Critical Chain Project Management :

Integration of Traditional Project Management and Theory of Constraint, i.e,

CCPM = PMBOK + TOC!

By

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- Lean six-sigma practitioner for 9 years
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- CSBB, CMQ/OE, Certified Lean Manager, CSQA &
- A Certified Scrum Master.

Acknowledgements

- http://theoryofconstraints.blogspot.com
- www.focusedperformance.com

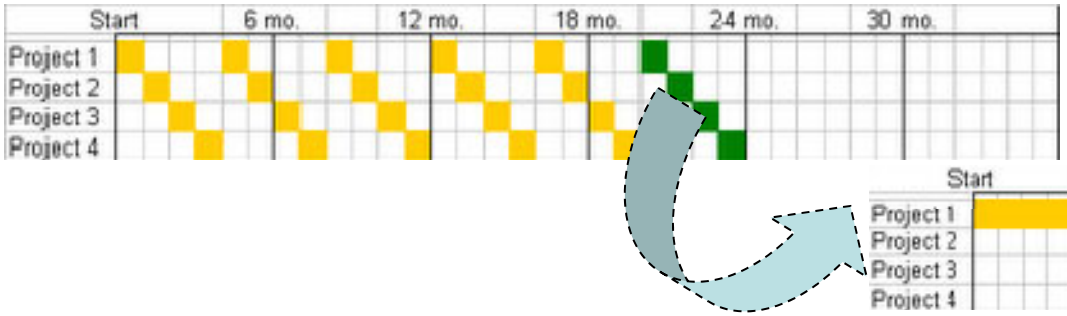
- Department of Logistics Management， National Kaohsiung Marine University http://logmgt.nkmu.edu.tw/
- www.criticalchain.co.uk/confluence.pdf

CCPM : Where does it apply ?

1. Are the individual tasks/milestones targets low on importance for business compared to project completion commitment ?
2. Are the projects fed into the system with strict ‘time to market’ deadlines to beat/meet competition or regulation ?
3. Is the ‘Return discount factor’ (risk associated with every project) very high because of rapid technology obsolescence , market competition and ever-changing business demands ? (NPV = FV / (Discount factor)^^ (Project duration)).
4. Is the firm focus on earliest delivery of business value instead of optimized resource utilization (Bigger Top line impact vs minor bottom line gains).
5. Project business value is measured by NPV and not only by ROI.

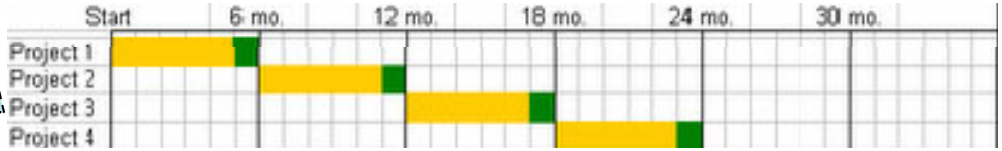
If your answer is ‘YES’ to any of the above : CCPM does apply to you.

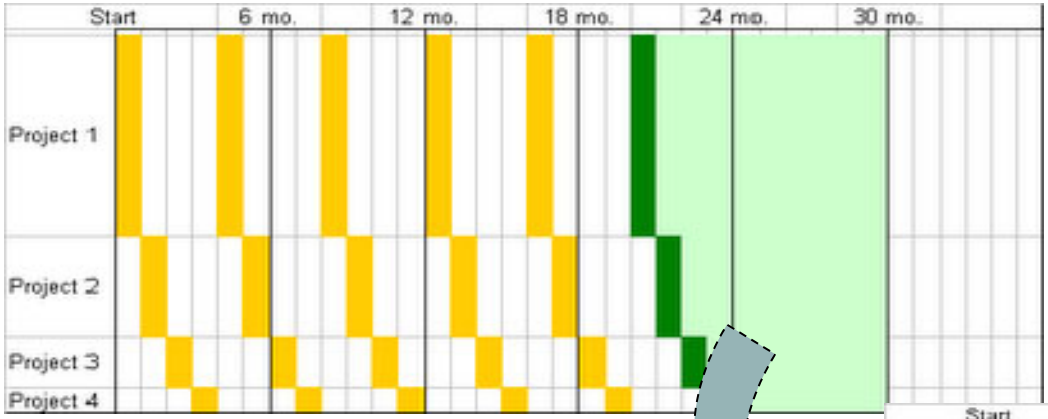
Multitasking vs Dedicated : Time and Cost benefit



