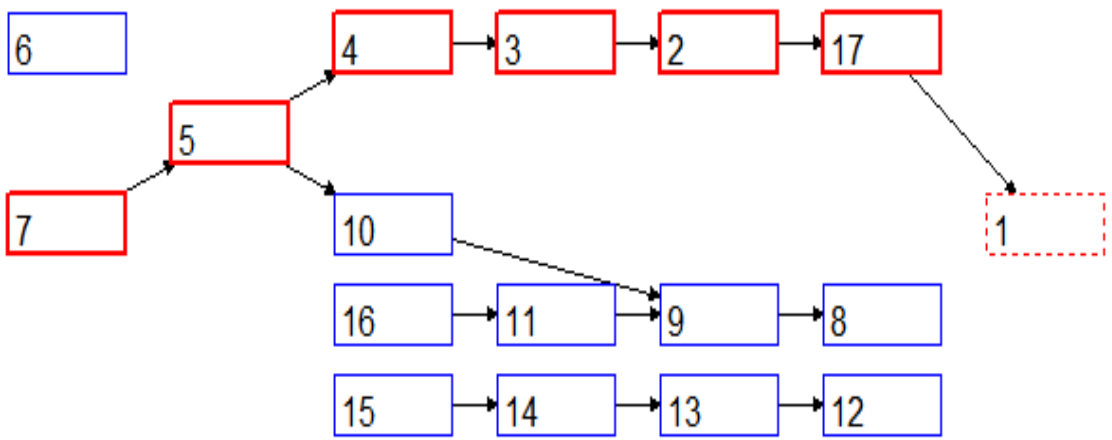
WBS	Project Network
WBS refers to a **deliverable**-oriented organizational chart of the work to be executed by the project team to accomplish the project objectives and create the required deliverables.	A project network is a graphic flow chart of the project work plan that is developed from the work breakdown structure (WBS). A project network is developed to **identify and document dependencies / integration points** among schedule activities that have been identified in the WBS. It is useful to level resources and identify the critical chain as well as understand how best to sequence the project tasks.

Work Breakdown Structure



Project Network

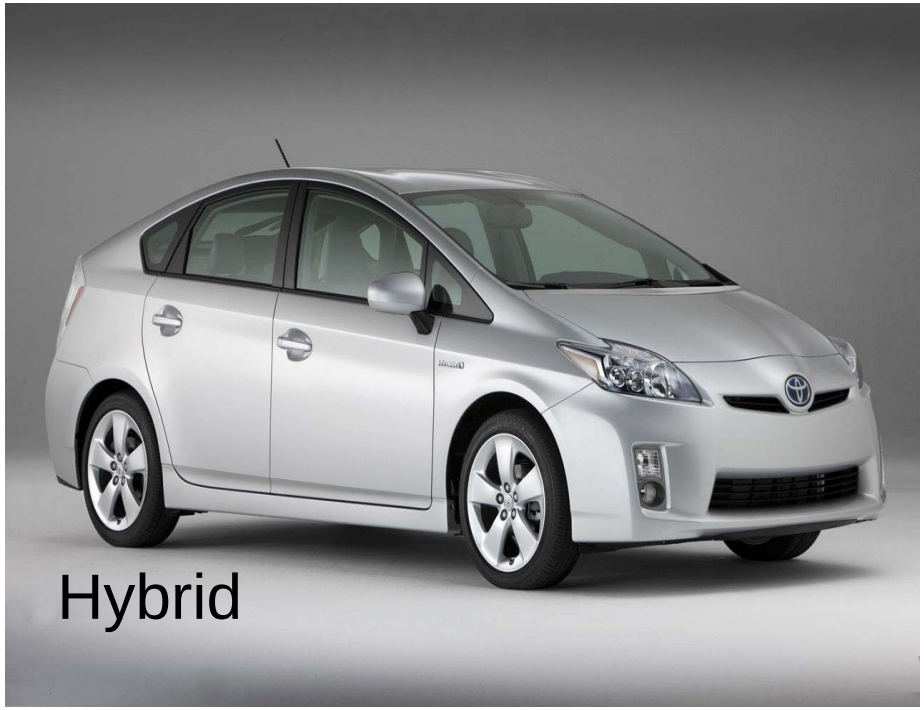
Task #	Task Name	R	Resource	ABP	HP
7	C1	2	Green	5d	10d
6	A1	2	Green	4d	8d
19	Feeding Buffer			4d	0d
5	B3	5	Black	8d	16d
4	A5	2	Green	15d	30d
15	F3	3	Magenta	20d	40d
3	A6	1	Red	15d	30d
16	E3	3	Magenta	10d	20d
14	F5			28d	0d
11	E5	4	Blue	28d	56d
2	A7	3	Magenta	20d	40d
10	C5	4	Blue	6d	12d
17	A9	1	Red	18d	36d
13	F7	3	Magenta	7d	14d
9	D7	5	Black	9d	18d
12	F9	1	Red	10d	20d
21	Feeding Buffer			37d	0d
8	D9	1	Red	6d	12d
20	Feeding Buffer			32d	0d
1	Project Complete			0d	0d



