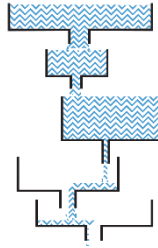


The Theory of Constraints applied to Production

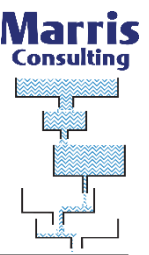
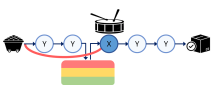
Webinar

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Paris, the 3rd of October 2023
Version 1.0





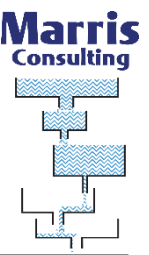
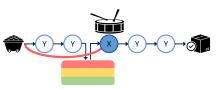
Agenda

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- Introduction
- Presentation of the Theory of Constraints
- The 5 focusing steps of the Theory of Constraints
- TDK example – capacitors industry
- Conclusion

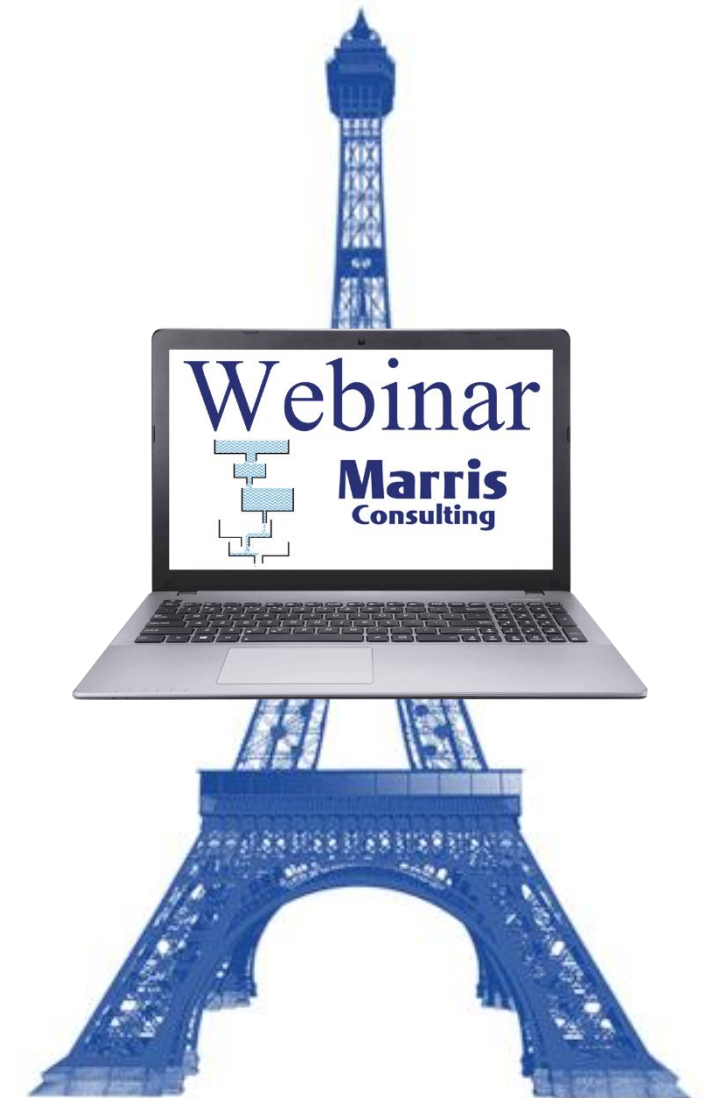
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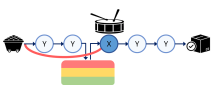




Organization of the webinar

- **Presentation** : 40 minutes
- Followed by a **Questions & Answers** session: 20 minutes
- You can ask questions and make written comments throughout the webinar using the "Q. and A." feature. Please avoid using the "Chat" tab for questions.
- The presentation material will be available on our website at the end of this 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 questions and answers session (choice of questions, etc...)

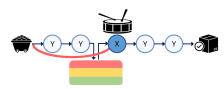




Philip Marris: CEO, Marris Consulting

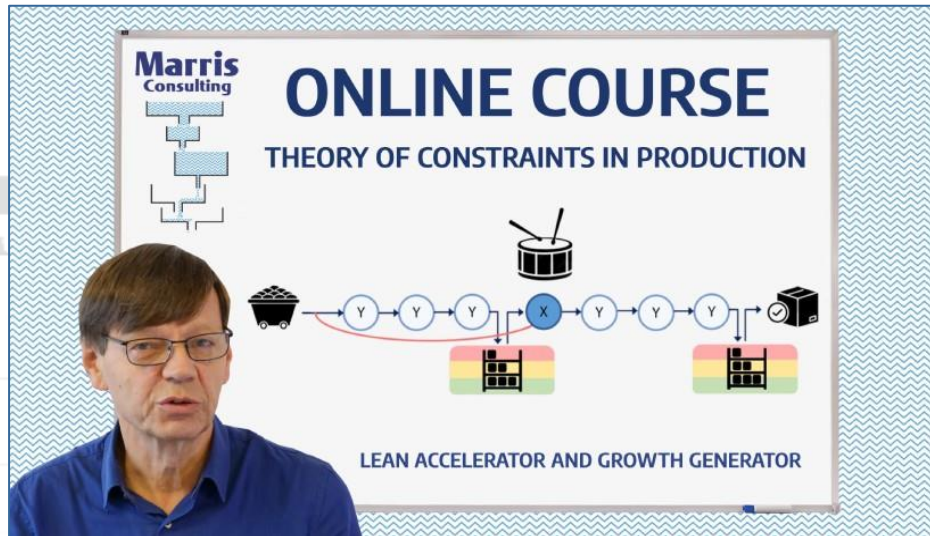
- English...and European,
- Bilingual & bicultural English/French.
- Consultant (sorry).
- Started using Lean in industry in 1984.
- Has been implementing ToC since 1986, when he worked with Eli Goldratt, the founder of Theory of Constraints/ToC.
- Implementation of ToC and Lean (sometimes also Six Sigma) in more than 300 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.

