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Project Management the TOC Way

Combining Critical Chain Project Management and the 5 Focusing Steps for astounding results

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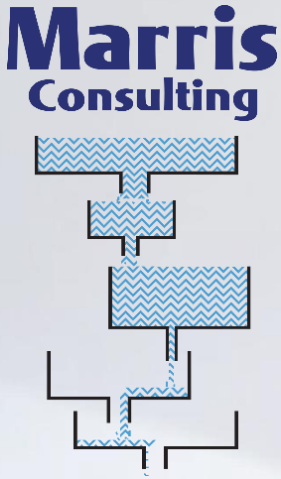
France



Philip Marris

Theory Of Constraints expert.
33 years of TOC experience. Started working with the founder Eliyahu Goldratt in 1986.

Lean expert.
35 years of experience in Lean. Assists some of the Leanest organizations in the world.

>30 years of experience helping over 200 companies in all industrial sectors.

CEO of Marris Consulting based in Paris, France.
Motto: *Factories, People & Results.*

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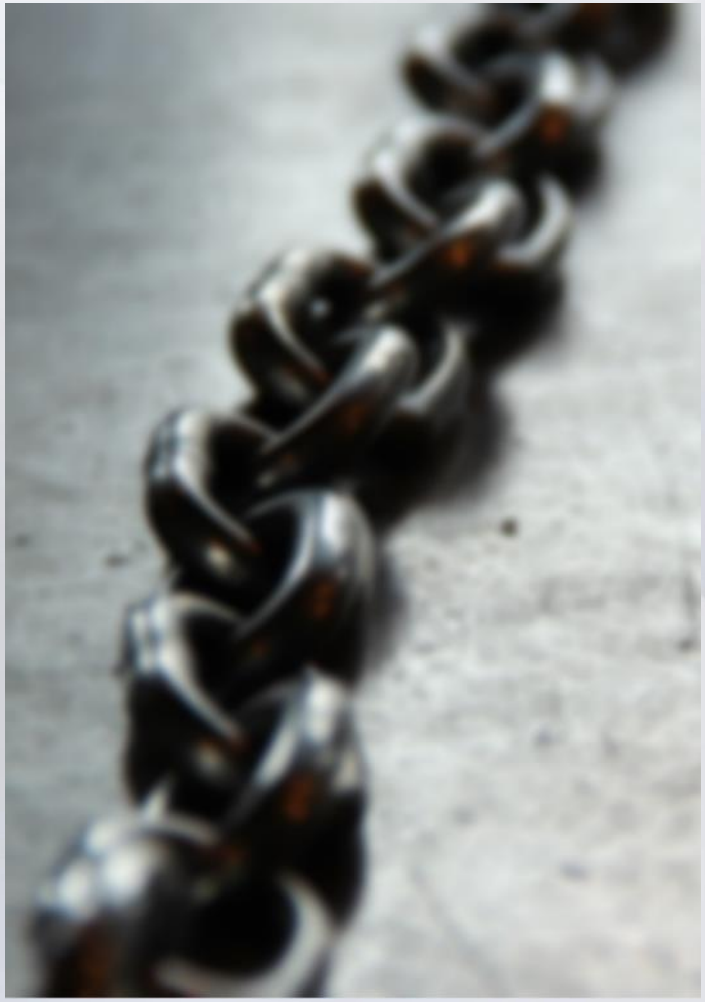
>30 years of TOC, >200 times

- 40% projects, 40% production.
- 16 TOC implementations live at the moment.
- All kinds of industries: Aero, Pharma, Luxury Goods, Aero MRO, Auto, Fast Food…

Presentation outline

- Introduction
- A few examples
- Conclusion

- Appendices

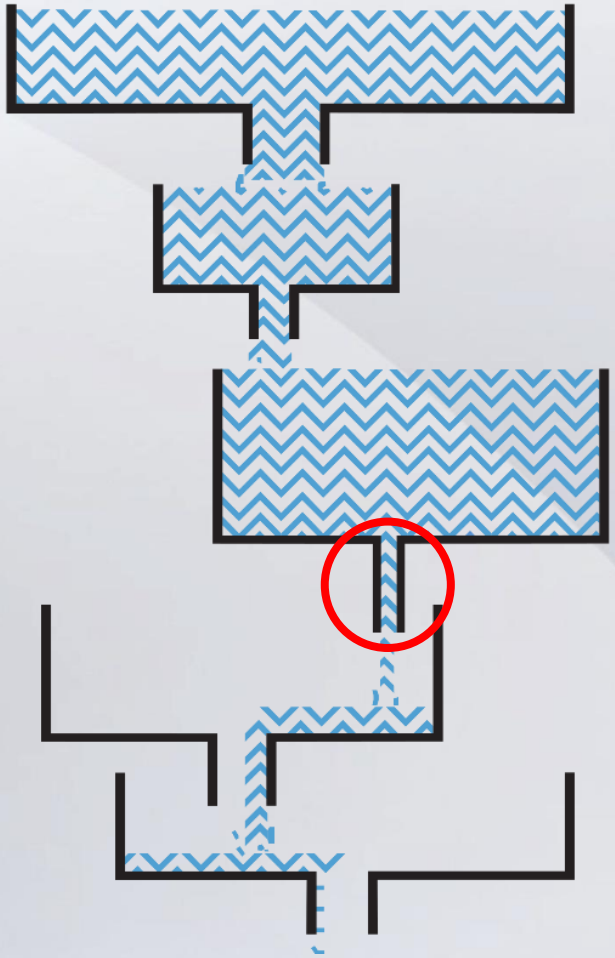


Introduction

The combination of
Critical Chain Project Management
and the Theory Of Constraints'
5 Focusing Steps
enable extraordinary results to be obtained
in an unbelievably short time.

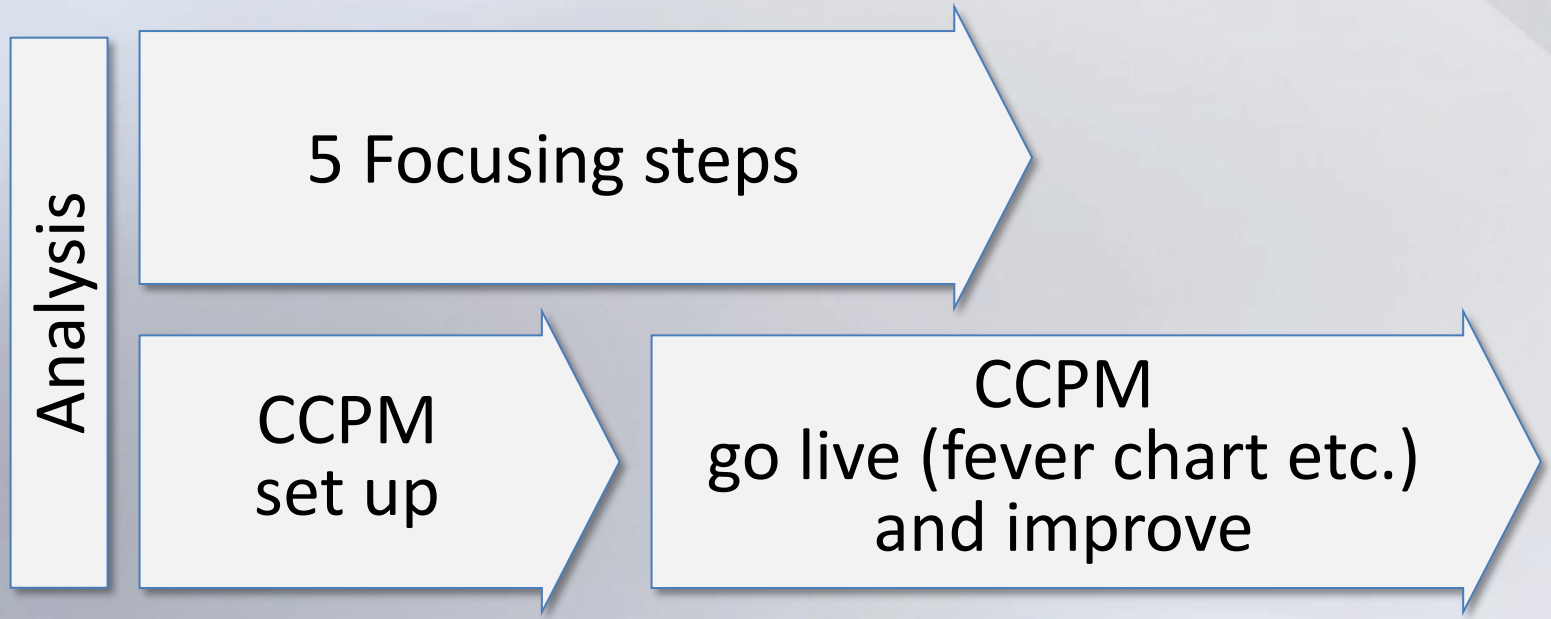
Portfolios of projects have capacity constraints

- We consider that there are two types of constraints in project environments.
  - The constraint of a single project is its Critical Chain: it determines the project duration.
  - The constraint of a project portfolio is a resource: it is the constraint that prevents the system producing more projects per year.



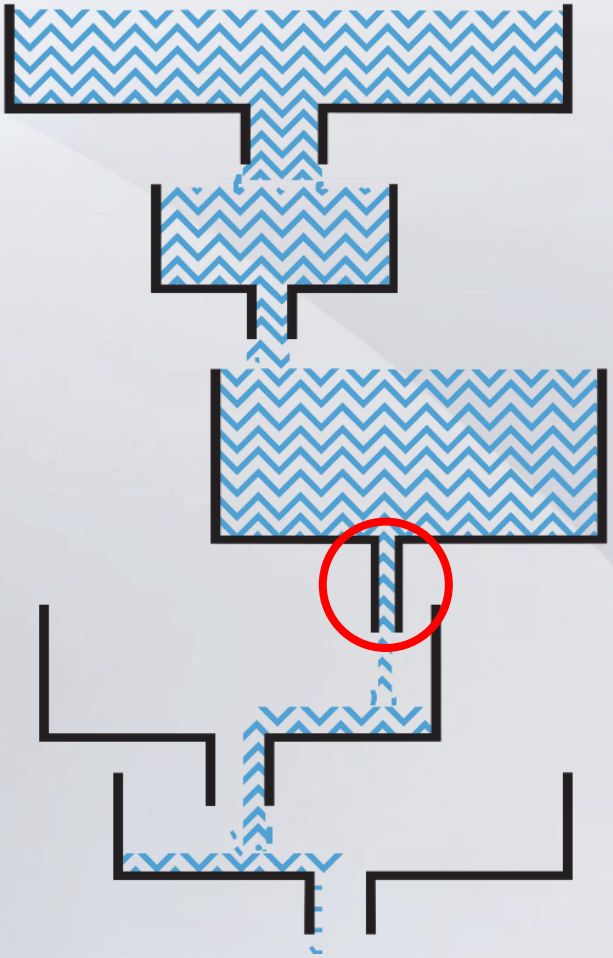
You can kick-start a Critical Chain implementation

- Capacity constraints in project portfolios can be immediately exploited to produce 2 or 3 times more. This can be done even before you go live with CCPM.



Step 1: Identify

- We believe there are nearly always capacity constraints (bottlenecks) in multi-project portfolio environments.
- Experts disagree on this subject.
- But in Marris Consulting's experience
  THERE ARE SIGNIFICANT BOTTLENECKS.



Step 1: Identify
Find the biggest queue

- Find the bottleneck by finding the biggest queue.
- This is easy whether or not you have a project management software.
- Warning: the queue can be smaller than a shoe box or even "invisible" (hidden in computers).