Building A Project Network

- Identify the project target objectives.
- Understand the project deliverables.
- Document the Critical Success Factors of the Project
- Begin with the end in mind starting from the end of the project
- Ask necessity based questions. (In order to begin this we must first have completed ____)
- Create one network path at a time
- Read the network forward
- Review tasks and dependencies
- Determine resource assignments
- Obtain input and advise from SMEs
- Identify task estimates (ABP – HP)
- Account for project risk and review project objectives

Critical Path vs. Critical Chain Project Management

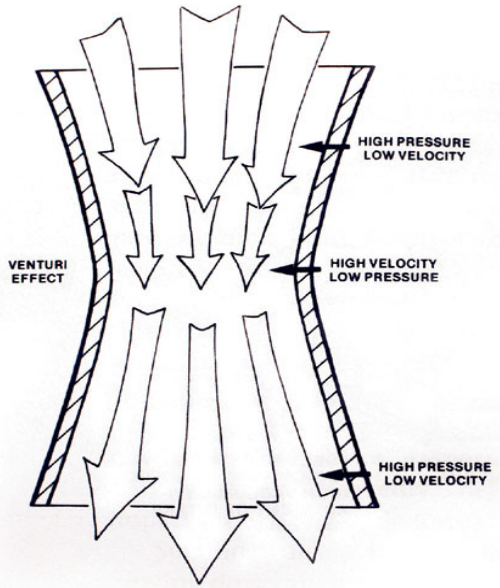


The algorithms used to determine the critical path vs. the critical chain are radically different.

What are some of the differences?

Critical Path	Critical Chain
The longest string of tasks in a schedule, taking into account all tasks dependencies.	The longest string of work in a schedule, taking into account all tasks and resources dependencies.
Resources are unlimited (based on DOD model of resourcing tasks)	Resources are constrained and limited (base on corporate America)
Schedule from the beginning of a project forward	Schedule from the end of the project backwards. Begin with the end in mind.
Each task is padded to account for variability.	Each task is scheduled based on the aggressive but possible time and buffers are aggregated at key integration points to account for critical and non-critical path variability
Key metrics are on time and on budget for each task.	Key metric is managing the project buffer for the project to be on time and on budget.