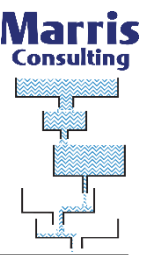




Marris Consulting, a consulting firm specialized in operational excellence and project management

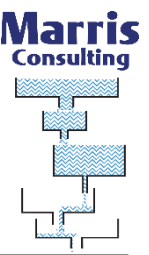
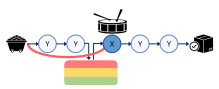
- Founded in 2005 by Philip Marris and based in Paris.
- 15 consultants and its network of partners.
- More than 300 implementations of ToC (usually combined with Lean).
- Over 400 videos of customer testimonials, educational presentations, expert interviews, etc.
- Launch of our new Theory of Constraints online training in October 2023





We are honored to have been able to help...





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- Introduction
- Presentation of the Theory of Constraints
- Case study in the automotive industry
- The 5 focusing steps of the Theory of Constraints
- TDK example – capacitors industry
- Conclusion

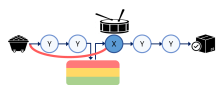
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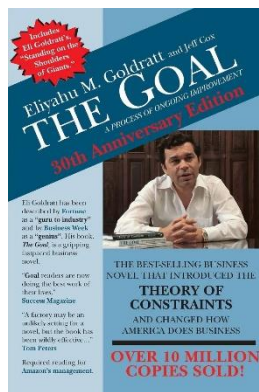
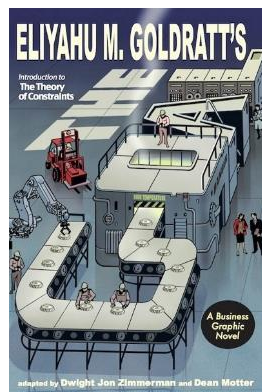
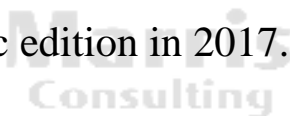


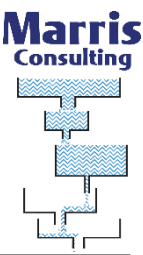
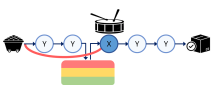


The Theory Of Constraints gained its global recognition because of the success of the best-selling “business thriller”: *The Goal* by Eliyahu Goldratt

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- First published in 1984.
- Over 10 million copies sold in 32 languages. Mandatory reading in most universities/MBAs/...
- Written by Eliyahu Goldratt the founder of ToC with Jeff Cox.
- The first book of its kind: a novel to explain a new approach to management.
- Chosen as one of the 25 most influential business books by Time magazine in September 2011.
- Used by Jeff Bezos, Amazon.com CEO, to build their Supply Chain and redefine the company's goal.
- New graphic edition in 2017.

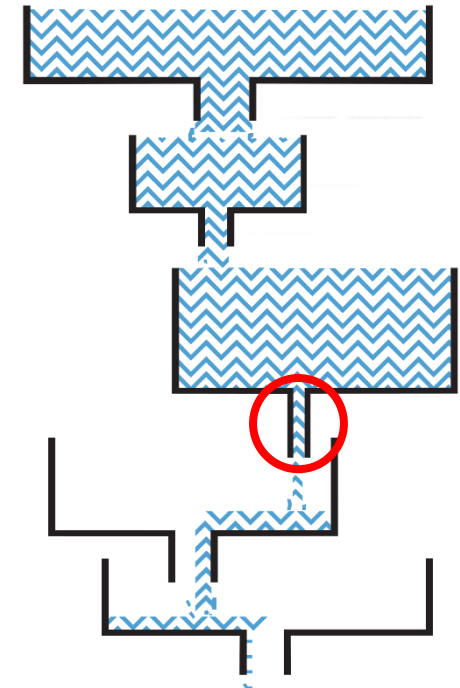




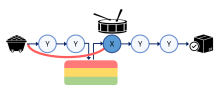
Focus on improving the system constraints that determine the overall performance

*It is no longer possible to distribute work equitably:
organizations are necessarily unbalanced*

- Companies (factories, engineering departments ...) and other organizations (hospitals, ...) inevitably have unbalanced capacities.
- Annual budgets pretend to balance organizations, but they don't succeed.
- There is always a constraint, a bottleneck somewhere in the system.
- Someone somewhere has drawn the short straw.
- One hour lost on the bottleneck = one hour lost for the system = one hour of lost sales.
- One hour gained on a non-bottleneck is an illusion... so be careful with local objectives such as OEE. 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 – Eliyahu Goldratt



"Goldrattism": Theory Of Constraints & Logical Thinking

Eliyahu Goldratt's ideas (the Goldrattism)

Theory Of Constraints (ToC)

Systemic view (global optimum). Inevitable imbalance. Presence of constraints.
Dual view. 5 Focusing Steps. Buffers to absorb variability and uncertainty. Growth.