All projects of equal business value →

Average Project Duration : 22.5 months to 15 months

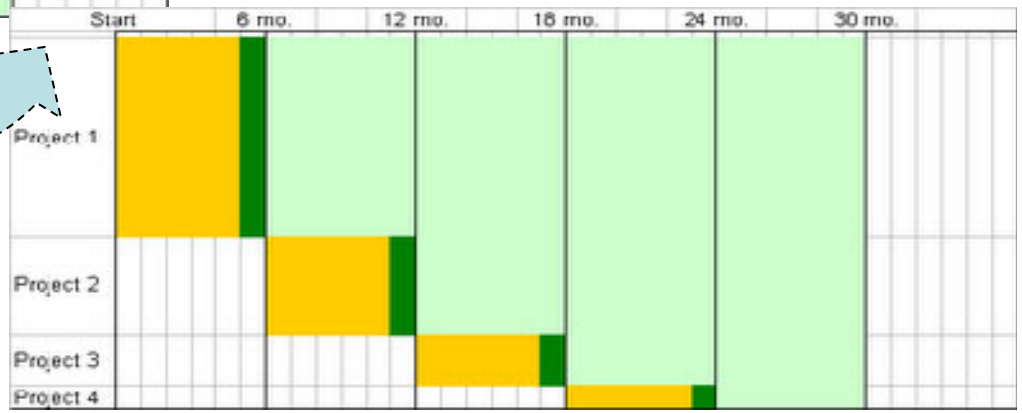




Vertical axis : Project business value : 8,4,2,1.

Total ROI in first 30 months = 8*9 + 4*8 + 2*7 + 1*6 = 124 VUs.

VU : Value Unit (a unit to measure business value of a project)



Vertical axis : Project business value : 8,4,2,1.

Total ROI in first 30 months = 8*24 + 4*18 + 2*12 + 1*6 =294 VUs.

Even if the quantified business values are NA, the ROI is much higher.

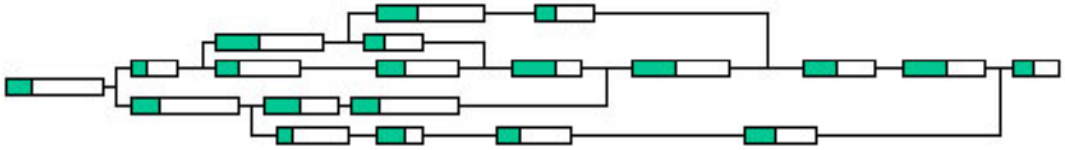
Uncertainty Is At The Core:
Newtonian (Machine) vs. Quantum (Human) Physics

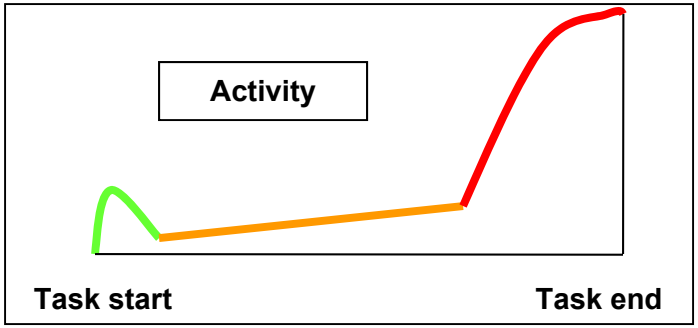
"Work expands to fill (and often exceed) the time allowed."
-- Parkinson's Law

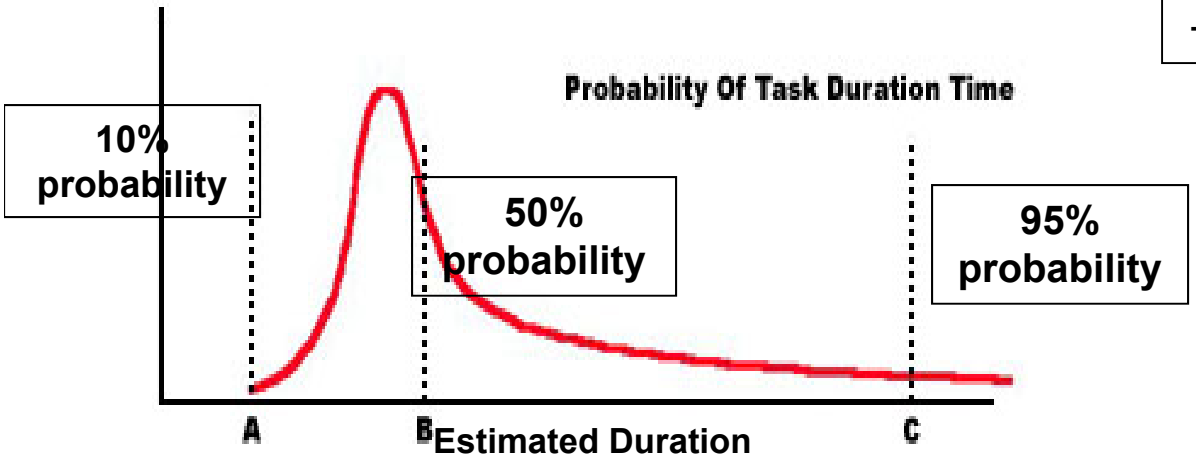
"Whatever can go wrong, will." -- Murphy's Law