TOC requires Project Synchronization and Staggering

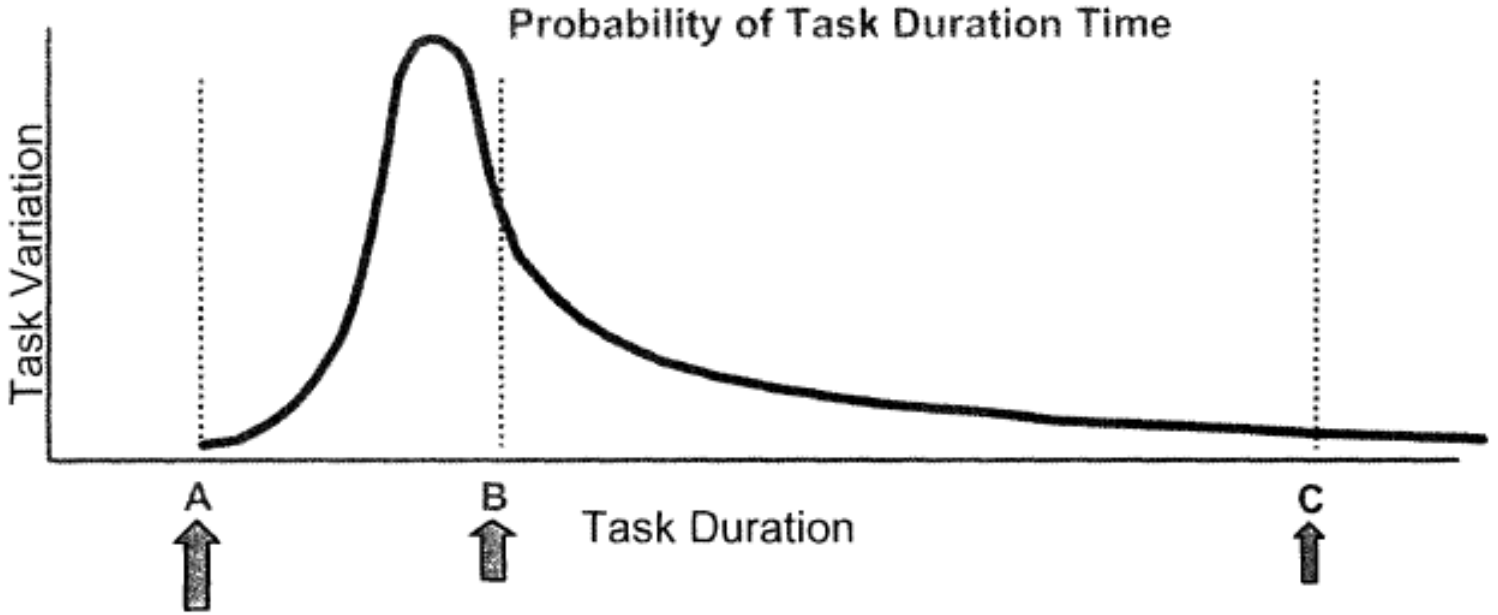


Reducing the number projects in the system and focusing on the critical few will deliver more projects faster creating velocity

Task variability is a fact of life.

- Putting on a pair of Levis
- Putting on a pair of Levis you owned in High School
- Putting on Sweats

