

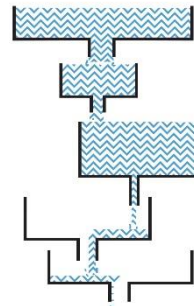


# Critical Chain Project Management

Advanced

- *Training material* -

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Consulting



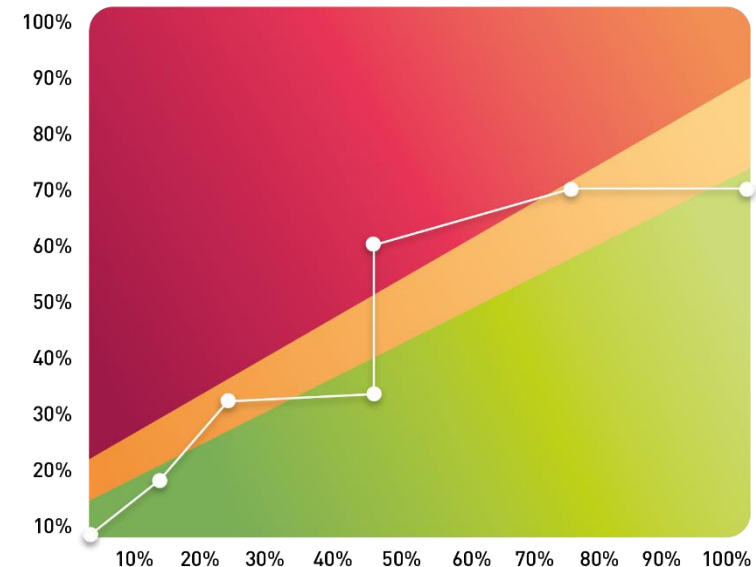
Online, 25<sup>th</sup> – 28<sup>th</sup> of May 2021

Version 1.0

# Extract

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1. Introduction
2. Advanced project scheduling with Critical Chain
3. Communication and relation with external actors
4. Identification of the capacity constraint in the project environment
5. Monitoring of project portfolios the Critical Chain way
6. Focused continuous improvement
7. Complementarity with other methods
8. CCPM software solutions
9. Conclusion



# Extract

## Training objectives

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- Deepen the details of CCPM planning
- Apply CCPM to different types of projects and portfolios
- Identify the capacity constraint in a project environment
- Know the constraints and selection criteria for a CCPM software
- Know how to perpetuate and exploit the benefits of Critical Chain



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  - a. Scheduling a long and complex project with Critical Chain
  - b. Planning optimization
  - c. Risk Management
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# Extract

## The progressive development of schedules is judicious for long and complex projects

- Long and complex projects are divided into successive phases, each of which can be entrusted to different project managers.
- Some of these phases will only be completed months or even years after the start of the project. So there is not the needed visibility on tasks and resources availability to plan the entire project all at once.
- In addition, CCPM scheduling requires a certain level of detail, so it makes sense to plan precisely the short-term activities, and more macroscopically the medium and long-term activities. As the project progresses, when the expected specifications and deliverables become clearer, detailed phase planning can then be performed.
- This method of progressive development is called Rolling Wave Planning.



# Extract

## To define and respect full kits improve productivity and timeliness

- We call full kit the set of elements necessary for the realization of a task. This includes all essential information such as specifications, list of critical criteria, diagrams, plans, documents, materials, components, tools, etc....
- The principle of full kit states that a task must not start until the dual condition of the completeness of the kit and the required level of quality of those constituents is fulfilled.
- The principle of full kit thus confers rights to the tasks performers (requirement of complete & compliant), but also the duty to deliver in the same way to the next performer. Thus, each task is trivially associated with two complete kits: an input kit and an output kit.
- Derogating from the principle of full kit has many negative consequences:
  - Increasing work-in-progress by interrupting work
  - Multi-tasking and resumption of activities, loss of time between the commutations
  - Poor visibility of the tasks progress and workload
  - Reduction of the quality of the deliverables between actors (errors, omissions ...)
  - Degradation of kit completeness