"2/3 of work done in last 1/3 of time" – Student's Syndrome

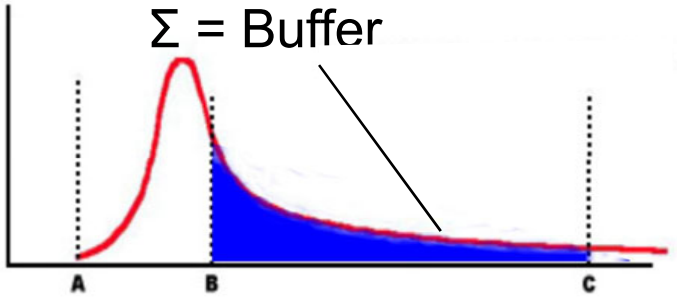
"How we measure people!" – Task Padding!



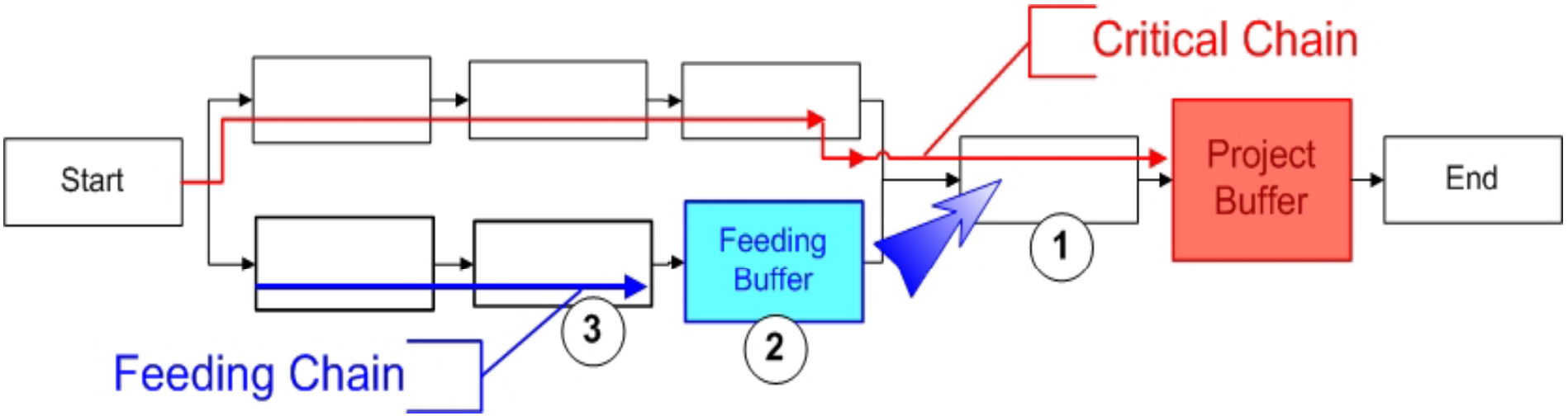




A Practical 10 Points Guide to CCPM



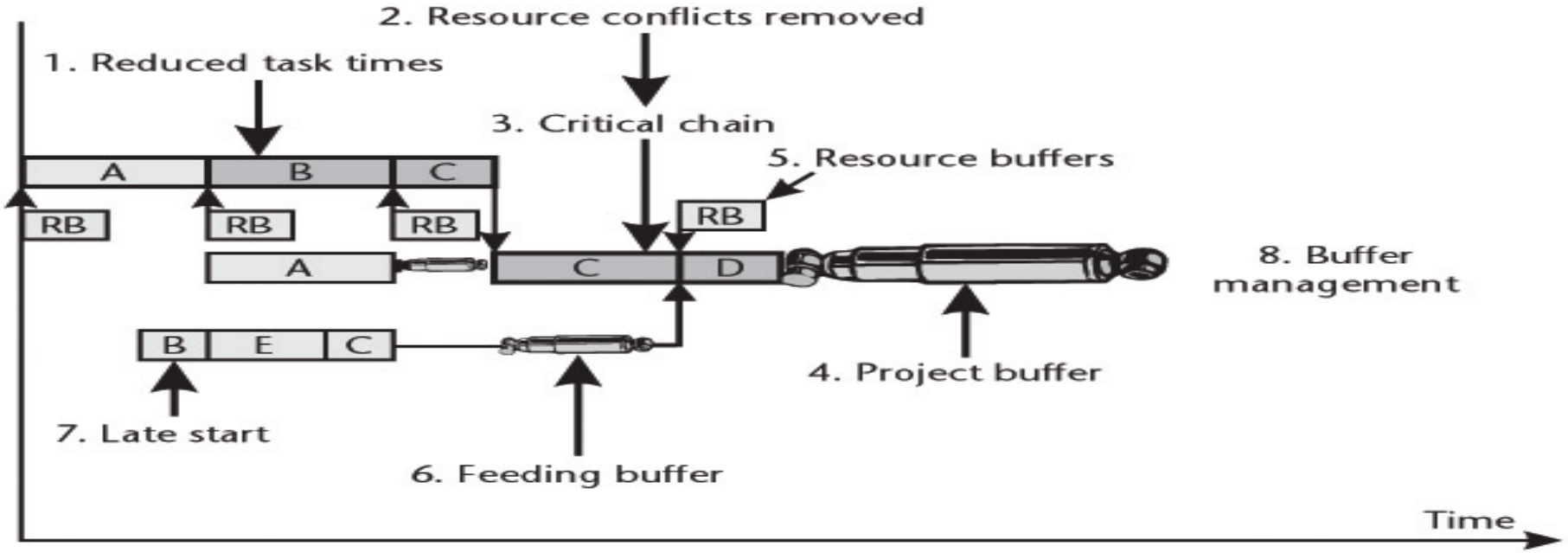
1. CPM + Resource Contention = Critical Chain
2. Management commitment to 'DRUM' resource availability, no multitasking
3. Estimate each task aggressively with 50% confidence instead of traditional 90% confidence factor. (Parkinson's law)
4. Rule of Thumb : Half of the Chain length as Project Buffer to protect customer commitment! (Murphy's law)