Find the biggest queue of work

The very good news

It is easy to multiply throughput and productivity by 2 or 3 very quickly

A few examples

In the following examples, several data have been modified for confidentiality reasons.
In all cases the real figures are more spectacular than those presented here.

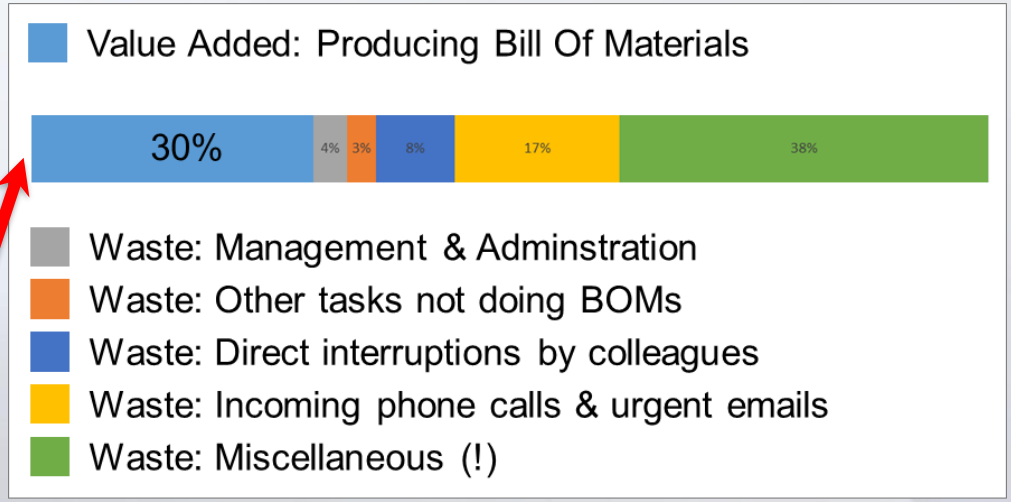
We use just 3 of TOC's 5 Focusing Steps (5FS)

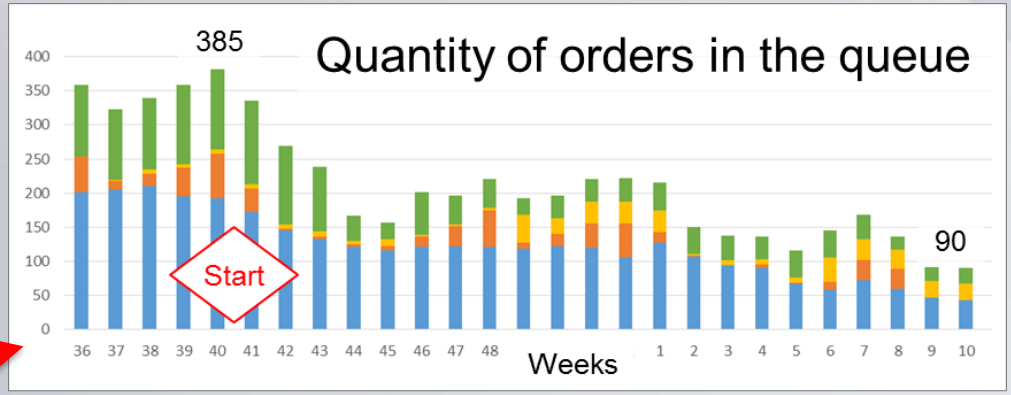
1. **IDENTIFY** the system's constraint(s).
2. Decide how to **EXPLOIT** the system's constraint
3. **SUBORDINATE** everything else to the above decision.
4. **ELEVATE** the system's constraint
5. **WARNING!!!!**

   If **in the previous steps a constraint has been eliminated, go back to step 1**,
   but do not allow INERTIA
   to become the system's constraint.

Example of world leader in luxury goods (>$3 billion)

- First iteration:
  (of Steps 1 then 2 then 5)
  - Bottleneck = Defining Bill Of Materials
    (it had a 5 month queue in an 15 month process).
  - DILO to analyse activity:
    30% efficiency.
  - Exploit
    - + 100% Throughput in one week
    - + 70% Throughput in one month
  - Lead time reduction of 77% in 5 months.





(continued) Example of world leader in luxury goods

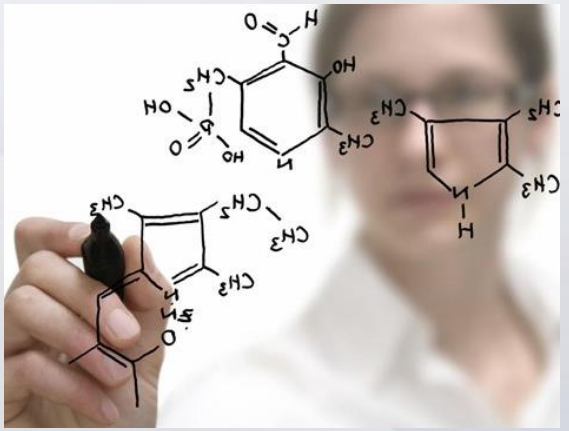
- Second iteration:
  - Bottleneck = Purchasing (ordering the components).
  - Exploit = +60% in 2 weeks.
- Third iteration:
  - Woodworking machine shop.
  - Currently being dealt with.

100% +70% + 60% = 230%

$\Rightarrow$ 230% increase so far => **x 3.3**

Example in pharma product development

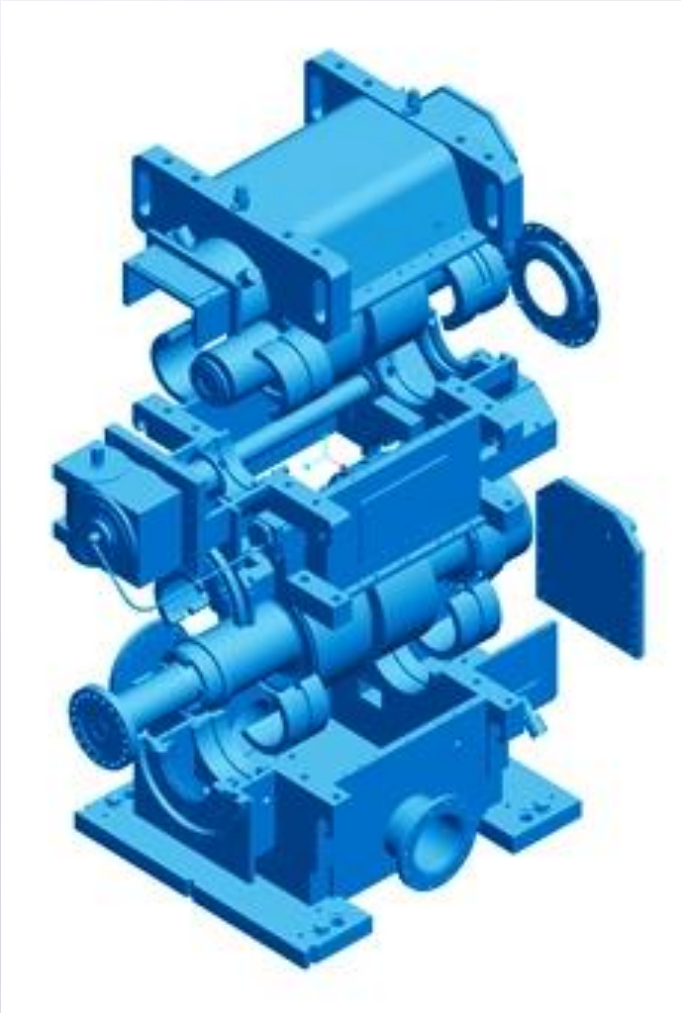
- A 280 person R&D Department of a leading Animal Health Pharmaceutical firm.
- They thought that the constraint was their 19 key expert research scientists.
- In fact it was their Industrialization Department. This had tripled the workload on the 9 people in this department.
- So the new block buster drugs developed were all waiting for this department to define how they were going to be produced.
- Exploit & Elevate: **>+200%** Throughput.



(continued) Example in ETO & MTO

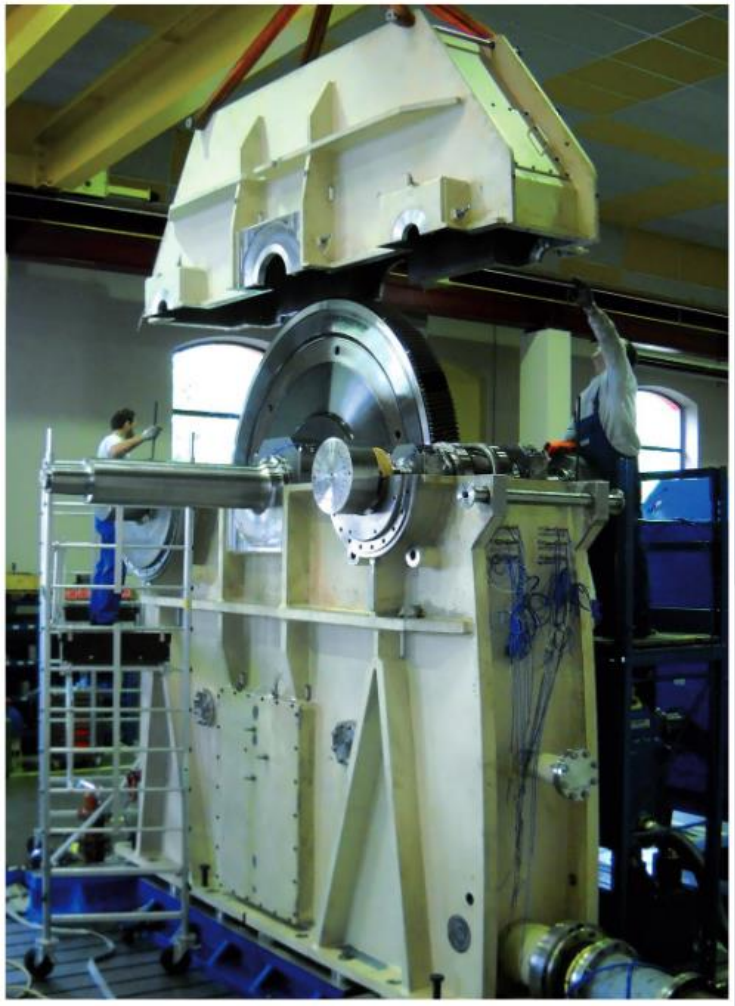
- 500 person company part of a very big (>300 000 people) organization.
- It is an Engineering To Order (ETO) and Make To Order (MTO) business.
- Designs and builds special big gearboxes.

Example: Gearbox between a gas turbine and a generator in a power plant.



Example in Engineering To Order (ETO) & MTO

- The bottleneck was in the Design Office in the Engineering Department. It was flooded: 90 projects in progress, 50 weeks of lead time, 1,8 projects (designs) finished per week.