Logical Thinking

"To teach the world to think"

Subject of the webinar

Drum-Buffer-Rope Production Management

The importance of constraints,
Focused approach, DBR or S-DBR, 5
Focusing steps in operations, etc.

Critical Chain (CCPM) Project Management

Project Buffer, Fever Chart, Critical Chain
sequence,
Preventing bad multitasking, project
staggering, etc.

Replenishment (?) Supply Chain

High frequency periodic replenishment,
centralized stocks (not too distributed),
buffers, etc.
[DDMRP]

Thinking Processes or Logical Thinking Process

Goal tree, current reality tree, future reality
tree. Conflict cloud. Strategy & Tactics.
Categories of legitimate reservations.

Marketing & Sales Marketing & Sales

Mafia (Unrefusable) Offer, Decisive
Competitive Edge. Sales Force constraints.
Delta T-Selling.

Throughput Accounting Business decision making

Throughput World. Throughput, Inventory
& Operating Expense.
T/cu, Dollar x Days, TBDM. Throughput
Economics. Etc.

ToC in Services Services

Control points instead of constraints,
quantity of excess capacity. Choice or
combination of Ops or project solutions.

Other elements (partial)

6 pillars of ToC, change matrix, 6
questions about technologies, Innovation
process, Management Skills, etc.



Online course extract:

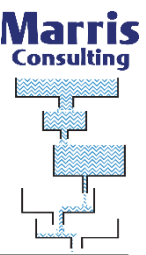
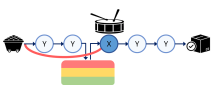
The 5 steps of the Theory of Constraints' continuous improvement process

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.

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

Official version!

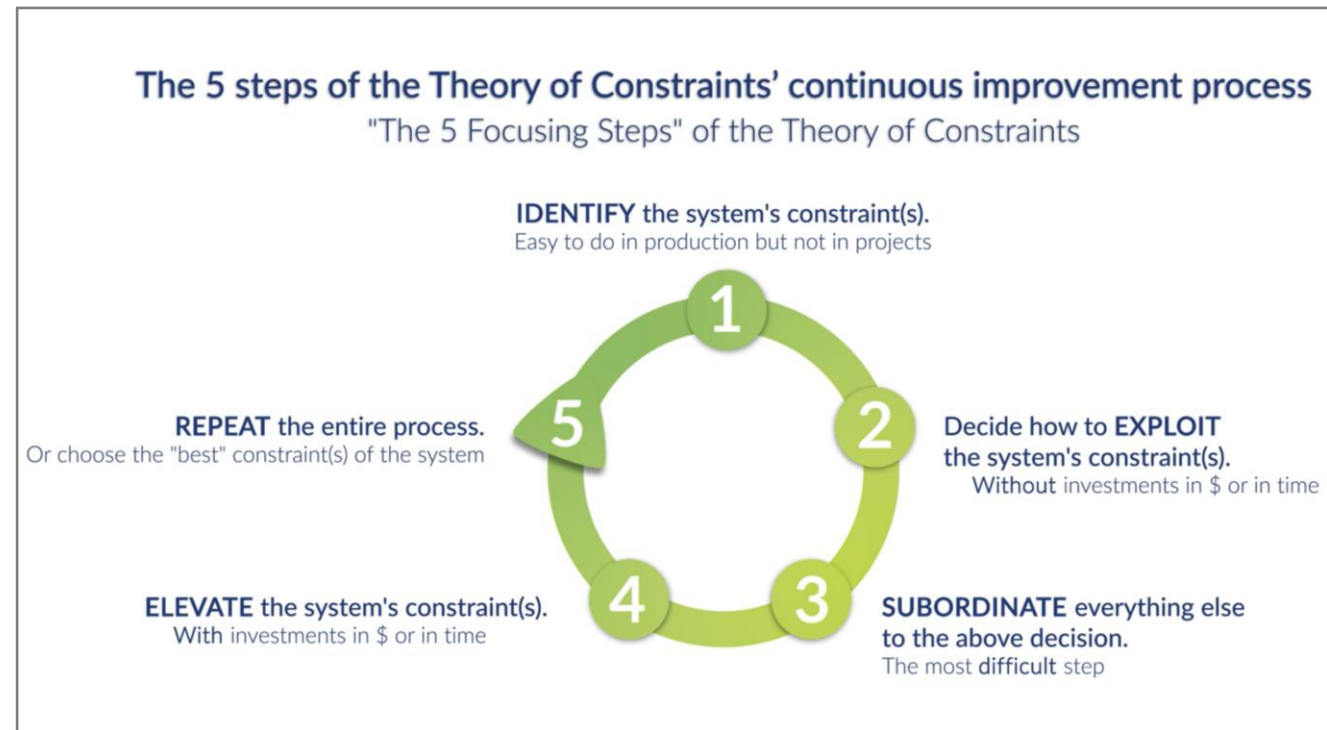
Easy to do in production but not in projects
Without investments in \$ or in time
The most difficult step
With investments in \$ or in time
Or choose the "best" constraint of the system

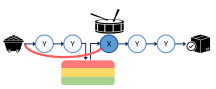


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1. Identify the constraints

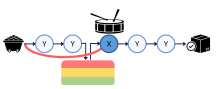
A critical and not necessarily easy step

- It is obviously the most critical step. How could you apply the Theory of Constraints if you don't know where your constraint is?
- **WARNING!** Today 80% of companies don't know where their capacity constraint is!
- 15 years ago, 50% of the companies we worked with knew where their bottlenecks were before starting to implement the Theory Of Constraints.
- Over the past 15 years, we have found that in 80% of the cases, the organization is initially mistaken as to where its capacity constraint is.



