

# TOC + Lean + Six Sigma or TLS

What is it?

Is it a threat or an opportunity for TOC?

**Presented by: Philip MARRIS**

**Date: Thursday 6<sup>th</sup> of June 2013 in Frankfurt, Germany.**

## ABSTRACT

### TOC + Lean + Six Sigma or TLS

What is it? Is it a threat or an opportunity for TOC?

TOCICO 2013 Conference

**Speaker: Philip Marris**

**Conference: TOCICO Frankfurt 6<sup>th</sup> of June 2013**

**Is “TLS” – the integration or combination of TOC with Lean and Six Sigma – a good idea? What does it mean exactly? How do they reinforce each other? What are the incompatibilities? Is it an opportunity or a threat for the TOC movement? Industrial improvement efforts over the past 20 years have been handicapped by quarrels concerning the relative merits of the different approaches and of the supposed incompatibilities or fundamental differences among them. TLS considers, on the contrary, that we should seek to combine them thereby creating a system that contains the best aspects of each movement.**

**The speaker, Philip Marris, is the CEO of Marris Consulting, Paris, France. He has implemented TOC with Lean and/or Six Sigma in industry over 50 times in the past 25 years.**



# Presentation outline

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- **Introduction**
- **Definition of TLS: TOC + Lean + Six Sigma**
- **Strengths and weaknesses of each component**
- **Why and how they can reinforce each other**
- **Why and how they are incompatible**
- **Is TLS a threat or an opportunity for the Theory Of Constraints?**
- **Conclusion**
  
- **Annexes**



# Introduction

# The speaker: Philip Marris

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- Started his Lean journey in industry in 1984.
- Started his TOC journey in 1986 when he joined Creative Output France and worked with Eli Goldratt.
- CEO of a management consultancy based in Paris France focused on industrial operations. 80% of the firm's projects are based on TOC + Lean.
- Author of the French TOC reference book *Le Management Par les Contraintes*.
- Founder of the LinkedIn group "TLS - TOC Lean & Six Sigma".
- Member of the TOCICO French Regional board and TOC Institute (India).



I  TOC!

# Thanks, Apologies & Perimeter

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- **Thank you to the pioneers:**
  - Eliyahu Goldratt & co.
  - Taiichi Ohno & co.
  - W. Edwards Deming & co.
  - The TLS precursors: Suzan Bergland, Bob Fox, Dee Jacob, Eduardo Moura, Bruce Nelson, Reza Pirasteh, Bob Sproull & others.
- **Apologies to experts in the fields not mastered by the speaker :**
  - Thinking Processes, Throughput Accounting, Distribution, Marketing & Sales.
- **We will focus on operations (not services).**

# Definition of TLS: TOC + Lean + Six Sigma

# The 3 components: TOC

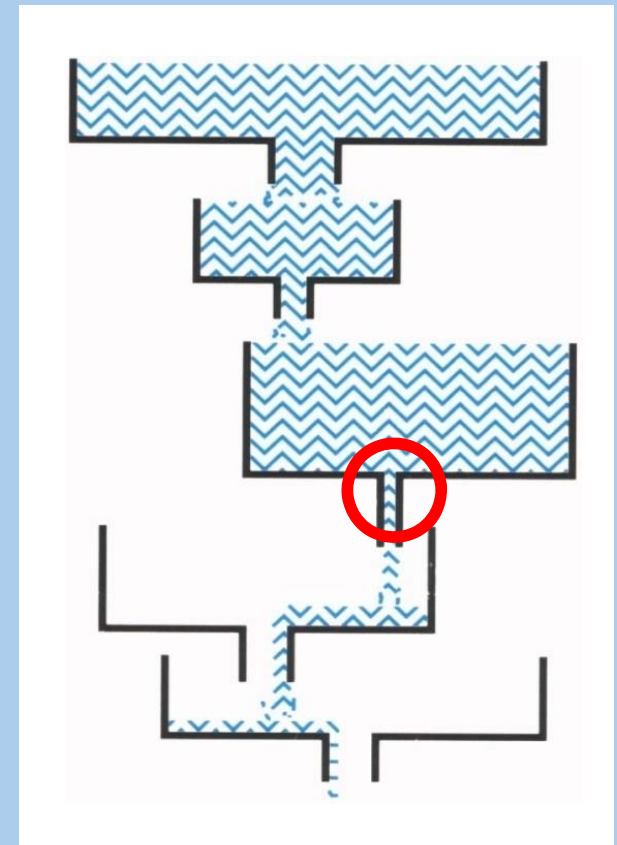
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## ▪ Theory Of Constraints (TOC )

- Focus on improving the system constraints that determine overall performance
- Increase profits by increasing sales rather than by cutting costs and hence avoid headcount reductions
- Developed by Eliyahu Goldratt since the 1980s



