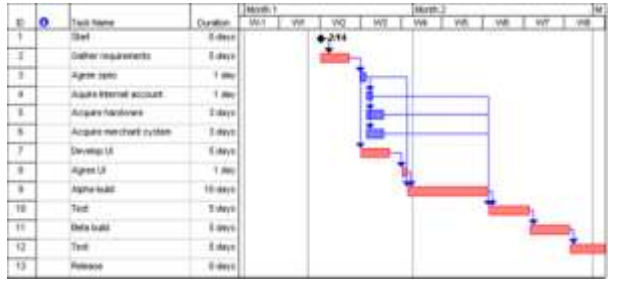
Complex Projects - How to reduce the schedule RISK and ensure the desired returns

Robert Bolton

12 May 2016



Project Governance and Controls Symposium (PGCS)

ADFA

Canberra

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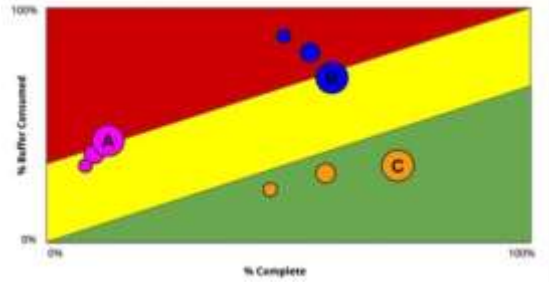

Agenda

- Background of Robert Bolton
- Complex projects
- Short history of scheduling methods
- Critical Chain Project Management (CCPM)
- Project Alliancing (PA)
- CCPM Case Studies
- Questions?

Robert Bolton

Civil Engineer (Sydney)
MBA (Ashridge UK)
Company Director (AICD)
Demand Driven Planner (CDDP)

Infrastructure, mining, oil & gas, IT,
Funds Management.

All aspects of Project Management

Expert in Theory of Constraints (ToC),
Developed Critical Chain & ToC Mining
Throughput Focused Mining (TFM)
Fast track construction
Activity Based Costing (ABC)

Sydney Convention Centre

Collector Bypass

Sydney Harbour Tunnel (SHT), Cut & Cover

London Victoria Goldmine

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Robert Bolton

Land Rover, Birmingham UK

Argyle Diamonds, WA

Worsley Alumina, WA

JNA Lucent, NSW

Iuka Resources, WA

Chevron FMC, Subsea, China

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No compromise

Robert Bolton – Financial and ICT

Common theme: Smart people dealing with lots of data trying to make the right decisions at the right time.

Direction: Building the systems that manage the projects to build the systems.

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On-time faster
On-budget for less
No compromise

Complex projects

- Many definition across regions and industry sectors.

  We use:-

- Project value is greater that 500 million USD
- Duration (or lead time) is > 6 months
- Many and diverse stakeholders
- Large project teams involving many parties
- Many relationships and independencies

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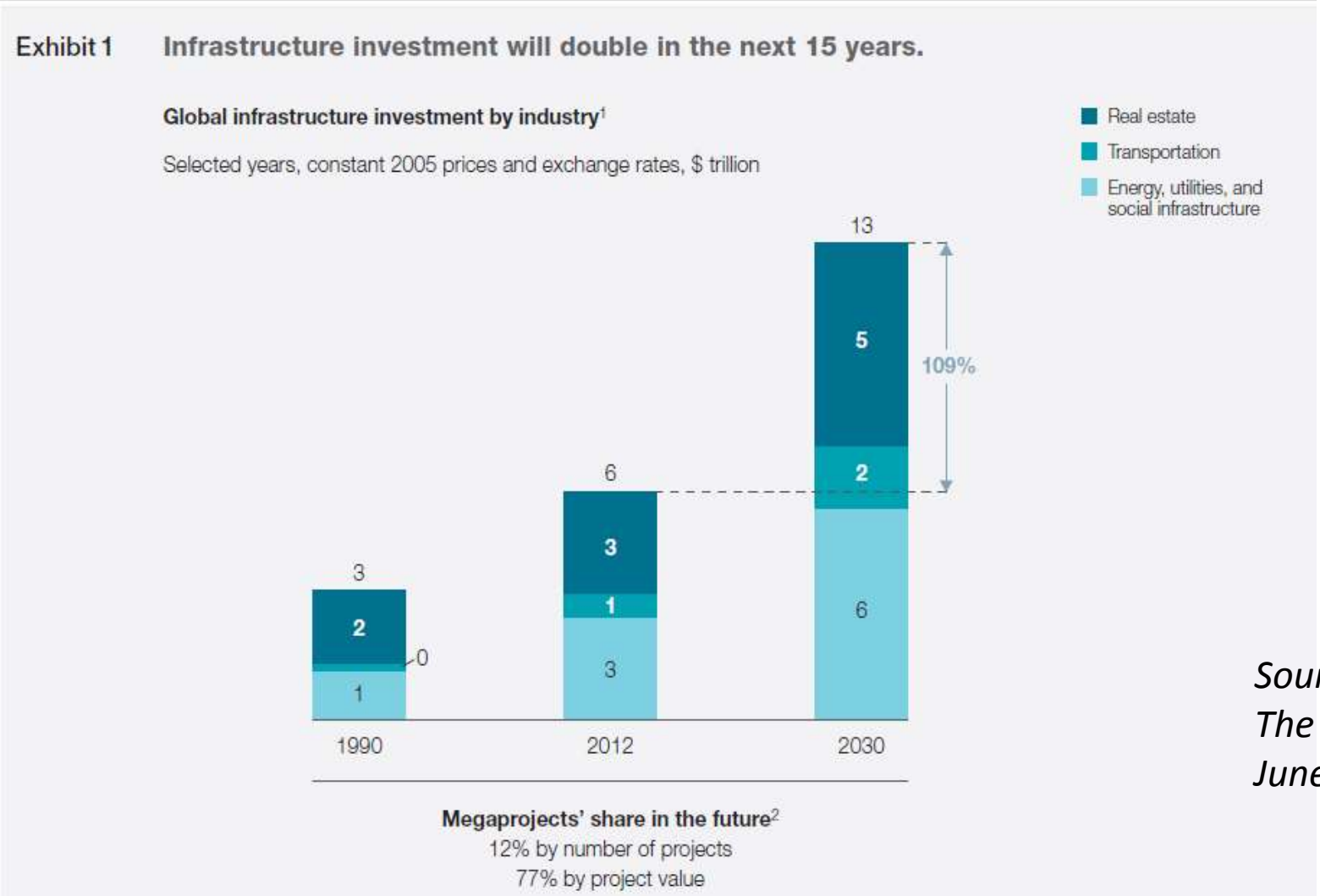
and getting bigger … Investment to increase by 200%



Source: McKinsey
The construction productivity imperative
June 2015.

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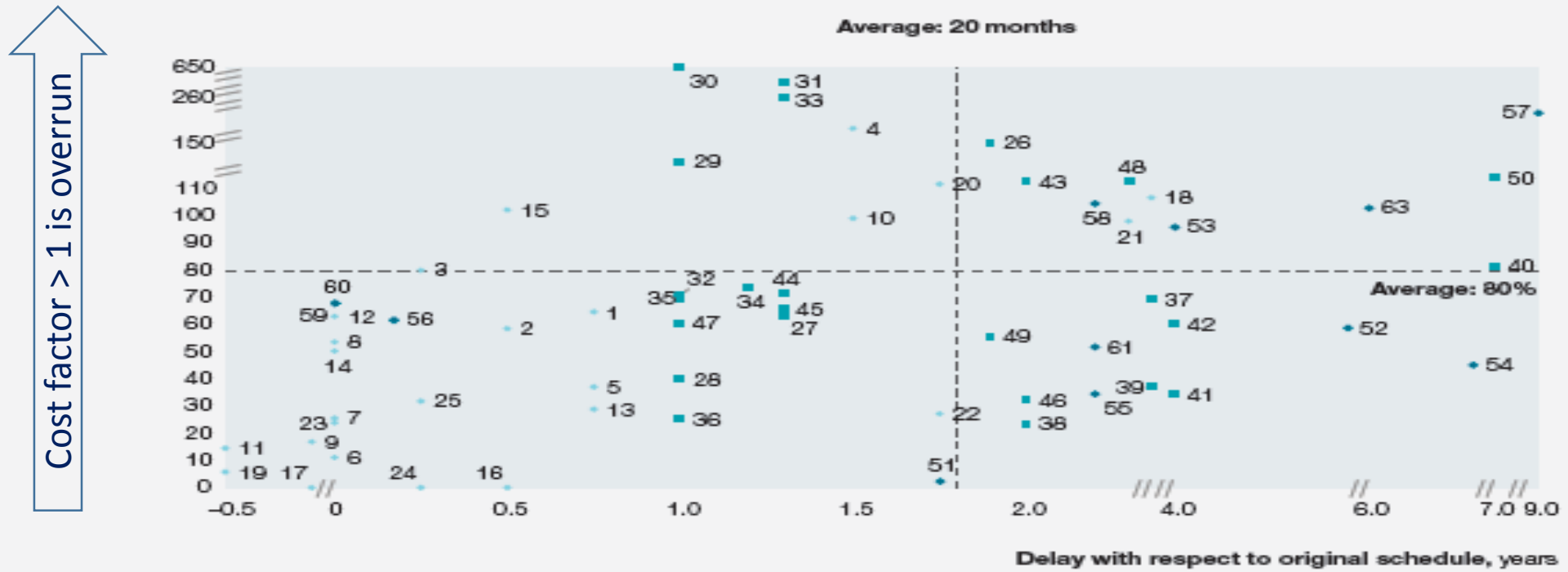
98% of mega (complex) projects incur cost overruns or delays