*In many cases, the constraints is located at a shared function or service within a factory such as, painting, surface treatment, **quality control** etc.*

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1. Identify the constraints

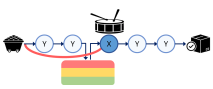
Use your eyes and your brain...

- This is Philip Marris' point of view (not orthodox)
- Do not blindly believe the data that comes from your computer system
- Watch the flow (Gemba / shopfloor visits):
 - Find the longest line,
 - Check the sources of ruptures,...
- Management is often wrong, operators on the shopfloor are often right
- Be careful if the bottleneck is too good to be true

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... and not the computer or the management...





2. Exploit the constraint:

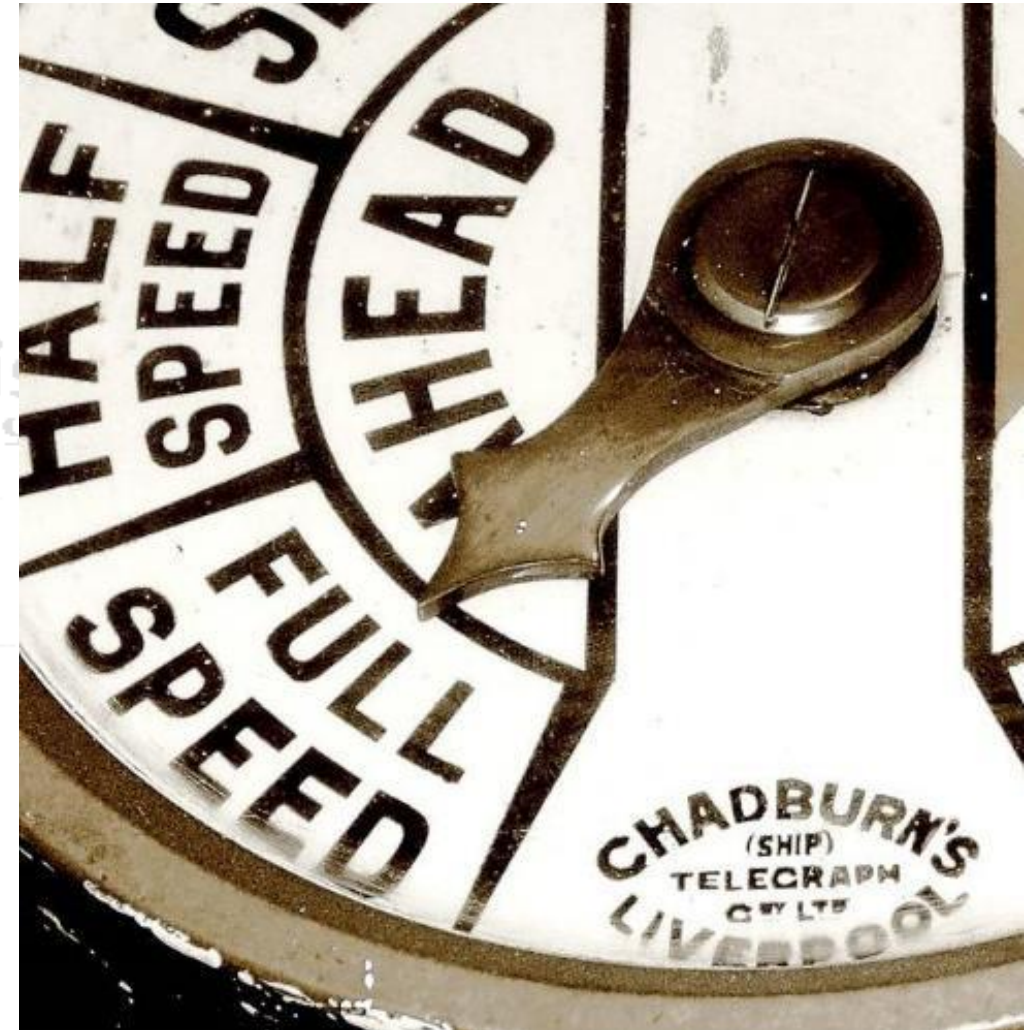
Exploiting a constraint is rather easy...

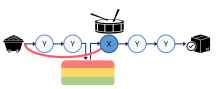
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- You concentrate all the company's attention on one resource.
- Everybody loves producing as much as possible.
- Because of the previously diluted efforts (all resources receive identical time and money), there are many low hanging fruits.
- Typically:
 - No stopping during breaks
 - No stopping during shift change-overs
 - First priority for labour shortages
 - First priority for support services such as maintenance, methods, Human Resources Dept. ...
 - Etc.

You should be able to increase the throughput by at least 20% in less than one day at this stage.

