How to identify bottlenecks in production and projects?

Marris Consulting

Paris, Wednesday 27th May 2020

Version 1.0

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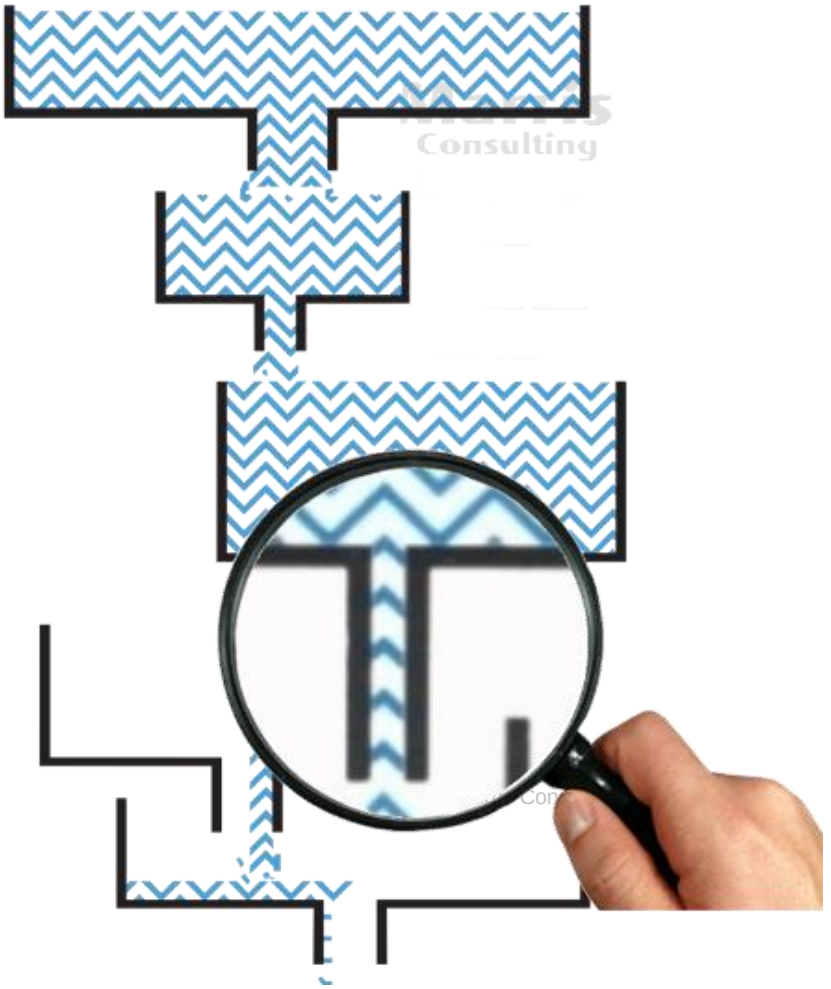


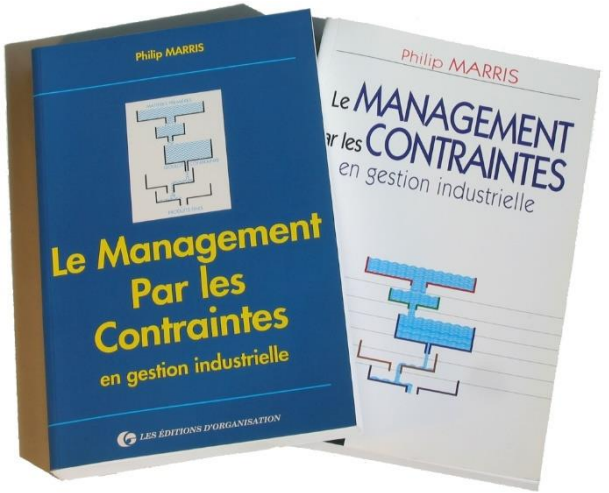
Organization of the webinar

- Presentation : 60 minutes
- Followed by a Question & Answer session: 30 minutes

- You can ask questions and make written comments throughout the webinar using the "Q. and A." feature at the bottom of the screen (mouse over).
- Presentation material can be downloaded on our website at the end of this webinar.
- There will be surveys during the webinar.
- The webinar is managed by 2 people:
  - **Philip Marris the "speaker"**
  - And **a webinar manager whose role is**:
    - To read the written questions as the webinar progresses
    - To manage the question and answer session (choice of questions, opening / closing the microphone, etc...)

Philip Marris:
CEO, Marris Consulting

- English…and European. Bilingual & bicultural English/French. Consultant (sorry).
- Started using Lean in industry in 1984.
- Has been implementing TOC since 1986, when he worked with Eli Goldratt, founder of Theory Of Constraints/TOC).
- Implementation of TOC and Lean (+ Six Sigma, DDMRP, PMBOK, Agile, …) in >260 companies around the world.
- Author of the French reference book on TOC in production: *Le Management Par les Contraintes*.
- Founder in 2005 of Marris Consulting.