Exhibit 2 **Ninety-eight percent of megaprojects face cost overruns or delays.**



Delay in year's

- 98% of projects incur cost overruns or delays.
- The average cost increase is 80% of original value.
- The average slippage is 20 months behind original schedule.

Source: Companies' public annual reports; IHS Herold Global Projects Database, November 19, 2013; press releases

Source:
McKinsey
"The construction Productivity Imperative"

June 2015

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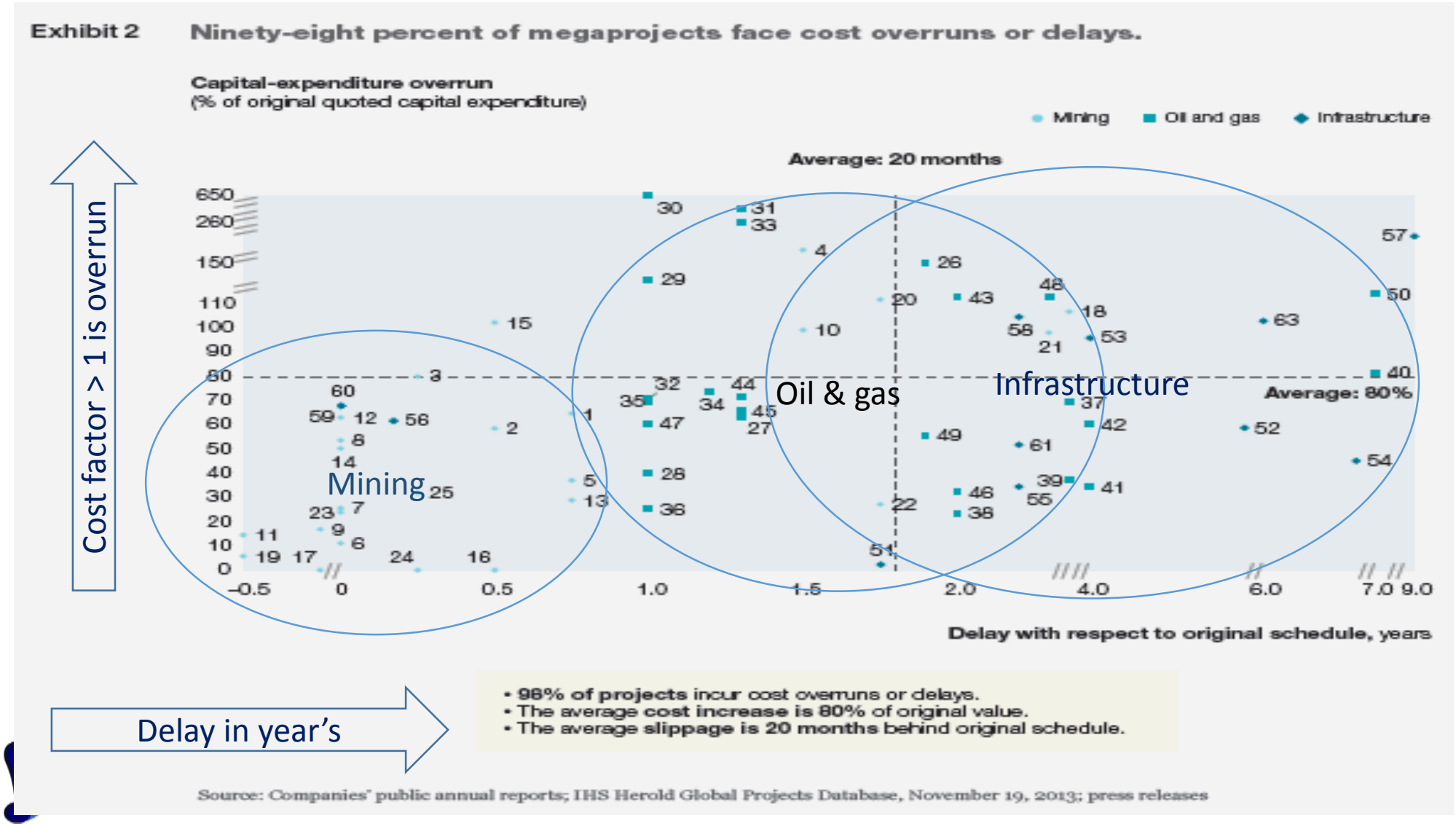
98% of mega projects (complex) incur cost overruns or delays - by sector



Source:
McKinsey
"The construction Productivity Imperative"

June 2015

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What does a schedule loss mean? What is the effect if a deadline is missed ?

Definition of a SCHEDULE RISK

Exposure to loss from a program not meeting its scheduled objectives.

Read more: http://www.businessdictionary.com/definition/schedule-risk.html#ixzz3jMgEdydk

I love deadlines; I especially like the SWOOSHING sound they make as they fly past

— Douglas Adams

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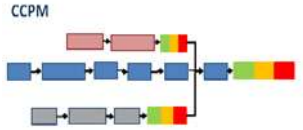
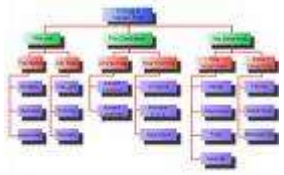
History of project scheduling





WBS

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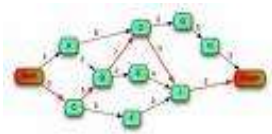
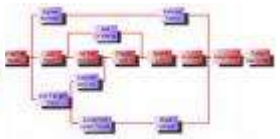
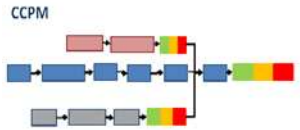




DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DU PONT

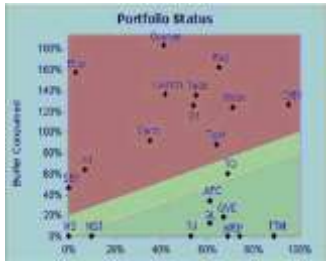
CPM



CCPM

Theory of Constraints

40-50 year gap



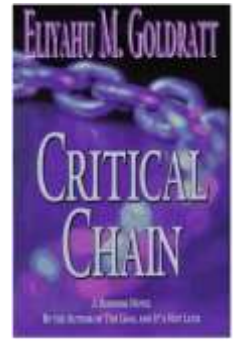
30-40 year gap

1911
Frederick Taylor

1920's
Henry L. Gantt

1950's
US Military
Du Pont & Rand Corporation

1996
Dr Eli Goldratt



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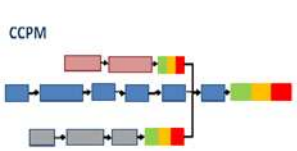
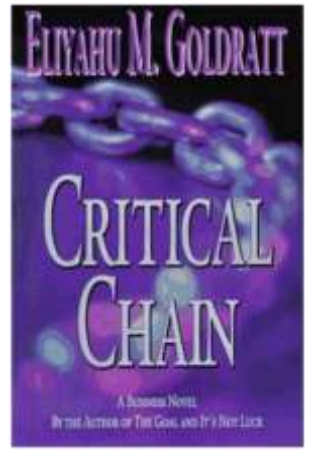


Critical Chain Project Management (CCPM)



- Pioneered in North Sea in 1990 – Statoil
- Critical Chain published in 1998
- Developed by Goldratt Institute & ToCICO community
- Single then multi project focused
- US Military (USAF) aerospace and telecommunications early adopters
- Not wide spread in construction – except Japan (Ministry of Works)

1. Short history of scheduling methods

Designed to deal with uncertainty and complexity and project management.