5. Rope the DRUM with 'Readiness Lead Time' ('DRUM → Buffer → Rope' of Theory Of Constraint)



The Practical 10 Points Guide to CCPM…

6. Dont ‘manage’ tasks deadlines. (Empower the Big Picture!)
7. Early, timely or late – all equally likely! Ensure ‘Task Relay!’
8. Start Late (Student’s)
9. Protect Critical Chain with Feeding Buffer.
10. ‘One Symptom(Measure) to all disease (Root Cause)’:Buffer Consumption

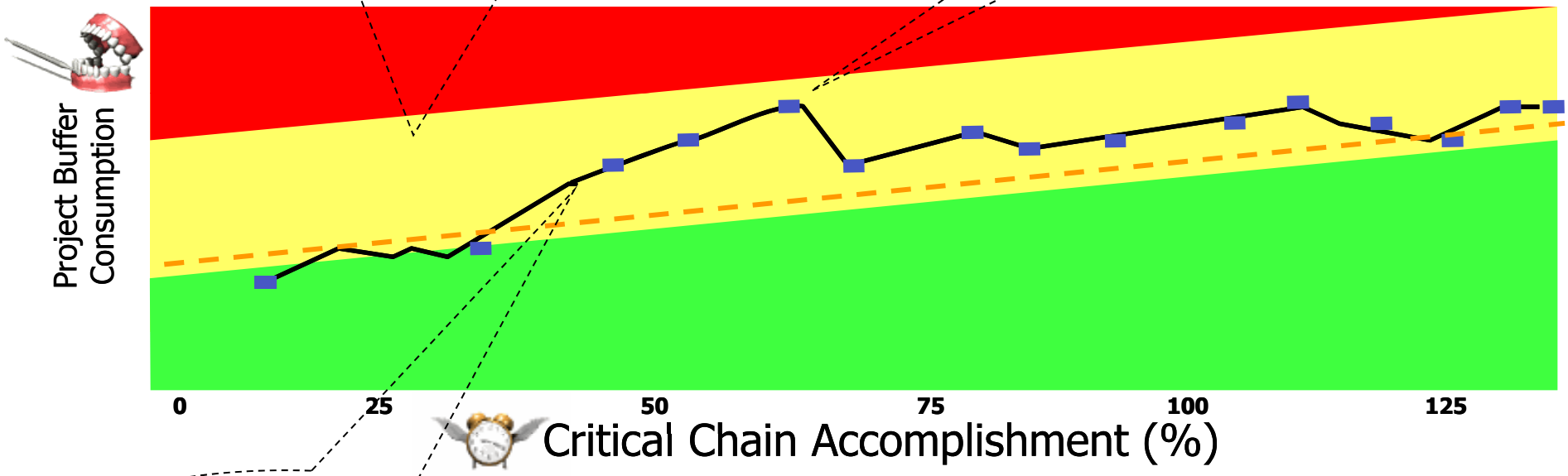
High Overall Average Contingency (= 30% * 1 + 70% * 2 = 1.7)
50% Maximum possible time saving at 100% confidence on project target.



