Project Controls Expo, Australia – 26th November 2019

Melbourne Cricket Ground, Melbourne

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Simon White

Project Controls Manager, BAE Systems

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Project Controls EXPO Melbourne, Australia

About the Speaker

Simon White – Delivering Reliable Repeatable Project Controls, BAE Systems

Originally an aircraft mechanic for C-130 Hercules and the F18-Hornet fighter jet, Simon White now ensures that the Aerospace Business Unit for BAE Systems has reliable, repeatable Project Controls.

He is passionate about 'evolution by enquiry', asking questions, and applying solutions that are fit for purpose, whether they be conventional or not.

He believes in breaking the rules, because if you always follow the process, you will never do anything different. And if you never do anything different, you will never change or evolve, so once in a while, breaking the rules is a must.

BAE SYSTEMS

Project Controls EXPO Melbourne, Australia

Critical Chain Project Management

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Project Controls EXPO
Melbourne, Australia

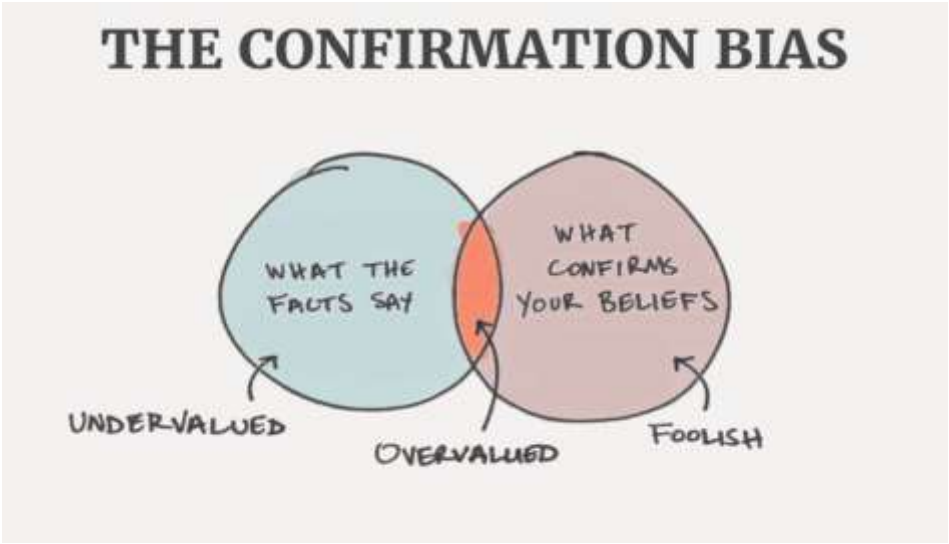
About the Topic

Critical Chain Project Management

Critical Chain is not 'the new Rock and Roll'. Nor is it a magic pill or a silver bullet.

Critical Chain is a relatively new methodology in the field of Project Management. It was developed and popularised by Dr. Elihayu M. Goldratt in his book Critical Chain (1997), which is written as a novel but outlines the methods used to ensure that projects complete on time.

The method is similar to Critical Path, in that it is a logic-based representation of the longest path of tasks to achieve project completion. The fundamental difference is the processes used to reach the Critical Chain, which focus far more on the human element, acknowledging the behaviour of people in the 'People, Processes & Tools'.


THE CONFIRMATION BIAS
WHAT THE FACTS SAY
WHAT CONFIRMS YOUR BELIEFS
UNDERVALUED
OVERVALUED
FOOLISH

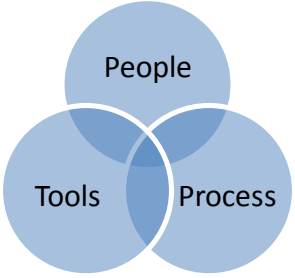
Earned Value Management Systems – The Facts

EV is a fundamentally sound control system,

When used appropriately, and applied diligently,

But does not suit all circumstances.

System of Project Control



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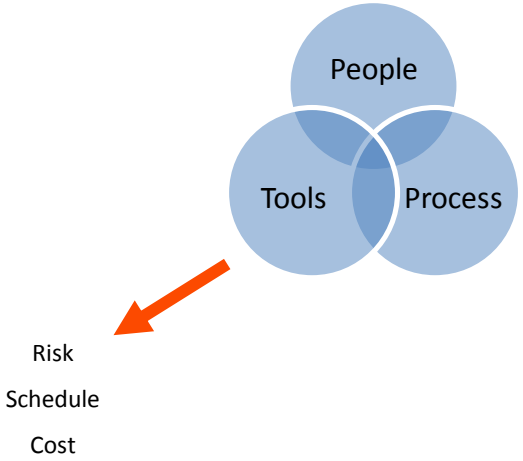

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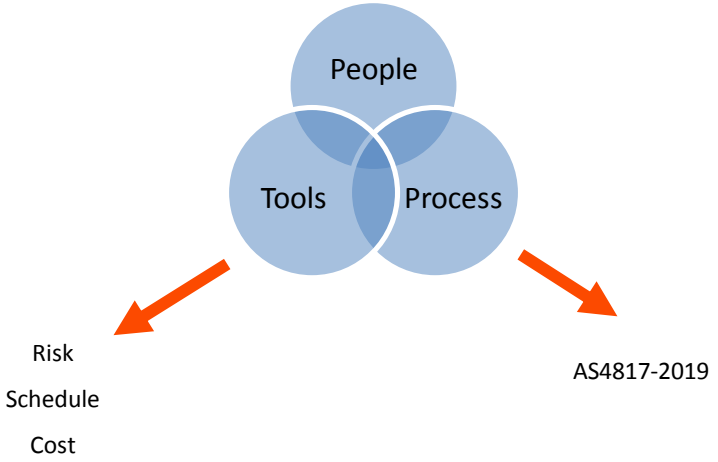

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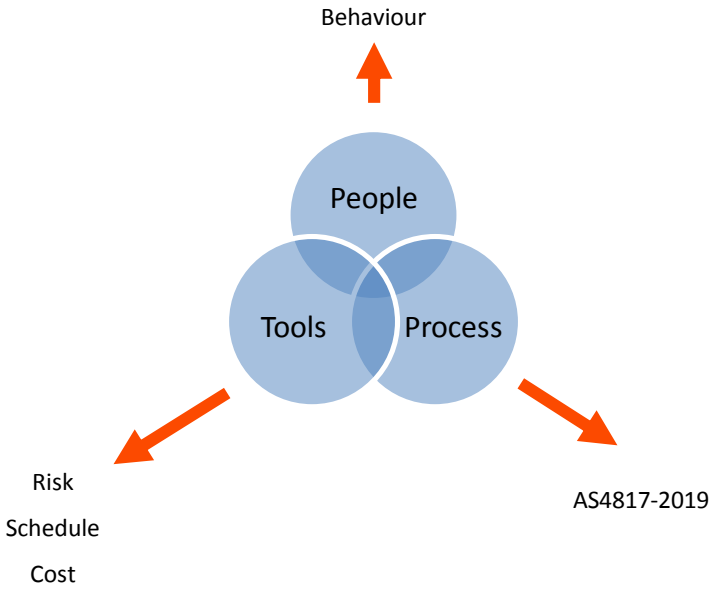
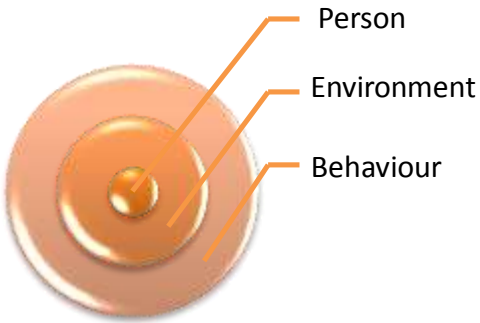


Behaviour and Measurement - People



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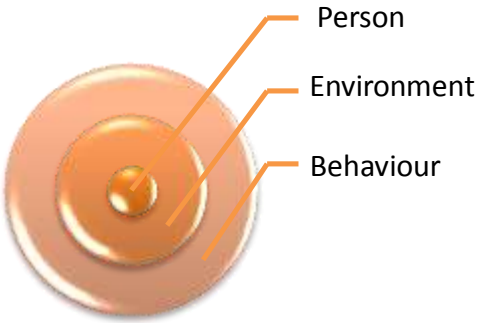
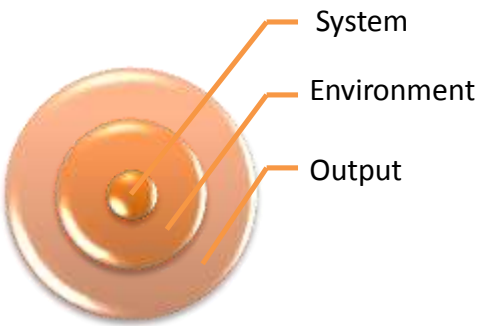


LEWIN'S EQUATION

$$B = f(P, E)$$

Behaviour and Measurement - Systems



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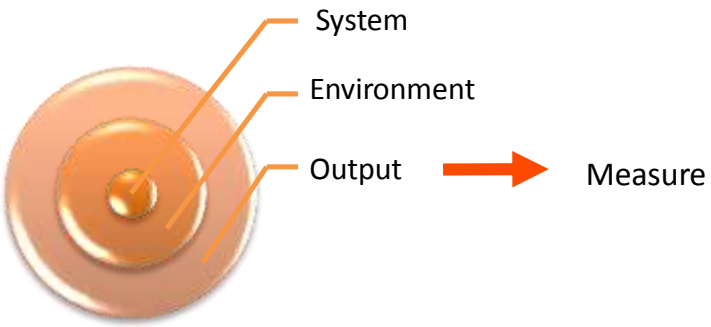

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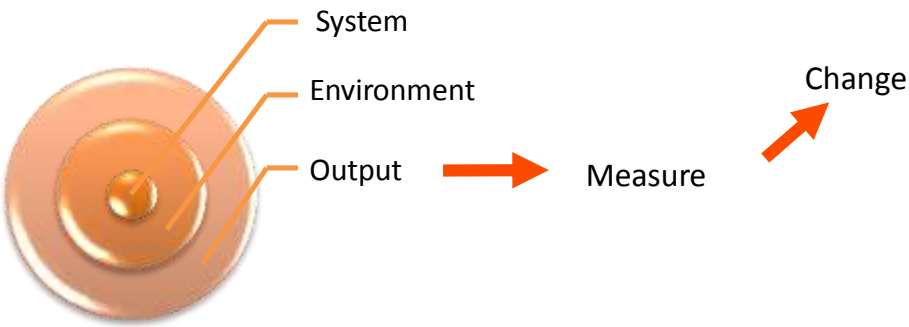

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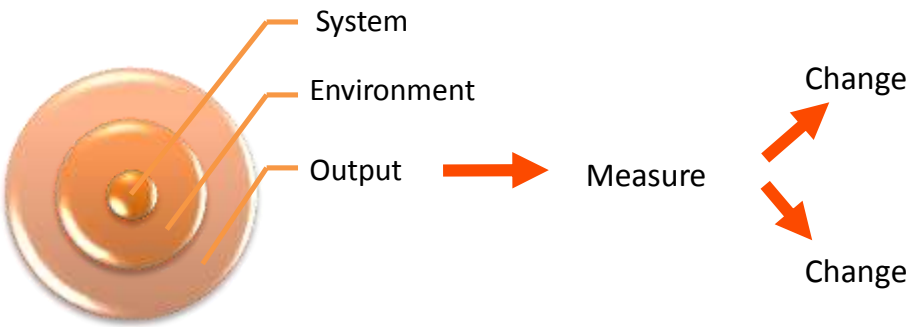