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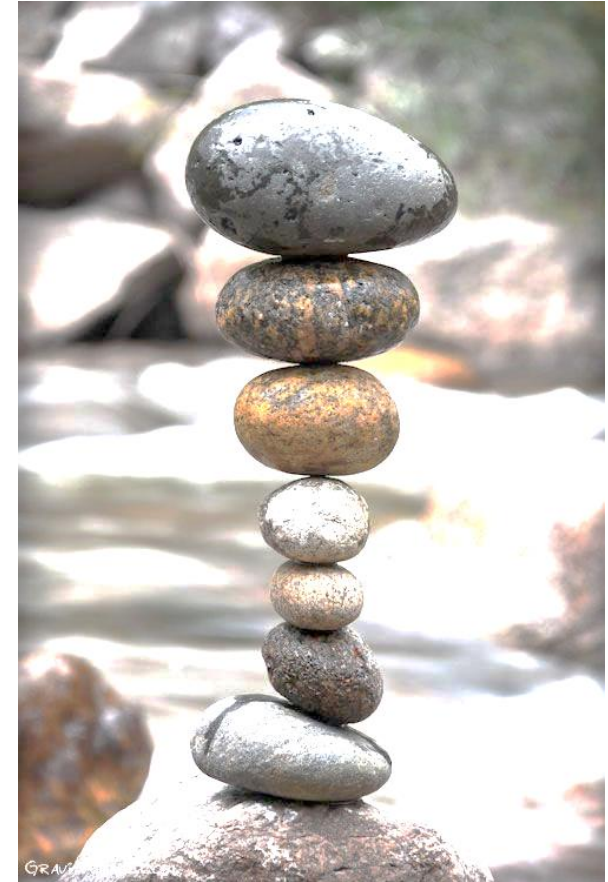
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# Extract

## The Critical Chain is the constraint, the backbone of the project

- When developing the project schedule, you must choose and create the "least bad" Critical Chain:
  - To reduce the duration of the project and obtain a project end date accepted by all,
  - To limit the multiplication of parallel tasks with similar durations. This makes the schedule fragile and vulnerable to changes of Critical Chain during the project execution, and it favours the appearance of quasi-critical chains.
  - To keep the Critical Chain in its area of expertise or in the direct control area of the project manager (not having > 50% of his Critical Chain in subcontractors, suppliers, etc. ...)
  - To avoid any poor dimensioning of the project buffer
- A robust and stable Critical Chain allows the simplification of the communication and the focus of the team.



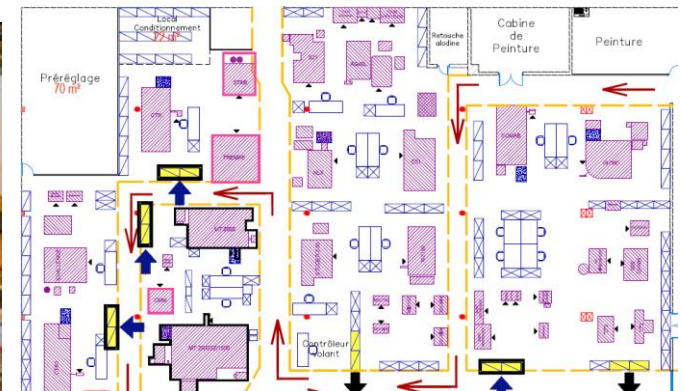
*Choose its constraint in order to avoid an unstable Critical Chain, out of direct control, and thus reduce the risk of non-compliance with the commitments*



## Context:

# Flows simplification – Flash re-organisation of a manufacturing workshop

- A project of simplification of the production flow and organization of lines function of product types led to a new layout.
- The re-organisation of the workshop corresponded to the relocation of about 70% of the machines (about 45 machines).
- In order not to disturb production because of an important downtime, the management allocated a slot of only 2 weeks during the Christmas holidays to perform the works.
- The first estimates gave an 8-week project.