Marris Consulting, a consulting firm specialized in operational excellence and project management

- Founded in 2005 by Philip Marris and based in Paris.
- 12 consultants and its network of partners.

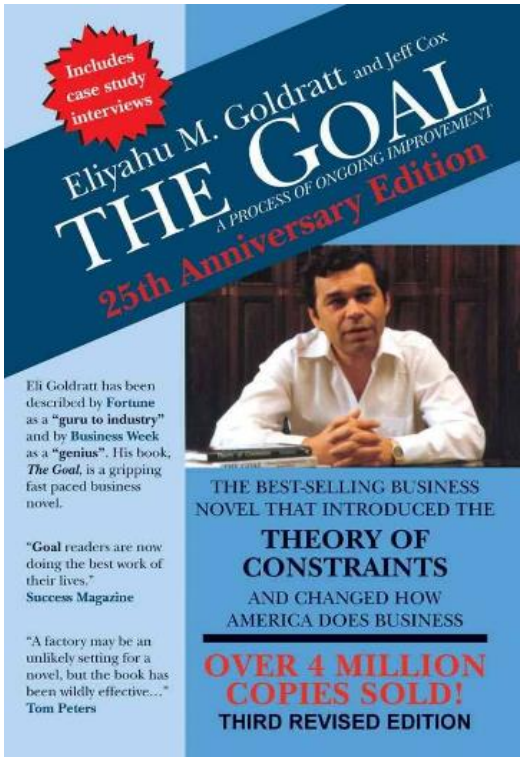
- More than 40 conferences and training sessions per year on operational performance, Theory of Constraints, Lean, Critical Chain Project Management ...
- Over 300 videos of customer testimonials, educational presentations, expert interviews, etc.

Experience
of more than 260 business transformations worldwide

The Theory Of Constraints gained its global recognition because of the success of the best selling "business thriller" *The Goal* by Eliyahu Goldratt

- A novel to explain a new approach to management
- Over 7 million copies sold in 32 languages.
- Companies 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 lost for the system = one hour of lost sales.
- One hour gained on a non-bottleneck is an illusion.
  A non-constraint must only work according to the constraint's requirements.
- A dual view is mandatory:
  different rules for constraints and non-constraints.



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

Actions must be focused on the resources that determine the global performance

The 5 steps of TOC's continuous improvement process

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.

Easy to do in production but not in projects

Without investments in $ or in time

The most difficult step

With investments in $ or in time

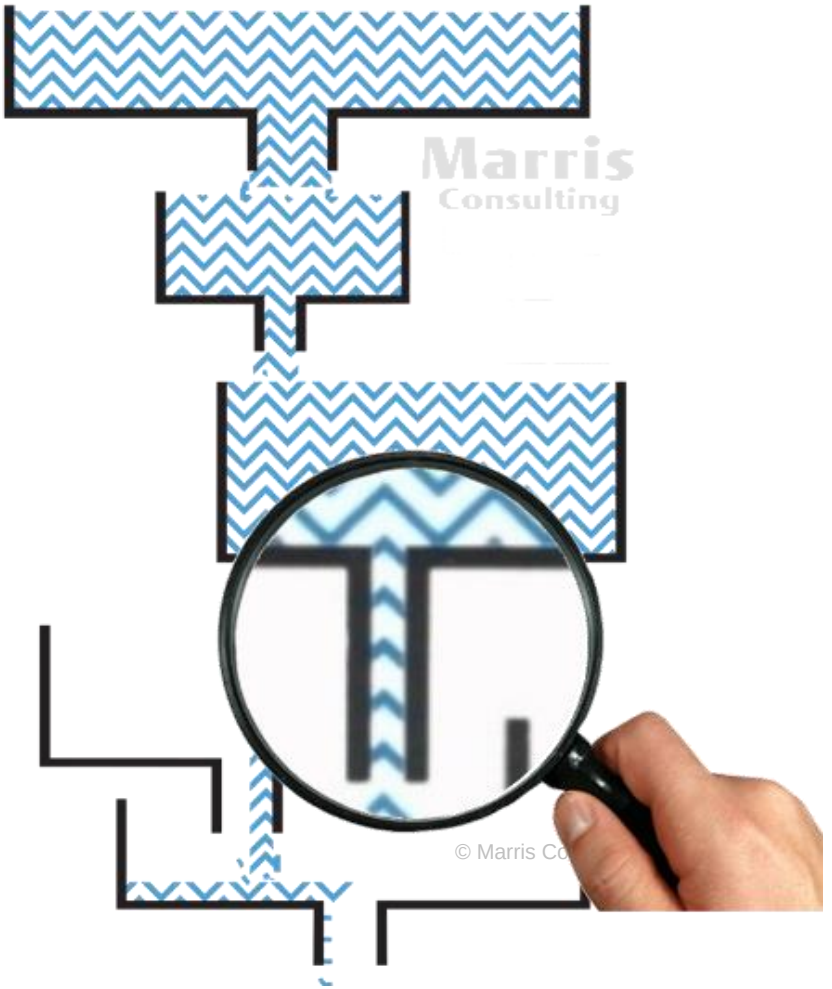
Or choose the "best" constraint of the system

Note: Often called *The 5 Focusing Steps* or TOC's *Process Of On-Going Improvement* (POOGI).