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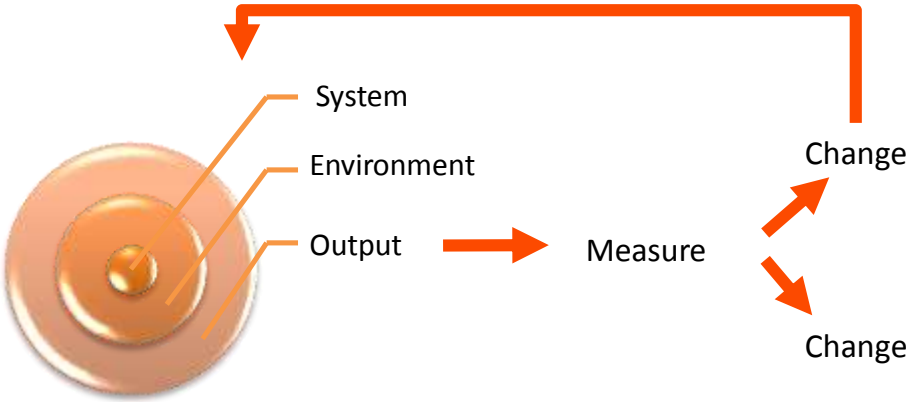

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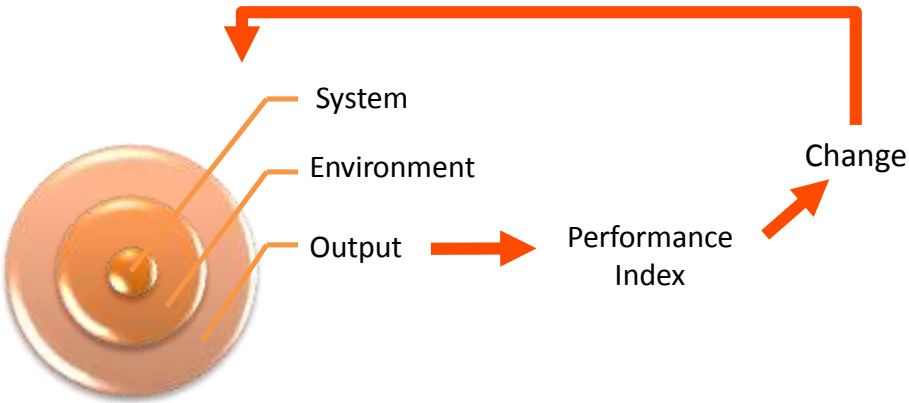

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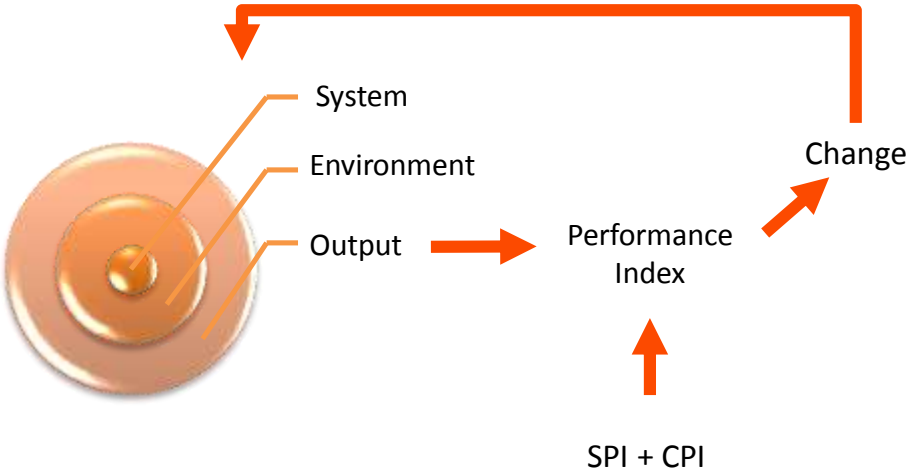
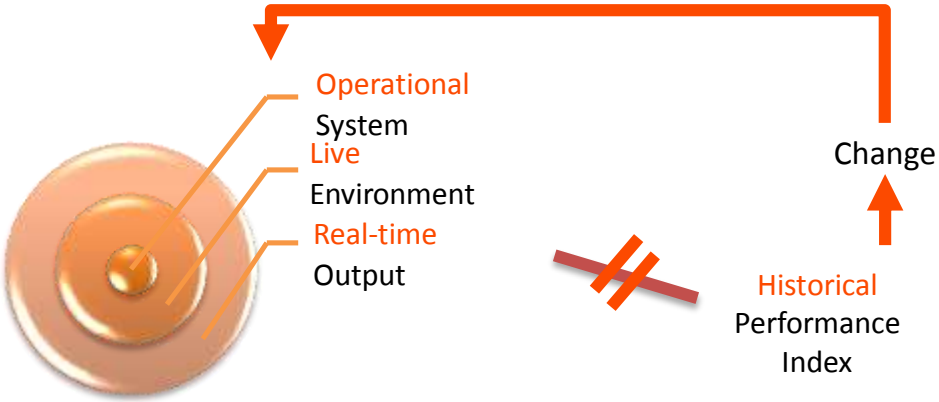


Behaviour and Measurement – A Conflict



Methodologies – what's my options?

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One Solution – Focus on your constraint

If you're failing to deliver?

If you have most inputs available?

And if you are NOT maximising your constraining resource at 100%?

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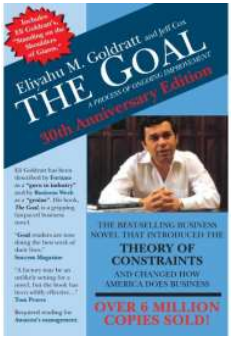
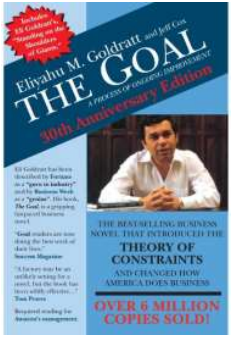
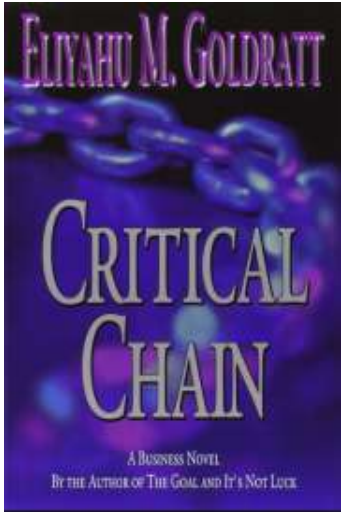
HOW you manage

Critical Chain – an extension of Theory of Constraints



Critical Chain – an extension of Theory of Constraints





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Cases of Critical Chain Project Management implementation worlwide

Industry	Project Type	Company	Results	Reference
Power	Engineering	ABB AG, Power Tech. Division	Throughput increase over 33% from 300 Bays to 430 Bays per year	www.realization.com
Power	Engineering	ABB Cordoba	Engineering cycle time reduced from eight months to three months.	www.realization.com
Power	Repair	ABB Halle	Number of projects completed per year increased from 42 to 54, >25%.	www.realization.com
Construction	Theme park design, install, and commission	Action Park Multiforme Grupo	Increased number of projects completed from 121 to 153.	www.realization.com
Telecommunication	ETO satellites	Airbus Defense and Space,Telecommunication Division	+33% in Throughput (installation drawings per week) & -85% engineering cost overrun	www.realization.com
Communications	Product development	Airgo Networks (Qualcomm)	Cycle time improved from 19 months to 8 months.	www.realization.com
Airport terminal administration and management	Various building projects	Airplan (Colombia)	2 pilot projects : Control tower project & project of terminal extension finished on time	www.tocpractice.com
Aluminum	Engineering	Alcan Alesa Technologies	Number of projects completed increased over 30%.	www.realization.com
Communications	Telecom switch design	Alcatel-Lucent	Increased throughput by 45% per person.	www.realization.com
Software	Software development	Alias Software	Cycle time reduced by 25% and project completions increased 17%	www.realization.com
Automotive	Product development	Alpine Electronics	Delivery dates compliance rate went from 22% to 88%	www.japan-toc-association.org
Communications	Customized software development	Amdocs	14% increase in revenue/man-month; 20% reduced cycle time	www.realization.com
Research	Research	Antarctic Support Associates	Project fully delivered on time VS 4 months late as anticipated (prior to CCPM implementation). Several thousand dollars saved and retained for ASA	www.criticalchain.co.uk
MRO	Helicopter Maintenance (For Flight Schools)	Army Fleet Support	33% reduction in CH-47 turnaround time. 55% reduction in UH-60 turnaround time. 8 aircraft returned to customer ($90M in cost avoidance). 18,000 sq ft of hangar space freed up ($2M in cost savings).	www.realization.com

Glass Manufacturing	Engineering (ETO + NPD)	Asahi Sensitivity	+23% throughput (number of projects completed per month). Overtime rate reduced by 35% , +50% increase in revenues with $50M in profits	www.realization.com
IT	IT installation	Avnet (Hitachi Data Systems)	Remote site installation time reduced by 54%	www.exepros.com
Manufacturing	Boiler installation	Babcock	Actual versus planned went from +200% to -20%. Between 20% and 35% reduction of manhours. 40% reduction of cycle time	www.torpractice.com
Aerospace	Aircraft manufacturing	BAE/ RAAF	Reduction of TAT (TurnAround-Time) by 45%	www.exepros.com
Building	Civil Engineering	Balfour Beatty	Project delivered 9.5 weeks earlier than estimated, which was 45 weeks earlier than actually contracted (the contracted delivery date was the client's deadline) - in spite of increased scope of work.	www.goldratt.co.uk
Resource	Engineering	BHP Billiton	25% reduction in hours needed to complete project and project finished three weeks early.	www.realization.com
Aerospace	Engineering	Boeing (Military)	Reduced required wing assembly time by 50%.	www.goldratt.com
Aerospace	Design and assembly	Boeing Space & Intelligence Systems	Doubled throughput and decreased cycle time by 28%.	www.realization.com
Aeronautics	Training System	Boeing T45	Projects finished 1.5 months ahead of schedule. Hardware/Software integration finished 32 days ahead of schedule 20% cost savings in design development phase.Realized additional $12M in ECP work.	www.realization.com
Aerospace	Engineering	Boeing Wing Assembly	On schedule, under budget. Reduced required wing assembly time by 50% (F-22).	www.goldratt.com
Machine manufacturing	Packaging line development	Bosch Packaging Systems	100% on-time delivery. +27% turnover. 30% cycle time reduction for projects >2500 hours	www.japan-toc-association.org
Communications	IT Professional Services (eg: website)	Bovine & Co (Rapid Solution Group)	Due date performance improved by 30%, lead times reduced by 25%	www.realization.com
Energy	Cleanup	BP Oil	Saving of over $700 million with accelerated project and production required to meet project needs.	www.pinnacle-strategies.com
Power	Engineering	C.N. Conestoc	Increased due date performance from 60% to 95%	www.realization.com
Software	Flight simulation systems	CAE USA	Reduced cycle times by two to four months, with a $37 million increase in the number of profitable programs.	www.goldratt.com
IT	IT	Caesar	95% of projects on time.	www.tocico.org
Construction	New hospital facility	California Department of	Built and opened new mental hospital in 6 months that other approaches failed to do in 12 months.	www.vectorstrategies.com