## Results:

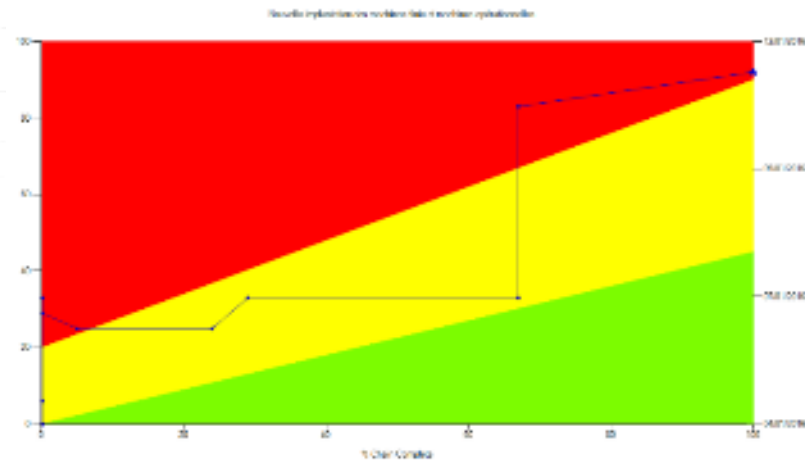
### Flows simplification – Flash re-organisation of a manufacturing workshop

- The sequence of operations and the resources utilization were challenged during the Critical Chain scheduling
- Several hypotheses had been tested before the start of the project (upstream preparation phase, etc. ...) which allowed to:
  - Justify investments to make the re-organisation in 2 weeks (investments in resources and equipment, etc. ...)
  - Choose the best scenario that meets the different dates constraints (including several external stakeholders)
- The "final" planned duration for this project was 8 days. The project was finalized 1.5 days in advance.



**TESTIMONY ON YOUTUBE:  
MARRIS CONSULTING**

<https://www.youtube.com/watch?v=-SUYXo0s-g8>



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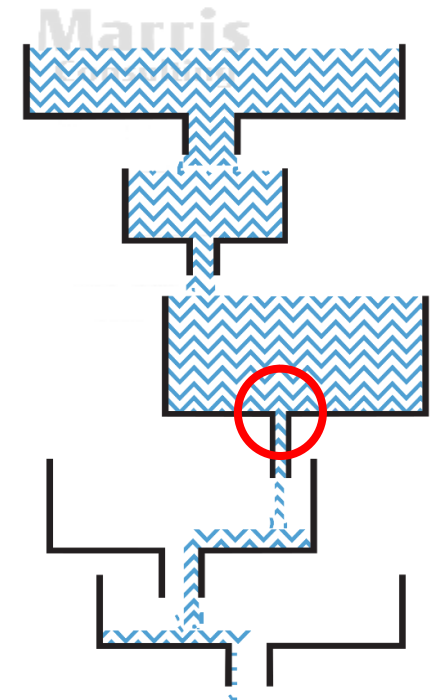
# Extract

## The importance of identifying your capacity constraint

*Focus actions on the constraints that determine the overall performance*

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- Companies (factories, engineering departments ...) and other organizations inevitably have unbalanced capacities.
- There is always a constraint somewhere in the system.
- One hour lost on that constraint (the bottleneck) = one hour of lost sales.
- One hour gained on a non-bottleneck is an illusion.
- A dual view is mandatory: different rules for constraints and non-constraints.



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*The sum of local optimums is not equal to the global optimum*

# Extract

## We consider that there are two types of constraints in project environment

- The constraint of a project is its Critical Chain: it determines the project duration.
- The constraint of a projects portfolio is a resource/business profile: it is the constraint that prevents the system to generate more turnover.
- This constraint is harder to find in project environments than in production.
- Data on tasks times and workloads are often difficult to estimate.
- They are either erroneous or non-existent; companies do not bother to calculate workloads except for very rough annual budget estimates.
- Companies are trying to develop today's products with yesterday's resource organizations.
- Typically in New Product Development, we regularly find that new skills, or steps where the workload per product has increased significantly are understaffed (examples: electronic, regulation, software development, quality management ... ).