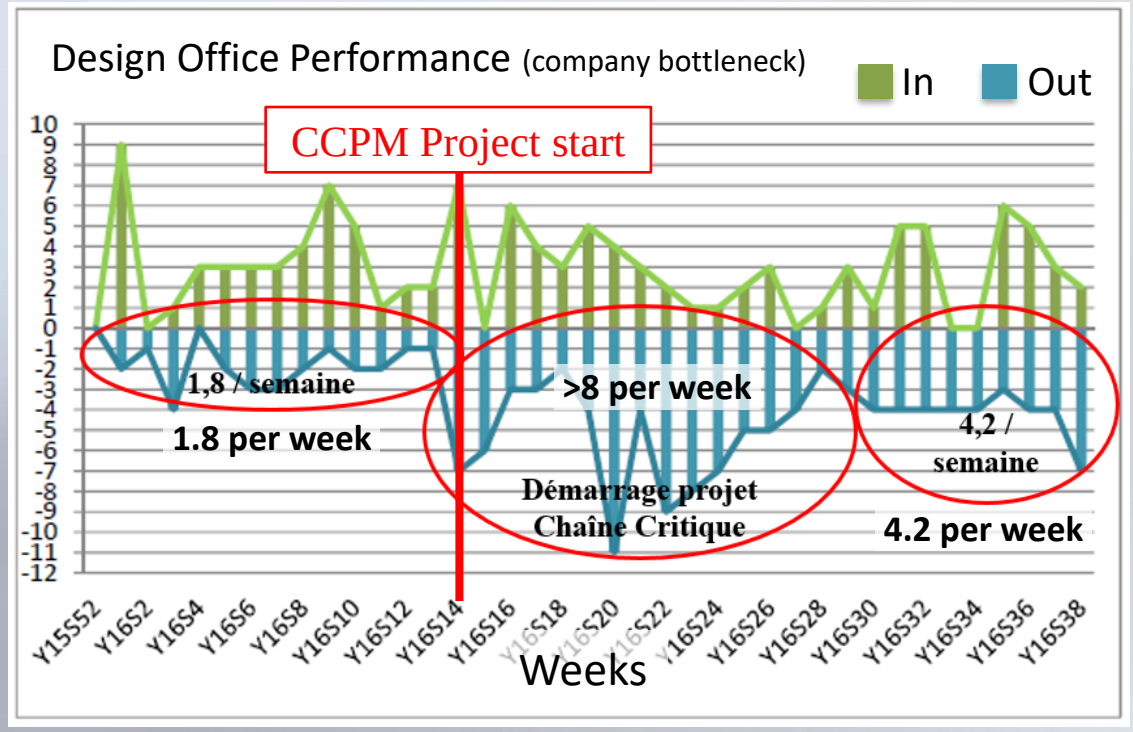
(continued) Example in ETO & MTO

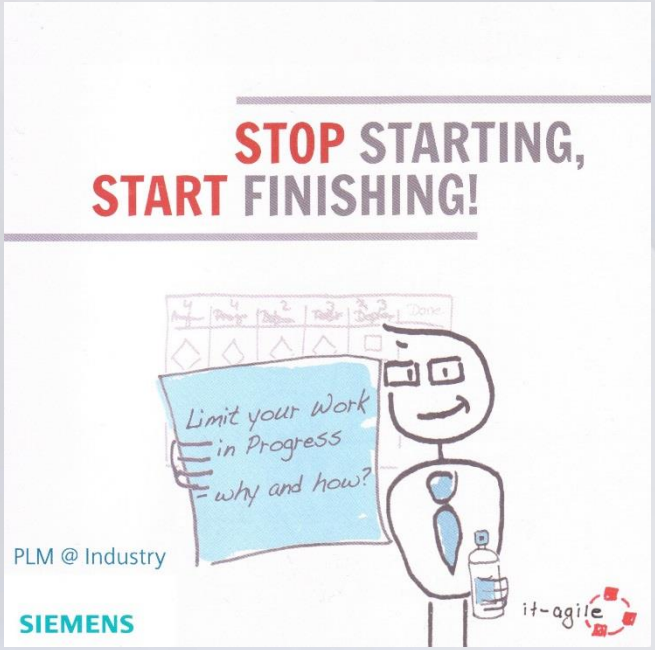
- Initially the working conditions in the Design Office were very bad.
- A DILO (Day In the Life Of) analysis revealed **massive multi-tasking**.
  - Switching tasks >60 times per day.
    i.e. an average of 7 minutes per task.
  - This reduced productivity by 70 to 90%.
  - It also generated many "silly" quality problems
    (for example numerous errors in the Bill Of Materials).

WARNING: multi-tasking kills

(continued) Example in ETO & MTO

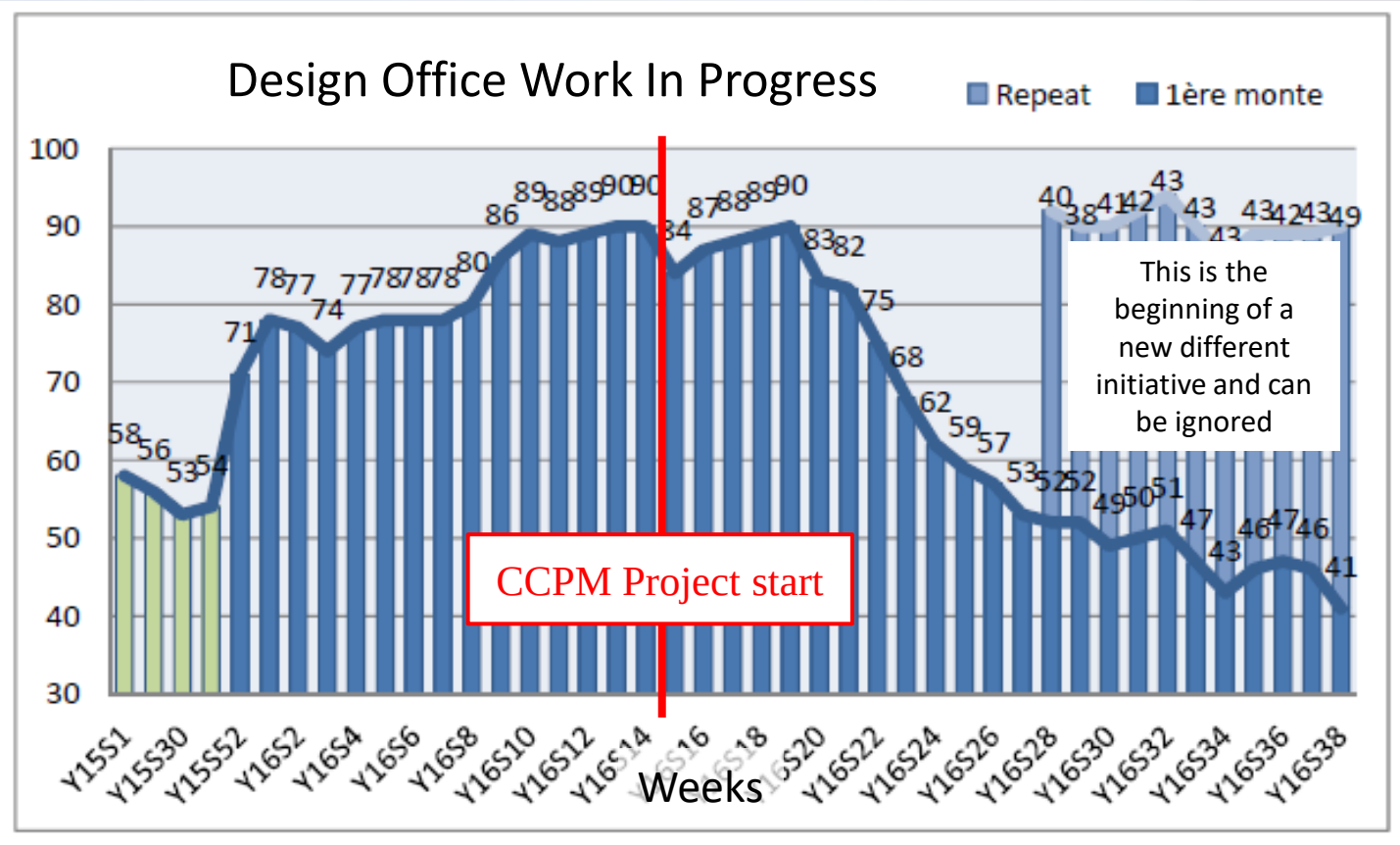
- New rule: "Start finishing and stop starting".
- Throughput and productivity improved by 130%.
- And during the flushing process by >400%.





(continued) Example in ETO & MTO

- Lead times were reduced in the Design Office from 50 weeks to 8 weeks.



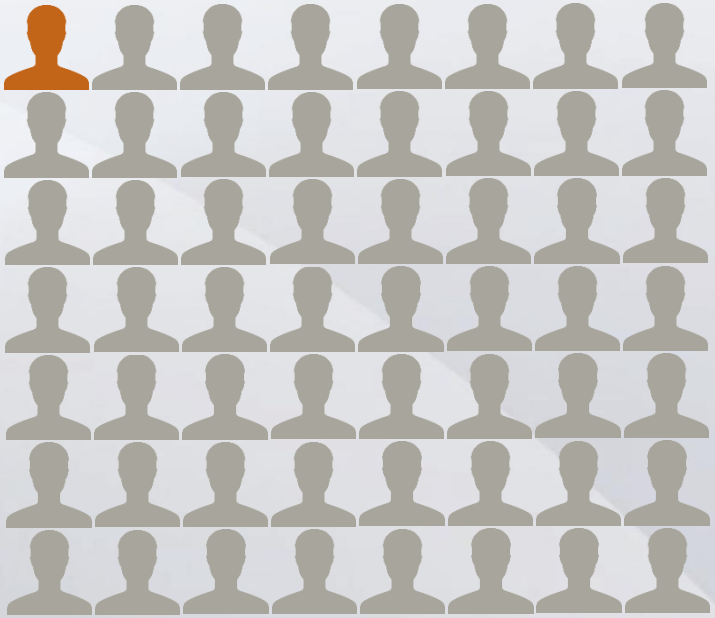
Example in a $10 billion company

- Anonymous, > $10 billion in sales and >20% annual growth.
- After analysing the difficulties that the company had in increasing annual growth using a "Goal Tree" approach (cf. Bill Dettmer)…
- …the constraint was identified as the I.T. function (1 200 people internal & externalized).
- Project just about to start. No results yet.

We are finding that I.T. is often the constraint that limits the growth of a company

Example in a Medical Devices Manufacturer

- 250 person company part of large firm.
- Portfolio managed: all the big improvement projects (22).
- Bottleneck one person in IT.
- DILO: 30% efficiency (once again!)
  This critical resource also managed access badges for the company…
- 5FS:
  - Exploit: + 80%.
  - Elevate (underway):
    Hire another person of course.



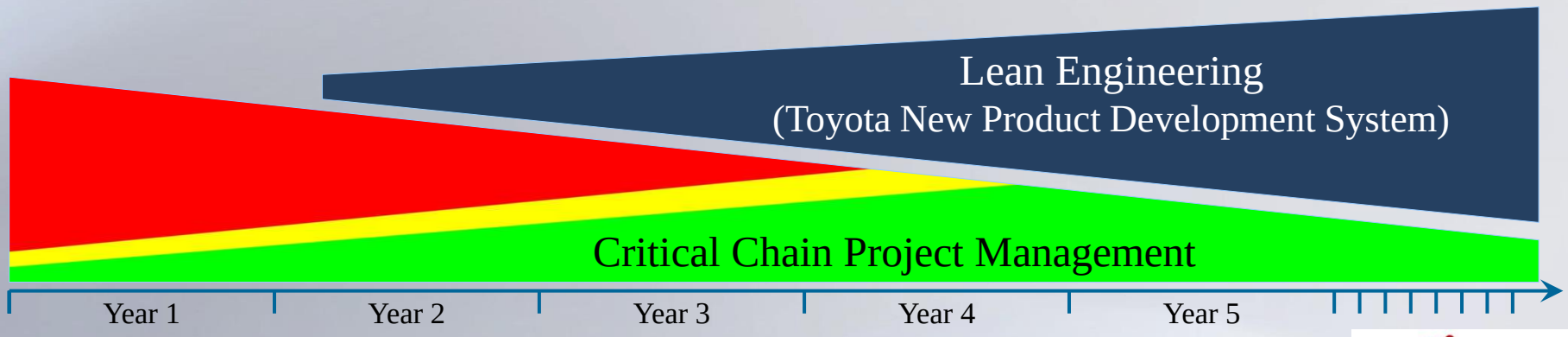
The capacity constraint determining the future performance of the company was just one person out of 250

Please note: bottlenecks are quite often in I.T.

