What is TOC?

A basics workshop

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Presentation organization: The change question sequence

BROAD OVERVIEW OF TOC BASED ON THE 3 CHANGE QUESTION SEQUENCE:

1. **What to change?** Core problem identification
   
2. **To what to change?** The win-win solution
   
3. **How to cause the change?** The implementation plan

TOCICO Dictionary 2nd Ed. p. 34.
Workshop topics

What is TOC?

Functions (links) currently covered by TOC
• Organizations
• Operations / Production
• Finance / Measures
• Project Management
• Distribution / Supply Chain
• Marketing
• Sales
• Managing People
• Business Strategy

Summary Decision Making
TOC origins\(^1\) and evolution

\(^1\)de Wet. 2007
Eli’s friend had a problem: His friend owned a factory that made chicken houses (much larger than coops) for the Israeli government. He had a scheduling mess, never getting any orders finished on time. Manufacturing environments are complex and full of uncertainty. When his friend focused on assembly, operations problems occurred in fabrication and when he focused on fabrication, problems occurred in assembly. Nothing was synchronized. Eli’s friend asked for his help.
Eli’s initial solution: Being a physicist, Eli approached the chicken house problem scientifically. He thought: The plant had many constraints controlling its environment. “Hmmm, this is similar to the many-bodied problem in physics,” he thought. In the many-bodied problem one solution approach is to determine the impact of the biggest body on the system then the next, then the next, etc. Let’s see if this analogy applies to the chicken house scheduling problem. Eli developed software\(^1\) called “OPT” (optimized production timetable, later technology) to solve this manufacturing scheduling problem.

\(^1\) Fry, Cox, and Blackstone, 1997
“I view science as nothing more than an understanding of the way the world is and why it works that way. At any given time our scientific knowledge is simply the current state of the art of our understanding. I do not believe in absolute truths. I fear such beliefs because they block the search for better understanding. Whenever we think we have final answers progress, science, and better understanding ceases. Understanding of our world is not something to be pursued for its own sake, however. Knowledge should be pursued, I believe, to make our world better—to make life more fulfilling.”

As the inventor of TOC Dr. Goldratt was asked to write the introductory chapter of Section I What is TOC? of the TOC Handbook. His chapter is titled: Introduction to TOC—My Perspective. Goldratt tells:

“There is a famous story about a gentile who approaches the two great Rabbis of the time and asked each, ‘Can you teach me all of Judaism in the time I can stand on one leg?’

The first Rabbi chased him out of the house, however, the second Rabbi answered: ‘Don’t do unto others what you don’t want done to you. That is all of Judaism, the rest is just derivatives. Go and learn.’

Can we do the same; can we condense all of TOC into one sentence? I think that it is possible to condense it to a single word—focus.”
Goldratt goes on to define “Focus: doing what should be done…

Focusing on everything is synonymous with not focusing on anything…

We don’t have a choice but to define focus more narrowly: do what should be done AND don’t do what should not be done.”

Goldratt. 2010, Ch 1. TOC Handbook.
Organizations / systems
Which system is more complex¹? A or B?

¹Modified from Goldratt, 1999, Satellite program, Session 6 Sales.
Traditional organization focus is cost world paradigm

A system consists of a series of independent components and the cost of the system is equal to the summation of the cost of all the sub-systems. The organization is analogous to a chain with each link being a different function or department. The prime measure of the chain is its weight. This view focuses on reducing the weight or costs at each link and judges actions and decisions by their local impact independent of other links.
Traditional organization focus / rules

SYSTEM A PERSPECTIVE/ASSUMPTION: If each person / dept./ division works as efficiently as possible in their area / specialty, then the org. will be as efficient as possible at achieving the goal of the org. Policies, measures and behaviors focus on local improvements everywhere.

ACTION: Measure local efficiencies. Focus on making everyone everywhere as efficient as possible. Keep busy! Find work.
TOC organization focus is throughput world paradigm

A system consists of a series of dependent variables that must work together to achieve the goal and whose ability to do so is limited by some system constraint(s). The organization is analogous to a chain with each link being a different function or department. The strength of the chain is the prime measure. This view focuses on improving the strength of the chain by focusing on improving the weakest link. The unavoidable conclusion is that global improvement is the direct result of improvement at the constraint....

System B

TOC organization focus / rules

Focus

System Goal = Ever-flourishing organization

How does this constraint impact the system goal?

Focus

FOCUS — System B perspective: Take actions to improve the weakest link with respect to the org. goal.