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*To find the constraint in a project portfolio,  
we look for the queues*

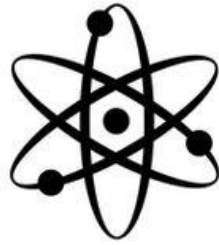


*Extract*

When you have a hypothesis for the location of a bottleneck, test it

- When you have a hypothesis for the location of a bottleneck, test it!
- Normally everything should make sense
- Example:
  - If the bottleneck produces 15% more then the organization should produce 15% more (often with a lag)
  - Late or overdue things are waiting in front of the bottleneck
  - You do not dare to launch certain projects because they would require the intervention of the bottleneck
  - Etc.

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**KEEP  
CALM  
AND  
TEST YOUR  
HYPOTHESIS**

# Extract

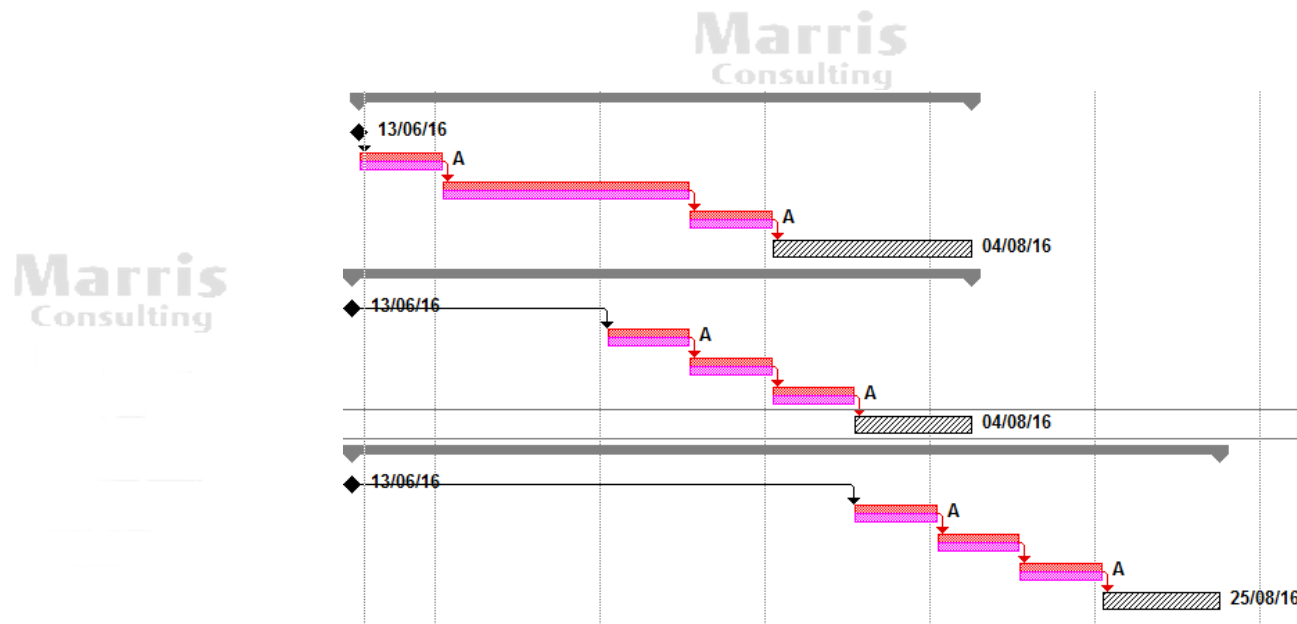
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**Stop starting  
and  
start finishing!**