Conclusion

The real challenge should be to do good projects with excellent outcomes

- The goal should not be just to finish one's projects on time and within budget.
- Critical Chain can put the organization under control and provide excellent project execution performance.
- But this should then be the foundation for doing projects that deliver exceptional results (exceptional products and services)…
- …by implementing things such as
  Lean Product & Process Development.

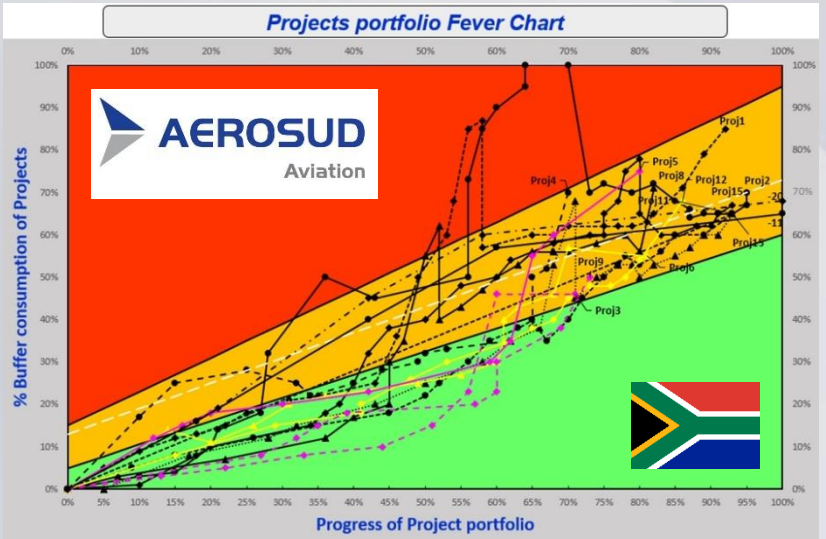


Project performance often determines a company's future

- Underlying the goal:
  "To Make More Money Now And In The Future" means (we believe) that there are simultaneously 2 constraints in all companies.
  - One that determines short term sales.
  - One that determines sales in the future.
- Building future sales is one or 2 portfolios of projects:
  - New product development portfolio.
  - Strategic improvements portfolio.
- So increasing the efficiency and throughput of these portfolios determines the future of organizations.

You should already have started your Critical Chain journey

- Using a combination of the 5 Focusing Steps and Critical Chain Project Management enables companies to:
  - Increase project Throughput and productivity x2 or x3,
  - Reduce project durations by 50% to 80%,
  - Finish nearly all projects on time.



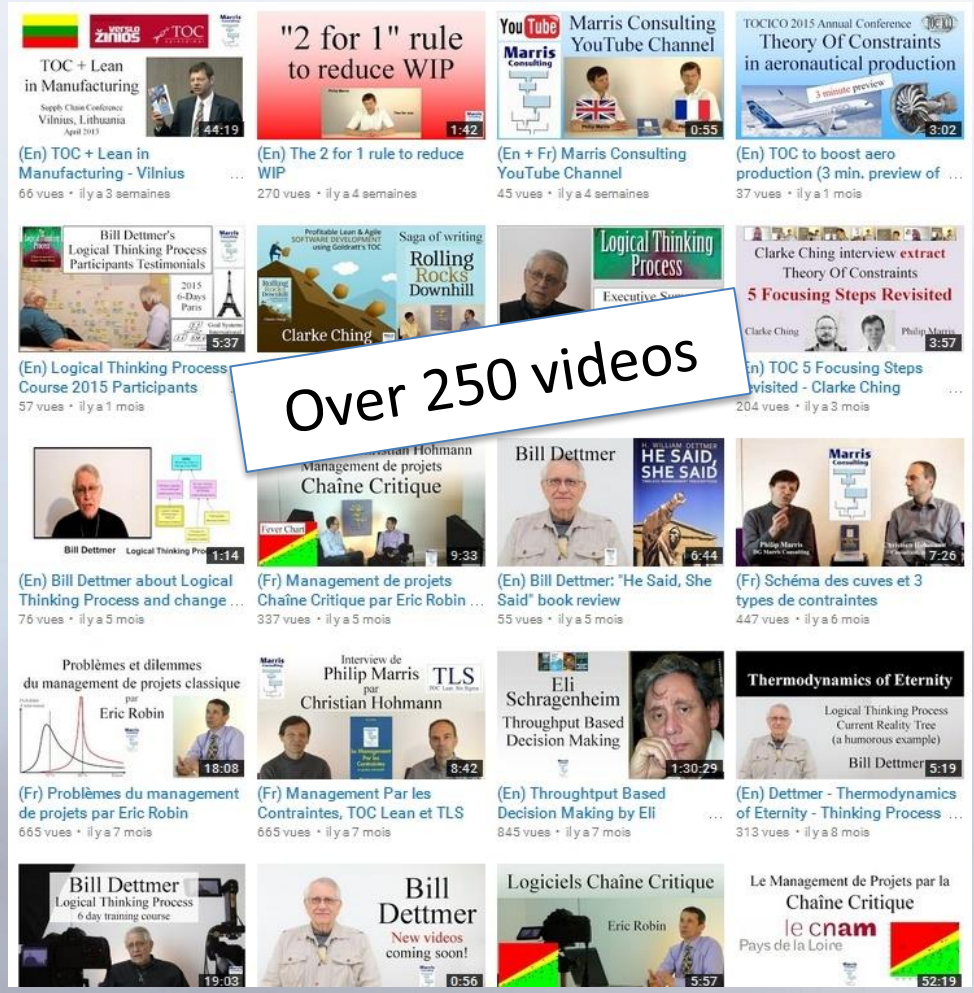
Thank you for your time.

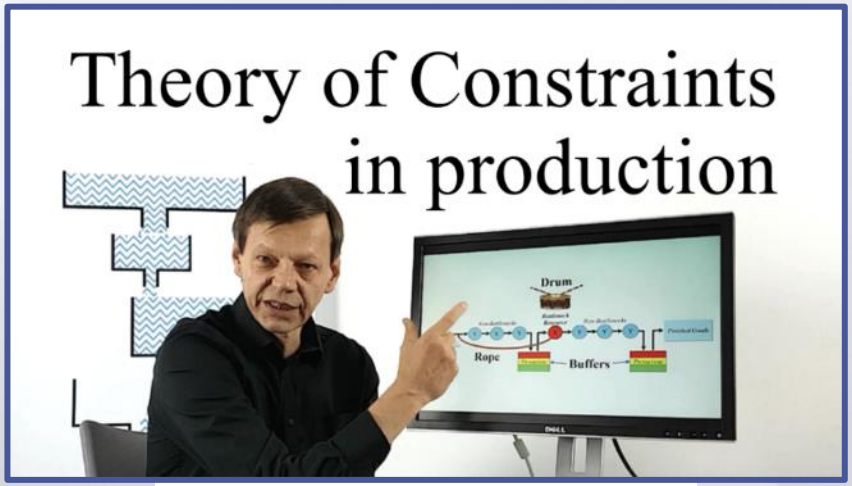
Any questions?

P.S. Do have a look at the 20 pages of information in the appendices to this presentation.

Appendices

A video website: Marris Consulting's YouTube Channel
Name of channel: "marrisconsulting" (attached)
https://www.youtube.com/user/marrisconsulting/videos





(En) Theory of Constraints in production - 5 min. summary

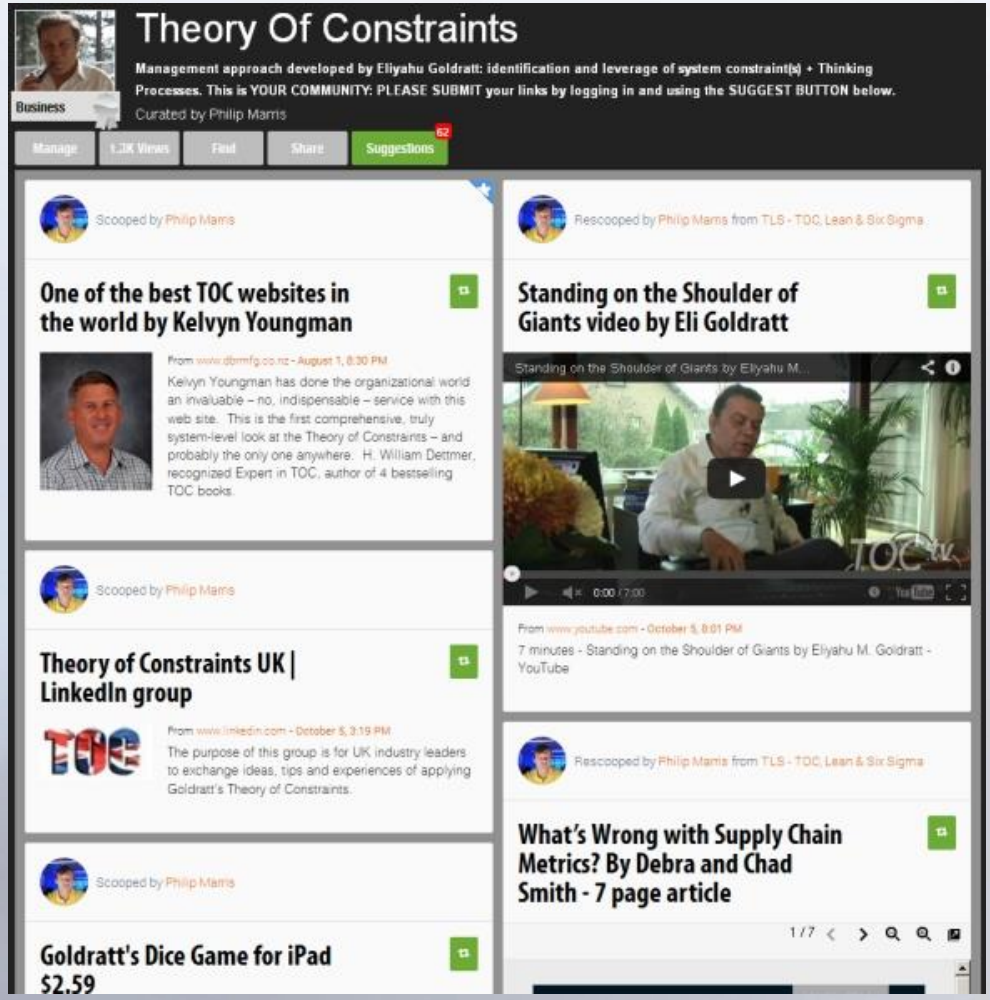
marrisconsulting
S'abonner 474

A brief 5 minute summary of how one applies the Theory of Constraints in a production environment. It covers: the axiom of the unbalanced plant, the existence of bottleneck, the Drum – Buffer – Rope flow control mechanism and the improvement strategy (the 5 focusing steps).