Result: >20% company throughput & >20% productivity improvement





2. Exploit the constraint:

...the results are different depending on the country or company

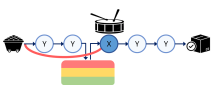
- In emerging countries, for example, we achieve almost 100% exploitation immediately: 8 hours per 8-hour shift.
- But in some companies, it will be difficult to exceed 75% due to:
 - Low work intensity in general
 - The so-called impossibility of:
 - Operating the bottleneck during breaks
 - Preventing the bottleneck from stopping during shift changes
- This results in a significant loss of overall performance.



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An hour lost on a capacity constraint is an hour lost for the whole plant



3. SUBORDINATE everything else to the above decision

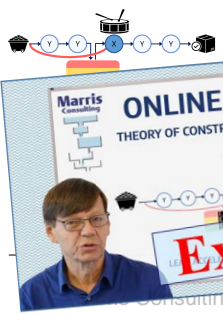
The hardest step of the Theory of Constraints

- Technically, it looks easy: it is just "the rope". Material should only be launched according to the requirements of the capacity constraint.
- But this implies that resources are no longer asked to work according to their own potential (their capacity) but according to the capacity of the constraint.
- Thus, all the local measurement systems must be eliminated. Local O.E.E.s (Overall Equipment Effectiveness or machine utilization) for instance must be abolished.
- **You have to learn to stop working intelligently.**
- People no longer need to look busy all the time.
- Ideally this new - or rather revealed - rest time should be converted into value-added tasks unrelated to production.

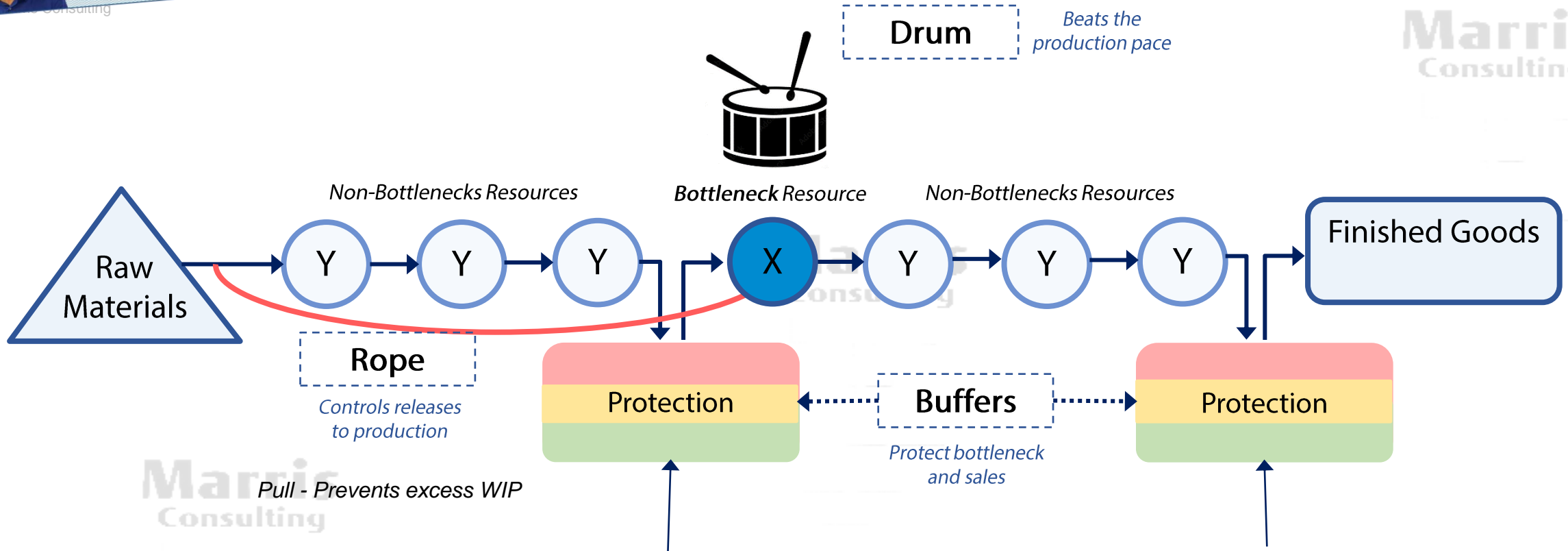
The difficulty with ToC is not the constraints but the non-constraints



This is the hardest step of the Theory of Constraints

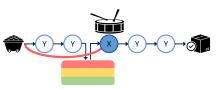


Online course extract: ToC controls the production flow with the Drum Buffer Rope (DBR) mechanism



*If the bottleneck does not produce continuously, the **overall throughput (sales)** is penalized, hence the need for a buffer in front of the bottleneck.*