Software	IT	Celus Group	Increased completion of SAP projects from 15 to 20 per month	www.realization.com
Power	Engineering	Central Nuclear Almaraz Trillo	Increased number of projects completed from 19 to 24-30 per month.	www.realization.com
Gate and Access Automation	Engineering R&D	Centurion Systems	After 3 years of CCPM. Number of projects completed multiplied by 6 with same team	www.leopinion.com
Automotive	Product development	Chrysler	Cycle time for prototype builds reduced from 10 weeks to 8 weeks.	www.realization.com
Health Care	New Product Development	CIBA Vision	Project execution synchronized across multiple countries to get it in control and on track to deliver on time	www.realization.com
Iron ore mining	Truck overhauls	Cliffs Natural Resources Michigan Operations	Overhaul duration reduced by 67%	www.stacksassociates.com
Financial services	Software development	Confluence UK	95% of projects on time	www.criticalchain.co.uk
Building	Bank construction	Constructora Velarde	Triple revenues in 2 years. 88% on-time delivery	www.tocico.org
Audio & video consumer electronics	New Product Development	Crystal Acoustics	20% reduction in time-to-market	LinkedIn - Crystal Acoustics
Building	SAP Implementation	Daiwa House	2011 Results after 1st implementation : 28% cycle time reduction for SAP module implementation 2015 Results after 4 years CCPM : +160% of completed projects per year - compared to 2011. >25% time on project duration for 28% of projects. Almost all projects are delivered on time.	www.realization.com
Biotechnology	Engineering	Danisco (Genencor)	Increased from 20% projects on time to 87%.	www.realization.com
Aerospace	Repair	Delta Air Lines, Inc.	25% increase in engines produced per year; 30% reduction in engine turnaround time	www.realization.com
Pharmaceutical	Product development	Dr. Reddy's Laboratories	85% increase in projects completed in first 12 weeks; 75% increase in new product launches year over year.	www.realization.com
Energy	Installation	Duke Energy	Doubled throughput in 3 months	www.realization.com
Semiconductor	Design and manufacturing	e2V Semiconductors	Cycle time reduced from 38 months to 23 months	www.realization.com
Communications	Network design and installation	eBRoom	On-time delivery improved from 75% to 95%+. Average cycle time was reduced from 70 days to 30 days.	www.realization.com
Communications	IT	eBRoom	From 40% to 90%+ of projects on time; lead time reduced from 130 days to 30 days.	www.tac-goldratt.com

Defense	Electronics	Elbit Systems	Within the Test Equipment department, 78% of on-time or <1-month delay delivery	www.tocpractice.com
Pharmaceutical	Development of Document Management Systems	Eli Lilly and Co	Projects schedule up to 12 months, reduced to 4 months	www.pmiorlc.org
Pharmaceutical	Product development	Eli Lilly and Co	On-time delivery of 100% with Critical Chain versus 60% with traditional project management	www.prochain.com
Refrigerator Compressing Manufacturing	Product development	Embraco	+100% throughput in 4years (number of completed projects per year) & 11% lead time reduction	www.realization.com
Aerospace	MRO	Embraer	Aircraft Turn Around Time cut by more than half (from >10 weeks to 5 weeks). Increase of mechanic's productivity by 70%	www.marris-consulting.com
Construction	Manufacturing plant	emcocables	Reduced 11-month average project duration to 7 months. Increased revenue by 55%, received 4 months earlier	www.realization.com
Construction	TGV station	Eiffage	€ 5 million penalty avoided	www.realization.com
Manufacturing	Product development	Emmerson	100% on-time delivery. 75% cycle time reduction	EM Strasbourg 2016 TOC conference
Measurement instrumentation	R&D	Endress + Hauser	+270% throughput, 60% higher reliability	www.a-dato.com
Aerospace	Helicopter manufacturing and maintenance	Erickson Air-Crane	Increased projects on time from 35% to 85%	www.realization.com
Medical	Increase of capacity	Erlanger children's hospital (USA)	Unit net income increased by 8%. $2.8 million-unit expansion project avoided.	www.eszpirit.com
Energy	Engineering	FMC Technologies	50% reduction in test and final assembly time.	www.pinnacle-strategies.com
Military	Repair	French Air Force	Returned two out of five aircraft to Air Force (€ 300 million value); 15% cycle time reduction, 15% increase in output with 13% fewer resources; 22% reduction in support shops' cycle time.	www.realization.com
Biotechnology	Biotechnology Plant Engineering	Genencor	15% cycle time reduction, 15% increase in output with 13% fewer resources; 22% reduction in support shops' cycle time.	www.realization.com
Public Institution	Efficiency improvement	Guarantee Fund Lithuania	95% reduction of pending applications. Application lead time reduced by 88%	www.tocico.org
Construction	House construction	Habitat For Humanity	A 4-Bedroom House assembled in 3 hrs 44 min & 59 sec in NZ (VS previous record of 4 hrs 39 min 8 sec in Tennessee) https://www.youtube.com/watch?v=eHRBeQbrqpo	www.criticalchain.co.uk
Durable goods	Product development	Hamilton Beach Brands, Inc	Increased from 34 to 52 new products in first year, 70+ in second year with no increase in head count	www.realization.com

Semiconductor	Plant construction	Harris Semiconductor	Began full high-tech production in 13 months, instead of 54-month industry norm.	www.goldratt.com
Consumer goods	Product development	Heineken, Spain	20% faster time to market. Improved projects on time from 60% to 98%.	www.realizeit.com
Data Security and Lossless Compression IP cores	Software integration	Helion Technologies	40% increase in IT integration Throughput in 4 months. 87% of projects finished on time	www.exepron.com
Aerospace	MRO	Helkoria	Went from 20 aircrafts/year to 40/year. Reduction of Turn Around Time by 52%	www.exepron.com
Consumer goods	Product development	HP Digital Camera Group	Improved new products from 6 in 2004 to 15 launched in 2005.	www.realizeit.com
Semiconductor	Engineering	Innoca Semiconductor	25% reduction in cycle time, from 84 days to 64 days.	www.realizeit.com
Aeronautics	Aircraft MRO	Israeli Aircraft Industries	From a 3-month TAT per Aircraft Check D Visit to a 2-week TAT	www.criticalchain.co.uk
Manufacturing	Product development	Johnston Sweepers Ltd.	80% on-time delivery	www.tocpractice.com
Building	Bridge building	Jantzo	On Design Department : Due Date Performance increased by 65%, overtime reduced by 28%, subcontractor costs reduced by 40% and CT reduced by 50%	www.tocpractice.com
Building	Building construction	Kimly Construction Pte Ltd	30% reduction in confidence cycle, better alignment of departments & subcontractors involved in various project stages, ability to assess the impact of potential changes	GoldrattInstitute
Consumer goods	New Product Development	La Fabel	Out of 74 on-going projects, 6 are running late	www.exepron.com
Building	Shipbuilding	Larsen & Toubro Shipbuilding	28-month project instead of 33-month provision, 5-month delay recovered.	www.realizeit.com
Energy	Design and manufacturing	LeTourneau Technologies Inc.	Reduced design and engineering from 15 months to 9 months, production engineering from 9 months to 3 months.	www.realizeit.com
Building	27-floor building construction.	Lithuanian building company	27-floor building construction, running late with due date several times postponed, came back under control according to schedule, delivered a month before planned.	www.exepron.com
Aerospace	Engineering and assembly	Lockheed Martin	Cut aircraft full finish time by 37% without reducing scope.	www.goldratt.com
Aerospace	IT	Lord Corporation	Found additional 60% capacity without hiring people	www.vectorstrategies.com
Semiconductor	Design	LSI Logic	Went from major tool releases were always late to released on time for three years in a row	www.realizeit.com

Telecommunication	Production realization	Lucent Technologies	without additional resources, more than tripled development project capacity (5 to 17). Reduced new product introduction intervals by 50%. 100% of projects completed ahead of schedule +30% revenue.	www.goldratt.com
Aerospace	MRO	Lufthansa Technik Maintenance International	TAT decreased by 15-20%, mechanic's utilization rates increased by 45%	www.realization.com
Medical	Transformation and compliance with new technology and	Maasstad Ziekenhuis Hospital	Within 6 months, number of finished projects/month multiplied by 2, projects lead time cut by half and 95% of projects delivered on time, scope and budget	www.tocico.org
Advertising	Advertising Product Development	Marketing Architects	+66% of completed projects in a time-period	www.realization.com
Medical	Product development	Medtronic	Improved software release intervals from 8 months to 9 months to every 2 months. Schedule slips on device programs cut by 50%.	www.realization.com
Medical	Product development	Medtronic, Europe	Reduced project cycle time from 18 months to 9 months. On-time delivery increased to 90%	www.realization.com
Electrical test instruments	New product development	Megger	Project average overrun went from 74% before CCPM implementation to 16% after CCPM implementation	www.tocpractice.com
Watch manufacturing	Mold engineering development	Morioka Seiko Instruments Inc.	87% Due date performance in mold design & production	www.beingmanagement.com
Textile	Capacity expansion	Nakoda	A scheduled 14-month project expected to be finished in May 2013, project finished in January 2013 (10-month duration)	www.realization.com
Insurance	IT	Nationale Nederlanden - Groupe Life	Due Date Performance went from 52% to 82%	www.tocico.org
Supply Chain	Data Systems and S/W integration	NeoGrid	25% improvement in Time and Material Cost Recovery	www.exepron.com
Consumer goods	Sales	Oregon Freeze Dry	Increased number of sales projects completed per year from 72 to 171.	www.realization.com
Glass	Plant engineering	Owens-Illinois	Decreased cycle time from 6 months to 2.5 months.	www.realization.com
Health Care	Emergency room in hospital	Oxford-Radcliffe Hospitals, UK	Increased patients through emergency room from <70% within four hours to 100%, while patient load grew by more than 25%	www.tocinternational.com
Pharmaceutical	Product development	P&G Pharmaceuticals	Increased projects completed per quarter from five to eight, and on-time rate from 55% to 90%.	www.realization.com
Shoe producer	New Product Development	Plasticmoda	On-time seasonal delivery for new models went from 37% to 78%	www.exepron.com
Aeronautics	MRO	Pratt & Whitney	Completed additional three months work without expediting or increasing costs 75 % of projects completed on schedule & under budget. Reduction of multitasking	www.goldratt.com