Eliyahu Goldratt



# The 3 components: Lean

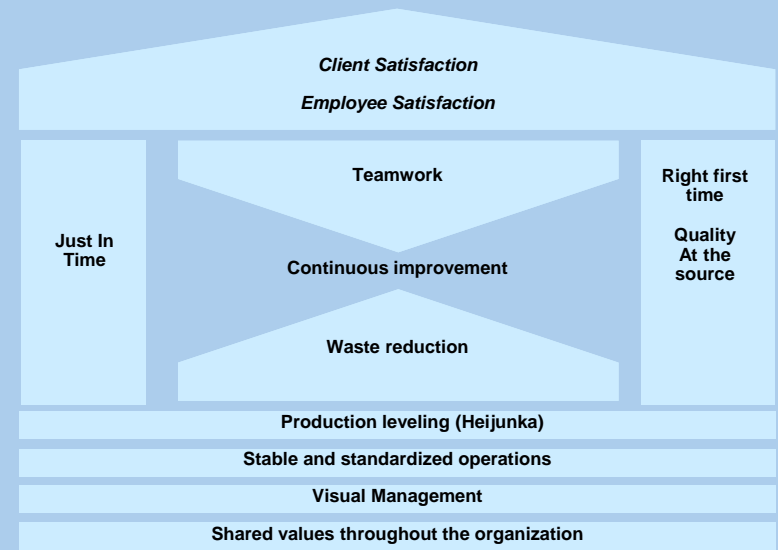
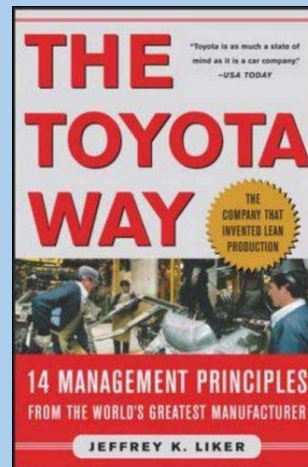
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## ▪ Lean Manufacturing / Toyota Way

- By far the most widespread approach in industry throughout the world
- A focus on eliminating all forms of waste
- A multi-dimensional approach: management, Just-In-Time, 5S, Lean Engineering, ...
- Developed by the Toyota Motor Company since the 1950s, called “Lean” since 1990



Taiichi Ohno



# The 3 components: Six Sigma

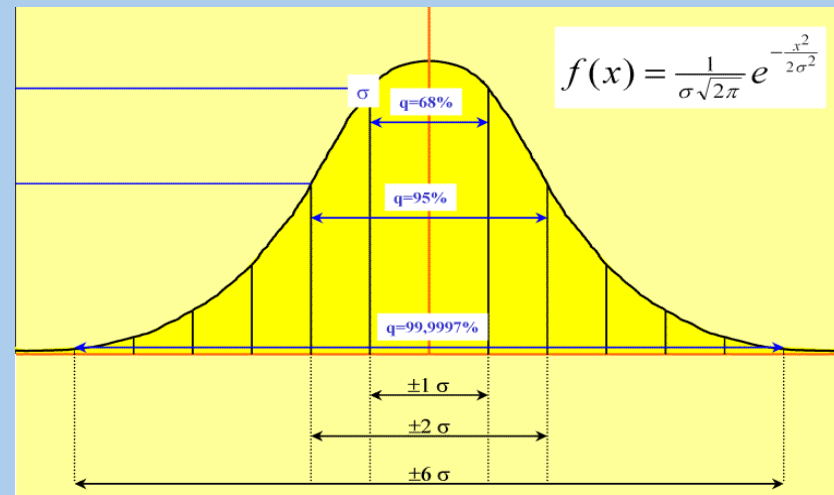
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## ■ Six Sigma

- Reduce process variability to 3.4 defects per million occurrences
- Mostly implemented using certified experts Green Belts, Black Belts, ...
- Includes a powerful tool to be used on important and complex problems (Design Of Experiments / DOE)
- Promoted by Motorola & General Electric in the 1980s



Jack Welch



# TLS : The integration of the 3 approaches

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**Emerged in 2006 (Pirasteh & Farah APICS article)**

**Industrial improvement efforts have been handicapped by quarrels concerning the relative merits of the different approaches and of the supposed fundamental differences among them.**



**TLS considers, that we should seek to combine**

**TOC + Lean + Six Sigma**

**thereby creating a system**

**that contains the best aspects of each movement.**

# Strengths and weaknesses of each component

# To better understand we identify sub-types: Good, Bad, Open & Closed

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- **Good Lean and Bad Lean**

- **Good Lean = Toyota = Growth (no downsizing) + A mindset + Beautiful Manufacturing + Lean NPD + URO + Supplier Partnerships + Kaizen + Etc.**
- **Bad Lean = A process of continuous downsizing.**

- **Open TOC and Closed TOC**

- **Open TOC = TOC is powerful, it is necessary but not sufficient.**
- **Closed TOC = TOC is better than everything else. TOC is the answer, what is your question? TOC is the only way.**