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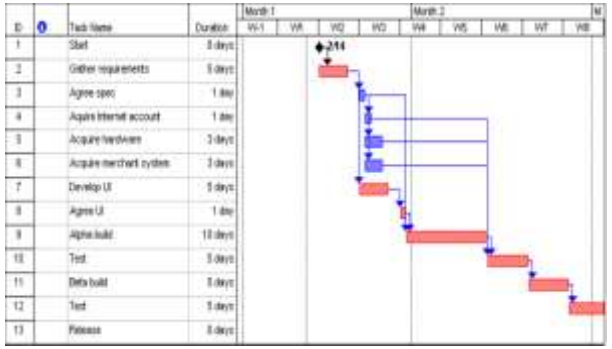
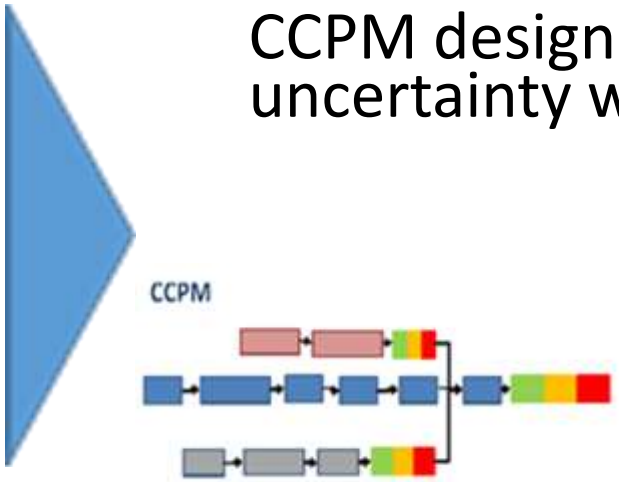
Critical Path (CPM) vs Critical Chain (CCPM)

CPM used to determine project length



CCPM designed to manage uncertainty with projects



CCPM features include:-

- Buffers to manage variability and complexity
- Necessary condition networks (backward logic building)
- Works in both single an multi-project environments
- Planning around resource limits (sometimes called constraints)
- Relay runner resource behaviour

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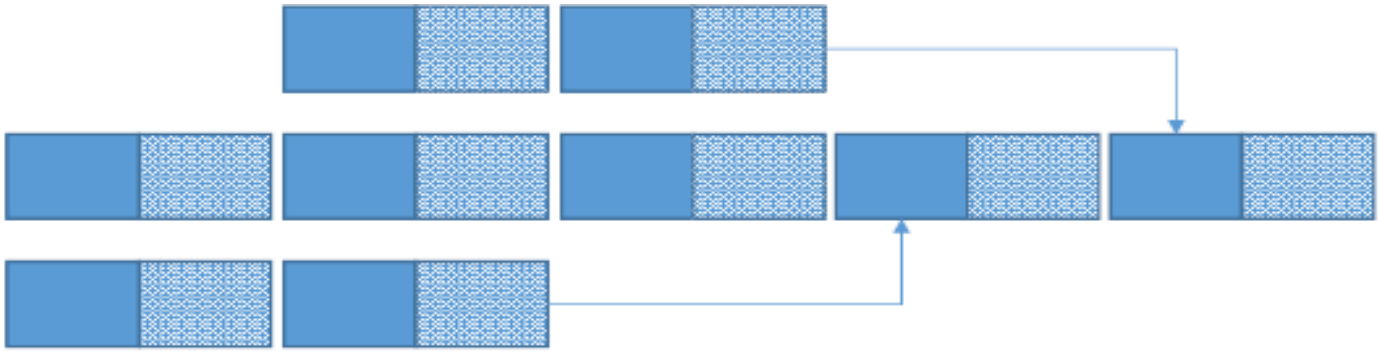
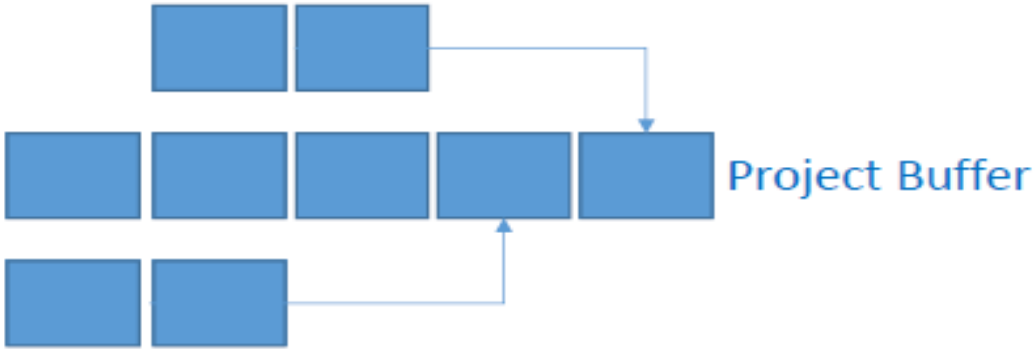
Assuming a robust Necessary Condition Network (NCN)

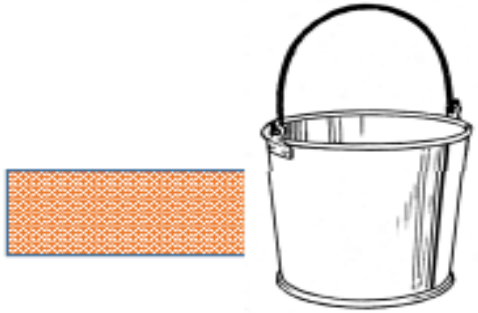
Start with schedule and aggregate safety