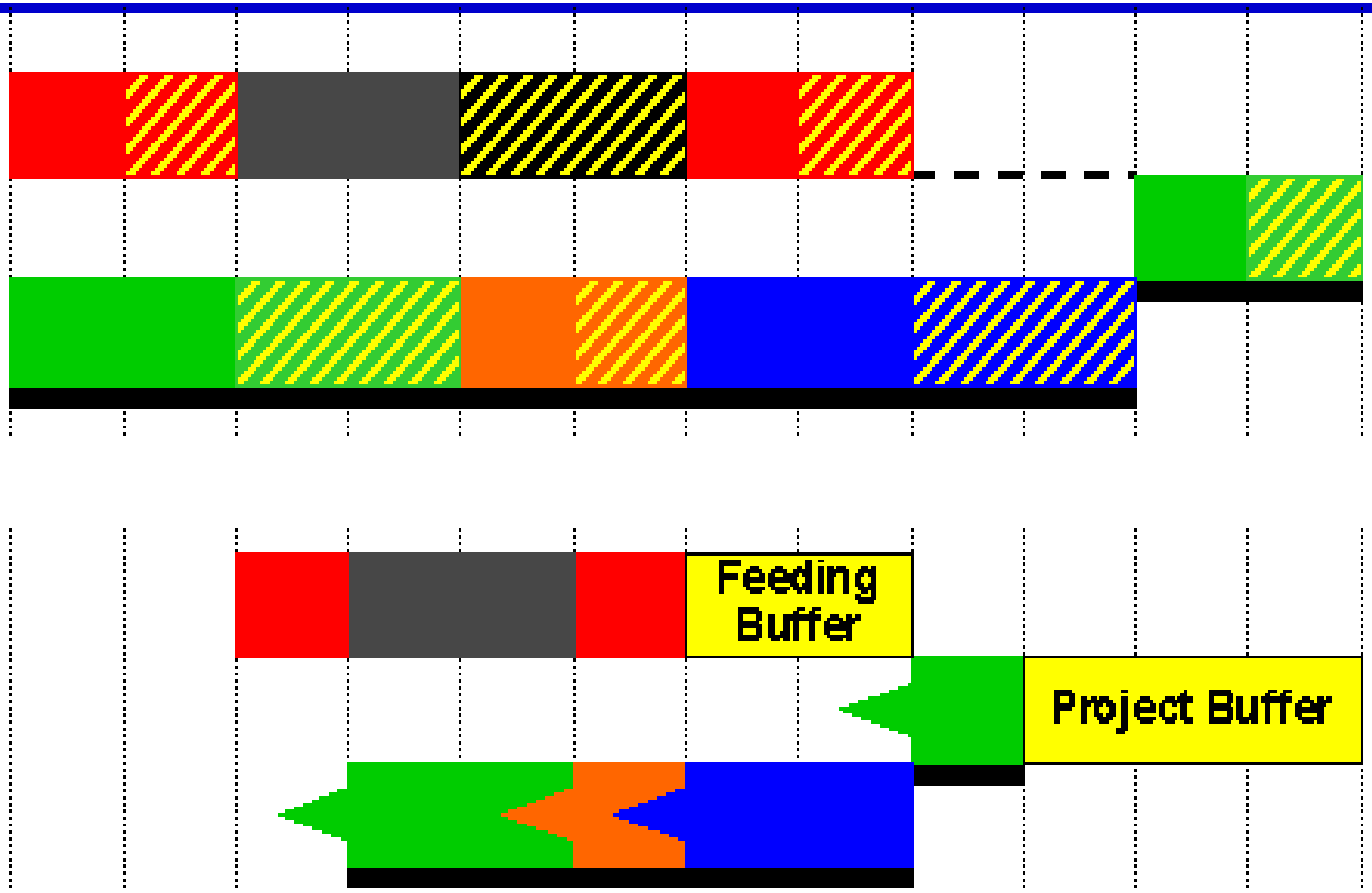
Task Estimating



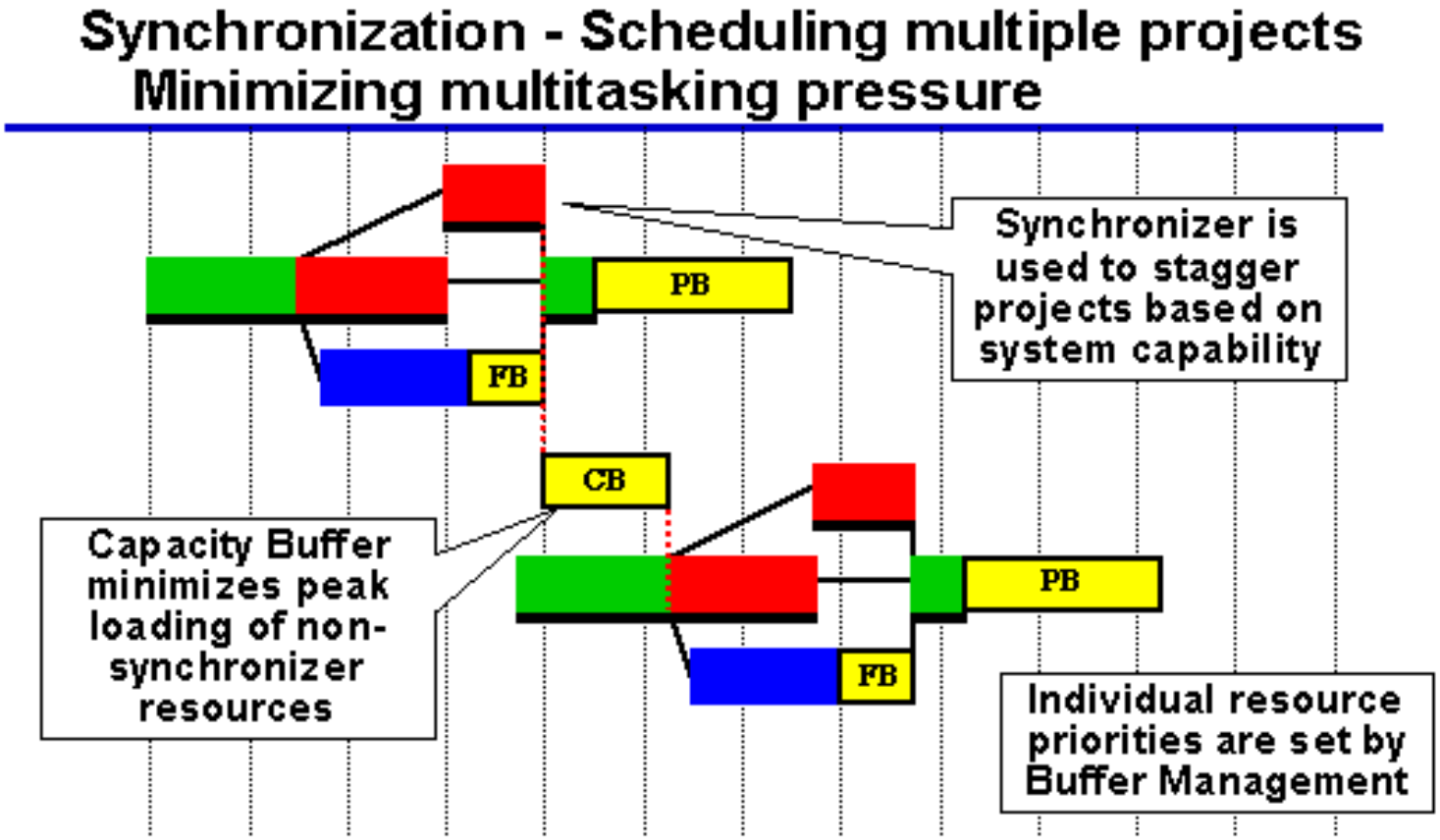
ABP Time
Possibly one can meet this time, even with some surprises. 50% of the outcomes are less than this, 50% are greater.