- **Good Six Sigma and Bad Six Sigma**

- **Good Six Sigma = Use data + VOC + Focused projects using DOEs.**
- **Bad Six Sigma = A lot of belts, a lot of projects, no DOEs, few results.**

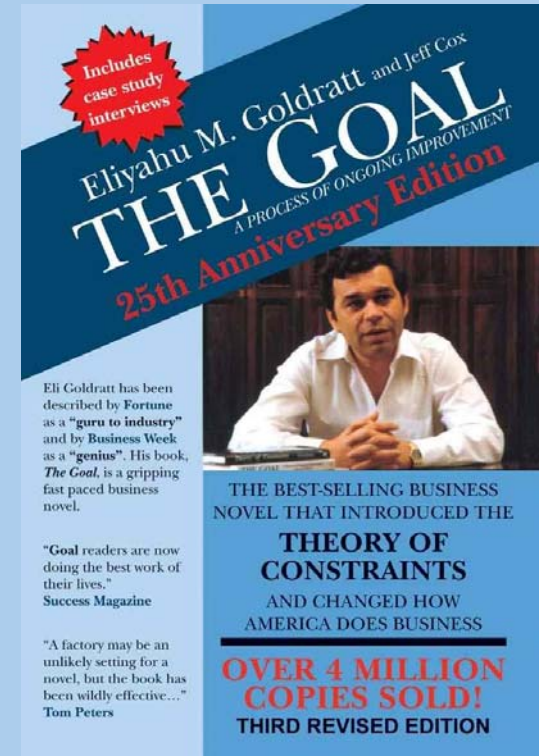


S.C. = Supply Chain. Lean NPD = Lean New Product Development (Toyota's Lean Engineering). URO = Unrefusable Offer. VOC = Voice Of the Customer. DOE = Design Of Experiments (Taguchi etc.)

# Strengths of TOC

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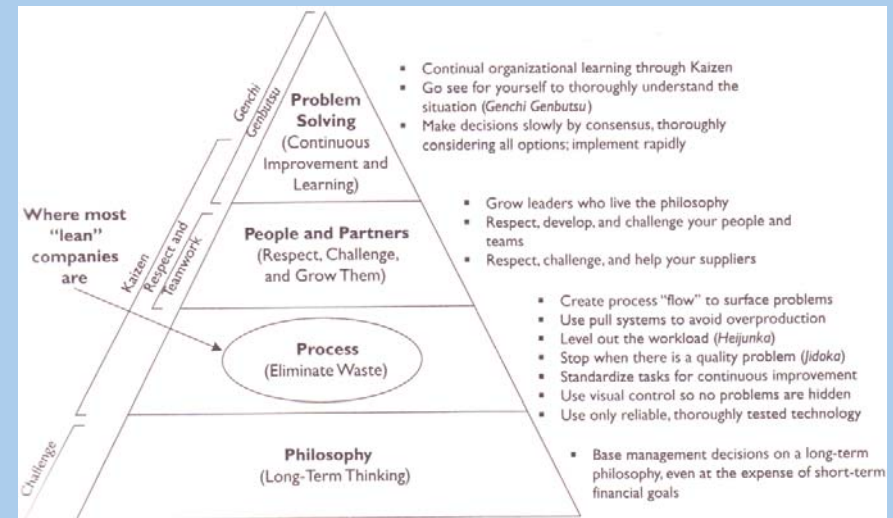
- Focus and leverage or 1% - 99%.
- TOC is the best of the 3 in terms of systemic thinking.
- Critical Chain Project Management.
  - It has the best market share of the TOC "engines" + very little competition + the market is huge
- The speed of TOC based improvements
- The worldwide best selling novel *The Goal* (5 million copies!)



# Strengths of **Good** Lean (1 of 2)

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- **99% market share in industry.**
- **The results and the longevity of the approach of the firms using Lean (it can no longer be called a fashion)**
- **The Lean Way (as in Liker's Toyota Way) is now a fairly mature and complete approach ("Lean Management" etc.)**
- **The foundations based on:**
  - **Where the action is (Gemba)**
  - **The speed of action**
  - **Zero (minimum) Work In Progress**
  - **The respect for people**
  - **The visual / simple solutions**
  - **The reduction in waste mindset (Muda)**



# Strengths of **Good** Lean (2 of 2)

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- **The long term view: thinking 20 years ahead, not obsessed by quarterly financial results**
- **Today a Body Of Knowledge (BOK) that is detailed, fairly exhaustive and fairly coherent**
- **Lean Engineering: How to develop products that are easy to produce, easy to use and reliable (this is rarely implemented outside Toyota)**
- **A community where the practitioners outnumber the consultants & experts 10:1**



# Strengths of **Good** Six Sigma

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- **The Design Of Experiments data based problem resolution approach which is very pertinent to complex problem solving where multiple factors interact.**
- **It had a flagship – General Electric – for many years (the Jack Welsh years).**
- **The DMAIC process has many practitioners.**
- **The voice Of the Customer is important.**
- **Strive for global (not local) results.**