80% of companies don't know where their capacity constraint is

- 15 years ago most companies knew where their bottlenecks were before starting to implement the Theory Of Constraints.

- Over the past 15 years we have found that 80% of organizations are initially mistaken as to where its capacity constraint really is.



Agenda

- Introduction
- A few examples
- Lessons Learned
- Conclusion
- Annexes

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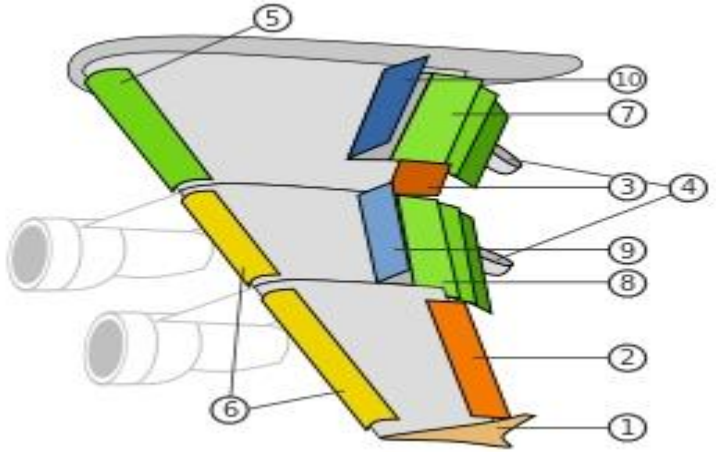
My impressive rolling mill

- A steel manufacturer world leader.
- A 2,900 person factory with a steel mill, a rolling mill, heat treatment and finishing operations.
- They thought it was their big impressive rare sophisticated rolling mill.
- In fact it was their 6 (boring) heat treatment furnaces.

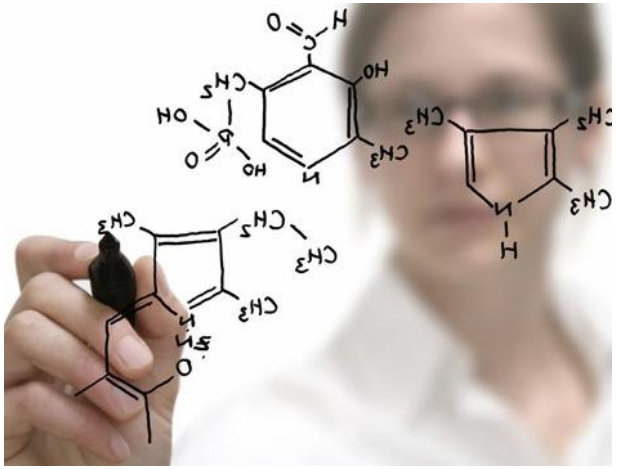
What is not in SAP doesn't exist

- A 400 person factory making Flight Control Systems for airplanes.
- They thought that their 5 most expensive machines CNC milling machines were the constraint.
- In fact it was their **Quality Control**.
- But their ERP/MRP system could not see this.
- This is a sad case because the huge pile of WIP before the constraint was hiding in plain sight.



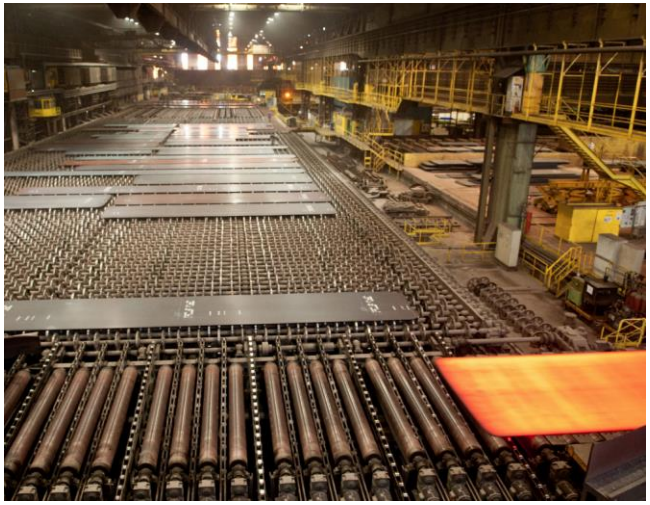
My key research experts

- 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 because of an outsourcing decision 3 years previously. This had tripled the workload on these 9 people.
- So the new drugs developed were all waiting for this department to define how and where they were going to be produced.



A constraint hidden in 30 different places

- Another steel making factory of 2,000 people making thick metal sheets with a lot of WIP and many overdue orders.
- And yet, following a downturn the whole plant was only loaded to 50% of its capacity.
- In fact, due to simplistic cost cutting, the constraint was the 16 people who did manual testing of the metal sheets at various stages in production.
- Difficult to spot because the queue of work was spread out in over 30 locations.