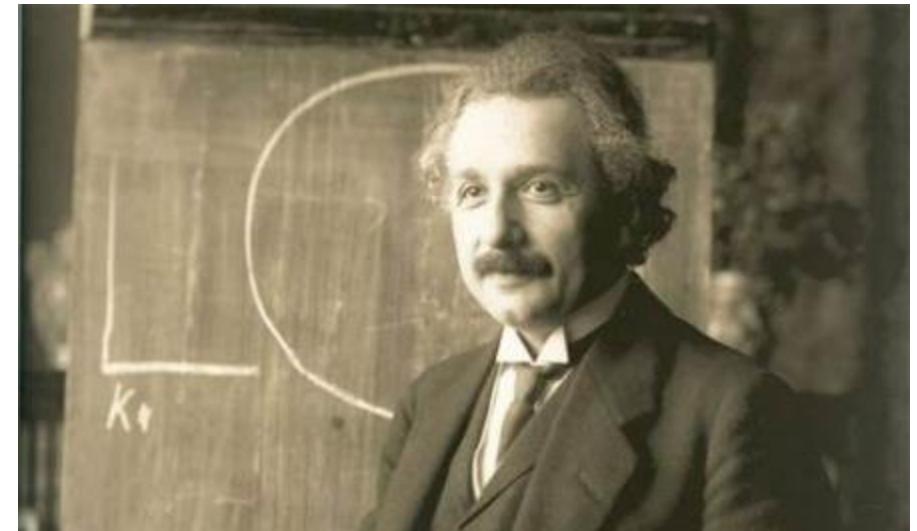
*There is variability throughout the chain. A buffer is therefore necessary before shipment to **ensure that order due dates are met.***

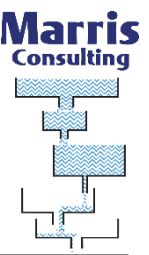
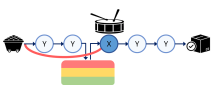


4. Elevate the constraint in the system:

A fairly easy step

- To increase the capacity of the system constraint is easy but, in some cases, it can take time.
- The ROI (Return On Investment) is usually easy to justify since the impact on profitability or Throughput will be very significant.
- It can take time though if:
 - It is a long investment process
 - A rare human capability will have to be grown / nurtured internally
 - It involves regulatory approvals
- The main danger is miscalculating the excess capacity surrounding the constraint. If in the elevation process the constraint moves elsewhere, then the ROI justification falls apart and the organization is destabilized by "discovering" a new constraint.





5. Go back to Step 1...or not:

Choosing the “best” constraint (according to Philip Marris)

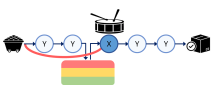
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The best constraint is the resource which would take the most money and/or time to turn into a non-constraint

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Marris Consulting's point of view

- If you follow standard Theory of Constraints orthodoxy, then in Step 5 you just go back to Step 1 and identify the new constraint.
- This means that ToC resembles permanent bottleneck hunting.
- Philip Marris does not agree with the 5th step of the 5 focusing steps.
- Philip Marris suggests:
 - That constraints are eliminated one after the other until one reaches the best (or least bad) constraint.
 - An organized unbalanced system with the best constraint surrounded by non-constraints.

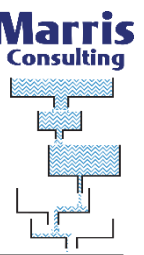
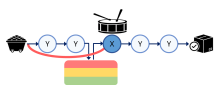
In his 1994 bestselling book in French the subtitle of the book is "A la recherche du bon déséquilibre" or "In search of the ideally balanced plant".

1. IDENTIFY the system's constraint(s).
2. Decide how to EXPLOIT the system's constraint
3. SUBORDINATE everything else to the above decision.
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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.

The difference concerns the 5th and last step

Constraints Management	Theory of Constraints
<ul style="list-style-type: none"> ■ Constraints are eliminated one <u>after</u> the other until one reaches the best (least worse) constraint. ■ An organized / target unbalanced system with the best constraint surrounded by non-constraints. 	<ul style="list-style-type: none"> ■ Permanent constraints hunting. ■ There is no such thing as the right or best constraint.





Agenda

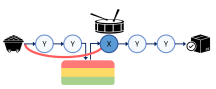
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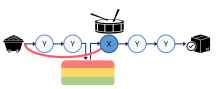


Context

- Industry leader in high power capacitors, for power transmission and automotive.
- TDK is one of the global leaders in high power capacitors. The plant in Malaga, Spain, designs and manufactures capacitors for different industries: Renewables Energies, Traction Systems, Industrial Motors, etc.
- The Malaga plant had to improve its performance to cope with the Covid crisis and then manage a big increase in demand.

About TDK Electronics Components S.A.U.

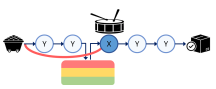




Implementation

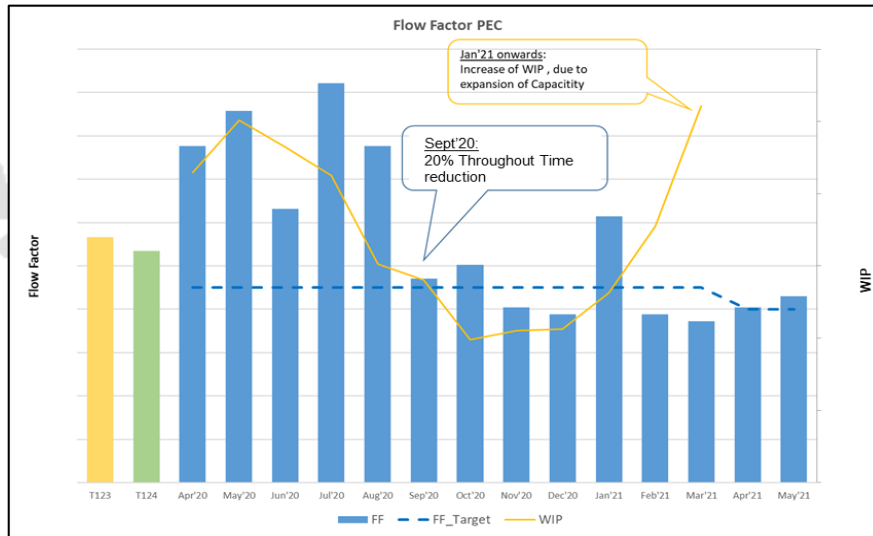
- The management team of the Malaga factory was eager to improve the performance of the factory and was interested in the Theory of Constraints. Inspired by reading *The Goal*, one of the managers decided to organize training sessions on the Theory of Constraints.
- This is where Marris Consulting assisted TDK: several training sessions on The Theory of Constraints in Production and Critical Chain project management were organized, to familiarize the factory and design office teams with the principles of ToC. (online training because of the Covid pandemic travel restrictions)
- After these training sessions, the Malaga factory launched a TOC based transformation. This included applying the “2-for-1 rule” and the 5 Focusing Steps.