# Weaknesses of TOC (1 of 2)

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- **Market share <1%.**
- **No big, long lasting successes after 40 years of existence.**
- **Closed TOC does not understand Good Lean**
- **A community comprised of many consultants and thinkers and not many doers**
- **Body Of Knowledge (BOK) still not clear: definition of constraints, no real TOC Handbook(!)**
- **The name "Theory Of..."**
- **No point of view for choosing (aiming for) the best constraint**

# Weaknesses of TOC (2 of 2)

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- **Confusion concerning: "Policy constraints", "Management Attention Constraints", Internal versus External Constraints.**
- **No mature system for identifying the system constraint when it is not in production.**
- **The Thinking Processes phenomena. A lot of talk and as yet no big problem solved in the past 10 years.**
- **(Maybe) a lack of focus: moving in to new domains without having a firm base in operations (Production and Projects).**
- **The very weak conversion rate of *The Goal* readers / readers that try and implement TOC.**

# Weaknesses of Lean (1 of 2)

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- **Bad Lean is 90% of cases so "Lean" has a bad reputation (downsizing) for many people especially in the ex-1st world.**
- **Its origins (Toyota cars) makes it difficult to adapt in some cases:**
  - Very capital intensive operations (can't balance the lines or maintain excess capacity)
  - Project or not very repetitive operations
  - Inherent variability in process times eg. Aeronautical maintenance
  - Process industries (especially continuous ones)
  - Very complex processes (need Six Sigma)

# Weaknesses of Lean (2 of 2)

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- **Shop floor manufacturing historical roots hinder the development of a more global/systemic view.**
- **Main focus is on product flow, eliminating all forms of waste (Mudas) and standards. As a result certain kinds of problems are not highlighted.**
- **Dull cars (conservative & not audacious).**
- **The Lean community does not understand Good TOC.**

# Weaknesses of Six Sigma

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- Six Sigma got conquered by Lean: there is often not much left of Six Sigma in a "Lean Six Sigma" initiative.

**This is the TOC community's main nightmare**

- The belt system is not working in practice:
  - Too many Master Black Belts are counter examples : few results, no Gemba, no change management, KPI = Qty. of projects, no respect for people on the shop floor. NB: This is rarely the case of a Lean Sensei (master).
- Design Of Experiments are now very very rare.
- DOEs require a large number of occurrences.
- No integration of the critical importance of flow.

Why and how  
they can reinforce each other

# T + L + S has many (obvious?) synergies

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- **TOC can help determine what to change and where to act**
- **Lean and SS tools can then be used to improve performance**
- **TOC can stimulate increases in Throughput**
- **Lean can help in reducing Inventory and Operating Expenses**
- **Six Sigma can not only be used to reduce variability but also to increase Throughput (increase bottleneck efficiency)**
- **TOC's Thinking Processes could help build a Strategy & Tactics Tree and identify opportunities outside of operations**
- **Maybe Lean can help create more durable success stories and provide management best practices & a long term vision**

# Why and how they are incompatible

# The incompatibilities are in the mindsets and nearly non existent in practice!

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- **Lean "One piece flow" versus TOC Buffers.**
- **Six Sigma Belts versus other "change agent" organizations.**

# Is TLS a threat or an opportunity for the Theory Of Constraints?

# TLS: A threat or an opportunity!?

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- An opportunity for **Open** TOC
- A threat for **Closed** TOC

# Conclusion

# Good TLS is...

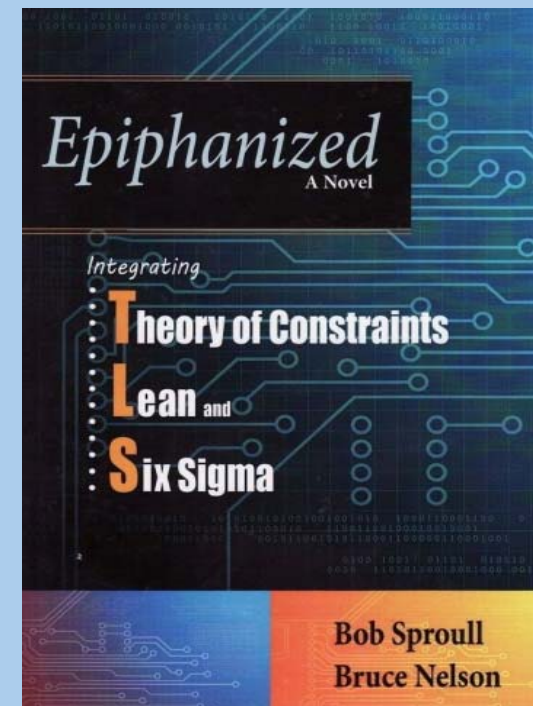
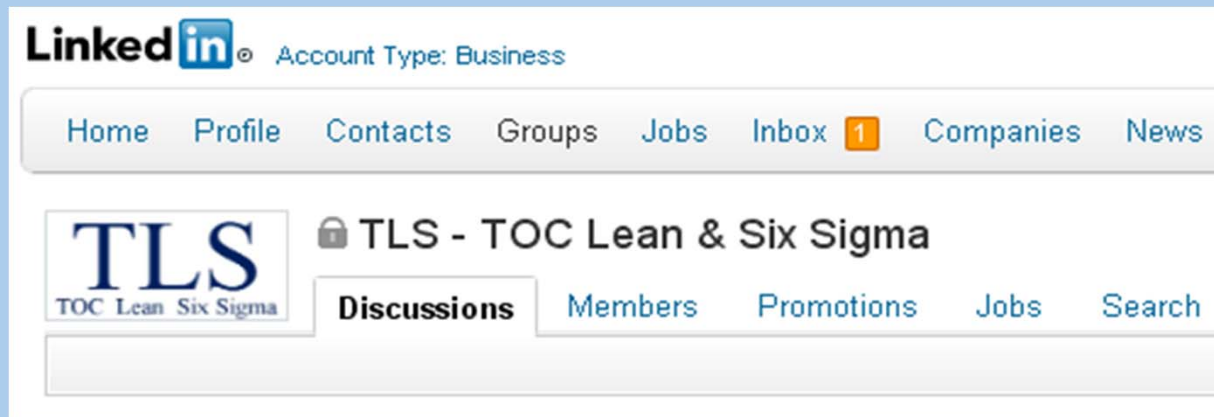
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- **Good Lean +**
- **Good Six Sigma +**
- **Open TOC**