Financial services	Network delivery	Radianz	Project performance has gone from less than 20% to greater than 70% of projects delivered on time and to original scope.	www.criticalchain.co.uk
Rail	Repair	Railcare Wolverton, UK	100% on-time delivery. Increased from one project at a time to three.	www.realization.com
Marketing	Marketing/Publishing Support	Rapid Solutions Group	On-time delivery improved by 30% Lead times reduced by 25%.	www.realization.com
Defense	New Product Development	Raytheon	Ontime deliveries, cost avoidance, reduction in project duration, etc.... example of Tracor Software : duration reduction, schedule went from 71 days to 24. $1.8M cost avoidance	www.raytheon.com
Manufacturing	Engineering and manufacturing	Rex Materials Group	Lead time down from six weeks to 10 days.	www.cmg-tec.com
Communications	Product development	Ricoh	New teleconference system (P3000) delivered on-time without any compromise on the initial design	www.bridgemanagement.com
Aerospace	Product development	Safran Group / Sagem	Reduced the average product development lead time of the entire portfolio by 50%.	www.aumis-consulting.com
Aerospace	Factory plant layout modification	Safran Group / Sagem	Total transformation of shopfloor layout. >80% of machines moved. Initial estimate 3 weeks, CCPM result 8 days with 4 hours of baffle earned.	www.aumis-consulting.com
Aerospace	Product development	Safran Group / Sagem	Recovery plan for an overdue critical new product development programme. 300 people, 6 facilities. Project deliverables promised to client recalculated and honoured.	www.aumis-consulting.com
IT	Product Development	Seagate Technology	Cut New Product Development durations by half	www.mettlebridge.com
Construction	House building	Shea Homes	Reduced cycle time by 40% from 91 days to 56 days.	www.vectorstrategies.com
Power	Engineering	Siemens Generator Engineering	Went from 110 to 128 projects completed, with 30% increase in throughput.	www.realization.com
Power	Engineering	Skoda Power	30% increase in casings per year. Went from60% to 90% on-time delivery, with 20%+ faster cycle time.	www.realization.com
Textile	Design	Skye Group	100% due date performance with 30% reduction in lead times.	www.realization.com
Aerospace	Engineering	Spirit Aerosystems	Reduced cycle time from 12+ months to 7 months.	www.realization.com
Building	Infrastructure building	Sub-contractor for Wroclaw city	Building roads, tram route, tram/bus station and Wroclaw stadium in order to host the UEFA 2012. all delivered on-time	www.tocpractice.com
Industry	Development of Measurement tools & systems	Synergis Technologies	Core identification of bottlenecks in the system Ability to predict issues ahead of time - avoiding fire-fighting with proactive behaviour. Customers found new confidence in Synergis. Synergis now has a system capable of managing over 200 complex projects concurrently. Lead times are being slashed, and being capable of delivering jobs on time	www.criticalchain.co.uk

Plastic	Mold Manufacturing	Takagi	Overall CT decreased by average 20%, production CT decreased by average 30%, throughput increased by 30% (number of projects completed per month)	www.tocpractice.com
MRO	Aircraft Maintenance	TAM MRO	7% reduction in TAT, ontime performance and quality increased	UNITED STATES SECURITIES AND EXCHANGE COMMISSION - LATAM Airlines
MRO	Aircraft Maintenance	TAP Maintenance & Engineering	21 % reduction in TAT, avoidance of subcontracting expenses	www.mromarketing.aviationweek.com
Steel	Plant maintenance	Tata Steel	68% fewer project time; went from 11 -day planned shutdown to 5 days.	www.realization.com
Security	Installation	Technology Integration Partners (TIP)	Drastic projects duration reduction, profit increased from 18,5% to 28,5% to 34,5% in 3 years.	www.exepron.com
Building	Palm Oil processing facilities building	Tecnintegral	A 18-month project finished 8 days ahead of schedule	www.exepron.com
Defense	Product design and manufacturing	Tecnobit	Reduced project cycle times by 20%.	www.realization.com
Health Care	Product development	Terumo Heart	90% on-time delivery, project duration reduction, for similar projects from 2-year to 6-month duration	www.realization.com
Aerospace	Product development	Thales Alenia Space	Reduced the duration of the final part of the development of a critical new satellite from 12 months to 5 months so as to finish on time	www.marris-consulting.com
Ship building	Building complex Platform Service Vessel	Thomas-Sea Marine	Average 8-12 months late deliveries on PSV deliveries. CCPM was implemented on 2 ships: 45 days late for one ship and on-time delivery for the second one	www.exepron.com
Automotive	Engineering	ThyssenKrupp	65% gain in productivity; 15% more projects completed.	www.realization.com
Injection moulding	New Product Development	Tomplast Uniplast	Number of completed projects per year multiplied by 7 in 3 years. Improvement of projects on-time delivery.	www.tocpractice.com
Durable goods	Custom design, manufacturing and installation	TRS Refrigeration	Reduced average project cycle time from 75 days to 46 days, and increased project capacity by 30% with no added manpower	www.tocca.com.au
Military	Repair, Logistic, and testing	U.S. Air Force (multiple bases)	Turnaround time reduced 25-30%, multiple aircraft returned to Air Force...	www.realization.com
Military	Army fleet maintenance	U.S. Army Fleet Support	32% reduction in CH-47 and 52% reduction in UH-60 turnaround time.	www.realization.com
Military	Repair	U.S. Army, Corpus Christi	Throughput increased from 5.4 aircraft per month to 6.3.	www.realization.com
Military	Repair and logistics	U.S. Marine Corps (Multiple bases)	Repair cycle cut by up to 50%, on-time delivery increased to 95%+, product rate increased.	www.realization.com

Consumer goods	Capital Projects and Marketing and R&D Innovation	Unilever SA	Implementation on a projects portfolio. Single project duration reduced up to 25%. Significant reduction of project lead time for the portfolio	www.critical-chain.co.uk
Military	Warfighter Systems Testing	US Air Force Operational Test & Evaluation Center	30% reduction in cycle time measured over 900 projects.50% improvement in resource utilization.80% on-time delivery performance.	www.realization.com
Military	MRO	US Air Force, Ogden Air Logistics Center	+32% in aircraft production per month. On-time delivery increased to 85%.	www.realization.com
Military	MRO	US Air Force, Oklahoma City Air Logistics Center	50% reduction in TAT. +47% production output. Dock spaces freed up (additional revenue potential $55M)	www.realization.com
Military	Aircraft Upgrade and Repair	US Air Force, Oklahoma City Air Logistics Center	+54% in aircraft production per year. Cycle times from 225 days to 195 days.	www.realization.com
Military	Aircraft Upgrade and Repair	US Air Force, Oklahoma City Air Logistics Center	Cycle time went from 181 days to 153 days. 11% capacity released for additional workload.	www.realization.com
Military	MRO	US Air Force, Oklahoma City Air Logistics Center	Average turnaround timefrom 327 days to 146 days. 44% increase in throughput in 1year.	www.realization.com
Military	MRO	US Air Force, Tinker Air Force Base	Engine Piece-Part Repair:68% reduction backshopcycle time.67% increase in monthly throughput. Engines and Modules: 10% increase in monthly throughput. 35% reduction in cycle time.	www.realization.com
Military	Aircraft Upgrade and Repair	US Air Force, Warner Robins Air Logistics Center	25% increase in throughput. Turnaround time reduced to 87-121 days.+32% in Mechanic output per day.40% reduction in overtime.	www.realization.com
Military	Aircraft Repair and Overhaul	US Air Force, Warner Robins Air Logistics Center	Turnaround time from 240 days to 160 days. 75% fewer defects.	www.realization.com
Military	Reset Maintenance Programs	US Army AMCOM-ALC, Field Support Readiness Directorate	TAT decreased by average 18%	www.realization.com
Military	Aircraft Maintenance	US Army National Guard, the 1106th TASM Group	+43% increase in number of visits. 60% reduction in cycle time	www.realization.com
Military	Helicopter Maintenance, Repair and Overhaul	US Army, Corpus Christi Army Depot	+17% increase in throughput. Between 15% and 50% reduction in TAT (depending on helicopter type)	www.realization.com
Military	Processing of Purchase Requests	US Department of Defense Procurement Organization	Delays reduced by 60%-70% reduction in cycle time.28% increase in throughput.	www.realization.com
Military	Army Vehicles Maintenance and Repair	US Marine Corps Logistics Base, Barstow	From 50% to 60% reduction in repair cycle time	www.realization.com
Military	Engines & Components Repair and Overhaul	US Naval Aviation Depot, Cherry Point/Aircraft	+11% productivity. Labor rate competitiveness	www.realization.com
Manufacturing	Design	Valley Cabinet Works	Went from 200 projects per year to 334 projects in the first nine months of the year measured.	www.realization.com

Critical Chain Fundamentals – Current Reality

Projects frequently overrun schedule
Projects frequently overrun budget
Projects frequently have to compromise on scope to deliver on time and budget
Projects have too many changes
In a multi-project environment, projects frequently fight over resources
Project durations get longer and longer
Many projects are cancelled before they complete
Project work becomes high stress for participants

Critical Chain Fundamentals – Future Reality

Projects always complete on or before the scheduled completion date
Projects complete at or under Budget
Projects always deliver the full scope
Projects have few changes
Projects receive needed resource without internal fights
Project durations get shorter and shorter
All projects complete
Project work creates win-win solutions for ALL stakeholders

CCPM – Task Duration Uncertainty

CCPM – Task Duration Uncertainty

CCPM – Task Duration Uncertainty

Waiting for resources

Waiting for specifications, materials

Waiting for decisions

Waiting for issue resolution

Waiting at integration points

CCPM – Task Duration Uncertainty

Queue and Wait

Waiting for resources

Waiting for specifications, materials

Waiting for decisions

Waiting for issue resolution

Waiting at integration points

CCPM – Task Duration Uncertainty

Waiting for resources

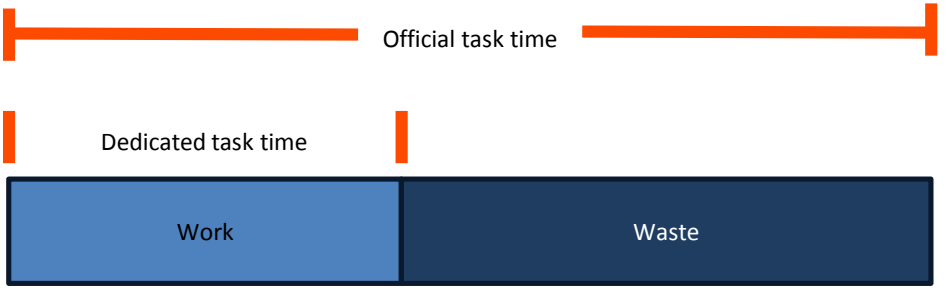
Waiting for specifications, materials

Waiting for decisions

Waiting for issue resolution

Waiting at integration points

CCPM – Task Duration Uncertainty



Waiting for resources

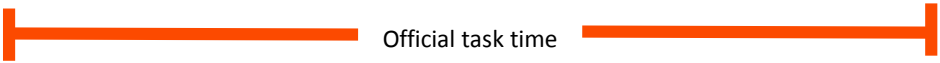
Waiting for specifications, materials

Waiting for decisions

Waiting for issue resolution

Waiting at integration points

CCPM – Task Duration Uncertainty



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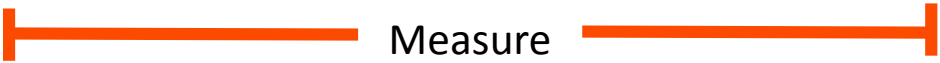
CCPM – Task Duration Uncertainty



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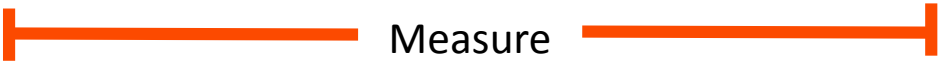
CCPM – Task Duration Uncertainty