Results

- 30% reduction in work in progress and 20% reduction in lead-time in 10 weeks.
- Significant increase in throughput and productivity.
- Marris Consulting then came for a two-day diagnostic to help the factory improve further.
- The assembly department was identified as the bottleneck. After the debottlenecking of the assembly the next bottleneck, the winding department, was improved.
- The performance of the site continues to improve in order to respond to the rapidly growing market.



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To find out more: see our customers' testimonials

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arianeGROUP

témoignage client
EuroCryospace

ABS JETS

client testimonial
ABS JETS

McDonald's

témoignage client
McDonald's

IAMGOLD

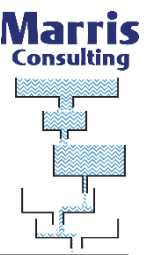
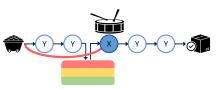
témoignage client
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IPSEN
Innovation for patient care

témoignage client
IPSEN

AEROSUD

client testimonial
AEROSUD



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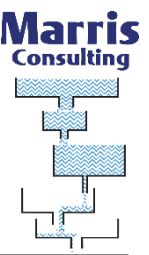
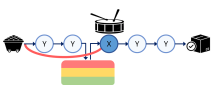


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ONLINE COURSE

THEORY OF CONSTRAINTS IN PRODUCTION

LEAN ACCELERATOR AND GROWTH GENERATOR



Marris Consulting has launched several online training courses

Marris Consulting's Online Training Courses

Welcome to our e-learning platform!

Here you can learn more about our online training offers:

Theory Of Constraints, Lean Management, Critical Chain Project Management.

Marris Consulting is a consulting and training company focused on significantly and sustainably improving the performance of manufacturing and process industries.

Learn more about Marris Consulting

ONLINE COURSE
Critical Chain
WILL YOU DARE TO FINISH ALL YOUR PROJECTS ON TIME?

ONLINE COURSE
Bad Lean
Good

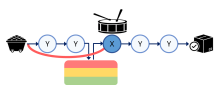
Bill Dettmer's ONLINE COURSE
The Logical Thinking Process

ONLINE COURSE
THEORY OF CONSTRAINTS IN PRODUCTION
LEAN ACCELERATOR AND GROWTH GENERATOR

*The TOC online course is launched today!
We are offering a special “early birds” 30% discount
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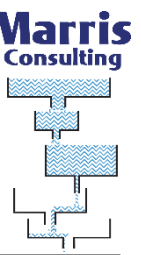
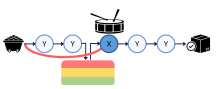
 Or participate in one of our face-to-face training sessions in Paris (in French):

- Theory of Constraints training on the 19th of October 2023
 - Critical Chain Project Management
 - Initial training the 4th of October 2023
 - Advanced training the 5th of October 2023
 - Good Lean versus Bad Lean training on the 30th of November 2023
- New webinars are being programmed for the coming months.
 - We offer all our training internally in-person worldwide
 - You can also ask for our 2-day flash diagnostic during which we help you find your bottleneck and the main issue preventing you from improving your performance.
 - The combination of the 2-day flash diagnostic and one day of training is often highly appreciated by our customers



Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Internal flow management						
De-bottlenecking						
External flow management						
Computer Aided Production Management System						

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Thank you for your time

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Questions ?

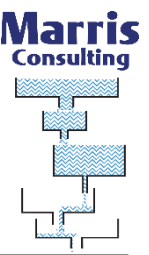
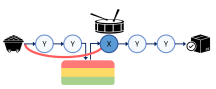
Do not hesitate to connect with me on LinkedIn

[linkedin.com/in/philipmarris](https://www.linkedin.com/in/philipmarris)



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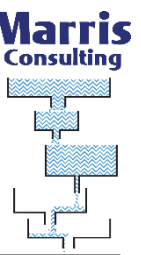
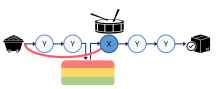