# If you wish to learn more about TLS

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- Read *Epiphanized* by B. Nelson & B. Sproull
- Join the *TLS: TOC Lean & Six Sigma* LinkedIn Group



# Thank you for your time and attention

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## Questions? Remarks?

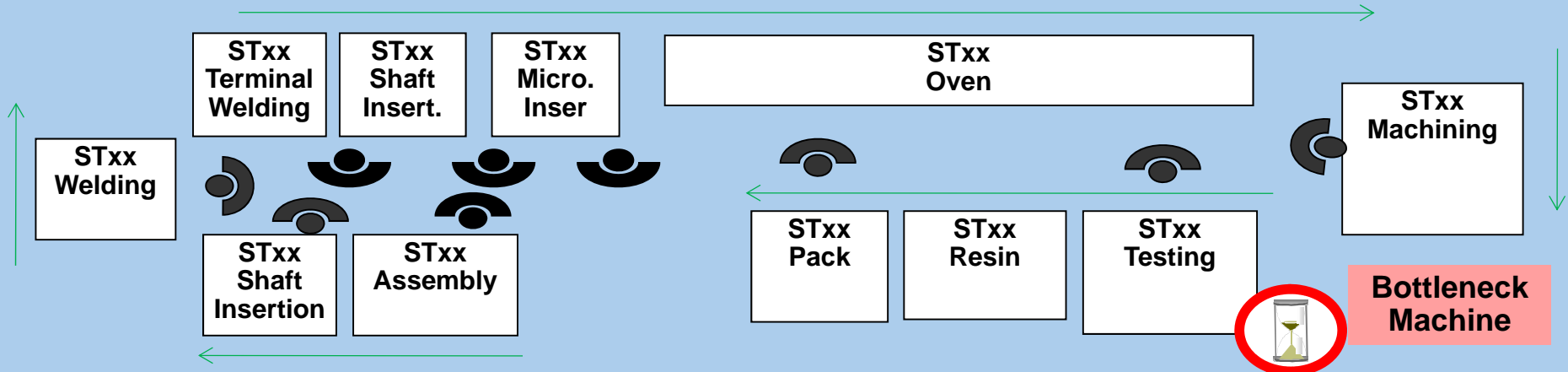
- **PS. Annexes: Bibliography & Case Studies.**
- **PPS. Please don't shoot the messenger.**

# Annexes

## Injecting TOC into a Lean process: An enterprise, already very Lean achieved a 15% improvement in just one hour

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- Case: A worldwide supplier of automotive components already very Lean
- TOC was injected into their Lean system:
  - “One piece flow” was challenged and a buffer of a dozen pieces was implemented in front of the bottleneck in order to protect this resource from minor disruptions (3 minutes or less) in the upstream processes,
  - Management attention was focused on the bottleneck resource (no stoppages for lunch breaks, rapid 5 whys on reoccurring production problems, priority for maintenance, ...).
- Results: >15% improvement in total output of the line in less than one hour.