Waiting for resources

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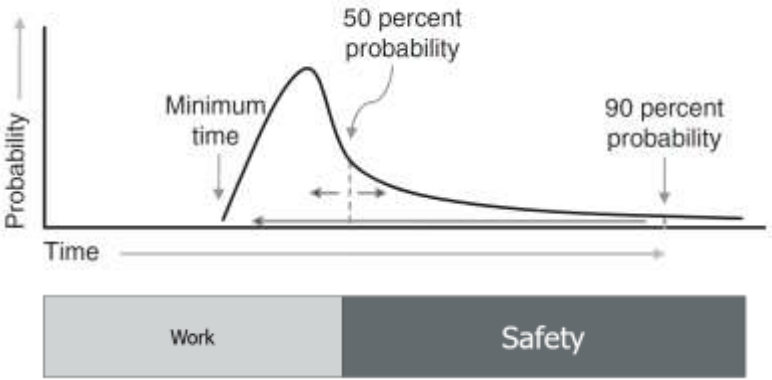
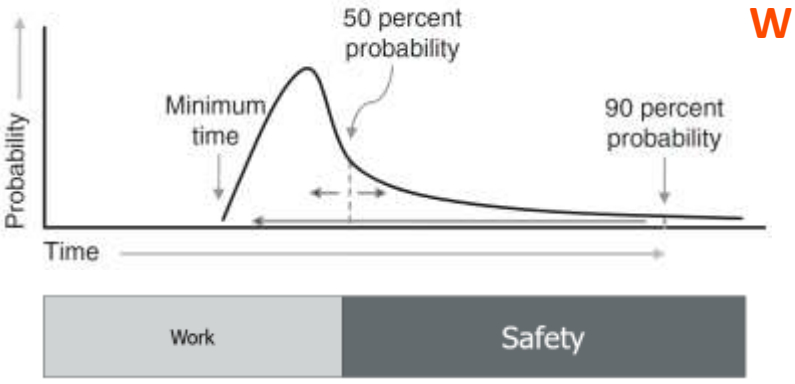
Waiting at integration points

CCPM – Uncertainty + Estimating

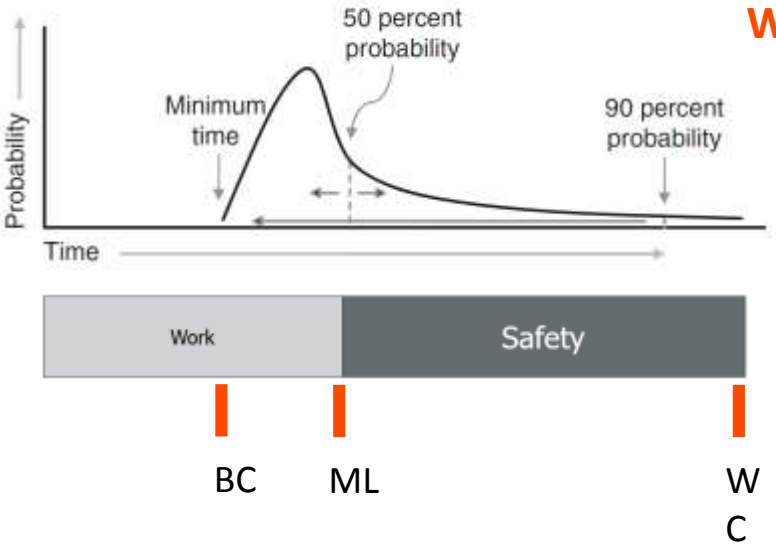


CCPM – Uncertainty + Estimating



What we have

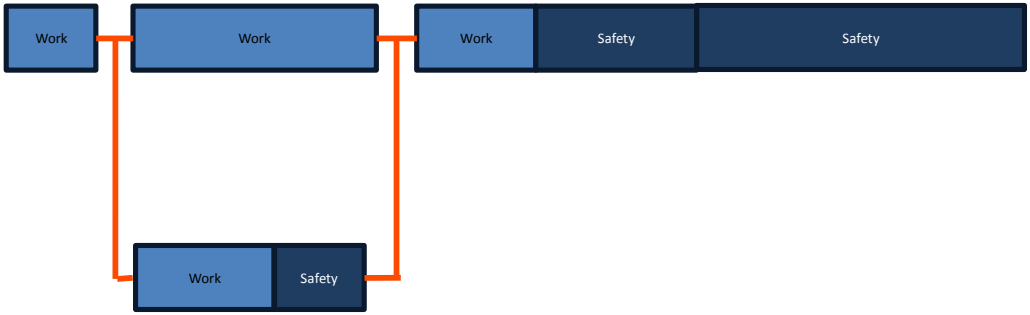
CCPM – Uncertainty + Estimating



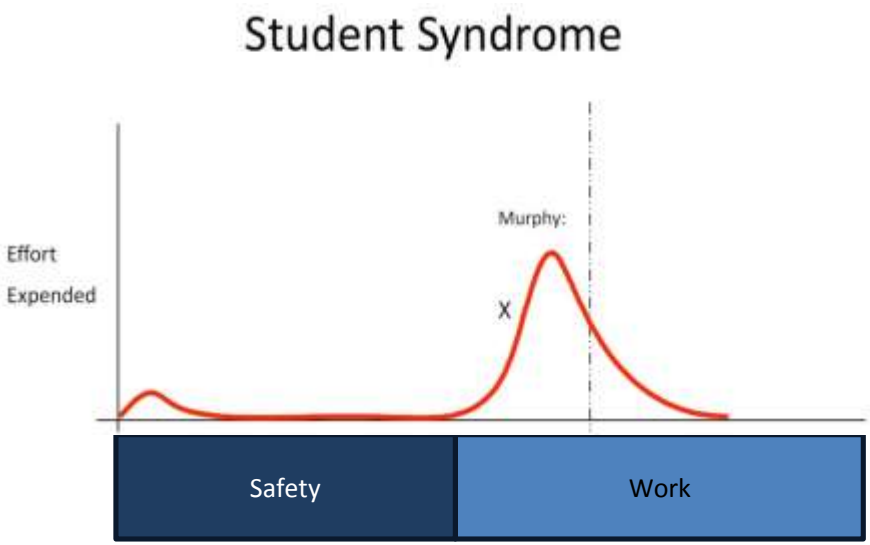
What we need

Critical Path Schedule

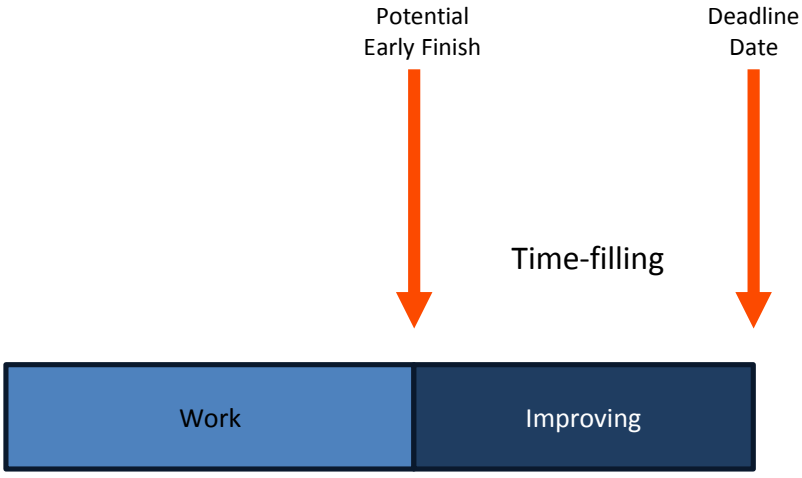
Critical Chain Schedule



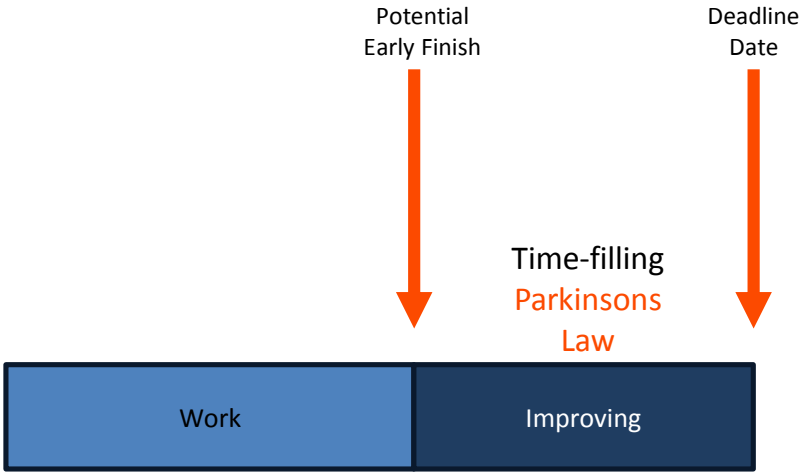
Correcting behaviours - Starting Late



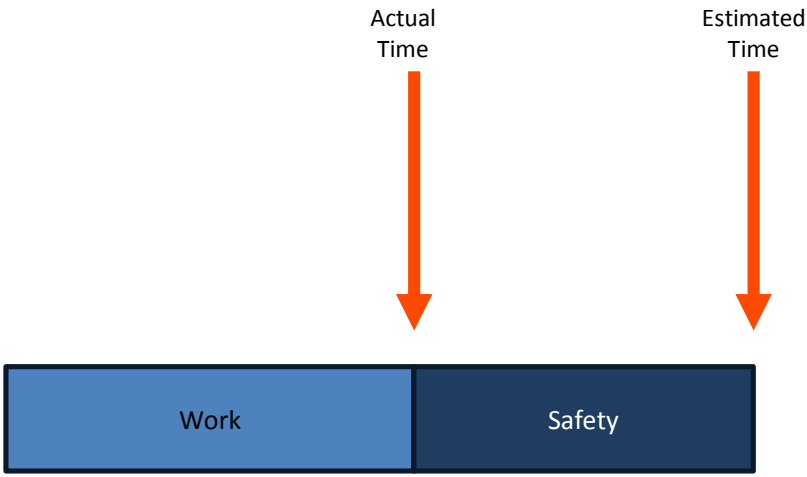
Correcting behaviours – Gold-plating



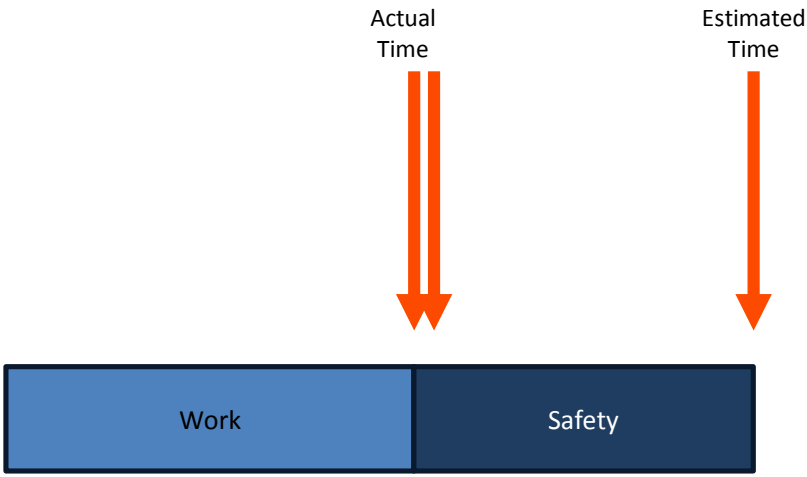
Correcting behaviours – Gold-plating



Correcting behaviours - Sandbagging



Correcting behaviours - Sandbagging



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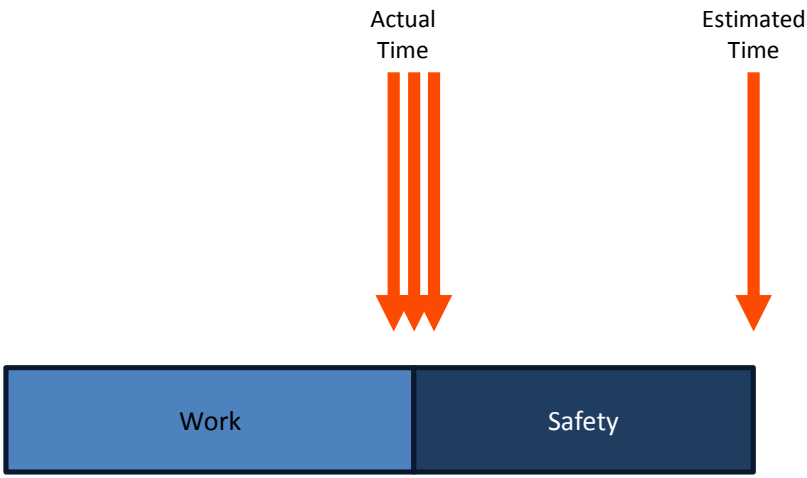