Even with a major disaster this time is highly achievable, and is commonly used.
Highly probable (HP)

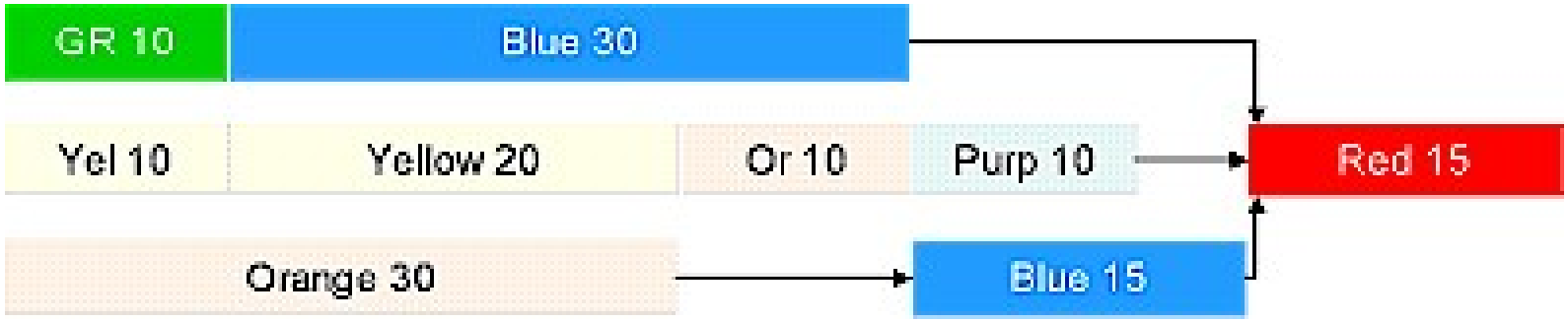
Project Scheduling for the single project
. . . The Critical Chain Schedule