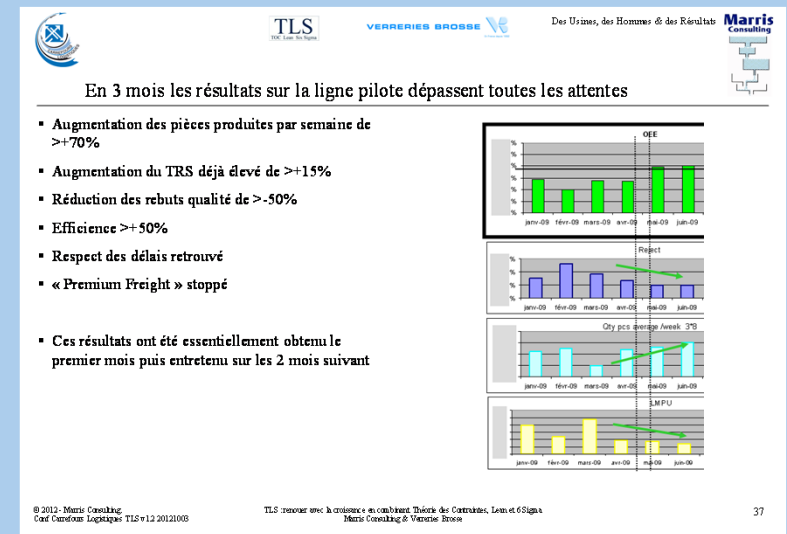
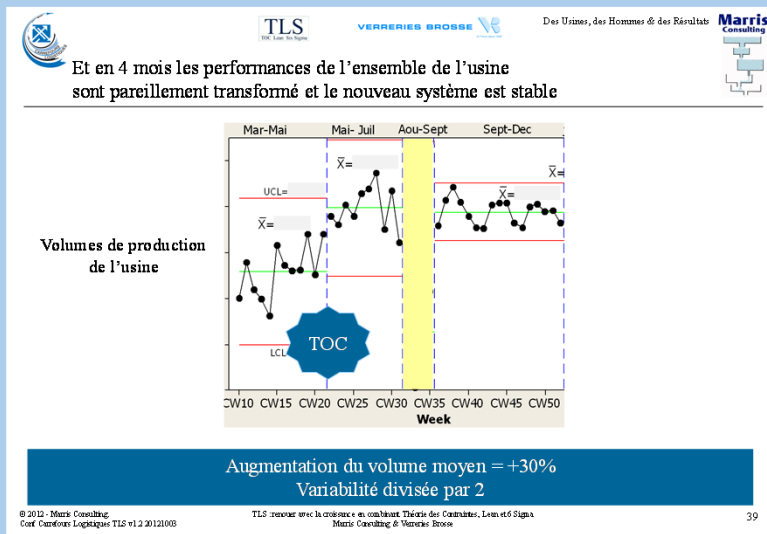


# Autoliv

## Injecting TOC into the Autoliv Production System to save a factory

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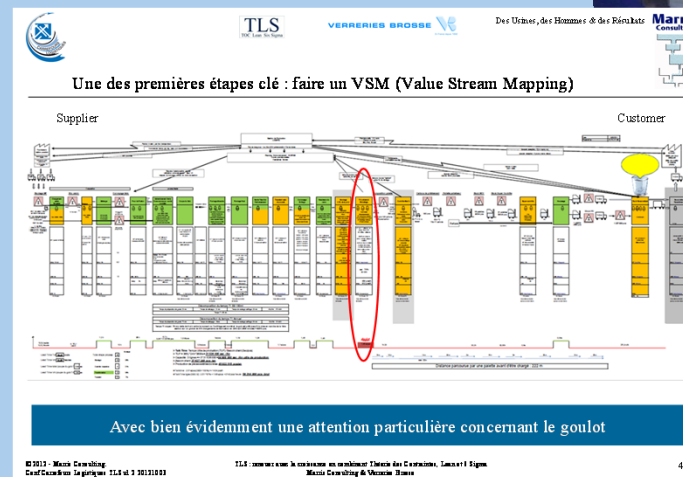
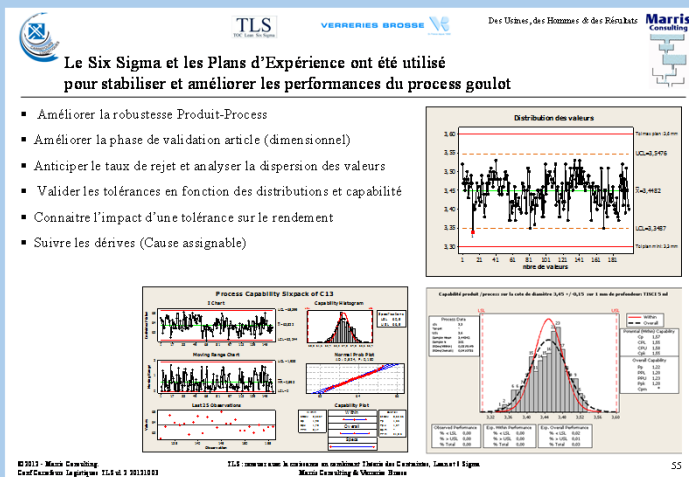
- In 2009, as a consequence of the volatility of the automotive market
- One of Autoliv's French factories that produces airbag electronic control systems
- Injected TOC into the Lean inspired Autoliv Production System
- This enabled a 70% increase in the parts shipped per week and saved the factory