To facilitate viewing and video selection use the playlists:

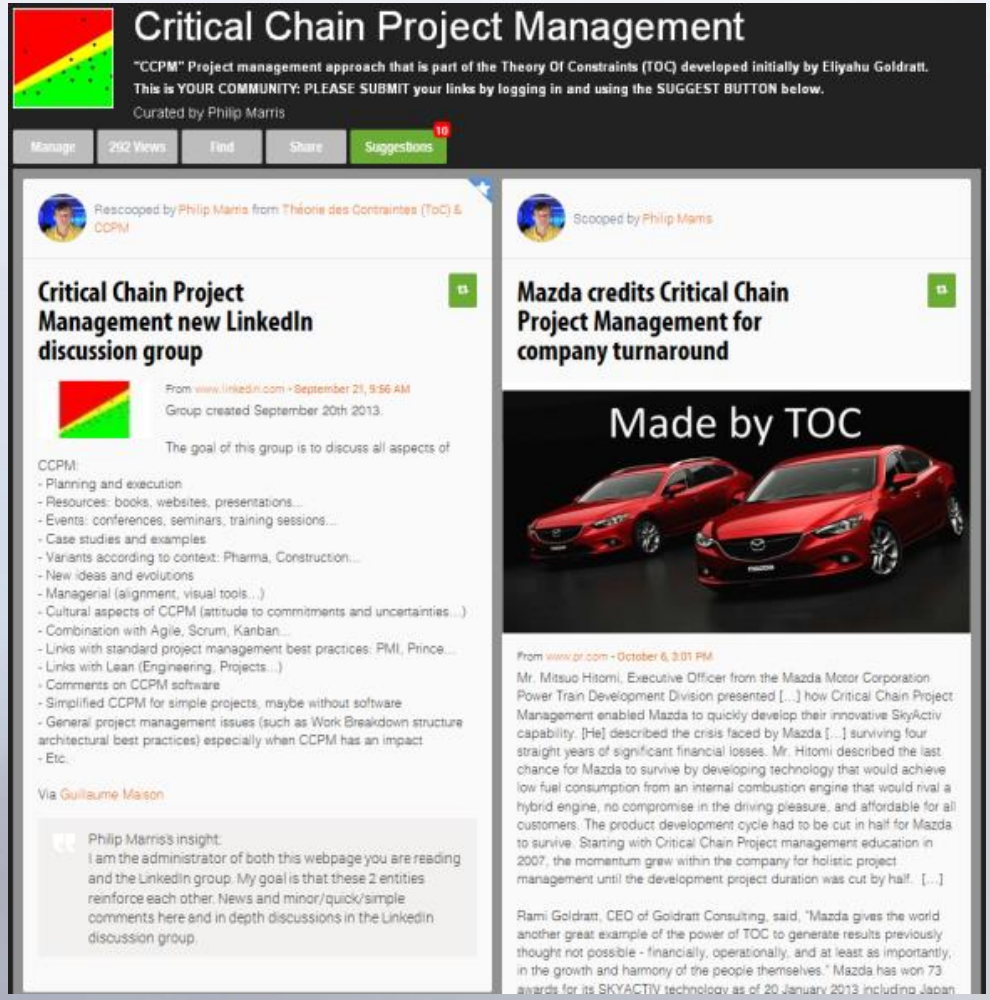
- English videos
- Critical Chain videos
- Etc.

A permanent news website dedicated to Theory of Constraints



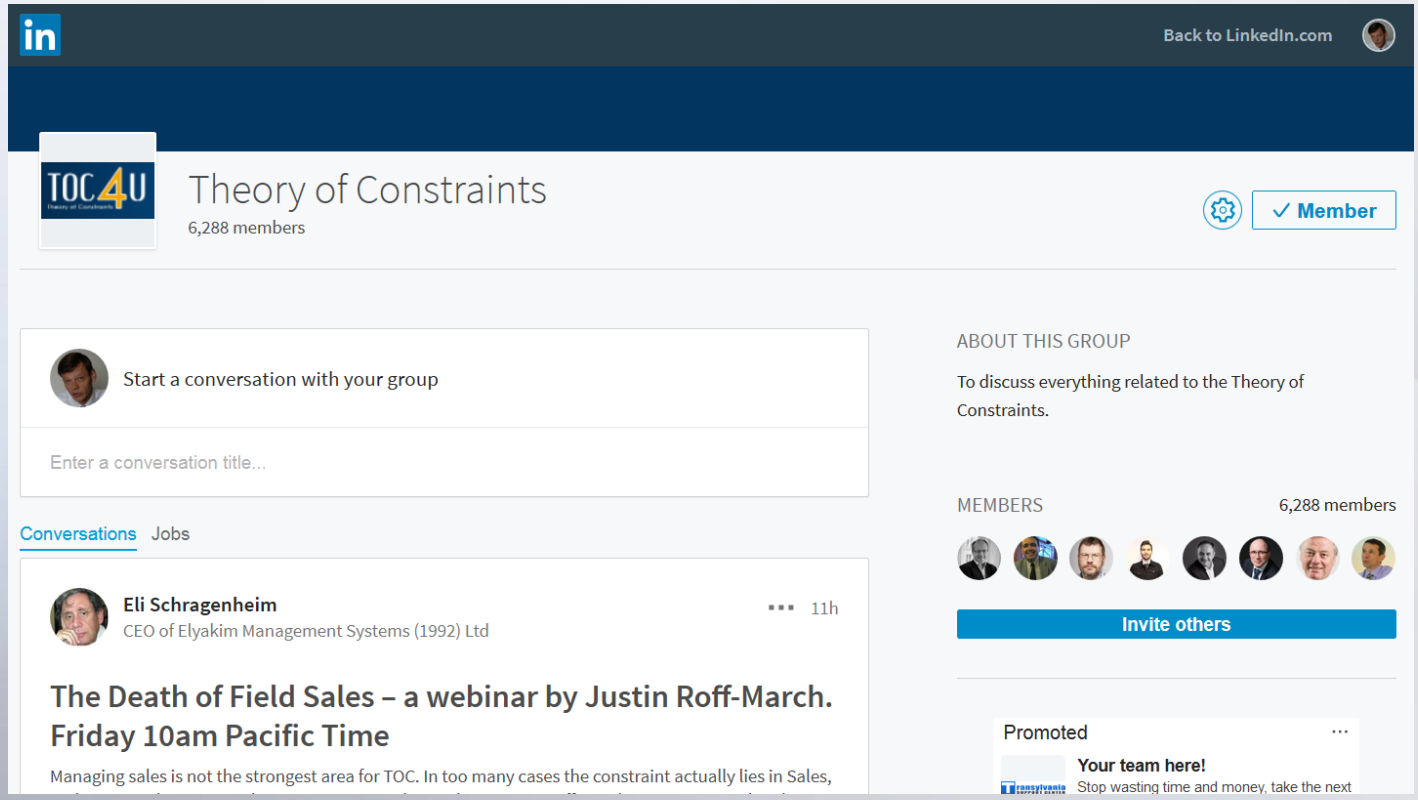
http://www.scoop.it/t/theory-of-constraints-by-philip-marris

A permanent news website dedicated to CCPM



http://www.scoop.it/t/critical-chain-project-management

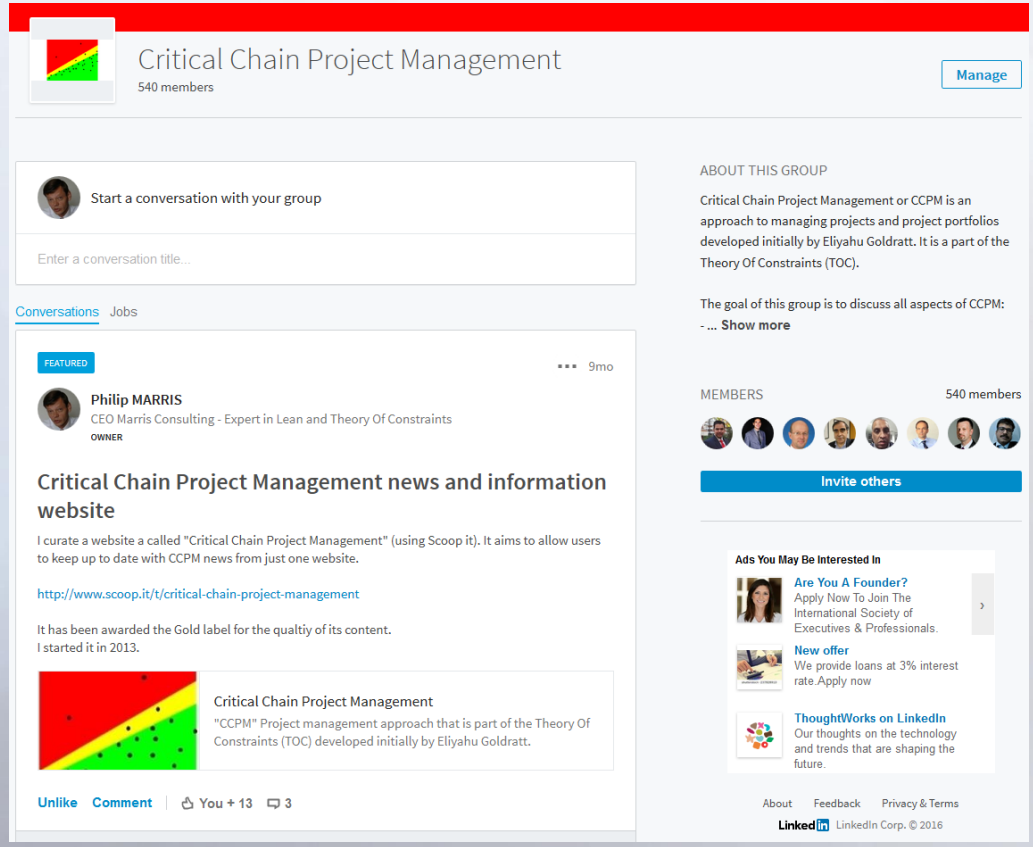
A LinkedIn Discussion group dedicated to Theory Of Constraints

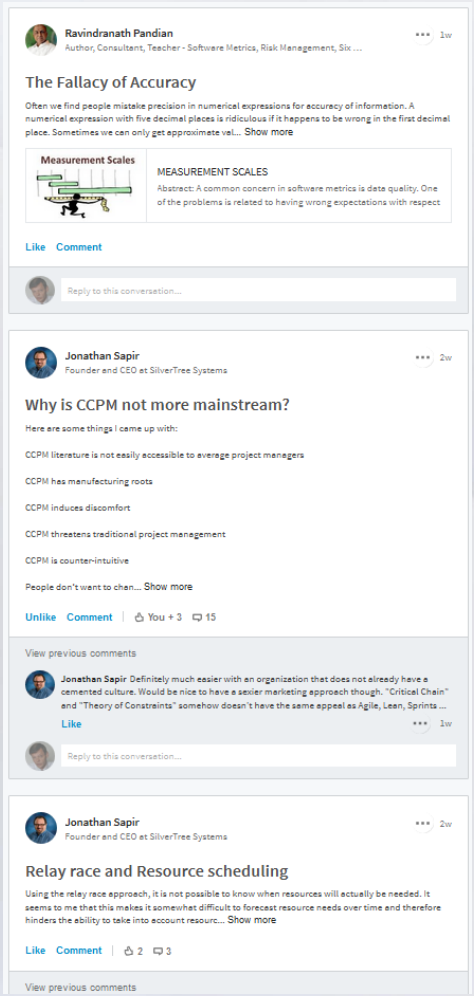


A LinkedIn account is required to access the group
https://www.linkedin.com/groups/84002

Beware there are several with similar names. This one is named: *Theory Of Constraints*