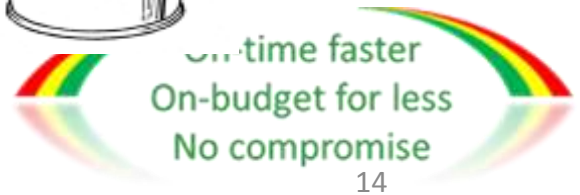


Typically 25% shorter

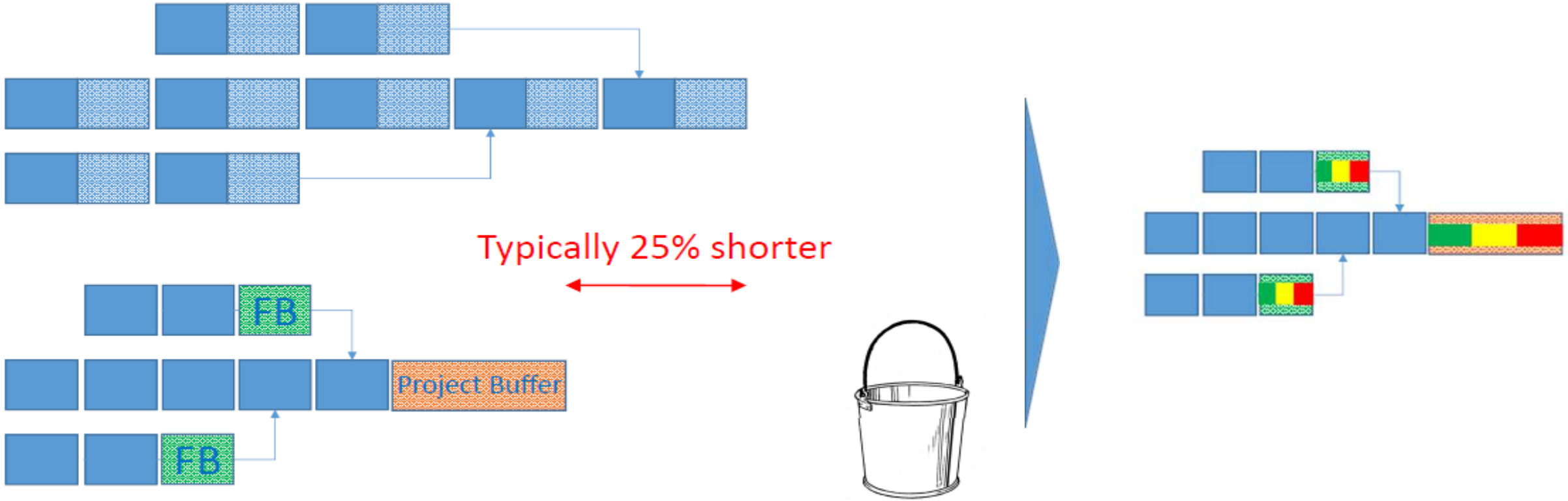


Project Buffer





Position safety in STRATEGIC buffers to protect duration



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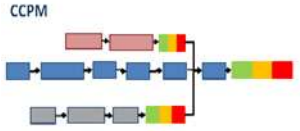
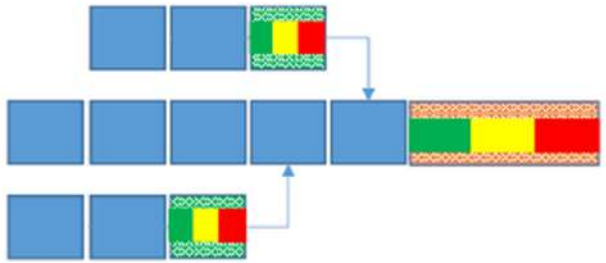
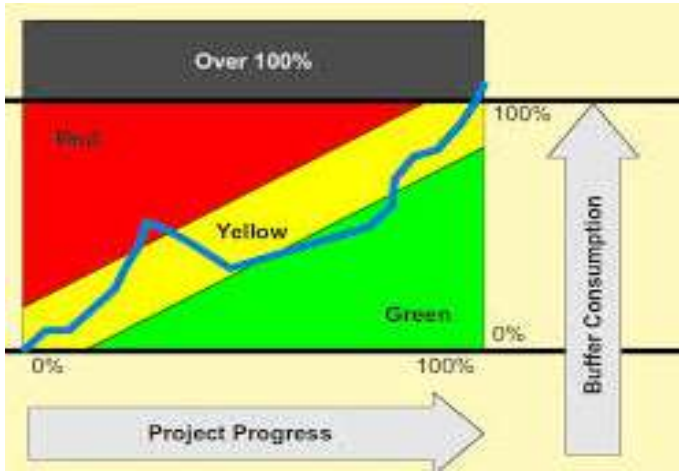


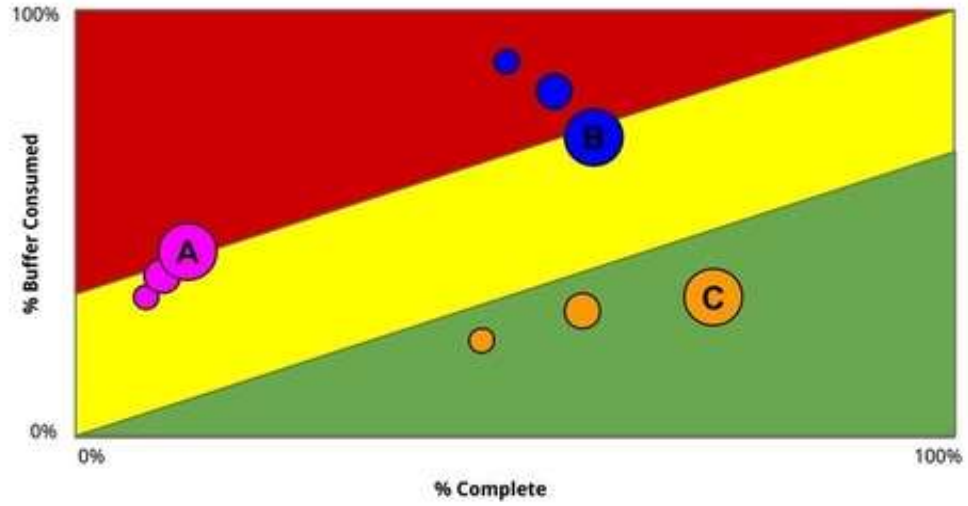
EXECUTION phase – management focus on buffer usage



Schedule risk view



Portfolio – executive view



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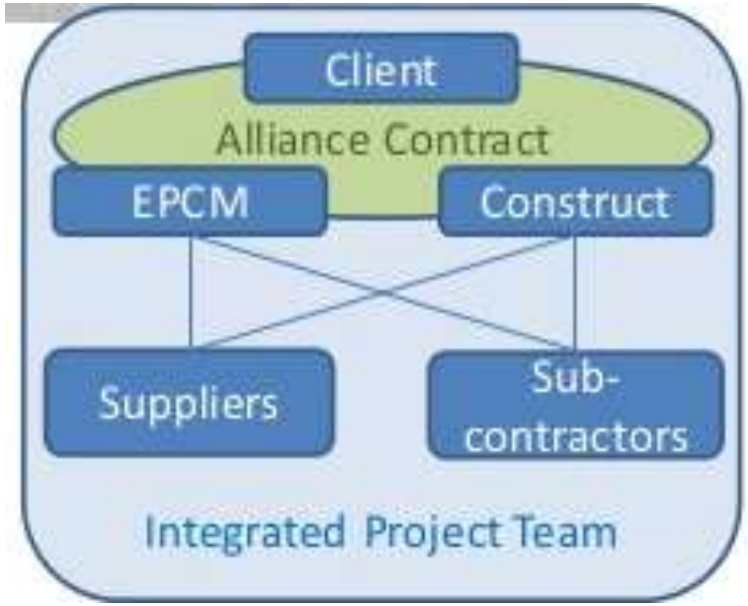
Project Alliancing

- Developed in the UK in early 1990's
- Australian Governments have used for major infrastructure, hospitals, road & rail

- Collaborative Selection & contracting
  - Client selects based on business capability and team member collaborative behaviour, rather than price
  - Commercials are aligned using alliancing payment structures. Everyone wins together or loses together.
  - Execution risk and allocation managed by team, based on best person to manage, AND best place to aggregate uncertainty

- Collaborative Project Team
  - Integrated Project Delivery (IPD) – less "command & control"
  - Working toward a common end - capability from the project.
  - Rapid project solving – all parties work together quickly to resolve
  - Fewer variations
  - *Client get the capability they want and need to solve business growth*