Synchronization

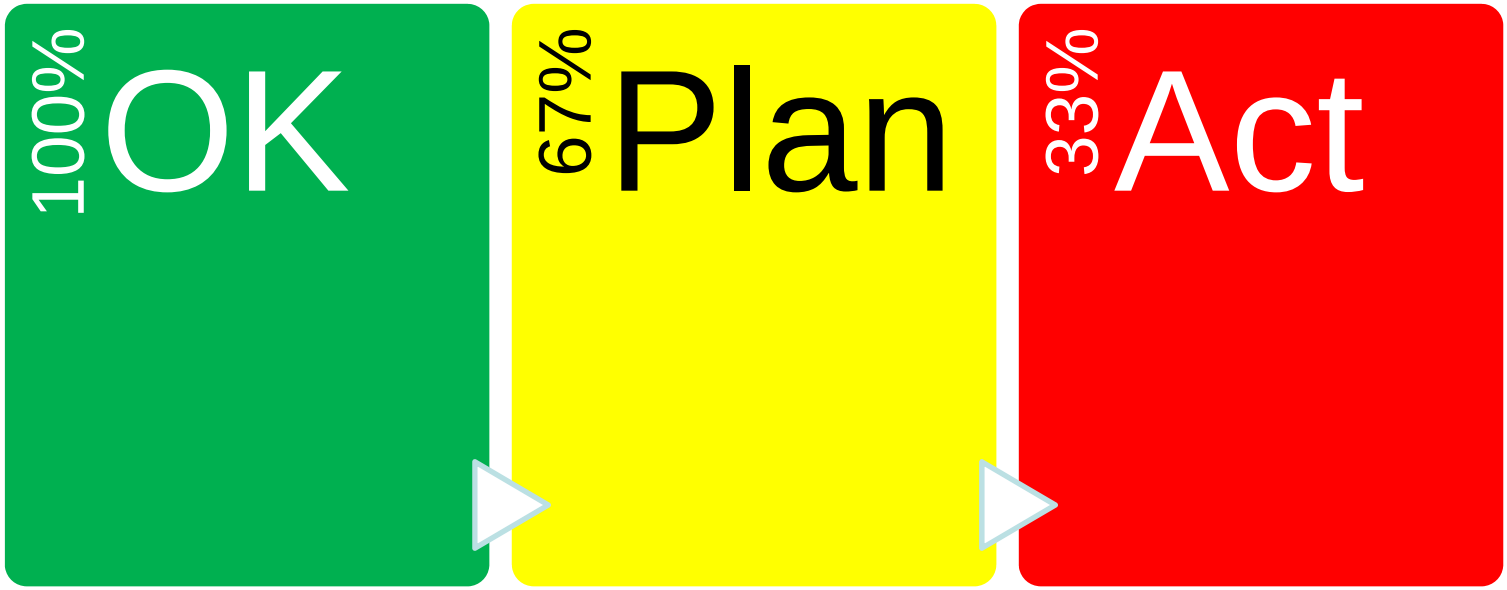


Buffer Sizing



- Rule of Thumb
  - 32.5 days
- Square Root of the Sum of the Squares
  - 100 + 400 + 100 + 100 + 225 = 925 (30.41)
- What are our options if the buffer is to small and how do we know?