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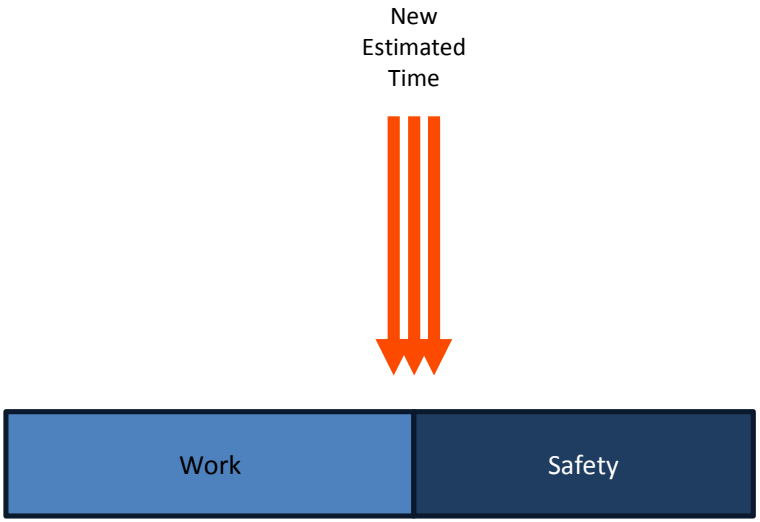
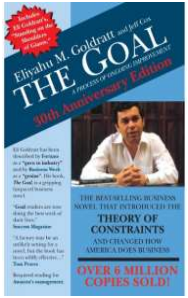
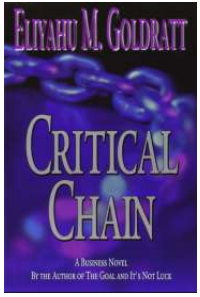
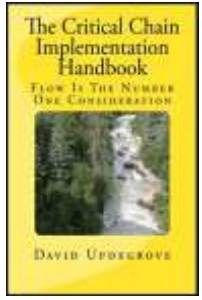
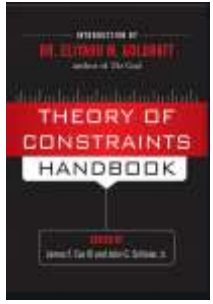


Implementation









Implementation

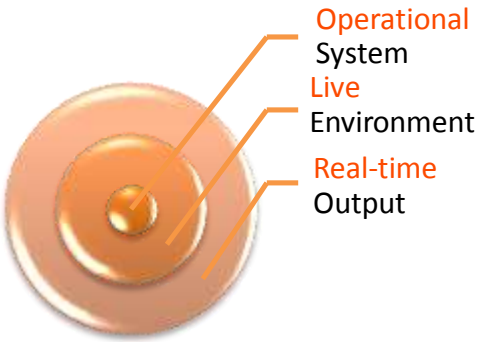
1. Aggressive but achievable schedule (takeaway safety)

2. Eliminate Resource Contention (resource is finite)

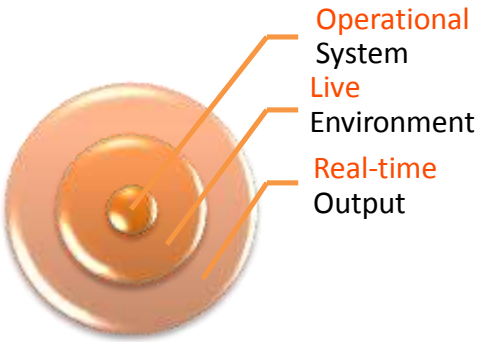
3. Insert both project and feeding buffers (give back safety)

4. Go to execution, reliably on time, every time …?

New Game – New rules

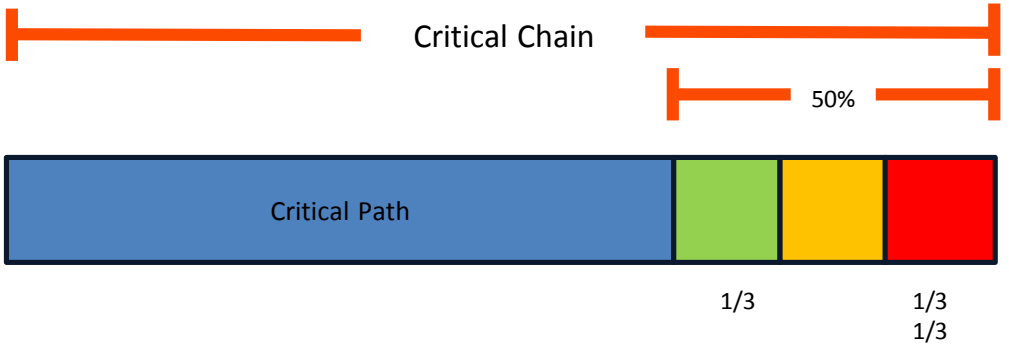


New Game – New rules

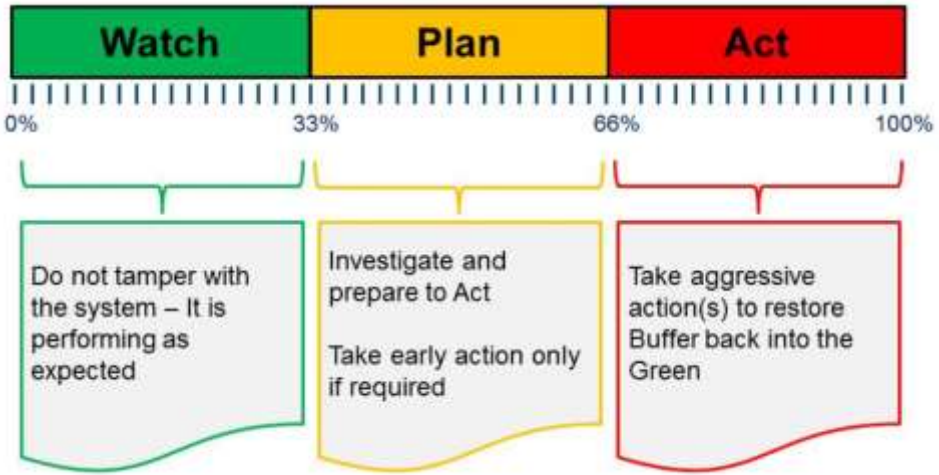


1. Pipelining
2. Buffering (reallocating safety)
3. Buffer Management

Buffer Management – Directing Management Focus

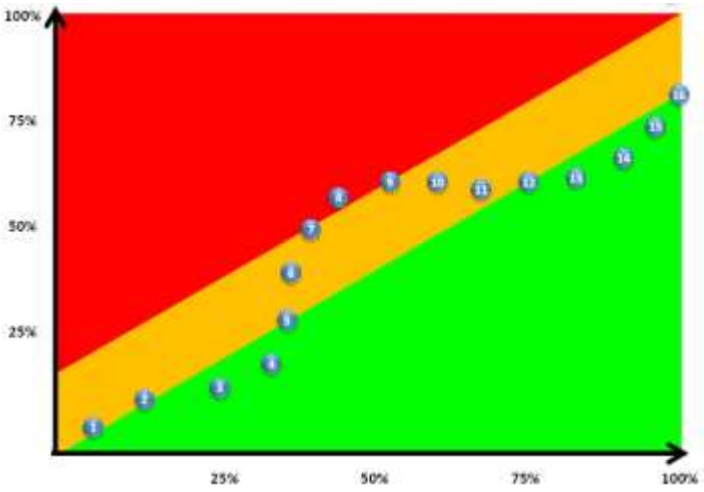


Buffer Management – Directing Management Focus



Buffer Management – Directing Management Focus

Buffer Penetration Index

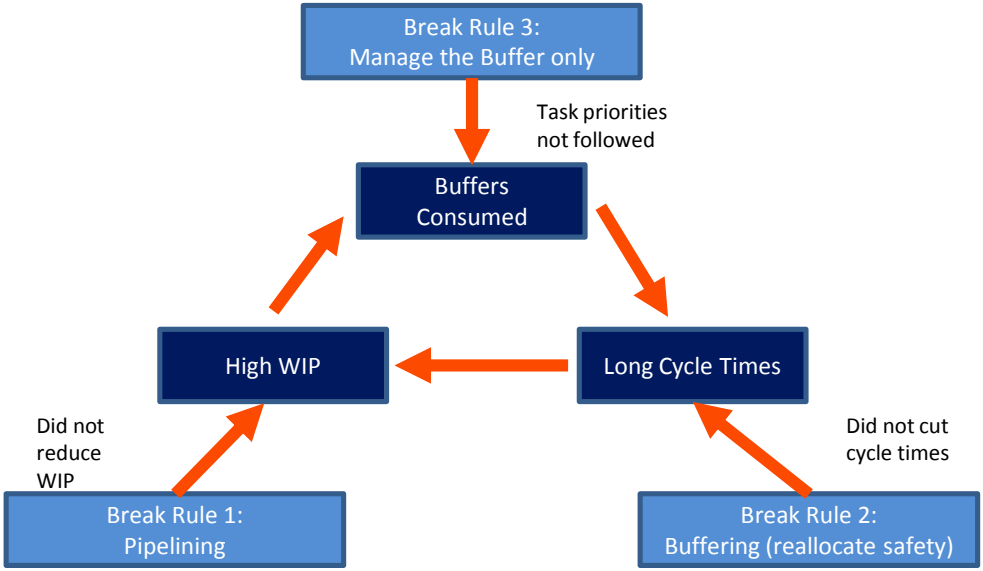


% of Critical Chain complete

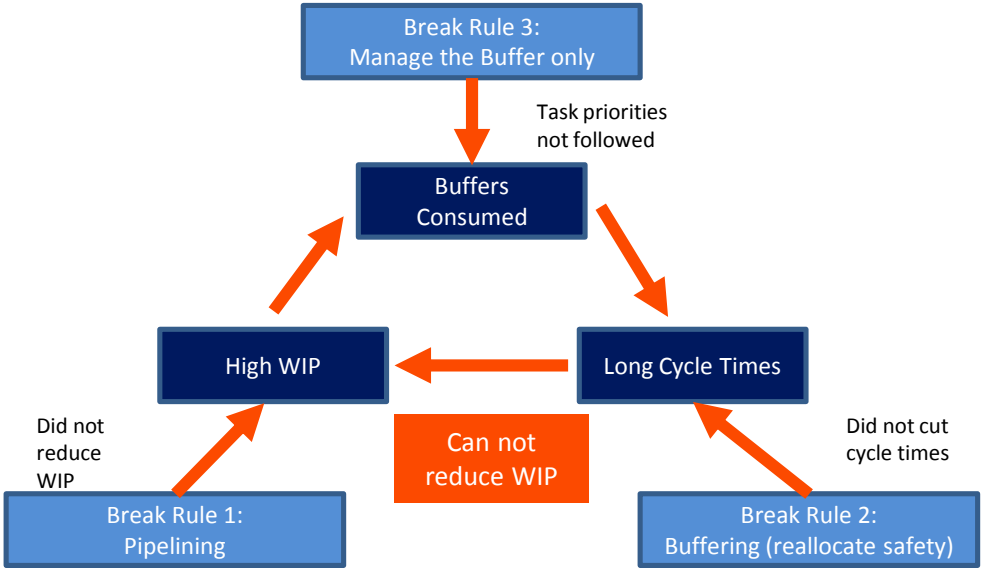
The Challenge of Change – Problems in Practice