# Staggering projects prevents from submerging the bottleneck with too much WIP and enables to reduce multitasking

- Staggering consists in shifting the beginning of each project according to the constraint availability.
- Staggering or pipelining is done within a portfolio (a set of projects sharing the same resources), there should not be resource contention between two portfolios.
- To stagger projects within a portfolio, the constraint must have been identified.
- Below is an example of projects staggering according to resource A's availability:

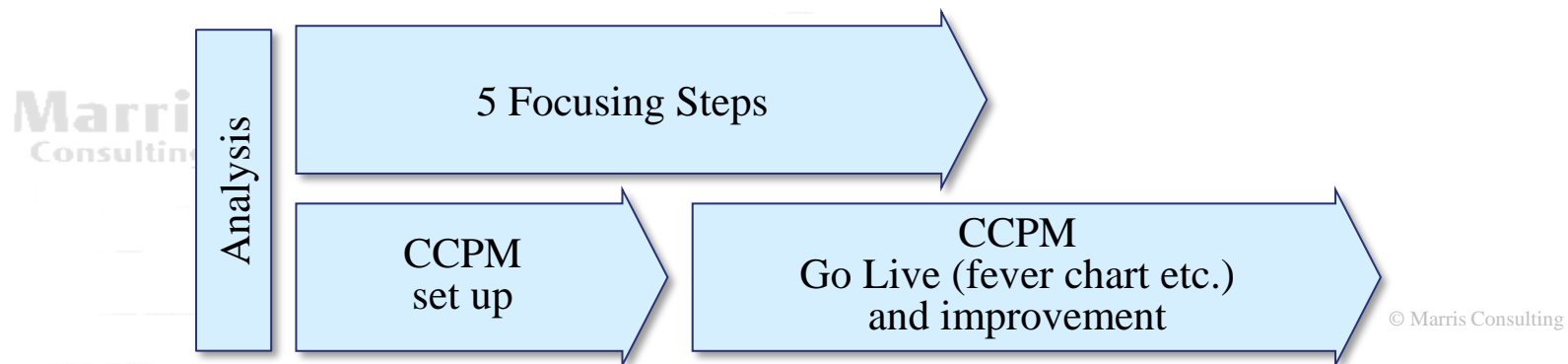




# Extract

To further increase performance,  
we seek to increase the capacity of the portfolio constraint

- Some capacity constraints in project portfolios can be immediately exploited to produce 2 or 3 times more. This can be done even before implementing CCPM.
- To do so, a simplified version of the “5 Focusing Steps” of the Theory of Constraints can be used:
  - **Identify** the capacity constraint by looking for the largest queue.
  - **Exploit** the constraint, often by reducing multitasking and removing/postponing less important jobs.
  - This usually increases productivity by 2 or 3.
  - Then you can **repeat** the process looking for the new constraint.



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  - a) Agile
  - b) Lean Engineering
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# Extract

## A priori Agile and Critical Chain methods are very different...

- The Critical Chain is particularly suitable to manage uncertainty in basic tasks times, scarce resource management and multi-project conflicts. An Agile approach is better suited to handle high uncertainty in customers' needs.

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	AGILE	CRITICAL CHAIN
Pros	Reactivity and autonomy of the project teams - Improvement of the relationship with the customer	Respect of project deadlines, overall vision of the project - Taking into account the capacities of the company
Cons	Blurred long-term vision of the project The (expensive) need to perform tests throughout the project	The Critical Chain method requires a strong change in the corporate culture. The project buffer must be understood and accepted by the management.
When must it be used?	On projects where an iterative process is possible (example software development)	On all types of projects (as long as the need is clearly defined)
Other differences	Project teams are dedicated to a project and autonomous, there are no resource conflicts between projects	The Critical Chain can integrate the Agile method, the opposite does not seem feasible.