The constraint is not always what people claim it is

- In a medical company, everyone agreed that the main blocking point of their new product and process development portfolio was validation
- To corroborate this perception, after having implemented Critical Chain Project Management, we analyzed the project buffer consumptions
- The validation steps were not their biggest issue ; it was not their capacity constraint
- Even if a daily irritant might cause frustration and delays in projects, it doesn't mean this is the real constraint
- The capacity constraint was in fact in operations

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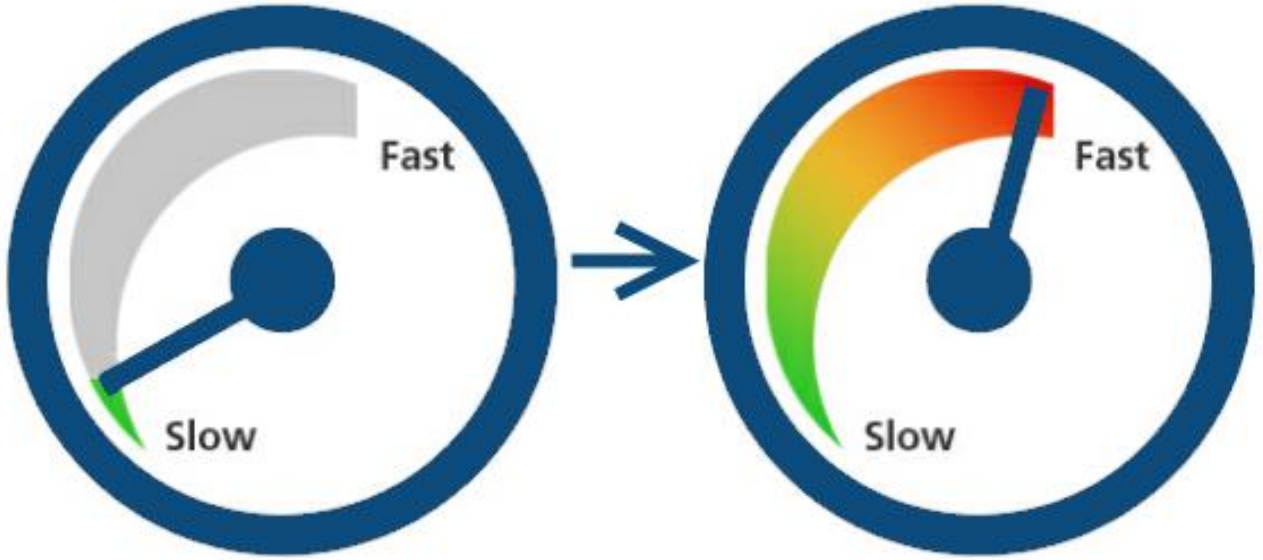
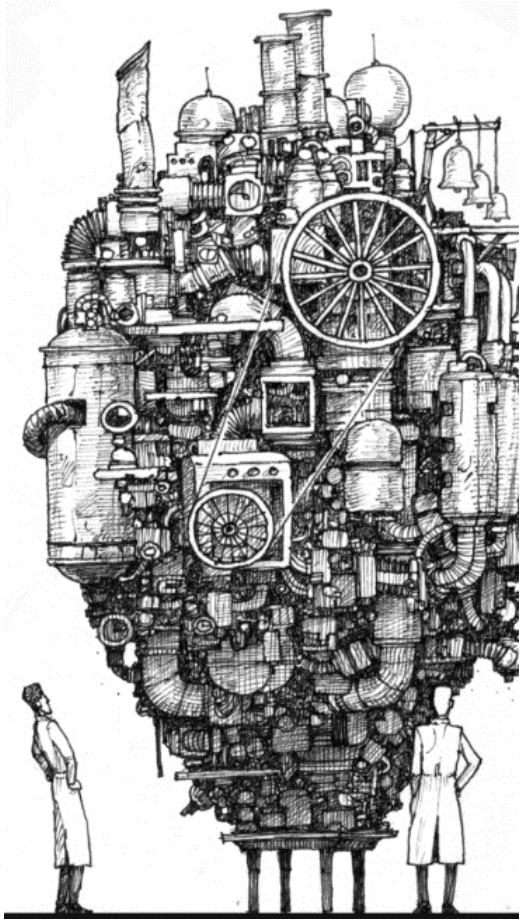


Beware of possible confusion about what a bottleneck is

- It often happens that due to "frequent problems", a resource is considered as a bottleneck
  - Do not confuse a capacity constraint with a reoccurring difficulty that disrupts operations
- Organisations confuse 2 types of resources:
  - *Punctual / Wandering "Bottlenecks"*: Resource that is frequently temporarily overloaded either because of "problems" (machine breakdowns, absenteeism, quality problems ...) and/or because of waves of work. **THESE ARE NOT CAPACITY CONSTRAINTS.**
  - *Structural bottleneck*: Resource which has, knowingly or unconsciously, over a long period of time, less capacity than the other resources. **This is the capacity constraint**.
- There are no wandering bottlenecks, this is often just the consequence of excessive Work In Progress and large batch policies that create waves of work. This will make the identification of the real structural bottleneck of the system more difficult.