CCPM Tools and Templates: Examples…

→ Look for trend
→ In Green, do nothing
→ In Amber, create the Buffer Recovery Plan for all upcoming tasks.

Execute the plan
→ Resource
→ Scope
→ Process



→ Weekly monitoring
→ Create a **buffer recovery plan**

Project Buffer Consumption Plot

CCPM Tools and Templates: Examples…

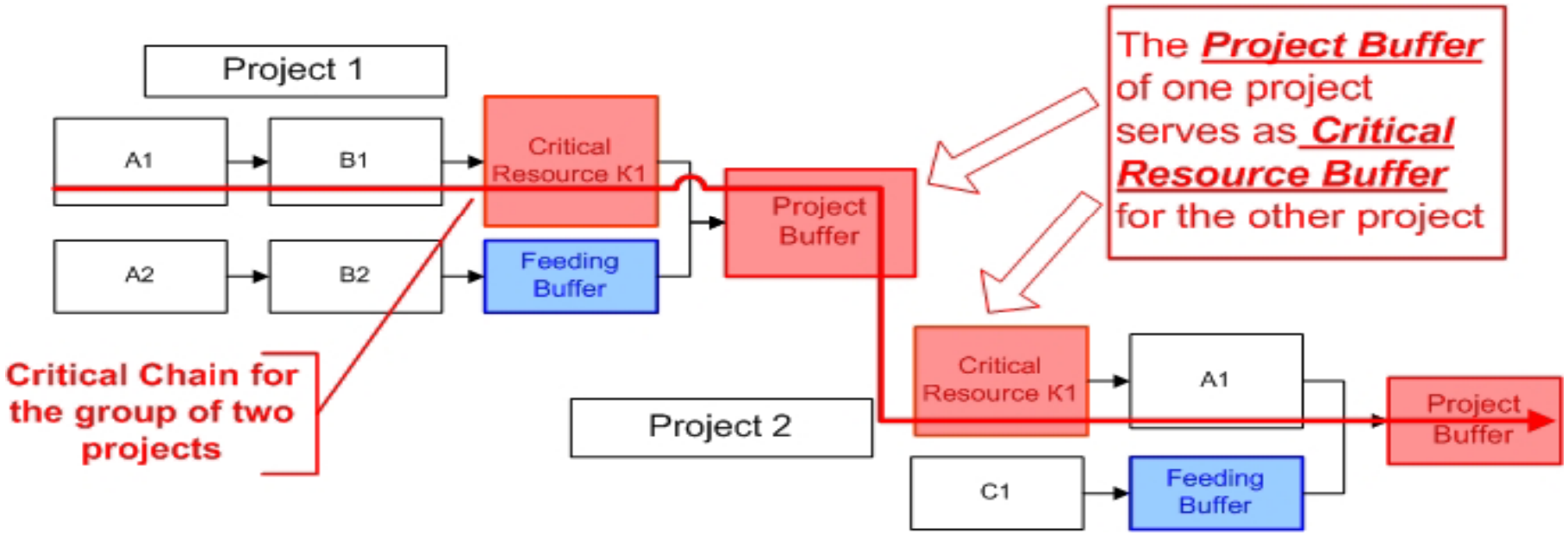
Buffer Recovery Plan

Methods to Increase Resources	Methods to Reduce Scope	Methods to Improve the Process
Add additional staff	Subcontract part of the scope	Change the activity logic (e.g., go from finish to start to finish to finish) Examine the activity logic for ways to reduce batch sizes
Break up the activity to use a more diverse kind of staff	Revise requirements	Provide improved tools
Pay overtime (for labor)	Defer requirements to later in the project	Obtain expert assistance
Use subcontract labor		Use process improvement tools, especially cycle-time analysis
Add incentives (for subcontracts)		Perform some of the work early on downstream tasks to reduce their duration