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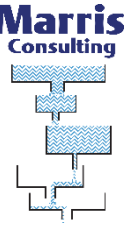
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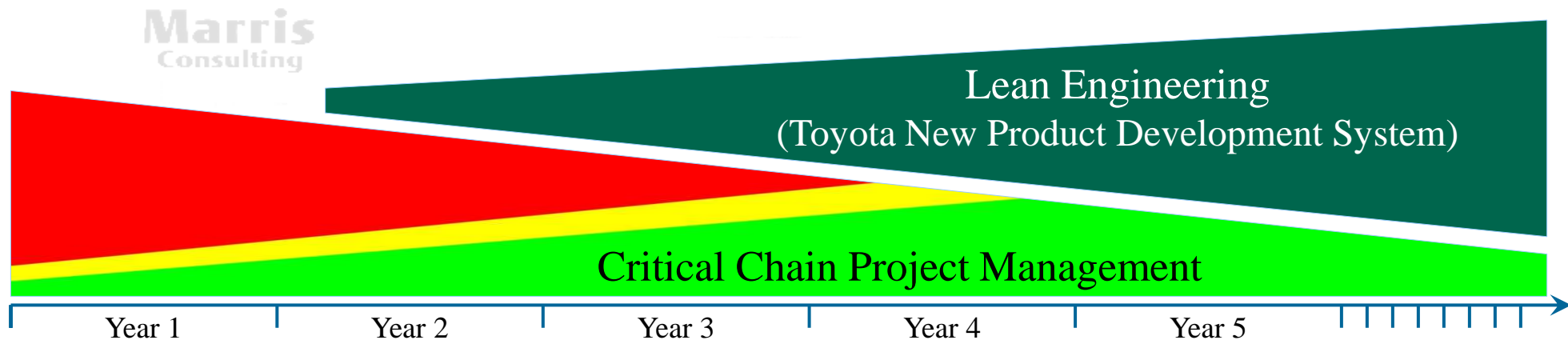
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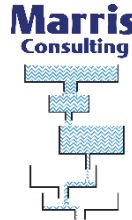


Extract

## For New Product Development projects, CCPM is an ideal predecessor to Lean Engineering

- Lean Engineering or Lean Product & Process Development (LPPD) aims at:
  - Producing better products to satisfy the customers
  - Making production more efficient
  - Improving the process of development « Products and Production System »
- To initiate a real LPPD approach requires to plan and anticipate, to carry out tests, to capitalize on experience and feedbacks.
- But in a chaotic mode, it is not possible to implement such an approach.
- Thus CCPM is required to stabilize the system and free up time for a Lean Product & Process Development implementation.






See Philip Marris' conference on this subject (in French):

"Critical Chain + Lean Engineering"


Extract



**Conception, développement et Théorie des Contraintes**

En quoi la Théorie des Contraintes permet de relever les défis  
d'une conception rapide en maîtrisant les risques

- Conférence ProGection / Philip Marris -



Annecy, le jeudi 8 octobre 2015  
Version 1.1



Philip Marris



**Conférence ProGection 2015 - 2ème partie**

**Lean Engineering**

**20:37**

(Fr) Lean Engineering :  
Conférence ProGection 2015 - ...



© Marris Consulting

The video: <https://youtu.be/WpoDQpFxEoI>

Conference material: <http://www.marris-consulting.com/formations-actualite/conferences/conference-progection>

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# Critical Chain deployment requires a software tool adapted to the needs and specifications of the organisation

- Numerous software solutions exist on the market to work the Critical Chain way, including traditional project management software which developed CCPM options, or other editors who propose add-ons or independent software based on CCPM principles.

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- The challenge consists in choosing the right solution depending on the specificities of the implementation, as well as the current and future requirements.
- In addition to the cost it represents, many parameters have to be taken into account to choose the tool.
- We have edited a CCPM software comparison, it includes about ten software, which represent a limited panel only.
- Comparison criteria of this study are not comprehensive, but help to guide the decision.





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# Extract

## Critical Chain Project Management: *too good to be true!?*

- Finish almost (80% to 100%)  
all your projects on time...
- ...within budgets...
- ...and initial specifications.
- Finish projects twice as fast.
- Finish twice as many projects per year with  
constant resources.
- Improve quality of life for everybody.