My big and beautiful bottleneck

- We find that management often falls into the trap of wishful thinking
- Most often, (mistakenly) identified constraints are:
  - The most expensive machine
  - The team of experts
  - Etc.
- They confuse where the constraint should be and where it really is



The only difference between an adult and a child is the price of his toys

Beware of your ERPs blind spots

- Production systems have more and more "indirect" operations.
- Their capacity is not properly managed in the ERP (Enterprise Resource Planning / Company I.T. system).
- For example: Quality control.
- The performance – the "productivity" – of these operations is rarely monitored correctly by management.
- So the constraint does not receive the appropriate management attention.

In the past 5-10 years we have found that in over 50% of organisations the capacity constraint is in Quality Control

The mirage of assembly operations as a capacity constraint

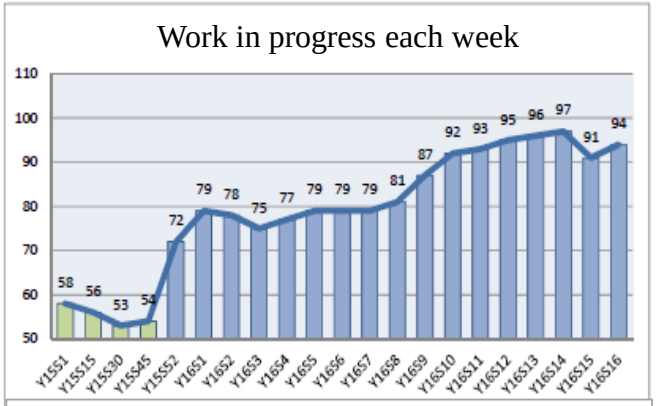
- Quite often companies consider that their assembly operations are their capacity constraint because the queues before this process can be significant.
- Before concluding that this is the bottleneck, make sure that the assembly:
  - Is not waiting for components, parts or validation documents,
  - Does not suffer from a non-quality problem, failure of Engineering deliverables, etc.
  - Does not suffer from a skills deficit (loss of experience, ...)
- In periods of high tension, such as at the end of the month (often called a “hockey stick” or end-of-month phenomena), these operations are often able to produce 2 to 3 times more.
  These phenomena prove that this stage is not a bottleneck, but on the contrary that it has enough capacity compared to demand.
- Not often applied, the “full-kit” principle allows to create a step of flows synchronization and to gain in productivity within assembly.

Capacity constraints in projects

- In project environments the data regarding task durations and workloads are difficult to estimate.
- Often the organization does not even attempt to calculate workloads apart from a very approximate annual budget.
- Companies are trying to develop today's product portfolio with yesterday's resource pool.
- Typically, we classically observe that in New Product Development the new competencies are understaffed.
  - Examples: electronics, regulatory, software development, quality management …
- The test stages are quite often capacity constraints.

Two approaches possible to find the bottleneck in projects environment

- Either the constraint is identified thanks to quantification of queues
  - You can stagger project according to this to reduce WIP and multitasking, and thus have time to focus on improving productivity
- Either there is no certainty about the constraint
  - The whole portfolio should be planned in Critical Chain and the workload profiles analyzed to identify which resource is the constraint
- Beware ! As reliability of task durations and thus workload might be low, we recommend to make the constraint visible by using visual tools, such as mascots