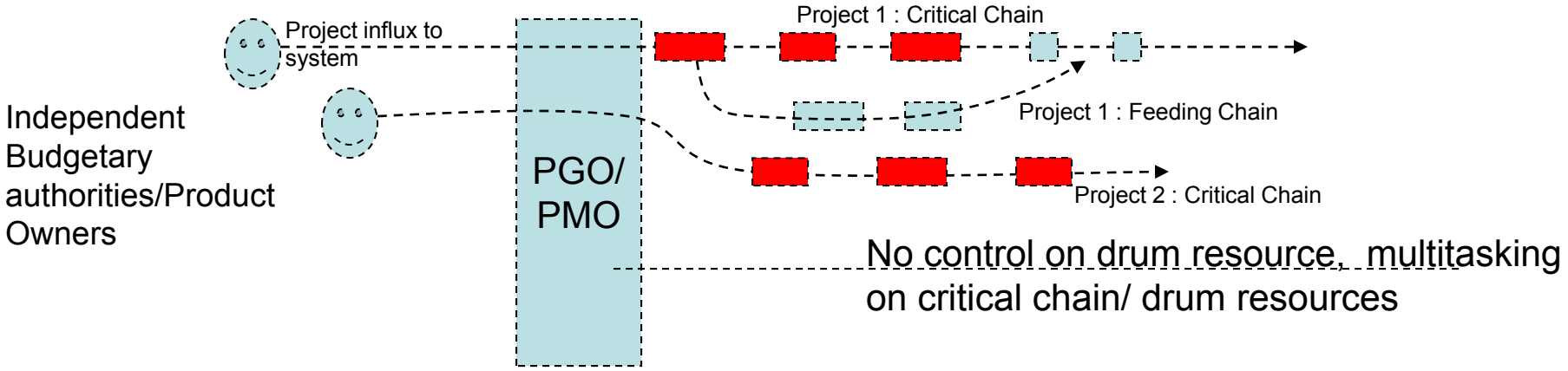
CCPM RAG Dash-board

Priority	Status	Project name	Project manager	Deadline	% accomplished
1		**Project 1**	**John Screw**	**25.12.2006**	**98**
21		**Project 2**	**Mary Mess**	**31.01.2007**	**48**
13		**Project 3**	**Peter Pickpocket**	**14.02.2007**	**63**
54		**Project 4**	**Mary Mess**	**03.03.2008**	**15**
23		**Project 5**	**George Binladin**	**24.05.2007**	**41**
13		**Project 6**	**Helluv O'Booze**	**01.08.2008**	**18**

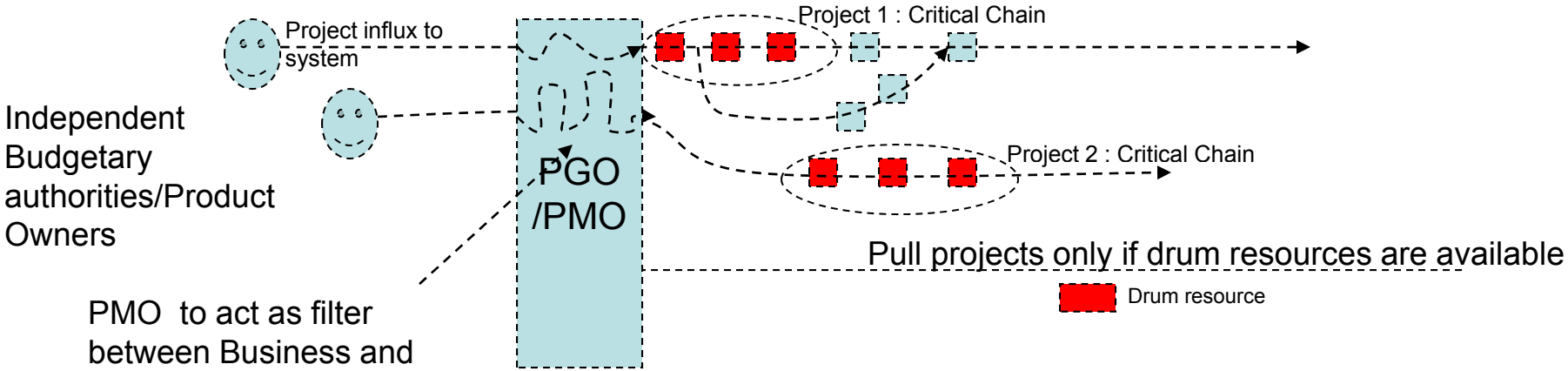
CCPM Program Management : Multiproject scenario



Multi Project Case Study @ Investment Bank IT



Traditional 'Push' System



PMO to act as filter between Business and Delivery system, create a slack in the pipeline.