Challenge 1:	Managerial Commitment to the rules
Challenge 2:	Theory/concept into practice
Challenge 3:	Sustaining the Rule and the Results

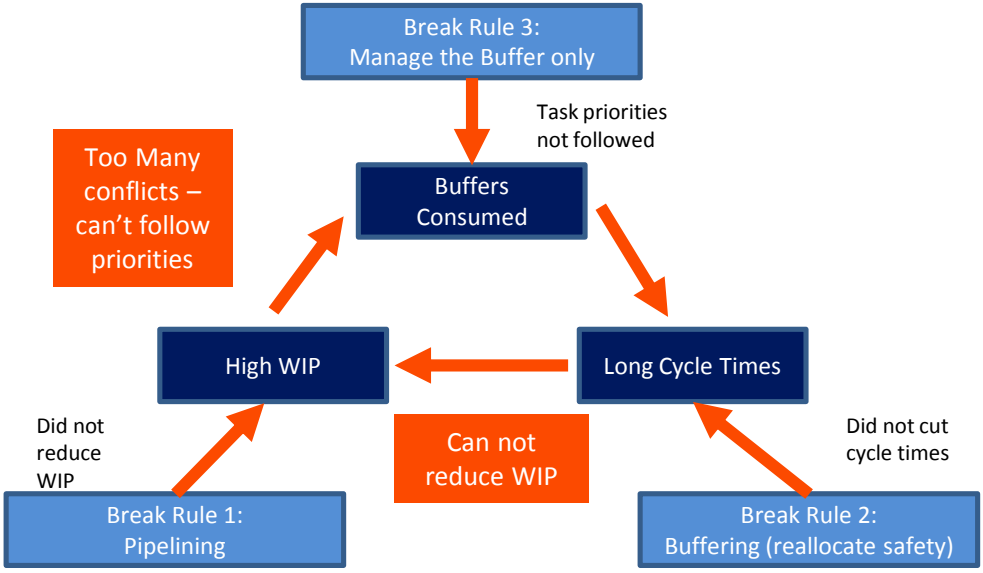
The Challenge of Change – Problems in Practice



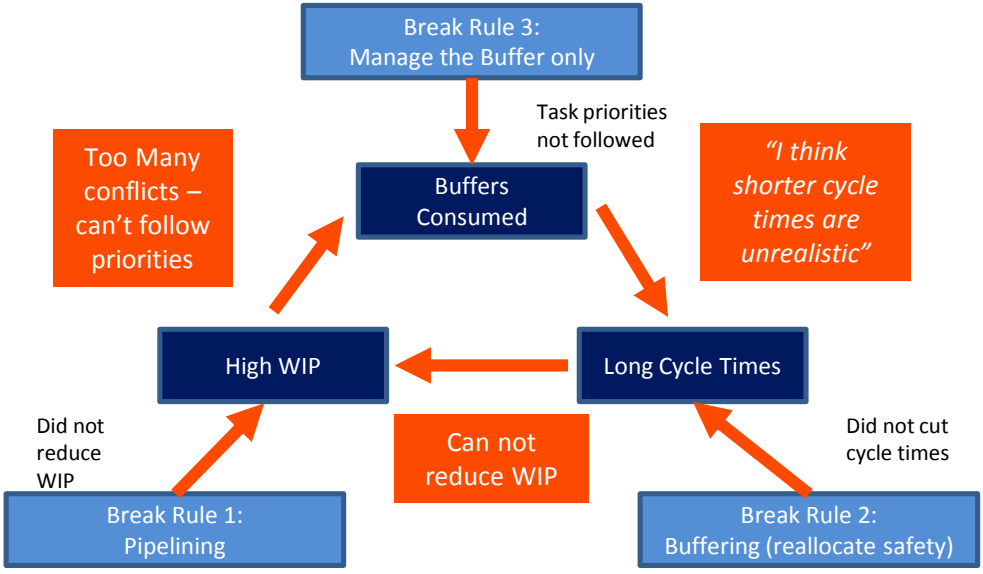
The Challenge of Change – Problems in Practice



The Challenge of Change – Problems in Practice



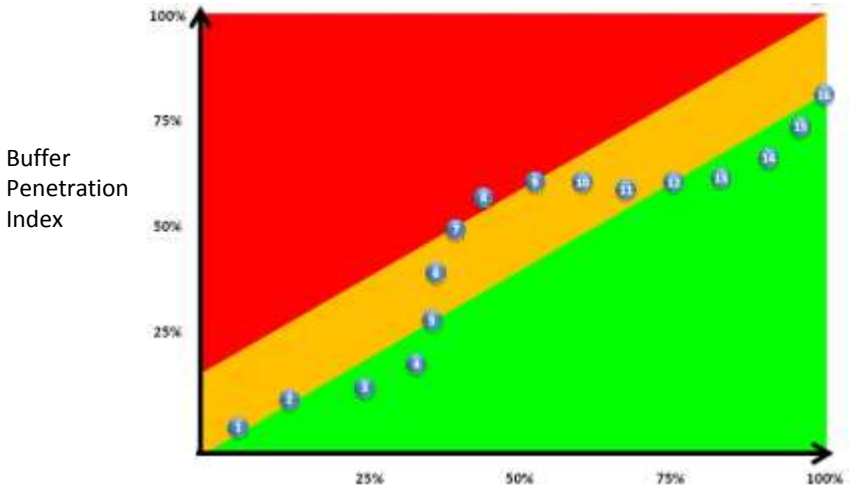
The Challenge of Change – Problems in Practice



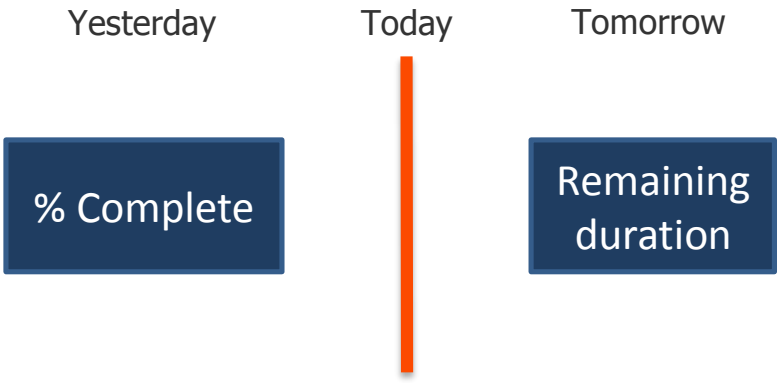
The Challenge of Change – Mechanised Change

WIP Policy:	Execution pipeline is finite
Pipeline Review:	Following WIP Policy?
WIP Alert:	Actual WIP exceeds allowable WIP
Tasks:	Scheduled on buffer-based priorities
Compliance:	Tasks not following priorities

Critical Chain and Cost Management



CCPM + EVMS = A Powerful Solution



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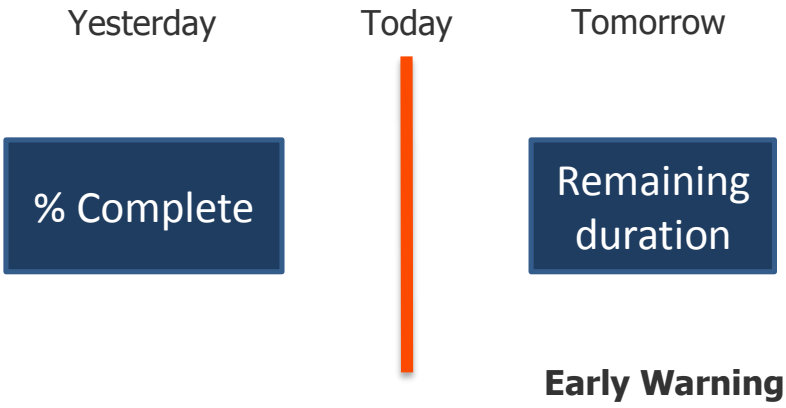

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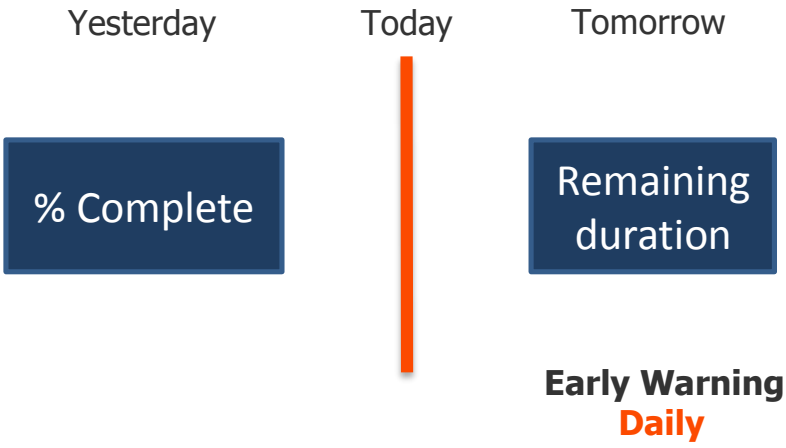

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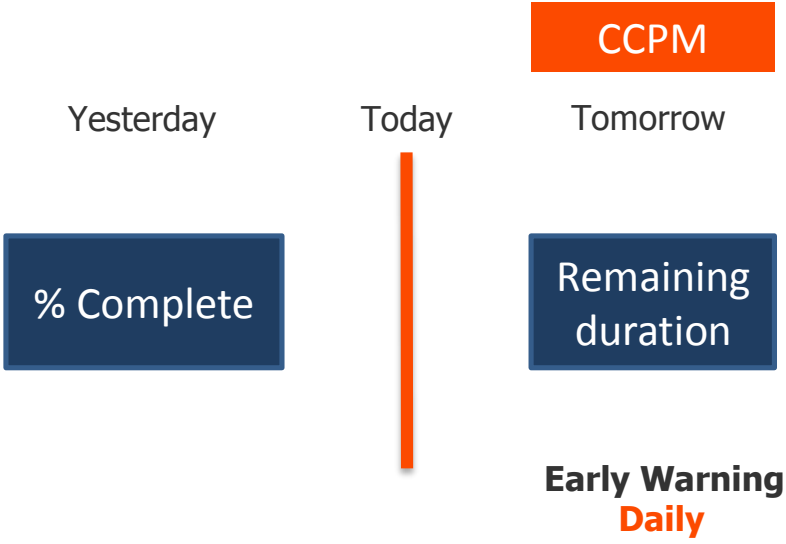