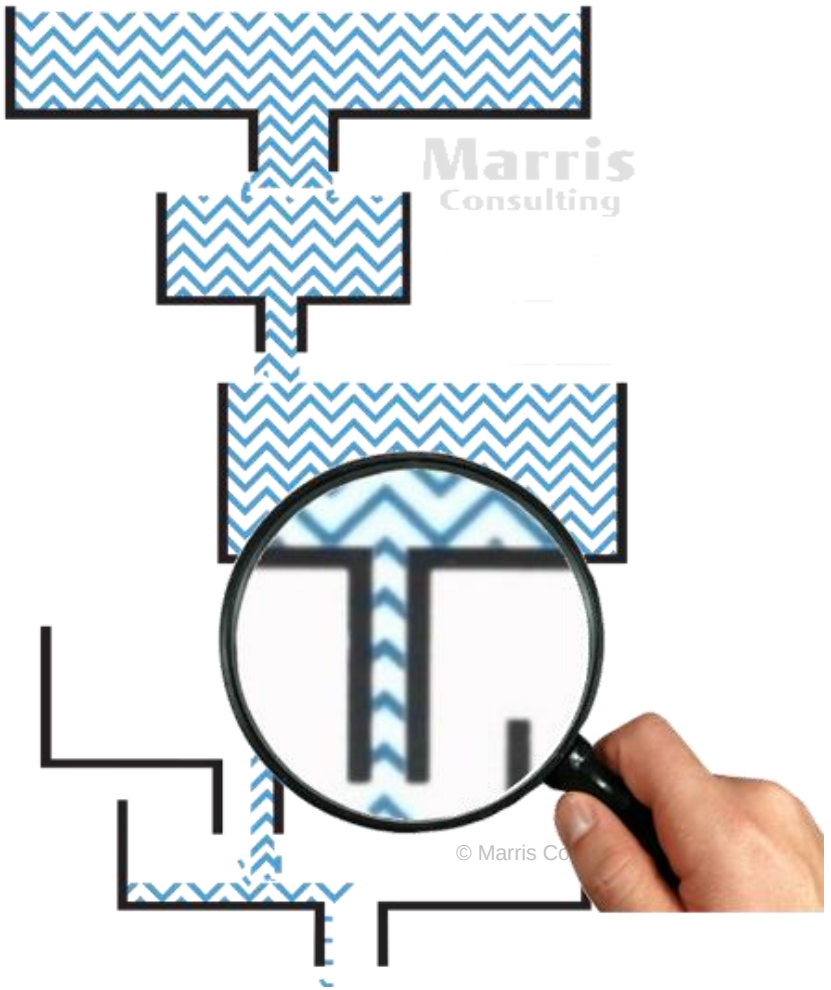


In this company, 94 projects over 300 were waiting the design office when we did the diagnosis, that's how we found it was the bottleneck. The WIP was increasing for weeks.

Looking for queues in projects will be easier if you make your capacity constraints visible with mascots and/or datas/gemba

The bottleneck is often somewhere in the middle

- Bottlenecks are often neither at the beginning or at the end of the process.
- Because if it was at the beginning then everybody would have great difficulty in looking busy…
- …and if it was at the end then it would prevent rapid panic to finish orders on time.
- Note 2 exceptions, both very regrettable:
  - Quality control
  - Testing in I.T. development



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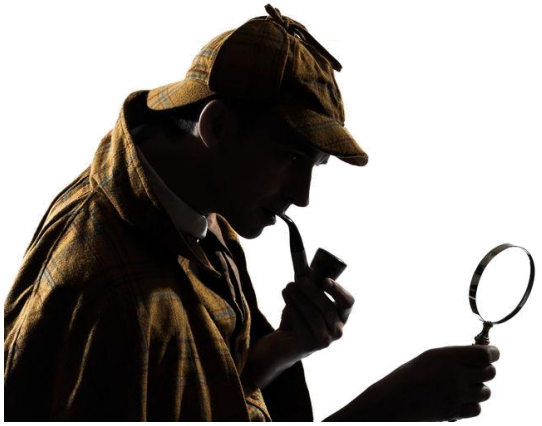
Your analysis is probably out of date

- Too often management is talking about where the constraint used to be…3 years ago.
- To help find the real bottlenecks ask yourself what has changed over the past 5 years:
  - New quality requirements
  - Cost cutting initiatives
  - New technology or machines
  - New management with new rules
  - New regulations
  - Etc.

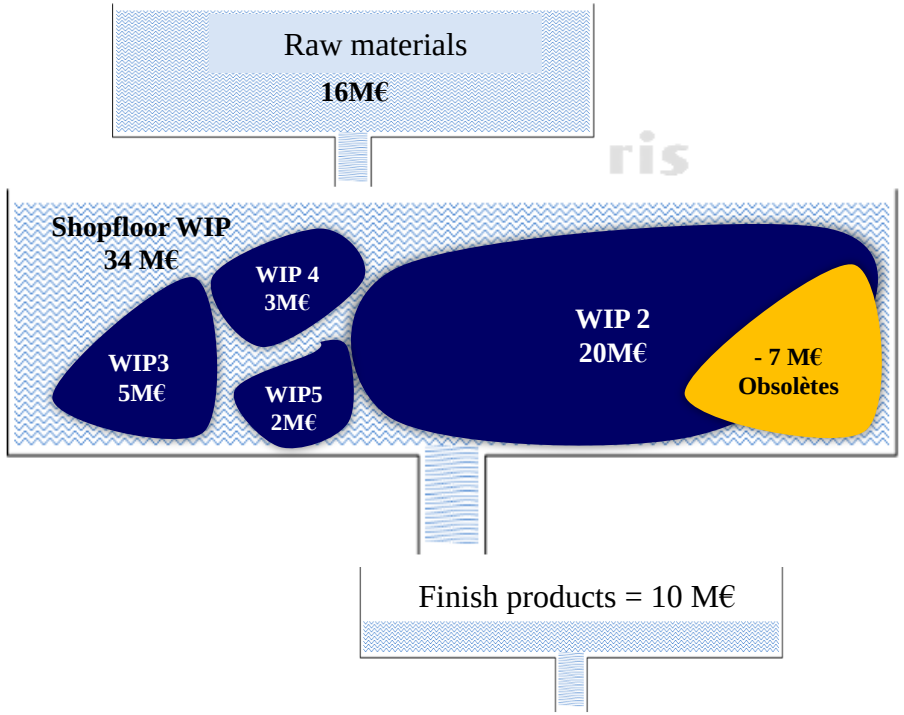
Quick tips

- Forget the data and look where the work is done (Gemba)
  - Look at the flow and search for the big queues
  - Look where yours projects are waiting
- Beware if the bottleneck is too good to be true
- When you have a hypothesis for the location of a bottleneck TEST IT. Normally everything should make sense.
  - If the bottleneck produces 15% more than the organization should produce 15% more.
  - Late or overdue things waiting in front of the bottleneck.
  - Etc.