CCPM 'Pull' System

CCPM Vs PMBOK 9 Knowledge Areas

Project Integration Management :

- No dedicated elapsed time
- Manage taks due dates
- Task padding
- Protection from individual task variance accumulated into project buffers and not managed individually.
- Project buffer duration is 30%-50% of the length of the critical chain.
- Reduce Management Intervention by 97.5%
- Relay runner ethic : resource to complete task as quickly as possible and pass on the next available resource.
- Resources on the critical chain the flexible enough to start on a range of dates instead of a particular date.
- Ultimate objective is to get the project done on-time or before time not the tasks done on time.
- Three useful ratio metrics :
    - % critical chain completed upon % project buffer consumed
    - % feeding chain completed upon % feeding buffer consumed
    - Buffer consumption speed. (Days per week)

Project Scope Management :

- Keeping the cycle time to a minimum the project benefits are maximized in terms of NPV.
- Very quickly project scope becomes obsolete and CCPM support agile heavily on this aspect.

CCPM Vs PMBOK 9 Knowledge Areas

Project Time Management :

- Dual saving on time estimates : dedicated and no padding.
- Start task as late as possible (no slack time) : to avoid 'parkinson's law and student's syndrome. Late start means higher NPV, less risk of bad multitasking.
- Avoids "Layered Padding", e.g. 1 day of hard work for a team member, suddenly becomes a 2 weeks project ->
    - Team member to team lead : 2 day (1 day padding)
    - Team lead to Program Manager : 1 week (3 days padding)
    - Program Manager to Business user : 2 weeks (1 week padding)

Project Cost Management :

- Focus on early business value or NPV of every project and for multi project portfolio instead of individual resource efficiency. Multitasking enables resource optimization for managers and CCPM discourages multitasking.

- (Contract head count environment) & (Low imp. On velocity) & (Low NPV) == High individual efficiency.
- (Business Value driven env.) & (High competition) & (Low indiv. Efficiency) == High NPV.

- (High team size to manage) & (Non dedicated-bad multitasking) & (High cross portfolio risks) == Longer projects.
- (Smaller team) & (dedicated time estimates) & (Buffer management) & (indep. Projects) == Shorter projects.

CCPM Vs PMBOK 9 Knowledge Areas

Project Quality Management :

- Project Dollar Days : This is an effective Productivity ratio measure/tool for a multi project environment. Number of dollars generated by collection of projects (NPV of all cash flows) divided by the number of man days consumed by projects. Useful for PM office, senior management.
    - If the project hits upon a quality issue, more resource required for rework and hence more man days, the Project dollar days comes down.
    - If the project gets delayed, the NPV comes down and the productivity ratio comes down.
- Quality control : Instead of task level controls, CCPM builds project level controls, with more opportunity of root fixes and less follow ups and micro management. CCPM appreciates all types of common causes of variation and manage them through buffers.

Project Human Resource Management :

- Pull instead of push motivates individuals and empowers them to finish work as early as possible.
- Less stress for employees, less last minute surprises, fear of failures.
- Improved productivity and team effort.

CCPM Vs PMBOK 9 Knowledge Areas

Project Communication Management :

- Resource manager and project managers work together on effective reporting of alerts downstream to allow pull.
- Lighter tracking and reporting purely based on buffer management.
- Drum buffers should always be informed and team need to identify the drum buffers accurately.

Project Risk Management :

- The risk management primarily constraint based, CCPM looks at critical chain as constraint and continuous focus to minimize the same.
- Project buffer and feeding buffers act as contingency reserve for project deadline.
- Easy and early identification of project risks, categorizes risks in terms of their relative impact on project end date.
- Balanced reaction to risks and issues.

Project Procurement Management :