Buffer Management – Leading Indicator

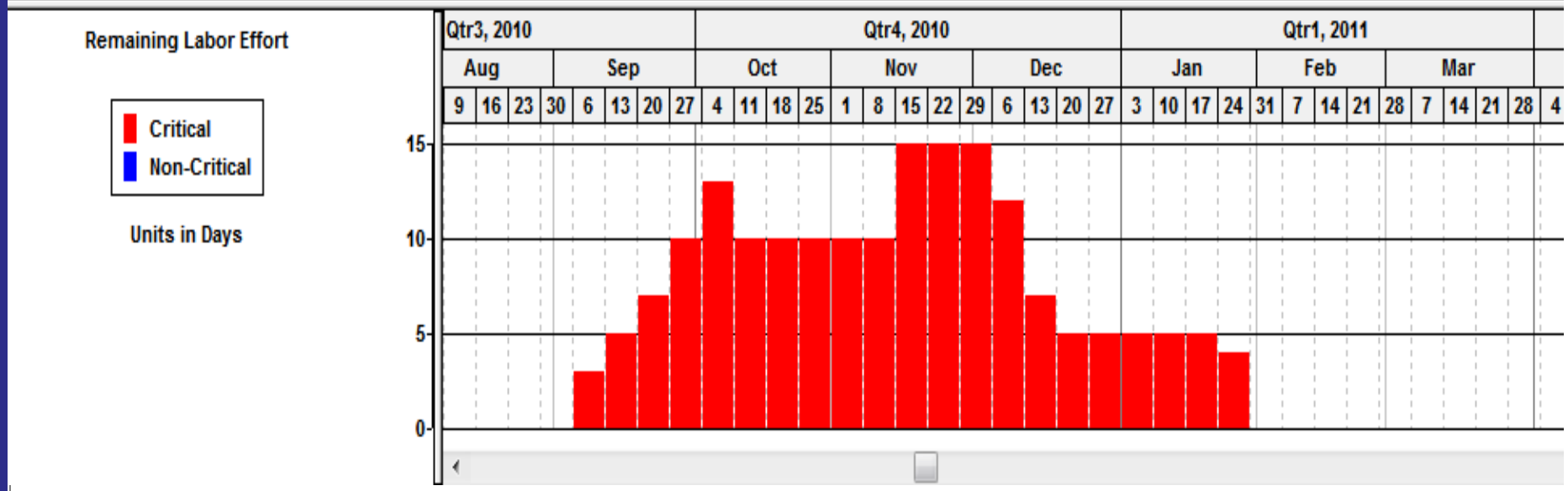


Task variability is protected by aggregated buffers

Aggregated Buffers Saves Time and Money

Resource Histogram – Understanding Capacity

	Resource #	Resource ID	Resource Name	Type	Drum Resource	Availability	Default Rate	Cost	Calendar	Email Address
	1	2J7FGEC	Red	LABOR	No	2h/h	1h/h	$0.00/h		
	2	2J7FGED	Green	LABOR	No	2h/h	1h/h	$0.00/h		
	3	2J7FGEE	Magenta	LABOR	No	2h/h	1h/h	$0.00/h		
	4	2J7FGEF	Blue	LABOR	No	1h/h	1h/h	$0.00/h		
	5	2J7FGEG	Black	LABOR	No	1h/h	1h/h	$0.00/h		



- TOC Overview
- Demo
- Summary

- TOC Overview
- Demo
- Summary

Aligning Behavior to increase our execution velocity

What we want	What we don't want
Balancing workload with the organizations capacity to deliver.	Starting more projects than the organization has the capacity to handle.
Focus on managing the project buffer and buffer consumption. (Proactive management)	Firefighting to deliver projects on time, on budget and within scope. (reactive management)
Understanding that variability exist and manage it using aggregated buffers.	Padding each tasks to deliver projects on time. Project will take longer and longer to complete.
Team Member Relay Runner Model Process	Violating task or project dependencies to keep people busy
Project Managers and Resource Managers working closer together	Project Managers fighting over resources

In Summary

- What did we learn?
  - Critical Path Management was developed by the DOD using **unlimited resources**, Critical Chain accounts for the reality that all task have variability and that resources are limited
  - Buffer Management provides a calculated leading indicator that provides an early warning if projects are trending to slip their dates.
  - CCPM accounts for the reality in variability.

How can you implement this process in your environment?

- Recognize the need for a new way to management projects in a resource constrained environment.
- Obtain agreement on the core problem resulting from managing projects using CPM with constrained resources.
- Gain buy in and acceptance on Critical Chain Project Management
- Treat the implementation of CCPM as a project.
- Provide training and education for Project Manager, Resource Managers, Senior Management and other IS Staff on the benefits of CCPM
- Develop the internal technical capability to manage CCPM projects within our environment
- Develop phased rollout approach for other projects to adopt CCPM
- Evaluate results after each phased rollout and establish new policies, procedures and best practices.

Presentation Delivered by:

Gerald Leonard, PMP, MCTS, CQIA, ITIL

Email: gerald.leonard@verizon.net

LinkedIn: **http://www.linkedin.com/in/geraldjleonard**

Blog: **http://principlesofexecution.typepad.com/principles-of-execution/**

Twitter: **http://twitter.com/#!/geraldjleonard**