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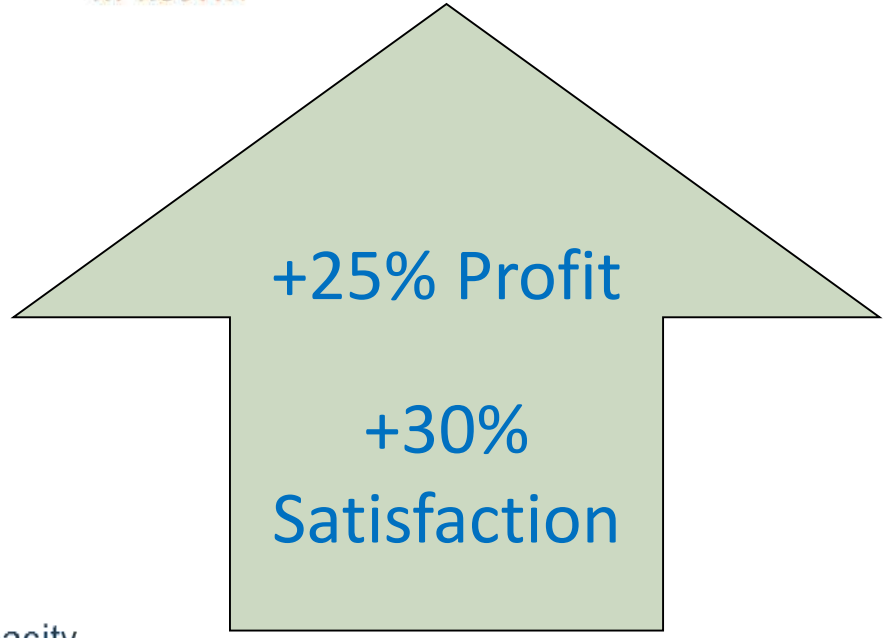
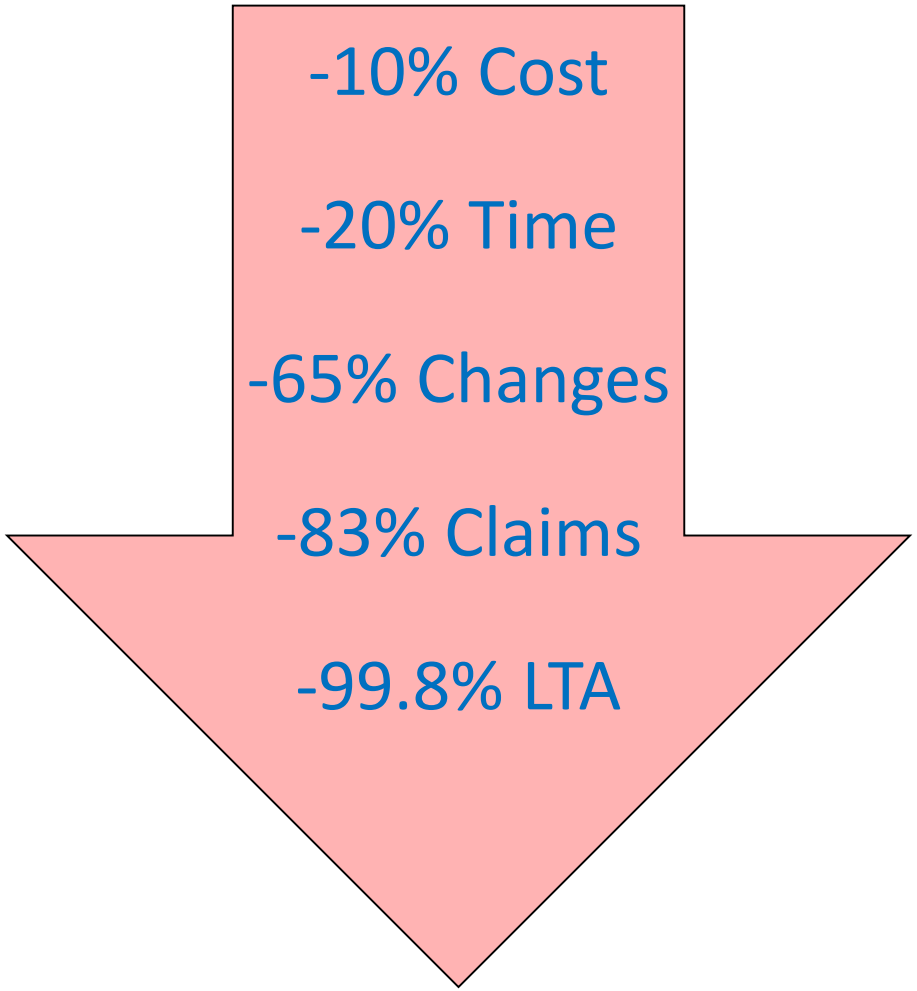
The Pay-off: 300 construction projects studied, those using collaboration got…

Construction Industry Institute®
THE UNIVERSITY OF TEXAS AT AUSTIN





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Collaboration - Critical Success Factors

- Aligning interests
- Ensuring “doing the right thing” for the project owner is also the “right thing” for your employer
- Behaviours + Selection + Contract
- Contract is at the heart of the agreement – not in the back-office
- Collective responsibility for overall project management
- Early selection of the team
- *Collaboration is necessary but not sufficient for successful projects*

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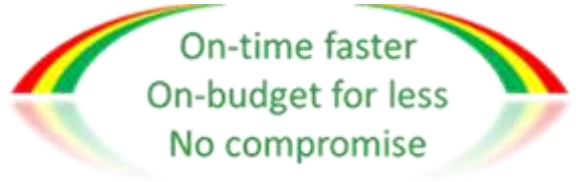

CCPM Case Studies

CCPM used around the world…

Source: Business Flow Flow

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Examples Critical Chain Project Management (CCPM)

-

Exepron Applied to Data Systems and S/W Integration

NeoGrid

Exepron's impact on Performance

- Source: www.Exepron.com

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Oil & Gas - Wheatstone

- Project turnaround – “Accelerate Wheatstone”
- Background FMC won $325 M in November 2011 – 65 pay items
  - Complex project out of control - Key executive “We do not know how late it is” - Aug 2013
- Team of 8 - 12 team members
  - Singapore, Malaysia, China, US, Norway
- FMC – silo’s, low PM skills, diverse cultures, measures not aligned
- Outcomes
  - P6 – 12,000 tasks – re-base lined
    - Vs 8,000 with –ve float
  - streamlined information flow
  - improved Stakeholder relations (CVX)
  - single priority point & portfolio boards
  - de-risking the manufacturing and delivery of
    - key high value components
  - developed scheduling & process for manifolds
  - buffer systems

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Project Progress – Variance Brick Wall – Based on latest Jutal recovery plan (Dated Mar.14)

Jutal Variance Brick Wall Based on latest recovery Plan dated Mar.14

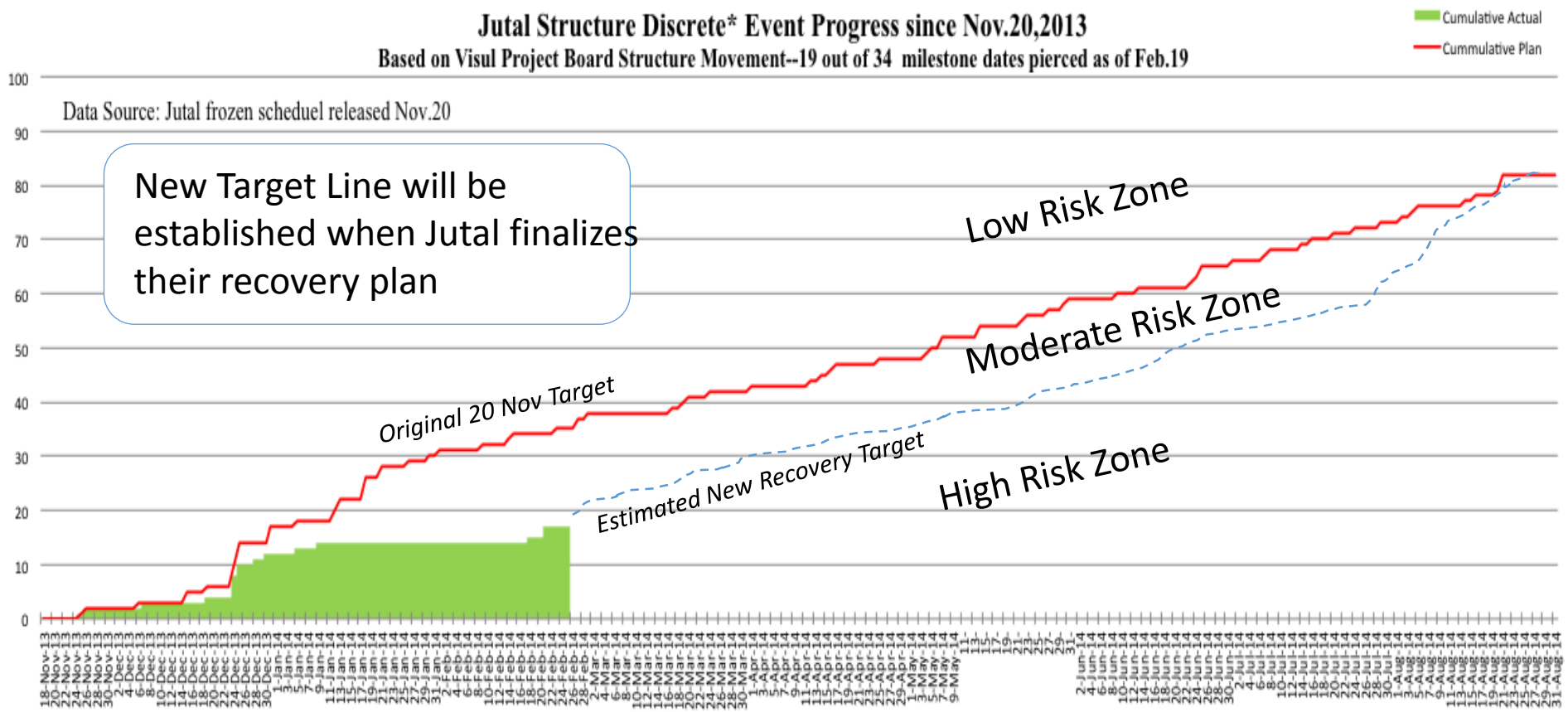
Variance = Percent Actual Done less Percent Planned(based on Mar.14 recovery schedule)