A LinkedIn Discussion group dedicated to Critical Chain Project Management



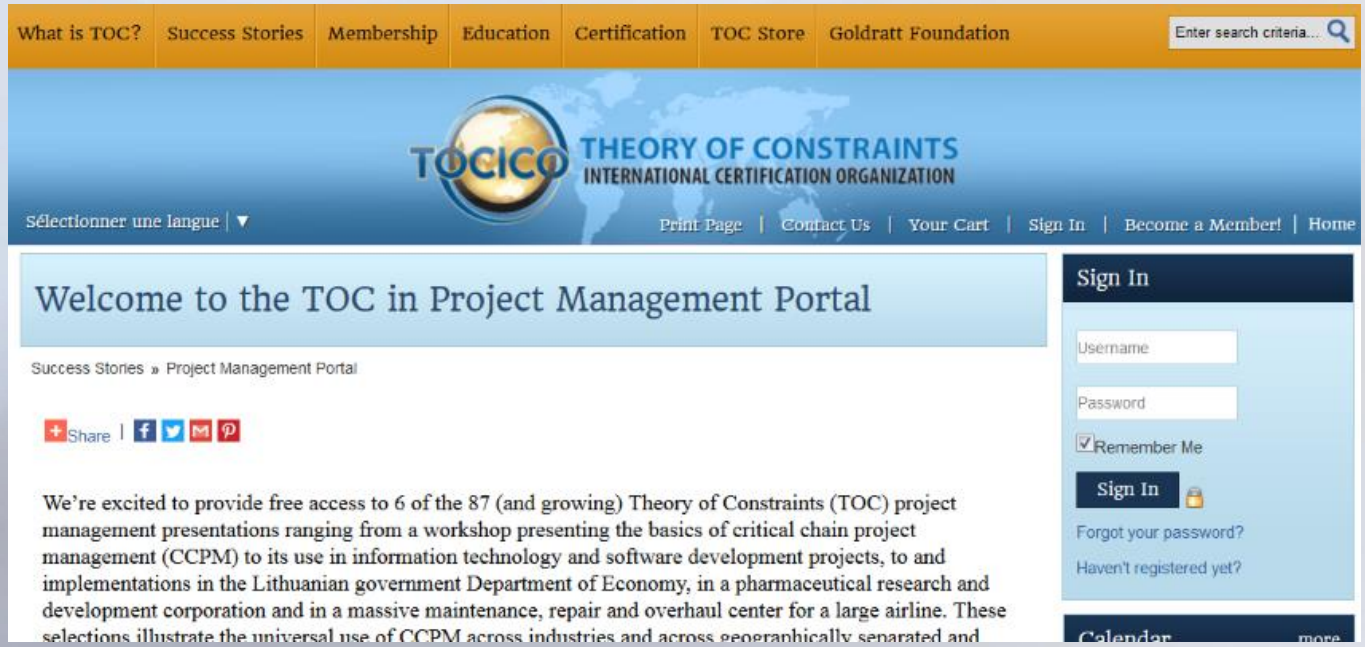


A LinkedIn account is required to access the group
https://www.linkedin.com/groups/5183858

Beware there are several with similar names. This one is named: *Critical Chain Project Management*

TOCPA (Theory Of Constraints Practitioners Alliance)
http://tocpractice.com/

TOCICO CCPM Portal
(Theory Of Constraints International Certification Organization)
https://tocico.site-ym.com/?page=project_portal



Victoria University Wellington New Zealand – TOC Database

http://www.victoria.ac.nz/som/research/theory-of-constraints

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA UNIVERSITY OF WELLINGTON

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You are here: Home > Research > Theory of Constraints

Theory of Constraints: A Research Database

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Theory of Constraints: A Research Database

Welcome to the Theory of Constraints (TOC) online resource, which aims to support collaboration between researchers and practitioners in the field.

About the Theory of Constraints database

A database of TOC articles, books and conference papers was started back in 1996, with our first bibliography published in 2000.

We have recently searched the literature and updated our records and have now assembled over 4000 articles, books, and conference papers, on all areas of TOC. The database here contains journal articles and conference papers, to complement the listing of TOC books compiled by Prof Jim Cox, which is available on the TOCICO website.

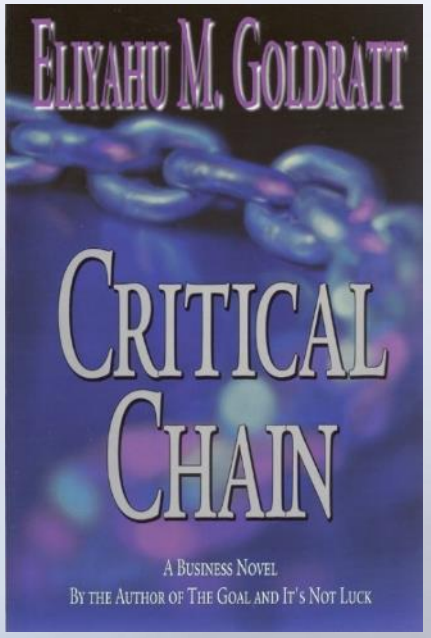
This evolving database will be published via regularly updated spreadsheets that build on the great work done to date, and available as a downloadable resource for researchers and practitioners alike.

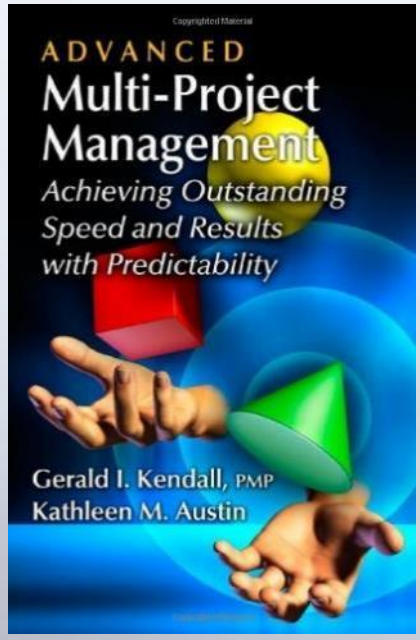
Database Categories	File size	File type
Critical Chain Project Management (CCPM) (updated April 2016)	6 MB	Excel spreadsheet
Thinking Processes (updated April 2016)	5,967 KB	Excel

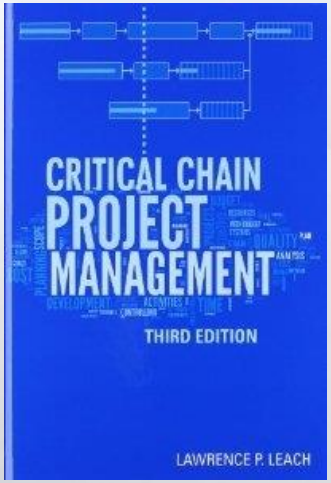
Reference Type	Year	Title	Author	Publication	Abstract	URL
A+ Journal	2016	Zhang, Junguang; Song, Xiwei; Díaz, Estrella	European Journal of Operational Research	Project buffer sizing of a critical chain based on comprehensive resource tightness	A buffer sizing method based on comprehensive resource tightness is proposed in order to better reflect the relationships between activities and improve the accuracy of project buffer determination. Physical resource	http://www.sciencedirect.
Book Section	2016	Critical Chain Project Management (CCPM)	Ellis, George	Project Management in Product Development	This chapter presents critical chain project management (CCPM). The chapter starts with an overview of the method and then relates it to the Theory of Constraints, the foundation of the technique. A step-by-step	http://dx.doi.org/10.1016/I
A+ Journal	2015	Quantitative Analysis of Rate-Driven and Due Date–Driven Construction: Production Efficiency, Supervision, and Controllability in Residential Projects	Arashpour, Mehrdad; Wakefield, Ron; Bilsmas, Nick; Abbasi,	Journal of Construction Engineering and Management	Concerns about production efficiency, quality, and affordability in the residential construction indicate there may be benefits in adopting alternative production control strategies to those traditionally used. Reducing adverse	http://ascelibrary.org/doi/a
A Journal	2015	Optimisation of critical chain sequencing based on activities' information flow interactions	Zhang, Junguang; Song, Xiwei; Chen, Hongyu; Shi, Ruixia	International Journal of Production Research	One critique for the classic critical chain sequencing methods is that only resource constraints and logical relationships between activities are considered, while interactions of information flows are ignored. However,	http://www.tandfonline.co
Other Journals	2015	Productivity of product design and engineering processes	Hinckelleyn, Johannes; Dekkers, Rob; Kreutzfeldt, Jochen	International Journal of Operation and Production Management	Purpose – Maintaining and improving productivity of product design and engineering processes has been a paramount challenge for design-driven companies, which are characterised a high degree of development of	http://dx.doi.org/10.1108/I
C Journal	2015	Inclusion of strategic management theories to project management	Parker, David W.; Parsons, Nicholas; Isharyanto, Fitri	International Journal of Managing Projects in Business	Purpose - The purpose of this paper is to explore the benefits of integrating the theory of constraints (TOC), resources-based theory (RBT), resource advantage theory (RAT), with a structured project-based methodology e.g.,	http://www.emeraldinsigh
Other Journals	2015	A Model for Continuous Improvement at a South African Minerals Beneficiation Plant	Ras, E.; Visser, Jk	South African Journal Of Industrial Engineering	South Africa has a variety of mineral resources, and several minerals beneficiation plants are currently in operation. These plants must be operated effectively to ensure that the end-users of its products remain internationally	http://www.scielo.org.za/s
A Journal	2015	Dynamic monitoring and control of software project effort based on an effort buffer	Zhang, Junguang; Shi, Ruixia; Díaz, Estrella	Journal of the Operational Research Society	The improvement to the monitoring and control efficiency of software project effort is a challenge for project management research. We propose to overcome this challenge through the use of a model for the buffer	http://www.palgrave-jour
A Journal	2015	Project management for uncertainty with multiple objectives optimisation of time, cost and reliability	Jeang, Angus	International Journal of Production Research	This research adopts an approach that uses computer simulation and statistical analysis of uncertain activity time, activity cost, due date and project budget to address quality and the learning process with regard to	http://dx.doi.org/10.1080/0
B Journal	2015	Improving performance in project-based management: synthesizing strategic theories	Karessa, Cullen; David, W. Parker	International Journal of Productivity and Performance Management		http://dx.doi.org/10.1108/I
Other Journals	2014	A decomposition heuristics based on multi-bottleneck machines for large-scale job shop scheduling problems	Zhai, Yingni; Liu, Changjun; Chu, Wei; Guo, Ruifeng; Liu,	Journal of Industrial Engineering and Management	A decomposition heuristics based on multi-bottleneck machines for large-scale job shop scheduling problems (JSP) is proposed. In the algorithm, a number of sub-problems are constructed by iteratively decomposing the large-	http://www.jiem.org/index
Other Journals	2014	COMFRC Addresses Legacy Hornet Readiness	Walters, Andrea	Naval Aviation News	According to PMA-265, 114 aircraft have completed inspections and are designated for service life extensions beyond 8,000 flight hours, with an additional 102 aircraft undergoing high-flight-hour inspections at Fleet	http://web.b.ebscohost.co
Other Journals	2014	Software Project Management: Theory of Constraints, Risk Management, and Performance Evaluation	Asseman, Antoine; Aloraidi, Nada Ashgar; Salim, Mariam; Rezk,	The Journal of Modern Project Management	Constraints and risks are two critical factors that affect software project performance more attention needs to be paid to constraints and risks in order to improve performance. In this paper, investigation will take place to	http://www.journalmodern
Book Section	2014	Critical Chain Project Management		A Handbook for Construction Planning and Scheduling	Critical Chain Project Management™ (CCPM) is frequently presented as a revolutionary new project management concept, an important breakthrough in the history of project management. CCPM focuses on the uncertainty in	http://dx.doi.org/10.1002/9
Other Journals	2014	Critical Chain Method in Traditional Project and Portfolio Management Situations	Anantatmula, Vittal S.; Webb, James B.	International Journal of Information Technology Project Management (IJITPM)	Critical Path (CP) method has been under scrutiny in recent years as the next evolution of project schedule development, the Critical Chain (CC) project management is gaining attention. Advocates of the Critical Chain	http://www.igi-global.com
Other Journals	2014	Theory of Constraints and Its Application in a Specific Company	Linhart, Jakub; Skorkovský, Jaromír; Others,	Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis	This article analyses the possibilities of the practical utilization of Critical Chain Project Management methodology. Our study analyzed key processes related to the implementation and utilization of such a tool in a concrete	http://acta.mendelu.cz/62/
Conference Proceedings	2014	Multi-objective optimization model for multi-project scheduling on critical chain	Wang, Wei-xin; Wang, Xu; Ge, Xian-long; Deng, Lei	Advances in Engineering Software	In this paper, a multi-project scheduling in critical chain problem is addressed. This problem considers the influence of uncertainty factors and different objectives to achieve completion rate on time of the whole projects. This	http://www.sciencedirect.
C Journal	2014	Mitigating behavioral outcomes in a multiproject environment: a modified CCPM model	Agarwal, Atul; Larson, David	Academy of Information and Management Sciences Journal	Organizations continue to struggle in managing projects that lead to successful conclusions. While tools such as PERT and CPM have helped the project management process, they have not produced the level of success as	http://search.proquest.com
C Journal	2014	Mitigating Behavioral Outcomes in A Multi-Project Environment: A Modified CCPM Model	Agarwal, Atul; Larson, David	Academy of Information and Management Sciences Journal	Organizations continue to struggle in managing projects that lead to successful conclusions. While tools such as PERT and CPM have helped the project management process, they have not produced the level of success as	http://search.proquest.com
C Journal	2014	Critical chain and theory of constraints applied to yachting shipbuilding: a case study	Bevilacqua, Maurizio; Ciarapica, Filippo Emanuele; Mazzuto,	International Journal of Project Organisation and Management	Product development projects, like many other types of projects, often can exceed their planned schedule by 50% to 100%. Often this is attributed to uncertainty or the unforeseen. To compensate for this age-old dilemma,	http://www.inderscienceo
Conference	2014	The ITLS (TM) model-Integration of Theory of Constraints, Lean Manufacturing and Six Sigma: A	Navarro, Carlos I. M.; Cleto, Marcelo G.	Proceedings of the 2014 Industrial and Systems	Recently the three most applied approaches into the Operations Continuous Improvement are Theory of Constraints (TOC), Lean Manufacturing and Six	http://search.proquest.com