# An excellent case study of TLS in France: les Verreries Brosse

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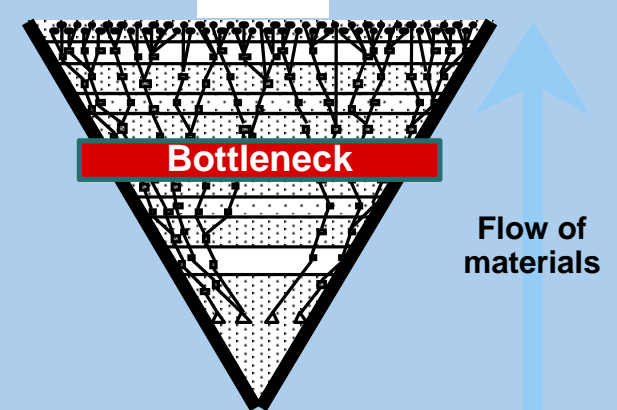
- This case study was written up in the April 12, 2012 issue of l'Usine Nouvelle, an influential French business magazine.
- The company produces perfume bottles.
- All three components are fully exploited in the solution:
  - TOC to focus on the bottleneck,
  - Lean in all areas of management and methodology,
  - Six Sigma (Taguchi, Design of Experiment (DOE), etc.) was deployed on the bottleneck.



## Metallurgical Enterprise: >20% improvement in sales in 3 months

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- Case: a metallurgical factory with more than 1,500 workers.
- TOC identified the bottleneck process as heat treatment (and not the other expensive processes such as the rolling mill)
- Improvement efforts were focused on the bottleneck:
  - SMED (or rather “Process SMED”) was used to significantly reduce the (temperature) change-over times,
  - Six Sigma was used to greatly reduce the variability and reduce the scrap and re-work.
- The Drum-Buffer-Rope method greatly reduced the amount of WIP (>50%).



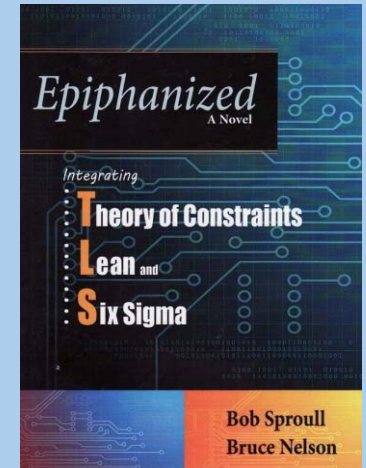
***The combination of TOC, Lean and Six Sigma led to a rapid increase of the Throughput (and sales) of >20%***

## TLS books: 2 business novels

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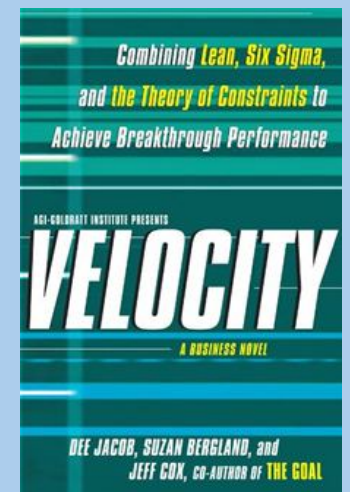
- ***Epiphanized* by Bob Sproull & Bruce Nelson (2012)**

- While taking the form of a novel to get the ideas across there are also 1100 pages of technical material which explain in detail the principles of TLS, Throughput Accounting, the Thinking Processes, the Replenishment Model, DBR (Drum – Buffer – Rope), Critical Chain Project Management, etc.



- ***Velocity* by D. Jacob, S. Bergland & J. Cox (2010)**

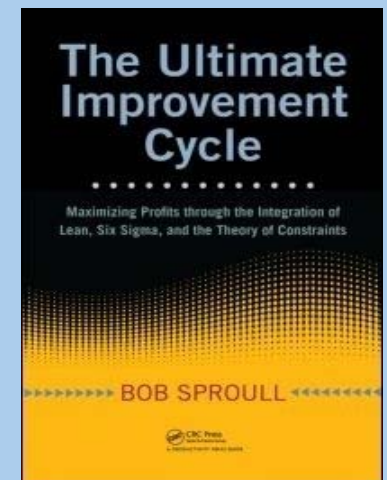
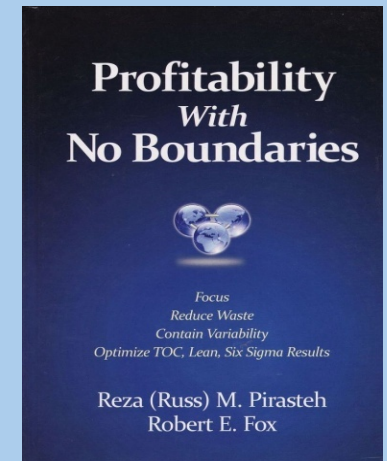
- A business novel which describes how to combine the three approaches. This novel lays out an interesting case of a double bottleneck. During the course of the novel the actors solve both a managerial constraint as well as a production constraint.