Level 3 Data Supplied by Jutal Apr.1

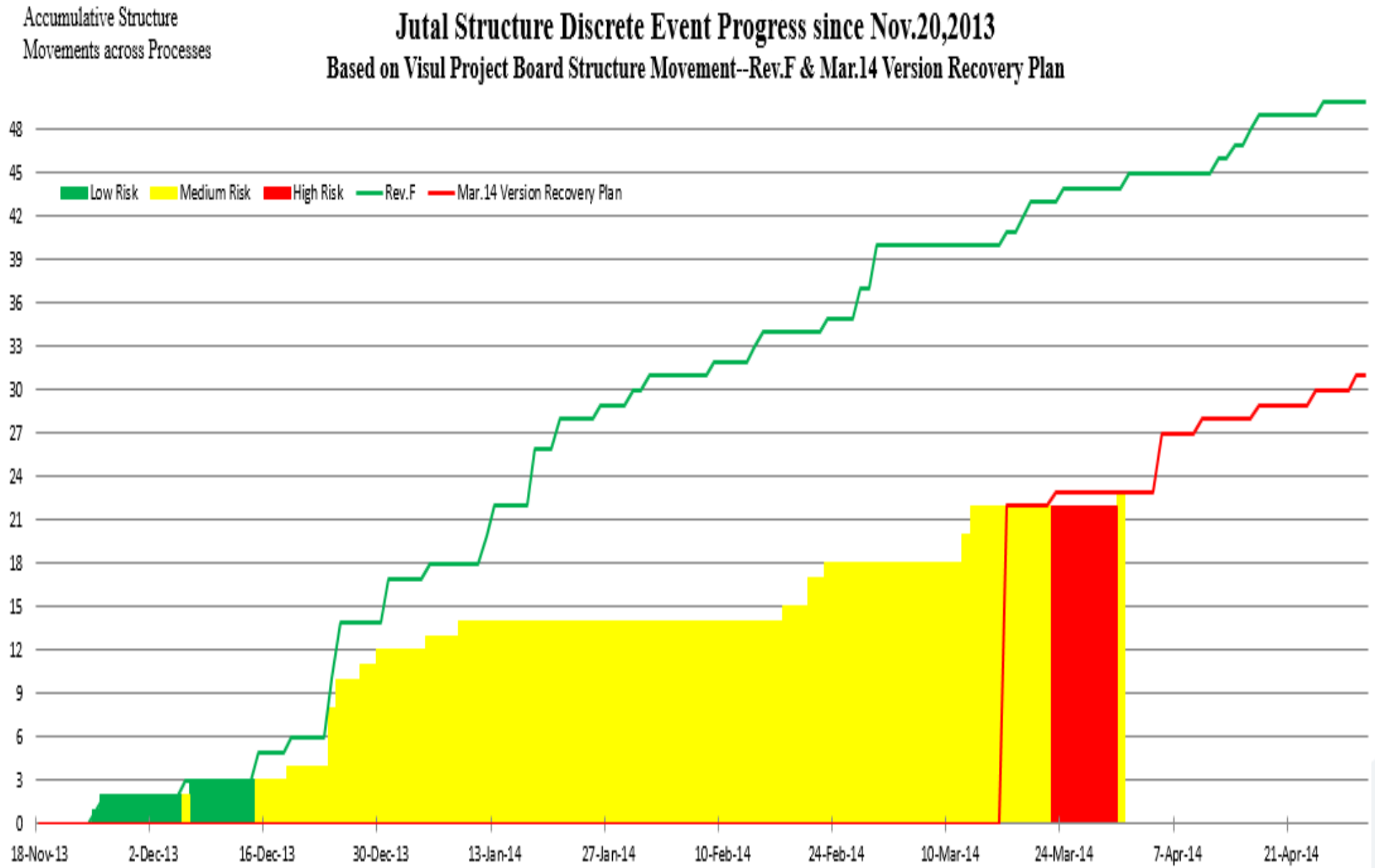
		Fab	Blast/Coat	Piping	Tubing	Top Asm	FAT	SIT	Load-Out	Immediate Challenges	Sceondary Challenges
DH IAG-1	Structure	Done	-1%	6%	7%			NA		2 Multibore Hubs, 9" gate valves	bolts, nuts, washers for 2" gate valves
	Mudmat	2%									
SH WST-1	Structure	Done	-9%	2%	-2%					2" SDSS Tee, 2" flange, 4" carbon steel Tee,	DOP drawings, bolts(M20X80, M16X60)
	Mudmat	1%									
SH WST-3	Structure	Done	-7%	-2%	-6%			NA		Multibore Hubs, 9" gate valves	bolts, nuts, washers for 2" gate valves
	Mudmat	1%									
MOL IAG-1	Lower Deck	Done	0%	-20%	-13%					Imperfect in KL 4-27, Tubing supports blasting/coating, hub supports blasting/coating	
	Upper Deck										
	Mudmat	3%									
EOL WST-1	Lower Deck	Done	11%	-1%	13%			NA		Finish Blast/Coat(top deck under 2nd coat touch up), tubing supports,hub supports	9" MGV
	Top Deck										
	Mudmat	30%									
EOL WST-3	Lower Deck	Done	11%	-1%	2%			NA		Finish Blast/Coat(top deck under 2nd coat touch up), tubing supports,hub supports	hub connector, 9" MGV
	Top Deck										
	Mudmat	1%									
Utility WST-2	Lower Deck	Done	8%	-1%	-3%			NA		Finish Blast/Coat(top deck under 2nd coat touch up), tubing supports,hub supports	9" MGV
	Top Deck										
	Mudmat	-9%									
Utility IAG-2	Lower Deck	Done	8%	-3%	0%			NA		Finish Blast/Coat(top deck under 2nd coat touch up), tubing supports,hub supports	hub connector, 9" MGV
	Top Deck										
	Mudmat	-8%									
PLR	PLR 24"-1	-10%	0%	5%				NA		Accellerate fabrication progress with more manpower from Jutal	Fll material
	PLR 24"-2	-7%	0%	-24%				NA			
	PLR 14"-1	1%	0%	14%				NA			
	PLR 14"-2	-13%	0%	-4%				NA			

0%	Green - Low Risk, Variance (V) >-2%
-15%	Yellow - Moderate Risk, V between -2% and -20%
-25%	Red - High Risk, V < -20%
Done	Process Complete

Project Health Metric – Structure Movement



Structure Movements are in yellow zone(medium risk) after SH WST-1 Mudmat movement into blasting chamber 1.



TOC3 Case study of BAE Systems Australia

LIF Program – MRO Environment

Rapid CCPM implementation and rapid results using EXEPRON

Source : Andrew Kay

EXEPRON
Collaborative Business Solution
TOC3

6 out of 6” first time around

- CCPM installed/operational in 9 Days
- 2 weeks to deliver first results
- First 6 Aircraft – all on time in accordance with program
- **A RECORD!!!**
- Some up to 43% less time
- 2nd aircraft delivered to customer 4 weeks early !!
- EXEPRON used from day 1

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Benefits Summary

- Early-as-possible selection increases commitment – both client and supply chain
- Outline bids based on capability (ie BOO to align over long term)
- Commercials and aligned with risk and reward allocated.
- Quicker problem resolution and communication between parties

- 95% on time (vs. >85% not on time with traditional methods)
- 20% - 50% faster cycle times
- 10% - 20% higher throughput (more projects per business units)
- Better synchronization
- Less Bad Multi-tasking

And much less burn out of Project Managers and their team?

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BREAKTHROUGH
Project Management

Higher ROI for the client
Higher profit for the supply chain

Aligned project team, with shared financial interest in overall project outcome

Same project delivered on-time, faster, using less resource, and at lower cost

Critical-Chain Project Management

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QUESTIONS ?