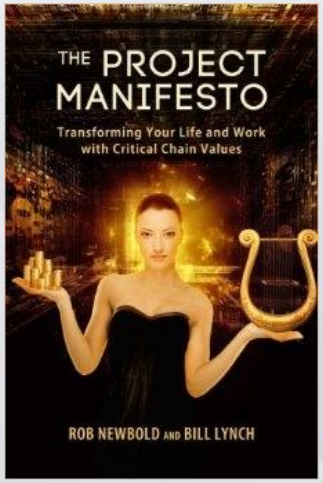
There is quite a lot of material on *Critical Chain Project Management*

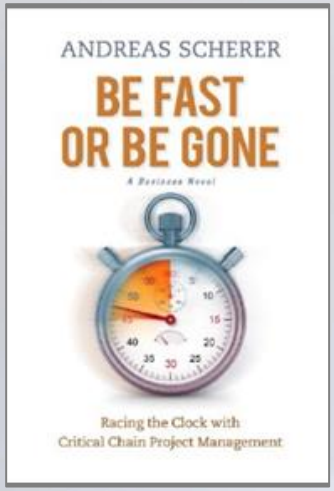
Critical Chain books



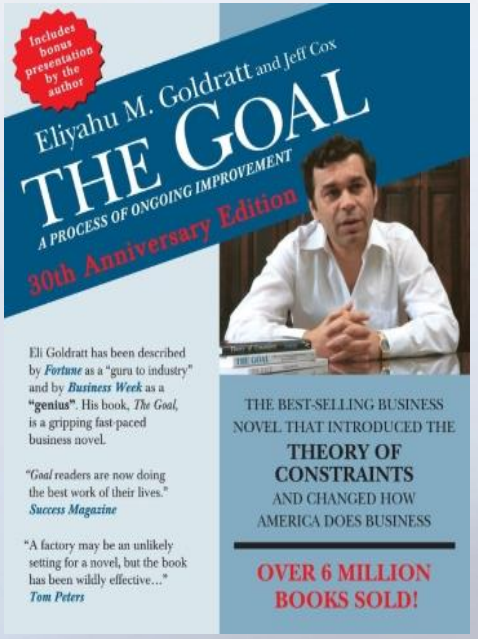


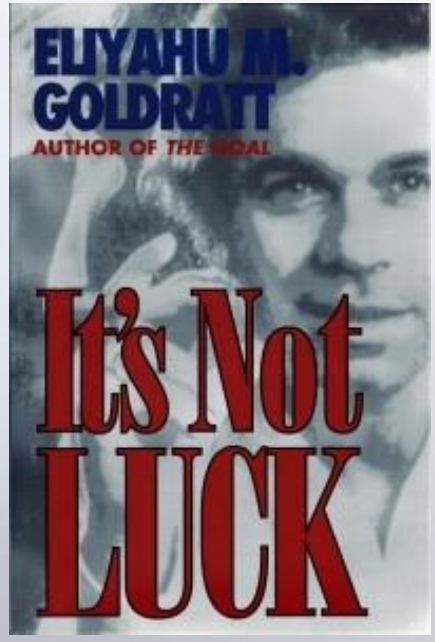


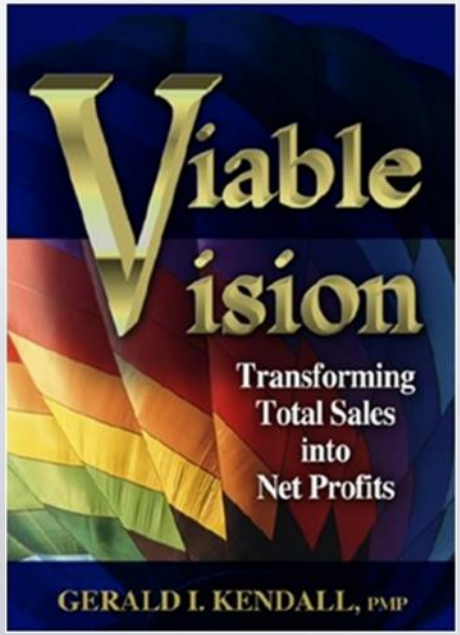


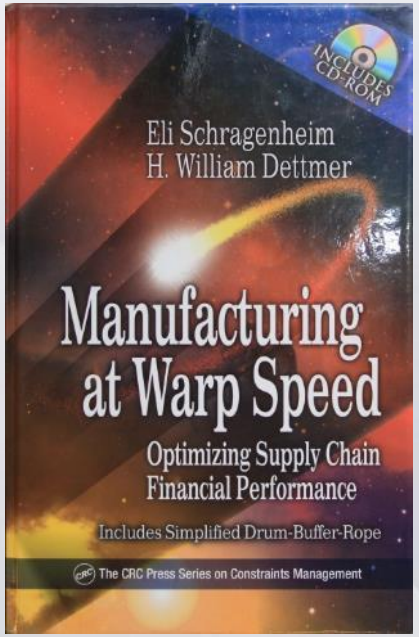


Theory of Constraints books

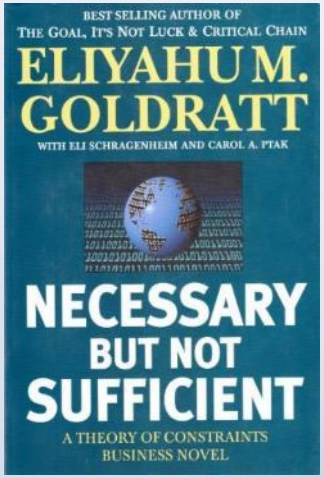


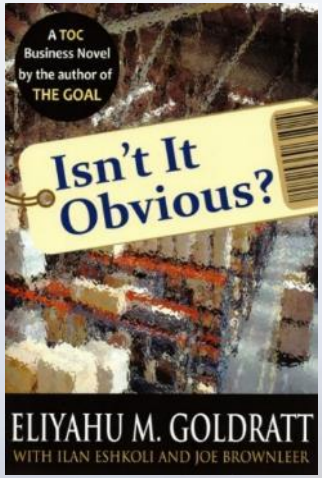


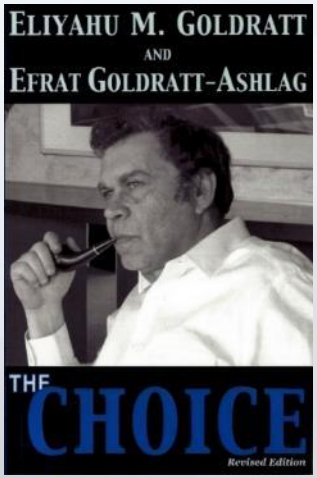


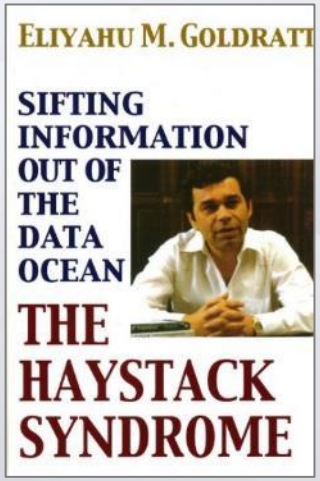


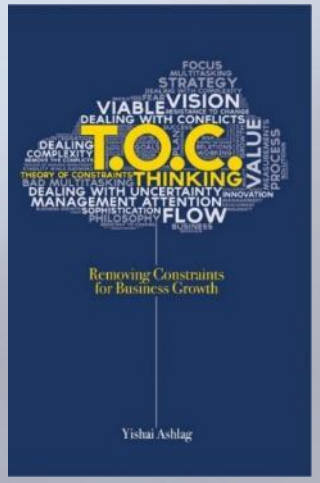
Other ToC books

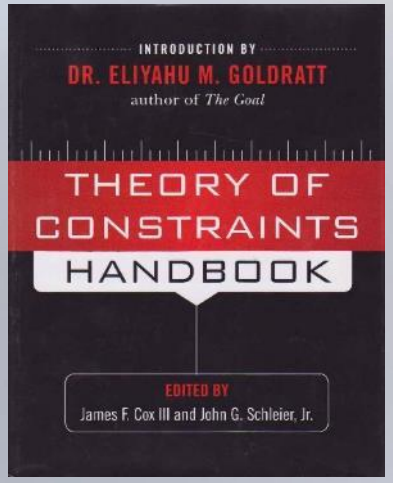


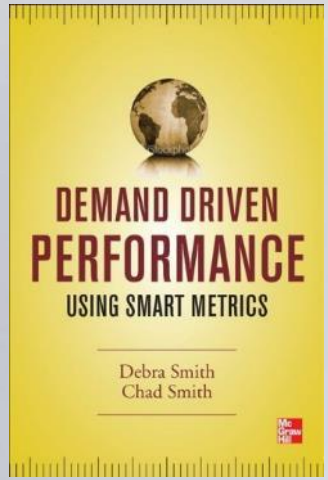


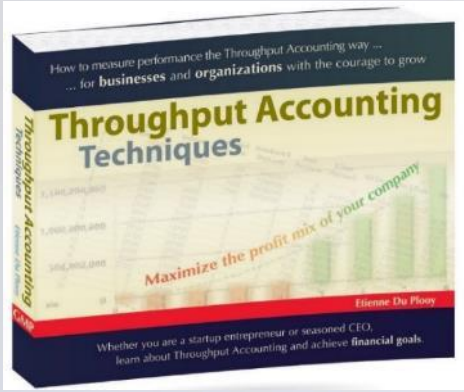




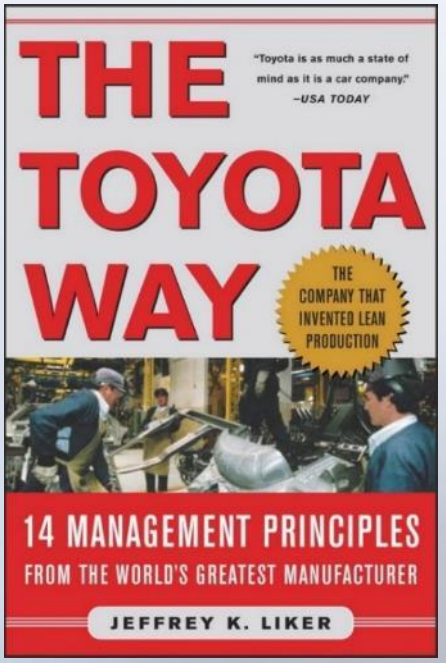


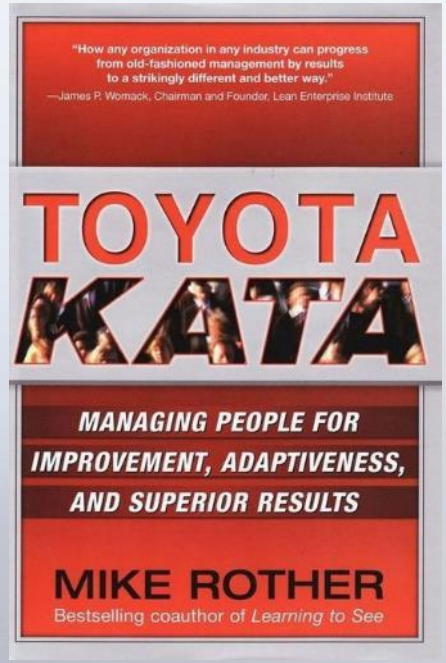


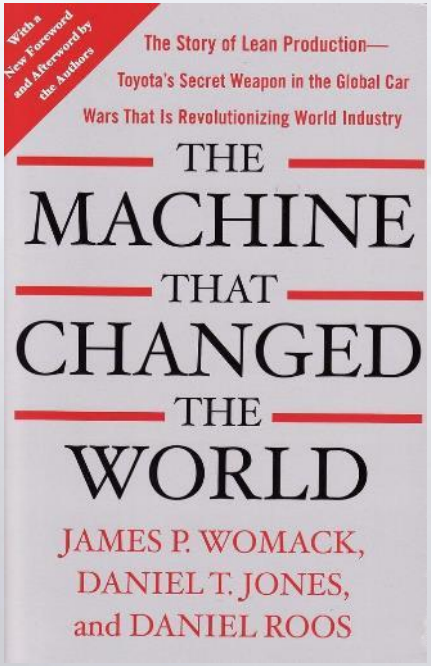


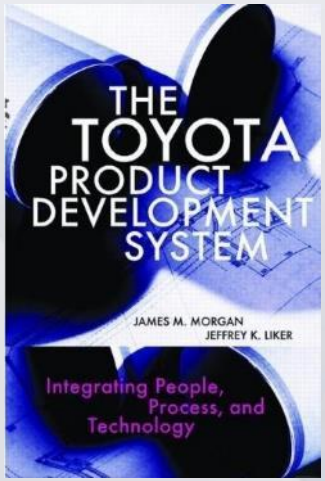


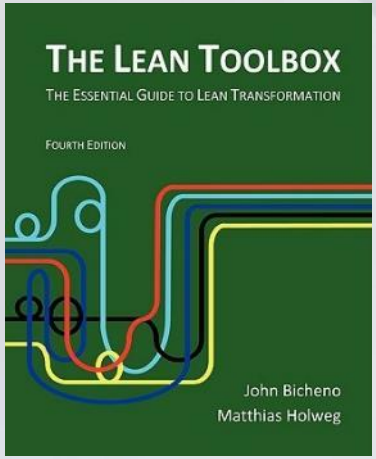
Lean books


THE TOYOTA WAY
"Toyota is as much a state of mind as it is a car company."
–USA TODAY
THE COMPANY THAT INVENTED LEAN PRODUCTION
14 MANAGEMENT PRINCIPLES
FROM THE WORLD'S GREATEST MANUFACTURER
JEFFREY K. LIKER


"How any organization in any industry can progress from old-fashioned management by results to a strikingly different and better way."
—James P. Womack, Chairman and Founder, Lean Enterprise Institute
TOYOTA KATA
MANAGING PEOPLE FOR IMPROVEMENT, ADAPTIVENESS, AND SUPERIOR RESULTS
MIKE ROTHER
Bestselling coauthor of Learning to See


With a New Foreword and Afterword by the Authors
The Story of Lean Production—
Toyota's Secret Weapon in the Global Car Wars That Is Revolutionizing World Industry
THE MACHINE THAT CHANGED THE WORLD
JAMES P. WOMACK, DANIEL T. JONES, and DANIEL ROOS


THE TOYOTA PRODUCT DEVELOPMENT SYSTEM
JAMES M. MORGAN
JEFFREY K. LIKER
Integrating People, Process, and Technology


THE LEAN TOOLBOX
THE ESSENTIAL GUIDE TO LEAN TRANSFORMATION
FOURTH EDITION
John Bicheno
Matthias Holweg

Theory of Constraints marketing & awareness activities

5 Permanent news websites (www.Scoopit.com)

- Theory Of Constraints (English & French)
- Critical Chain in (English & French)
- TLS: TOC + Lean + Six Sigma

>250 Free Videos (YouTube Channel)

Discussion Groups (LinkedIn)

- Critical Chain
- TLS: TOC, Lean and Six Sigma

2 dedicated websites in French

- TOC in Production
- TOC in Projects

Others:

- Twitter, Facebook, Etc.

Philip Marris, Founder and CEO of Marris Consulting
Business transformation, Theory Of Constraints and Lean expert

Marris Consulting

33 years of experience, 58 years old, Manufacturing & Supply Chain expert
Bilingual & bicultural English/French

COMPETENCIES

- **Transformation programs in industry**
- **Industrial Excellence Expert (manufacturing and product development).** Recognized expert in Lean, Six Sigma and Theory Of Constraints. Often combines these ("TLS").
- **Author** of an industrial management bestseller in France: *Le Management Par les Contraintes en gestion industrielle*, Editions d'Organisation [1994, 1996, 2000, 2nd Edition currently underway).

FORMER POSITIONS

- Cap Gemini Ernst & Young / Bossard Consultant: In charge of Manufacturing Operations for France & Europe (>200 consultants)