The analysis of the queues is a convincing track towards the identification of the bottleneck ...

- Tracking the queues is an effective way to start the identification of the bottleneck. However, it is necessary to go further than this first rapid reading.
- The following examples show that further analysis is necessary to understand the appearance of queues:
  - A long production cycle such as drying, impregnation, etc.
  - Part of the flow is subcontracted,
  - Internal or external non-quality, non-mastery of the manufacturing process (creating obsolete, non-compliant and potentially unusable stocks, etc.)
  - Etc…



… But watch out for the pitfalls of hasty interpretations.

Good news!

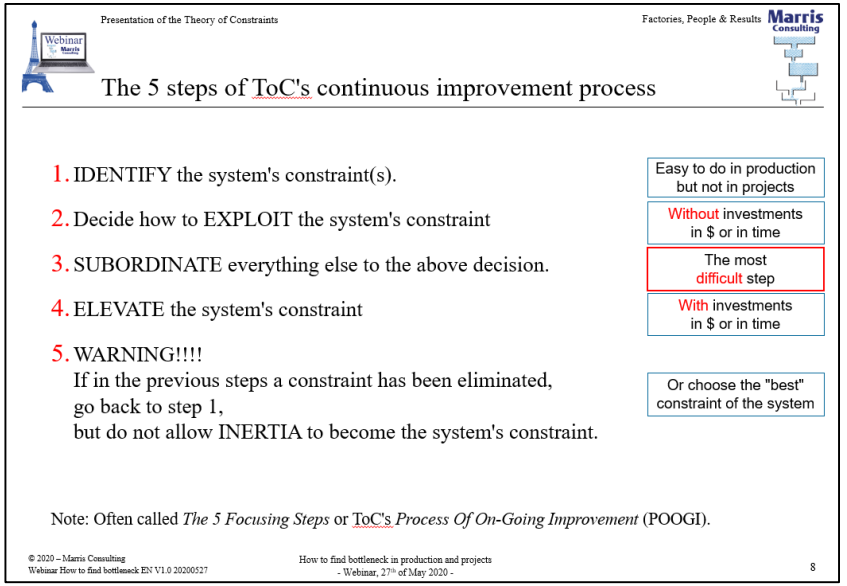
- There is an 80% probability that you are wrong about where your bottleneck is…
- …and that is very good news for you!

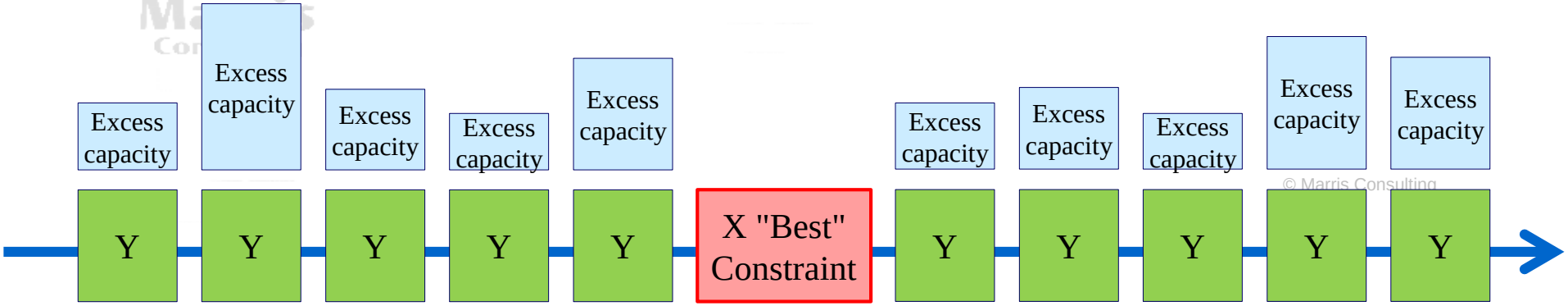
By the way there are always two simultaneous constraints

- The goal of a company is to make more money now and in the future.
- So we believe there are always 2 simultaneous constraints:
  - The constraint that controls how much money you can make now (by executing the order book)
  - The constraint that controls how much money you will make in the future (product development etc.)