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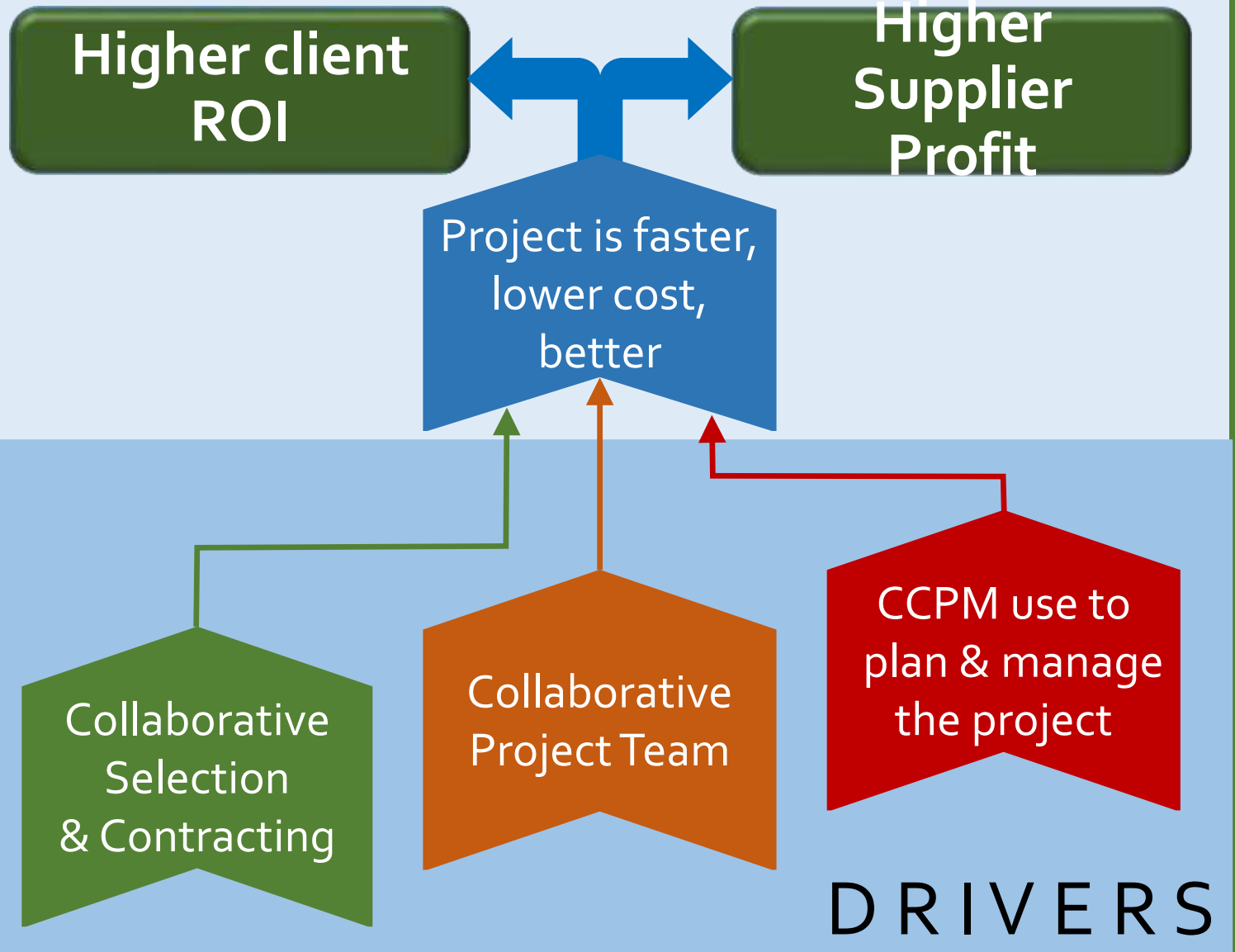
Questions backup ….

BREAKTHROUGH

On time in less time
On budget at lower cost
No compromise on scope or quality

PROJECT MANAGEMENT



BELIEFS

- Projects are inherently uncertain, and **cost and time uncertainty should be managed at the project-level**, not by individual suppliers/contractors
- A **collaborative project team** produces better results
- Traditional, fixed price or reimbursable, contracting discourages team collaboration
- **Key project suppliers should be rewarded in proportion to the project success -** making more or less less profit together, and
- **Blame and fault are irrelevant.** "One for all, all for one"

BREAKTHROUGH
Project Management

Planning & approval phase
- Setting the scope and financial limits –
Setting the rules of the game.

(aggregation of cost uncertainty for better decision making)

Execution Phase
-
Managing with the time & co-ordination limits
Playing the team game

(aggregation of time uncertainty for being decision making)

Higher ROI for the client
Higher profit for the supply chain

Aligned project team, with shared financial interest in overall project outcome

Same project delivered on-time, faster, using less resource, and at lower cost

Project Alliancing

Critical-Chain Project Management

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Complex Project and Critical Chain Project Management (CCPM) and Project Alliancing solutions:-

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What if you only implement some aspects of BPM?				
Collaborative Behaviours	Collaborative Selection & Contracting	CCPM	Comments	Risks and Downsides
☑	☒	☒	Can work if project not under pressure and things go well	Takes longer & costs more Suppliers can exploit trust & may feel pressure to resort to adversarial behaviours High stress environment – see below
☑	☑	☒	Can work well	Takes longer & costs more Problems can be hidden until they become large
☒	☒	☑	Can work where external suppliers are a small part of the project – rare in major capex or construction projects	CCPM can be used as a "fall guy" or excuse for poor performance. Suppliers have little commercial interest in project success
☑	☒	☑	Can work if project not under pressure and things go well	As CCPM only High stress environment – team members may have to choose between project success and commercial interests of their employer

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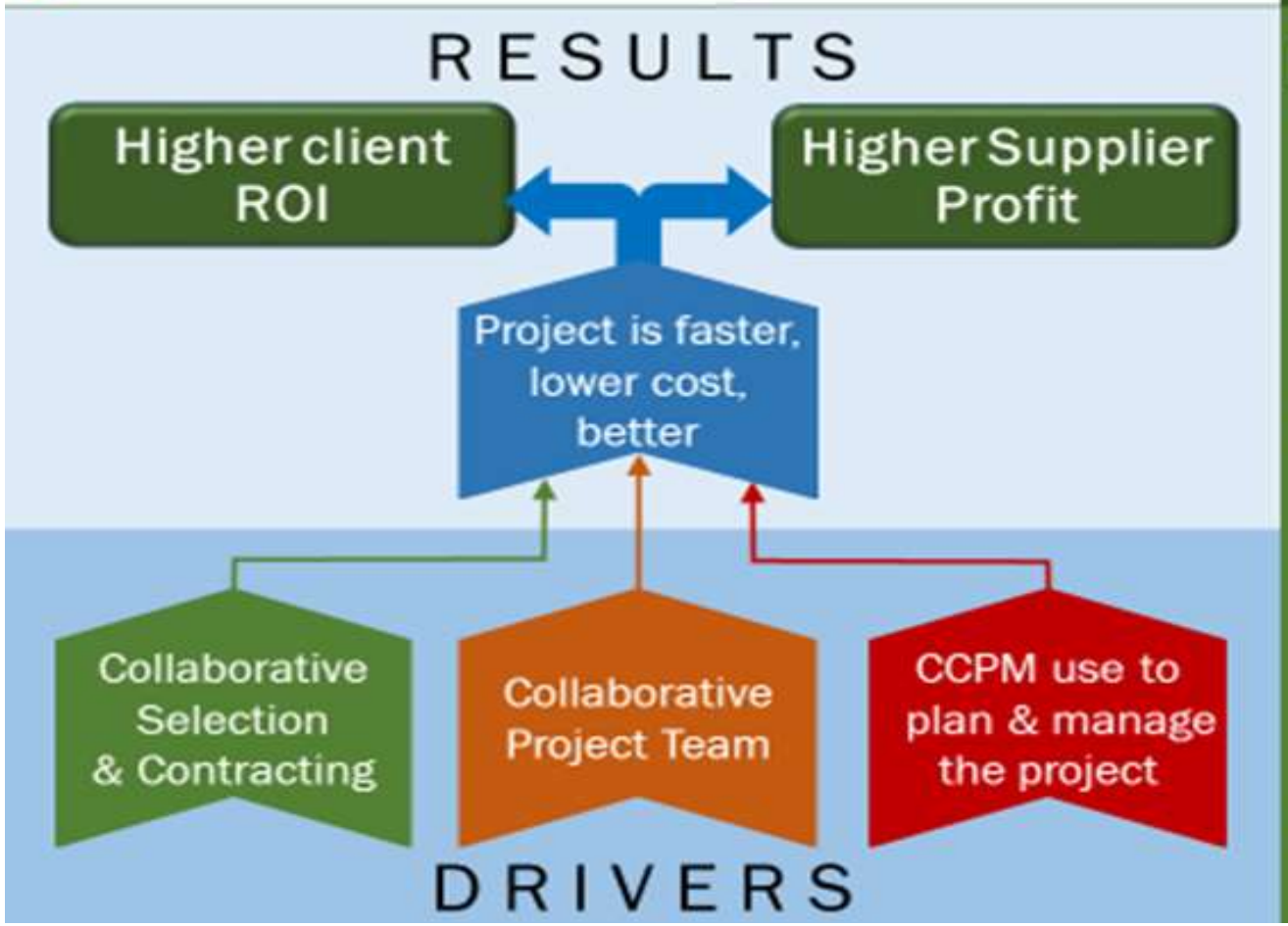
No compromise