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# Extract

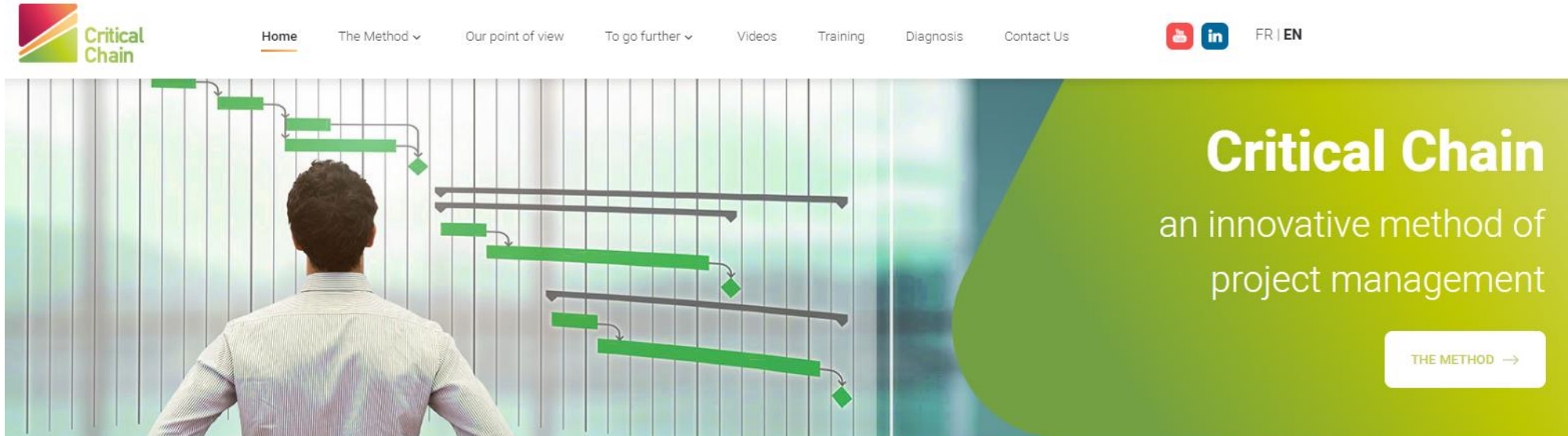
## Critical Chain Project Management: *too good to be true!?* (continuation)

- Eliminate the noise generated by defective project management and focus on the critical subjects:
  - © Marris Consulting - Business challenges, know-how, capabilities of the teams, customer orientation, training and competitive intelligence, silos, empowerment, ...
- Faster projects entail less defects.
  - It is the same as production flows. Cost / Quality / Time are not conflicting but complementary (Ohno & al.)
- We obtain a better Tactic and Strategic Visibility.
  - Visibility on 1 week, 1 month, 2 years... Powerful simulation capacity (if I get this important contract, the impact will be...)
  - Etc.



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A dedicated Critical Chain website: [www.critical-chain-projects.com](http://www.critical-chain-projects.com)



## Dare to finish all your projects on time!

This approach, a part of the Theory of Constraints (TOC), answers 2 recurring questions:

1

How to finish your projects on time, within budget commitment and honour the initial specifications?