- Cap Sogeti Industrie
- Creative Output: collaborated with E. Goldratt author of *The Goal*
- Vallourec: Shop floor foreman, Methods Engineer
- Professor at HEC Management School (Supply Chain & Manufacturing).

SECTORS / CLIENTS

- Over 150 engagements in industry.
- Aeronautical
- Pharmaceuticals
- Automobile industry: car makers and suppliers
- Process industry: steel, glass, cardboard, extruded plastic
- World leader in ball bearings
- MRO rail and aeronautical
- Packaging: cardboard, steel, plastic
- Electrical power systems: world wide leader
- Furniture manufacturer, Marine engine manufacturer, Armoured vehicles manufacturer, Electronics: printed circuit boards, …

MISSIONS / RESULTS

- **Production, Operations & Supply Chain (sample):**
  - Worldwide automotive OEM tier 1 supplier: increase in Throughput of 17% in 15 minutes. Savings >$400M per year. saved relationship with largest customer.
  - Large MRO (Maintenance, Renewal & Overhaul) Division of a major European railway operator (France, 25 000 p.): in one of the main factories (940 p.) reduction of the production lead-times for the renovation of high speed trains from 126 days to 38 days . Further lead-time reductions are underway over 2 years after the end of our assignment.
  - Labour productivity: furniture manufacturer +35% in 6 weeks, M.R.O: 80% in 2 months, manufacturing equipment (assembly) +70%, ...
  - Automotive Supplier (France, 350p.): Increase in the O.E.E. of the bottleneck resource by more than 30%, change from 5x8 shifts to 2x8 while providing the same output.
  - Complete reengineering of the Supply Chain of a steel manufacturer: Long term strategic planning, Sales & Operations Planning, Scheduling. Implementation of TOC/MPC. Increase in 40 points of the due date performance
  - Manufacturer of large machines for cardboard packaging: reduction in the delivery lead-time by over 50% and a reduction in the number of hours of labour per machine of over 30%.
  - Aircraft MRO: reduced durations by over 50% and increased productivity by over 80% in 2 months.
- **R&D & Industrialisation / Engineering / New Product Development (sample):**
  - Aeronautical product industrialisation portfolio: reduced durations and projects finish on time
  - Complete transformation of an Engineering department of 150 people. Reduction in project durations of over 40%. Improvement in productivity of over 25%. Projects completed on time went from less than 30% to over 85%.
  - Several aeronautical product development and industrialisation projects involving up to 500 people per project in up to 6 different simultaneous facilities with budgets up to 20M€ each.
  - New product development and product relooking: reduction of over 45% of average project duration, increase in number of projects completed each year of over 50%.
  - New product portfolio analysis and development strategy
  - Quotation process reengineering: handling speed multiplied by 4.

We are honoured to have been able to help…

Marris Consulting

Marris Consulting

Factories, People & Results

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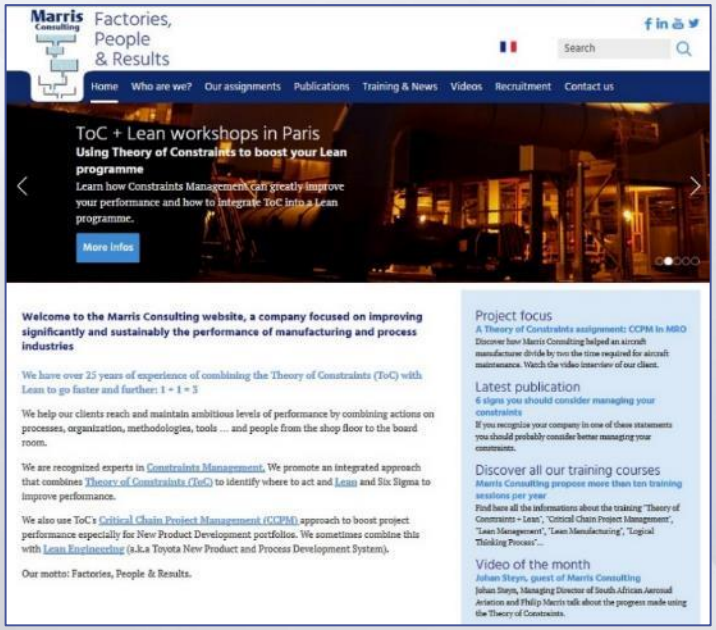
Paris 75755 Cedex 15
France
Tel. +33 1 71 19 90 40



www.marris-consulting.com