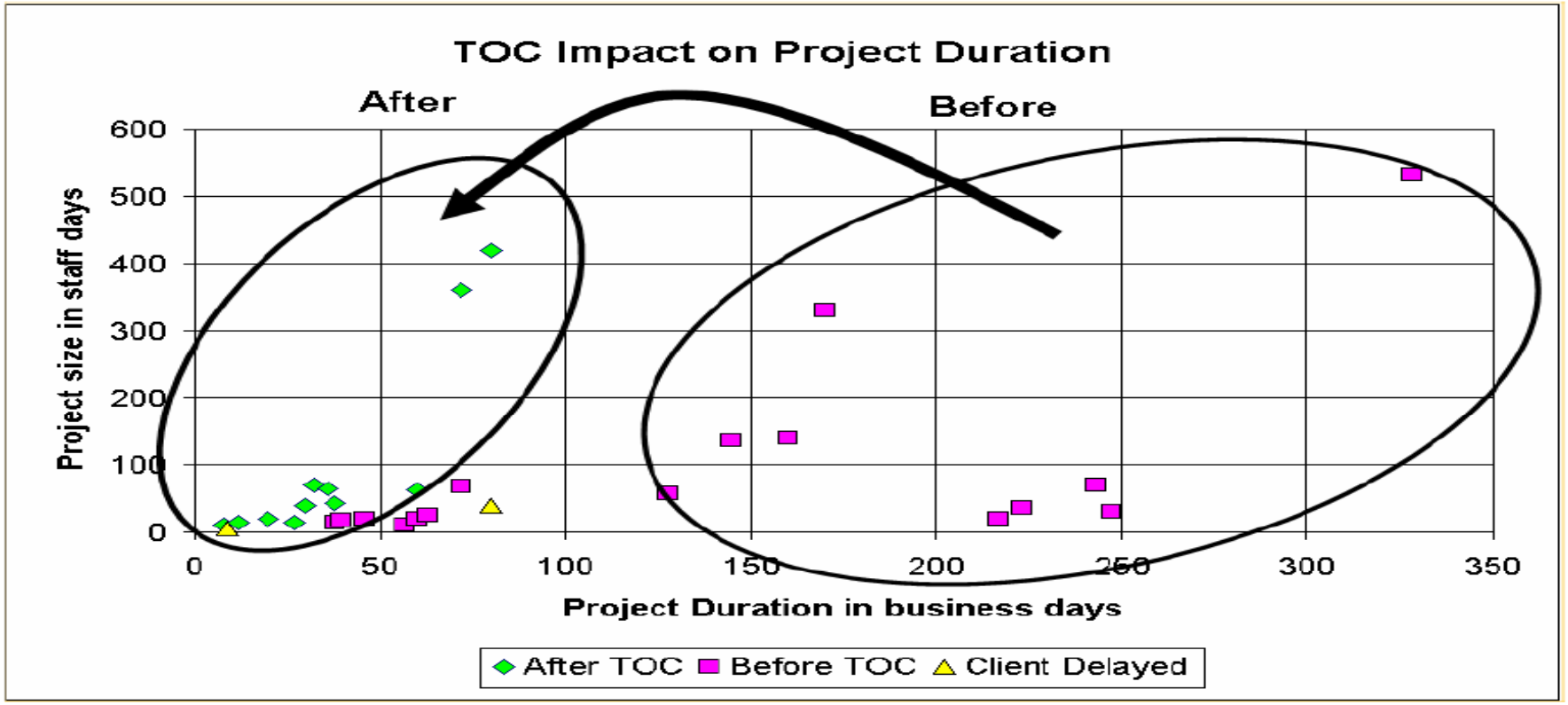
- Procurement decisions are made purely based on project completion time and quality instead of cost.
- Every procurements (vendor deliverable or infrastructure) on the critical chain must be delivered ontime, early delivery is valued higher than the additional procurement cost to do so.
- Buy or make decisions are important while considering options to bring the project duration down, contract out non critical deliverables to deliver project early.
- Solicit trade off between : cycle time, cost and risk from vendors.

CCPM : A brief case study…

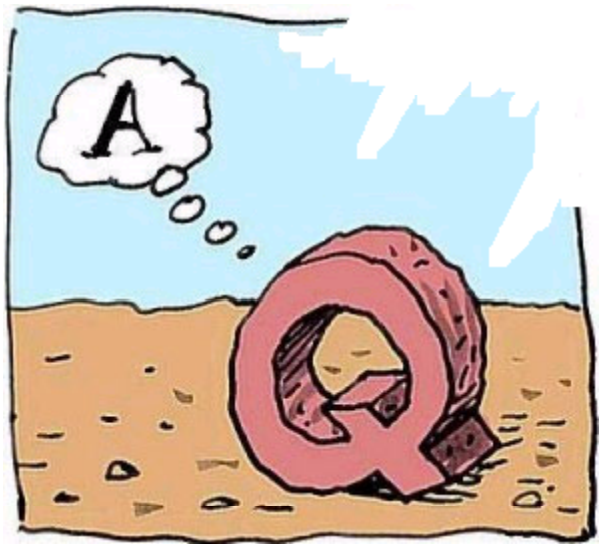
Confluence, which provides software solutions for the financial services industry, consists of approximately 50 highly innovative people led by young visionaries.

Confluence undertook a TOC Multi-Project Management implementation in the spring of 2001.

The facts:
See the picture below. The vertical axis denotes project size, in units of actual staff-days spent on the projects. Data points at the same vertical position denote projects of equal size. The horizontal axis denotes project duration, in business days. Weekends and holidays are excluded from the data.



CCPM!



Thank You