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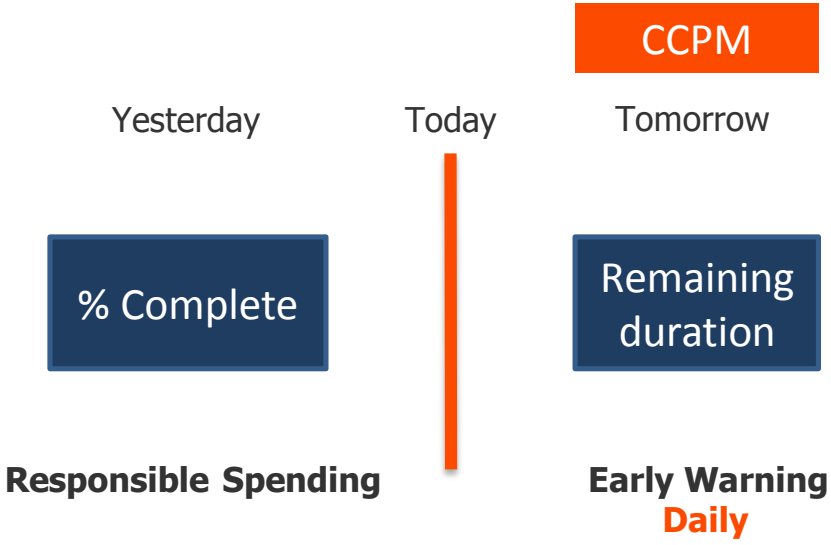

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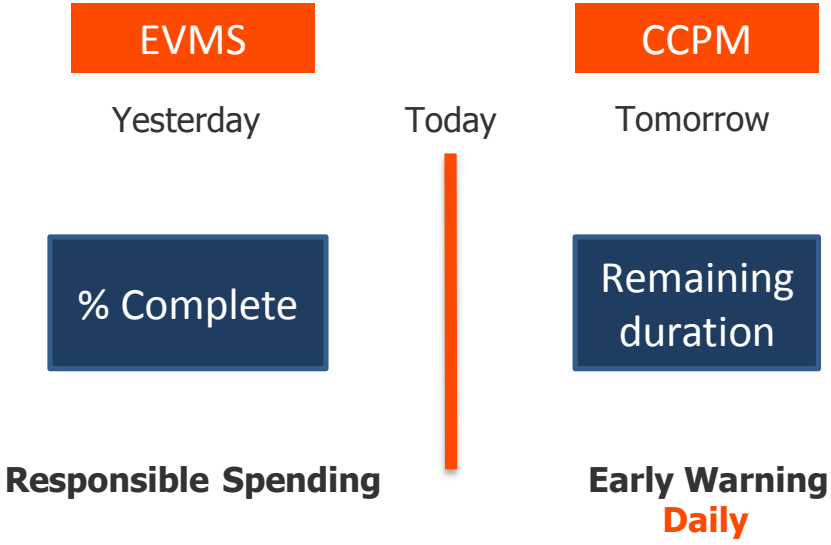

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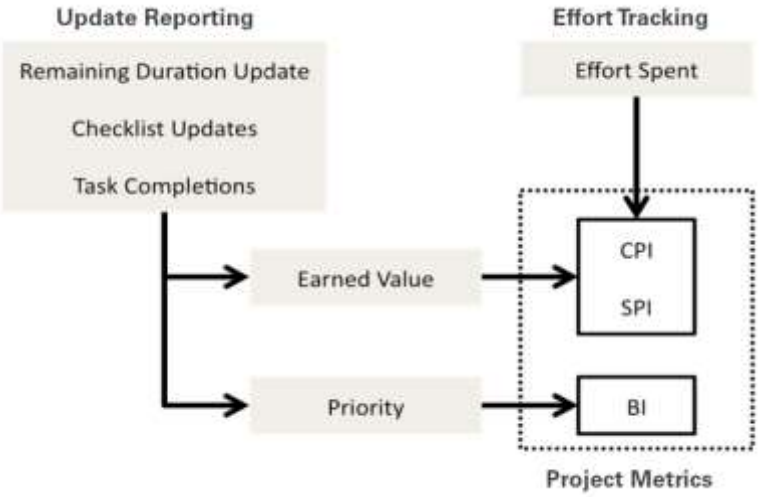


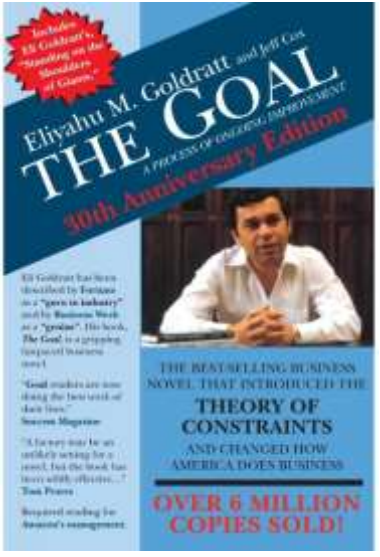
CCPM + EVMS = Decision-making Matrix

	BI GOOD	CPI GOOD	SPI GOOD
BI POOR	X	Buffer recovery is required. Check if adding resources will help.	This will happen when the longest chain is behind schedule and feeding chains are executing well. Plan buffer recovery.
CPI POOR	Resources are wasted. Make resource concentration effective for project by: • Cutting resources • Cutting the time lines	X	Resources are wasted. Make resource concentration effective for project by: • Cutting resources • Cutting the time lines
SPI POOR	This can only happen if resource dependencies are missing in CC plan as discussed in the beginning. Fix the CC plan.	In this case BI will be bad too. So, buffer recovery is required. Check if adding resources will help.	X

The Challenge – One tool for CCPM + EVM

Software	Lynx *TameFlow*	BeingManagement 3	**Exepron**	**CC (M) Pulse**	**ProChain Scheduling Pipeline Enterprise**	**Concerto**	**CCPM +**	**Aurora-CCPM**
Logo	LYNX A-dato	BeingManagement 3	EXEPRON	Pulse	ProChain	REALIZATION	CCPM+	Aurora-CCPM Stottler Henke
Editor	A-dato	Being CO., Ltd.	Exepron	-	ProChain Solutions	Realization	Robbin Gioia	Stottler Henke
Release date	Continuous Deployment of Updates	2007	2010	-	Version 1 in 1997 Current V12	V1.0 in 1997	RB founded in 1980	Founded in 1988 CCPM since 2005
Criteria								
Software architecture	Web-based/ Smart Client / Inhouse / Cloud	Cloud / On-premises	Cloud & Private Cloud Exepron Mobile available	Single Machine	Single Machine / Customer Server or Cloud	Web-based Option for MSP add-on, Supports SaaS & private/on-premise installations	Single Machine	Cloud, or Standalone, or In-house cloud/server
Languages								
Customer service	✓	✓	✓	✗	✓	✓	N/A	✓

MS Excel


Includes Eli Goldratt's "Standing on the Shoulders of Giants"
Eliyahu M. Goldratt and Jeff Cox
THE GOAL
A PROCESS OF ONGOING IMPROVEMENT
30th Anniversary Edition
THE BESTSELLING BUSINESS NOVEL THAT INTRODUCED THE
THEORY OF CONSTRAINTS
AND CHANGED HOW AMERICA DOES BUSINESS
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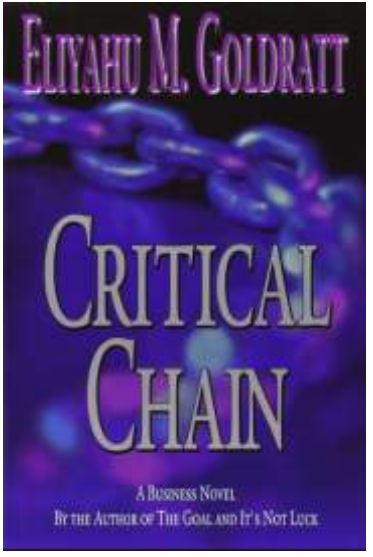

ELIYAHU M. GOLDRATT
CRITICAL CHAIN
A BUSINESS NOVEL
BY THE AUTHOR OF THE GOAL AND IT'S NOT LUCK

FOCUS

ACT

FOCUS

Theory of Constraints

ACT

Critical Chain

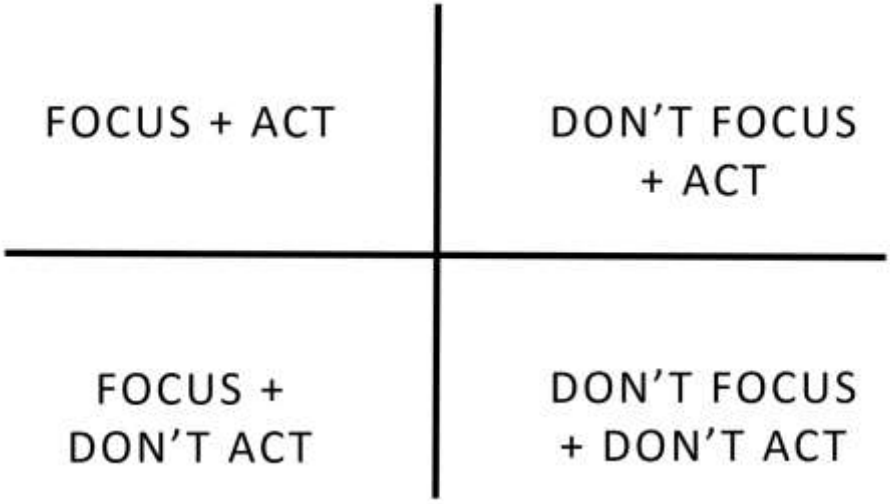
Theory of Constraints

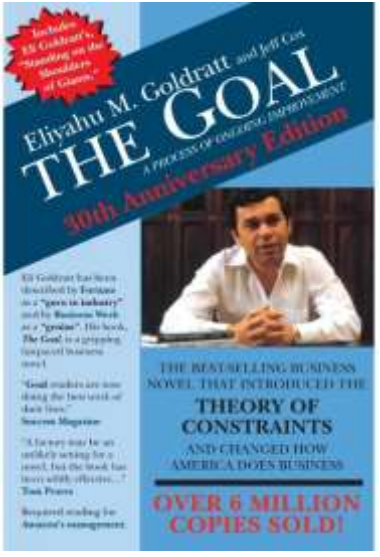
FOCUS

+

ACT

Critical Chain


FOCUS + ACT
DON'T FOCUS + ACT
FOCUS + DON'T ACT
DON'T FOCUS + DON'T ACT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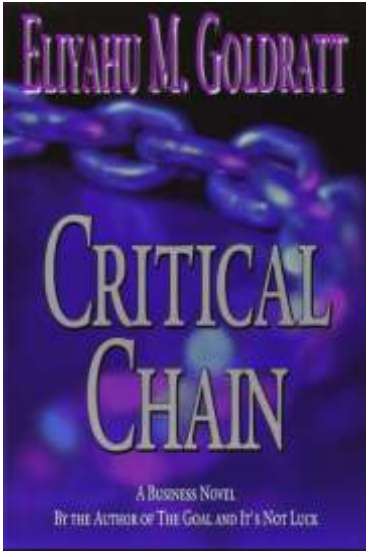
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