BREAKTHROUGH PROJECT MANAGEMENT



On time in less time
On budget at lower cost
No compromise on scope or quality

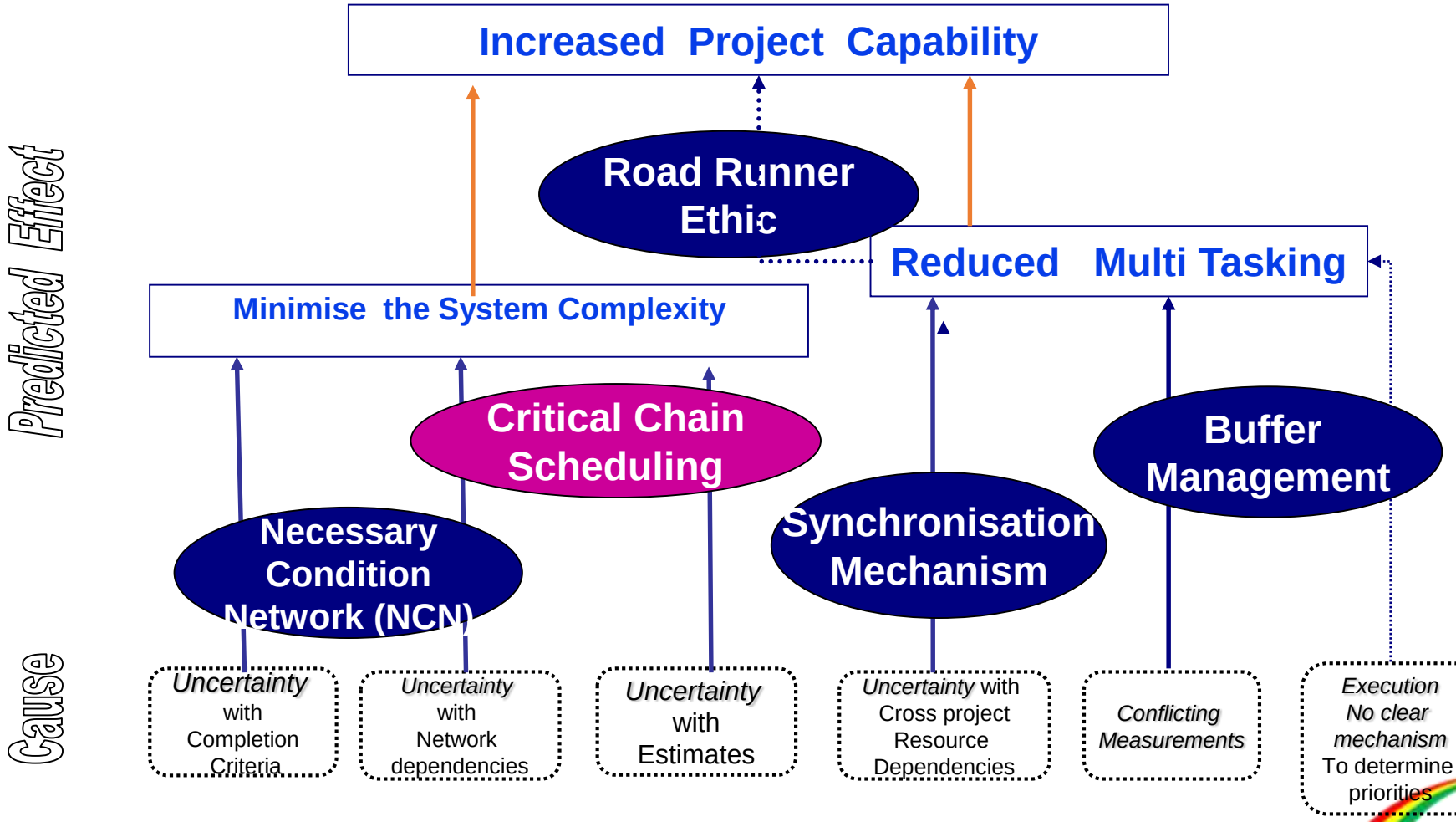
BELIEFS

- Projects are inherently uncertain, and cost and time uncertainty should be managed at the project-level, not by individual suppliers/contractors
- A collaborative project team produces better results
- Traditional, fixed price or reimbursable, contracting discourages team collaboration
- Key project suppliers should be rewarded consistently – making more or less profit together, and in proportion to the overall project success
- Blame and fault are irrelevant. "One for all, all for one"

Real Capacity
"Providing Focus"

On-time faster
On-budget for less
No compromise

CCPM Solution



On-time faster
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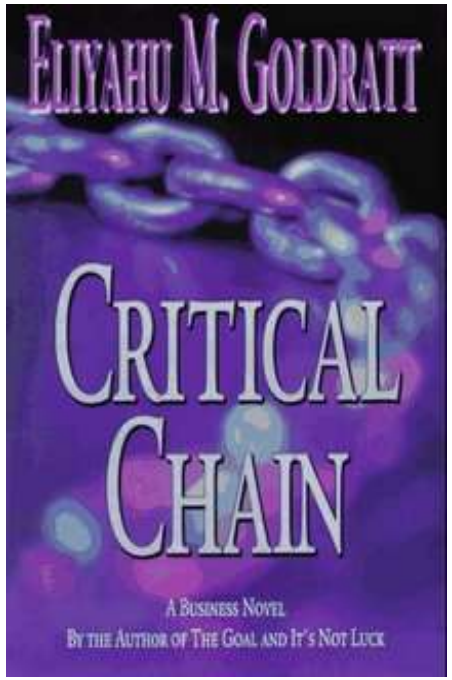
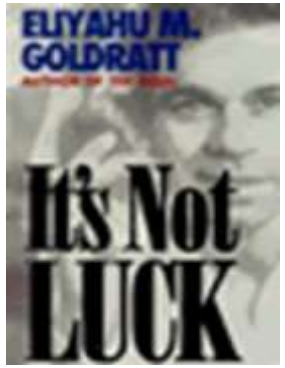
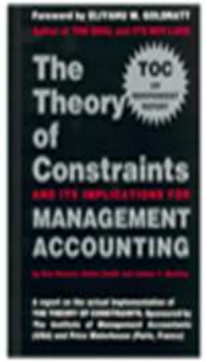
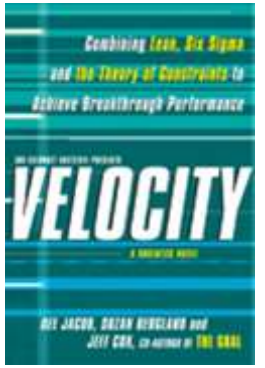
Real Capacity
"Providing Focus"

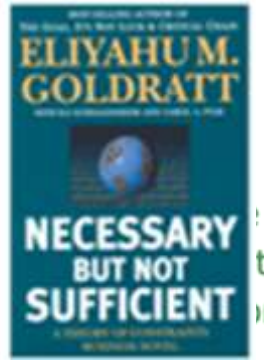
ToC and Eli Goldratt











Real Capacity
"Providing Focus"

faster
t for less
romise

Only 2 types of projects

- Olympic Stadiums or an Oil Well ?

- Fixed milestone or date

Value is released when operating

Real Capacity
"Providing Focus"

On-time faster
On-budget for less
No compromise