## TLS reference books:

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- ***Profitability with no boundaries* by Reza Pirasteh & Robert E. Fox (2010)**
  - Written by two well respected authors this book is principally a reference book for exploring the details of integrating TLS into an enterprise. It introduces iTLS® a systematic method for integrating the three components.
  
- ***The Ultimate Improvement Cycle* by Bob Sproull (2009)**
  - Written by one of the co-authors of *Epiphanized* . Recent (2009). The author is probably the most experienced implementer of TLS in the world.



# BIOGRAPHY: Philip Marris

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Philip Marris is CEO of Marris Consulting, a management consultancy based in Paris France focused on industrial operations. Over 80% of the firm's projects are based on TOC, "TOC + Lean" or TLS. He is the author of the French reference book « Le Management Par les Contraintes en gestion industrielle ». He is involved in the "TOC + Lean" movement and founder of the LinkedIn "TLS - TOC Lean & Six Sigma" group. He has designed, sold and executed over 90 transformation projects. He is a founding member of the board of the recently created TOC France association & TOCICO French regional group and is active in increasing the awareness of TOC in Europe. He is a member of the Advisory Board of the TOC Institute (India). Philip Marris was in charge of Manufacturing Operations in France and the "Rest Of the World" (Europe, Asia, Africa but excluding the US) in large consulting firms. He started his TOC journey in 1986 when he joined Creative Output France and had the honor and pleasure of working with Eli Goldratt and his brother Issi Pazgal. He started his Lean journey in 1984 and has been trying to better master Lean ever since. He has over 29 years of experience in industry and in consulting. Philip Marris started his career as a production engineer in the steel industry in the north France. He is English and is bilingual and bi-cultural.

## Speaking experience

Philip Marris gives about 4 conferences a year. For instance in the past 2 years: TOCICO 2012 in Chicago "Injecting TOC into a very Lean organization", French Operational Excellence annual summit Paris "TLS", ProGestion Franco-Swiss Business Leaders in Geneva "TOC, Lean & Six Sigma", French APICS annual congress in Paris (TOC / DBR), French Pharmaceutical industry annual Congress in Montpellier "CCPM: twice as many projects in half the time", PIOM (Performance Improvement & Operations Management) conference in Luxembourg on TOC in the M.R.O industry, Critical Chain Project Management Conferences in Paris (4), "TOC + Lean" conferences in Paris (4).

## Details of published works

Philip Marris wrote the best-selling textbook in French on how to implement TOC in manufacturing operations: "Le Management Par les Contraintes en gestion industrielle". Reprinted in 1996 and 2000. He is currently finishing a new edition. A website in French is dedicated to this book: [www.management-par-les-contraintes.com](http://www.management-par-les-contraintes.com). Among other things this book argues that the 5 focusing steps of TOC that lead to perpetually eliminating the current constraint is not always appropriate. It argues that in many cases a company should choose its "best constraint" or bottleneck resource and organize excess capacity around the constraint.

He publishes about 6 articles per year in printed or web based media. For instance in the past 2 years: l'Usine Nouvelle (2), Quality World Magazine, Industrie & Technologies (2), Pharma Pratiques, Supply Chain Magazine (2), Railway Gazette International, TechniquesIngenieur.fr, Maintenance & Entreprise, Logistiques Magazine, Qualitique, Mesures, Innovation & Industrie, Qualitéonline, Production Maintenance & UsineNouvelle.com.

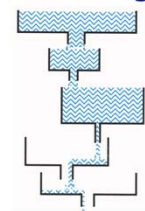
In 2013 he contributed to the translation of the prologue of the new memorial edition of Eli Goldratt's "The Goal" in French : Standing on the shoulder of giants.



- Marris Consulting conducts regular training courses in TOC, TLS, Critical Chain project Management, and other related areas of practice. The courses are delivered in Paris but can be arranged to be conducted at other sites.
- Clients : ArcelorMittal, Valeo, SNCF / French Railways, Veolia, Salzgitter Mannesmann, EADS, Aubert & Duval / Eramet, Autoliv, SKF, ABB, Man, Michelin, Glaxo, Bobst, Ceva Santé Animale, Banque de France, DSS / Kaysersberg Packaging and over 50 Small & Medium Enterprises.
- Marris Consulting has conducted over 100 engagements in transforming industrial enterprises in France and around the world.
- The firm is recognized as an expert in Theory of Constraints & Lean Manufacturing. Philip Marris is the author of the TOC reference book in French: *Le Management Par les Contraintes*. A new edition of this book is in the works. Philip is English and worked with Eli Goldratt in the formative years of TOC.
- TOC manufacturing & CCPM websites (English versions of these sites will be available soon)
  - [www.management-par-les-contraintes.com](http://www.management-par-les-contraintes.com)
  - [www.chaine-critique.com](http://www.chaine-critique.com)
- Founded in 2005, 12 consultants + freelance network

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