2

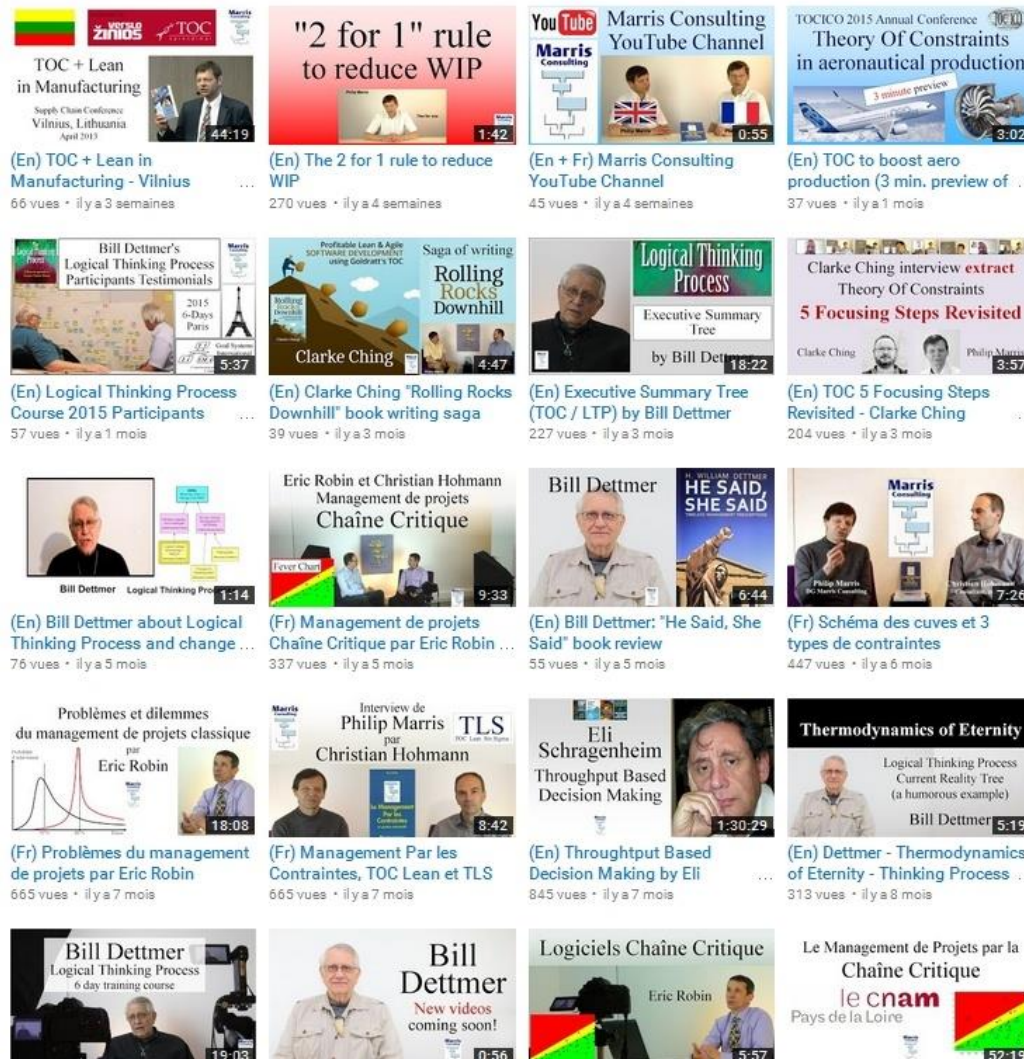
How to accelerate your projects (of new products development, of non-repetitive productions, of software development, of construction, ...)?



# A video website: Marris Consulting's YouTube Channel

<https://www.youtube.com/user/marrisconsulting/videos>

Extract



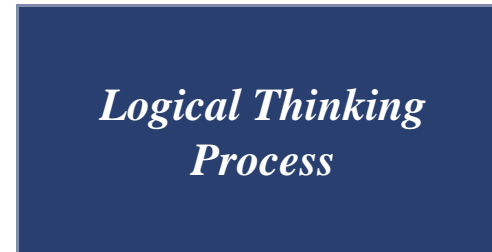
To facilitate viewing and video selection use the playlists:

- English videos
- Critical Chain videos
- Etc.



# Extract

Marris Consulting hosts over 30 public or internal training sessions every year





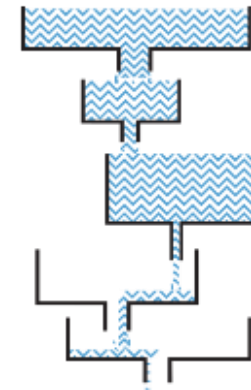


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