Identifying the constraint is the first step to a continuous improvement process…ultimately you should choose it

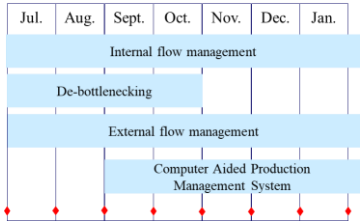
- "Orthodox" Theory Of Constraints is based on an iterative 5-step process
- We believe that "2nd level" TOC is to choose the "best" constraint and organize the non-constraints around it.
- Philip Marris' definition of the "best" constraint: the resource that would take the most money and/or time to turn into a non-constraint.





You can boost your improvement process now

- New webinars are being programmed for the coming weeks:
  - 10th of June : Aerosud, a Theory Of Constraints pearl in South Africa
- Due to the Covid-19 context, we have transformed all of our services into online services.
- "Remote" Diagnostics and assignements
- Currently >90% of our business is outside of France (Germany, China, USA, Spain, Africa …)
- Our next online inter-company training sessions:
  - June 30th to July 3rd : Critical Chain in English (8 hours over 4 days)
  - Critical Chain in French (To be scheduled in June or July 2020)
  - TOC in Production in French or English (To be scheduled in July 2020)
- You can register to our free webinars and our trainings on our website



Thank you for your time

Questions?

Do not hesitate to connect with me on LinkedIn
linkedin.com/in/philipmarris

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Over 300 videos on the Marris Consulting YouTube Channel

Useful web links
To get the latest news about Theory Of Constraints

- 5 permanent news website dedicated to Theory of Constraints (www.Scoopit.com)
  - Theory Of Constraints (French & English)
  - Critical Chain (French & English)
  - TLS: TOC + Lean + Six Sigma (English)
- >300 Videos (Marris Consulting YouTube Channel)
- Discussion groups (LinkedIn)
  - Critical Chain Project Management
  - Theory Of Constraints
  - TLS: TOC, Lean and Six Sigma
  - Logical Thinking Process
- Others:
  - Twitter, Facebook, etc…

Marris Consulting organizes more than 30 inter and intra-company training session per year

Logical Thinking Process

Lean Management

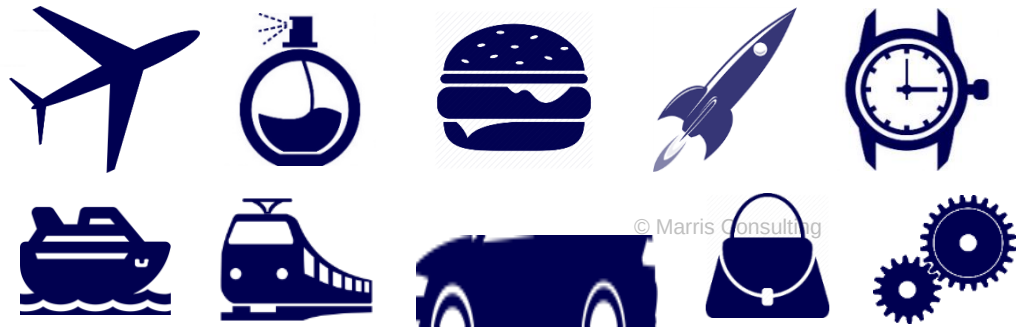
Critical Chain Project Management

Theory Of Constraints

Lean Engineering

Presentation of Marris Consulting

- Marris Consulting, founded in 2005, is a consulting company specializing in improving the operational performance of companies in the industrial world.
- The approach of Marris Consulting is based on the combination of Theory of Constraints (TOC), - and its various applications including Project Management by the Critical Chain -, and Lean and other Six Sigma type methodologies when it helps our customers' issues.
- Marris Consulting has a reputation for its ability to be pertinent in all kinds of industry. We have worked in over 250 companies helping in designing, making, selling and distributing:
  - cars, hamburgers, airplanes, perfume, trains, rockets, industrial equipment, pharmaceuticals, home delivery services, computer chips, chips (food), maintenance / repair / overhaul (MRO) of planes and trains, luxury handbags, corrugated cardboard production, the defense industry, Swiss watches, steel manufacturing, plastics, bank notes, satellites, gold mines
- We are committed, viscerally, to producing results.
  Results that are well beyond our clients' expectations.
  And results that last.
  Better still we incessantly seek to strengthen the process of on-going improvement; we want to see our ex-clients getting better and better many years after we intervened.



- Marris Consulting is based in Paris,
  but operates throughout France, Europe and around the world

How we do it

- We understand that the hardest part of what we do is to change "people". Apart from the pertinent ideas that we must have we must directly and indirectly change individual and collective behavior.
- We work simultaneously at all levels of the company from the front line to the board room.
- We are recognized experts in many different fields: "Lean" (manufacturing/engineering/management/…, the Theory Of Constraints, Six Sigma, Industry 4.0, DDMRP …
- One of our key strengths is that we analyze each of our new client's business & culture and then we mix up the right cocktail of solutions. We never impose a so called industry best practice.
- We like simple solutions. Simple is beautiful.

Philip Marris presents the 38th TOCPA Conference program

Marris Consulting

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Factories, People & Results

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