Agenda

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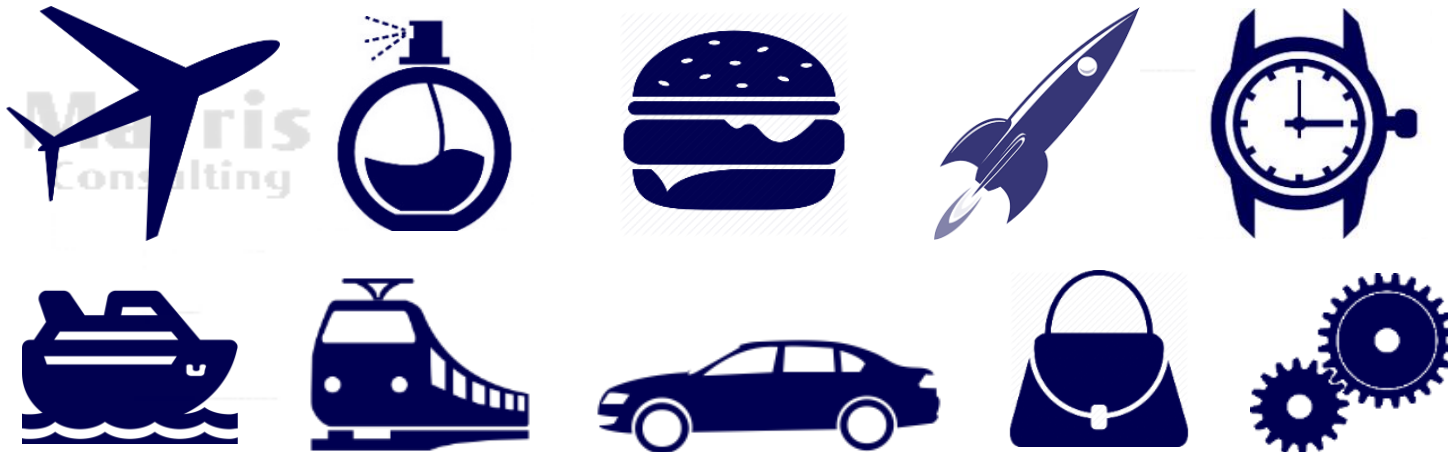
- Introduction
 - Presentation of the Theory of Constraints
 - The 5 focusing steps of the Theory of Constraints
 - TDK example – capacitors industry
 - Conclusion
- Appendices



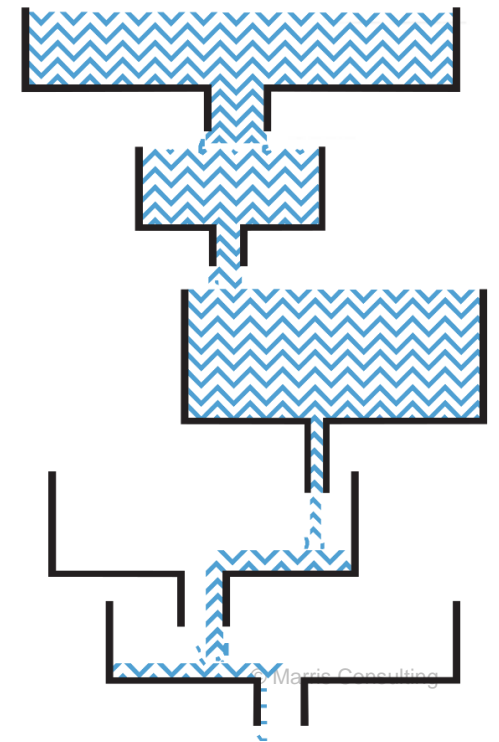


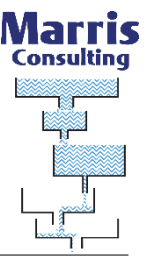
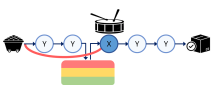
What we do

- Marris Consulting has a reputation for its capacity to be pertinent in nearly all kinds of industry. We have worked in over 300 companies helping in designing, making, selling and distributing:
 - cars, hamburgers, aeroplanes, 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 defence 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.



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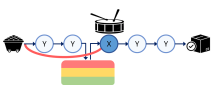




How we do it

- 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 behaviour.
- 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, Good ERP, ...
- One of our key strengths is that we analyse each of our new client's business & culture and then we create the appropriate cocktail of solutions. We never impose a so-called industry best practise.
- We like simple solutions. Simple is beautiful.





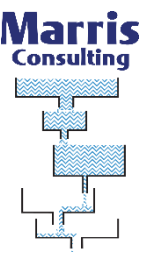
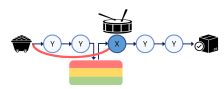
Some facts about us

- © Marris Consulting The company was founded in 2005 in Paris and we currently have 15 consultants.
- 20% of our projects are in France, 50% in the rest of Europe and 30% in the rest of the world.
- We have a very high client retention rate. Many of them have worked with us since the company was founded.
- We have an exceptionally low staff turnover.
- One of us is invited to be a keynote speaker at an international conference about once a month.
- We increased the productivity of one of the best automotive factories in the world by 17% in 15 minutes.
- We reduced the client delivery times of the world's leading fast-food company by over 40% and product waste by over 80%.
- We reduced the time to completely modify the layout of a factory from 8 weeks to 6,5 days.
- We are obsessed with producing exceptional long-lasting results.



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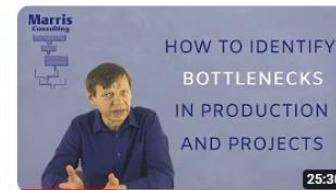
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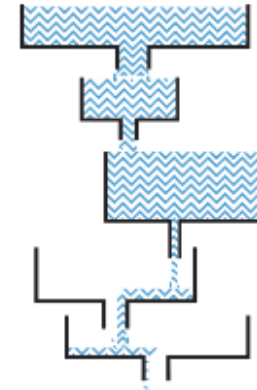


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