Constraint

Align other links to support the weakest link (no more, no less).
1. People are good ... but we all have “bad” assumptions that block us from seeing and **unlocking inherent potential** within ourselves, others and the organizations we work in. Goldratt

2. Every conflict can be removed ... if we can find and challenge the **erroneous assumption(s)** causing the conflict. Newton

3. Every situation (or system), no matter how complex it initially appears to be, is exceedingly simple ... if we can find the one or few high leverage points, the **inherent simplicity** in any situation or system. Newton

4. Every situation can be substantially improved ... if we can just **think clearly** in all situations we encounter using these assumptions. Goldratt

SYSTEM A PERSPECTIVE/ASSUMPTION: If each person / dept. / division works as efficiently as possible in their area / specialty, then the org. will be as efficient as possible at achieving the goal of the org. Policies, measures and behaviors focus on local improvements everywhere.

ACTION: Measure local efficiencies. Focus on making everyone everywhere as efficient as possible. Keep busy! Find work.
What to change?
Core conflict cloud: Operations

Objective
A The operations manager manages well.

Requirements
B Constantly fight to reduce waste.
C Constantly fight to increase flow.

Prerequisites
D Use efficiencies as prime measurement.
D’ Don’t use efficiencies as a measurement.

Session 1 Operations.
To what to change? Drum buffer rope / buffer management

Objective
A Be a good manager.

Requirements
B Constantly fight to reduce waste.
C Constantly fight to increase flow.

Prerequisites
D Use efficiencies as prime measurement.
D’ Don’t use efficiencies as a measurement.

Breakthrough injection (action): Use efficiency measure at constraint and flow measure at non-constraints. Use 5 focusing steps & a holistic scheduling / control system (DBR / BM, SDBR / BM, CC / BM, distribution / BM, etc.) & throughput acrting.

Session 1 Operations.
To what to change?
TOC production solutions

• Five focusing steps (5FS)
• Drum buffer rope (DBR) scheduling
• Simplified DBR scheduling (S-DBR)
• Buffer management (BM) for prioritizing execution
• BM for prioritizing improvement efforts
• Throughput accounting

For a definition of each solution see: TOCICO Dictionary 2012. 2nd Ed.
To what to change?
Process of ongoing improvement: 5 focusing steps

1. IDENTIFY the system’s constraint(s).
2. Decide how to EXPLOIT the system’s constraint(s).
3. SUBORDINATE all else to the above decision.
4. ELEVATE the system’s constraint(s).
5. WARNING!!!! If in the previous steps a constraint has been broken, go back to step 1, but do not allow INERTIA to cause a system’s constraint.

To what to change? An example

Where?

The constraint determines actual output
To what to change?
2009 Global rules of flow

Four concepts of flow\(^1\) are:

1. Improving flow (or equivalently lead time) is a primary objective of operations.

2. This primary objective should be translated into a practical mechanism that guides the operation when not to produce (prevents overproduction).

3. Local efficiencies must be abolished.

4. A focusing process to balance flow must be in place.

\(^1\)Goldratt, E. M. 2009b.
What to change?
Core conflict cloud: Finance/measures

Objective
A Manage well (according to measures).

Requirements
B Control costs.
C Protect throughput.

Prerequisites
D Judge according to local impact.
D' Do not judge according to local impact.

OR

**To what to change?**

**Throughput accounting**

1. **Objective**
   - A Manage well (according to measures).
   - B Control costs.
   - C Protect throughput.
   - **&**
   - D Judge according to local impact.
   - D’ Do not judge according to local impact.

2. **Requirements**
   - B Control costs.
   - C Protect throughput.

3. **Prerequisites**
   - D Judge according to local impact.
   - D’ Do not judge according to local impact.

4. **Breakthrough injection:** Use throughput accounting (TA) to link local decisions to global financial results. Use holistic applications (drum buffer rope, simplified drum buffer rope, critical chain, distribution / replenishment and buffer management) and measures that also causally link local actions to true global results (i.e. throughput and inventory dollar days).

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Goldratt, 1999. Session 2  
Finance and Measurements.
To what to change?
Day-to-day decision-making rules

1. What is the impact of Throughput (T)?

2. What is the impact on Investment (I) (formally Inventory)?

3. What is the impact on Operating Expenses (OE)?

\[ T = \text{Selling price} - \text{Truly variable costs} = SP - TVC \]

\[ \text{Net profit} = T - OE \]

\[ \text{Return on Investment} = \frac{\text{Net Profit}}{\text{Investment}} \]

\[ \text{Productivity} = \frac{T}{OE} \]

Throughput / Inventory dollar days
What to change?
Core conflict cloud: Project management

Objective

A We meet our original commitment.

B We do whatever it takes to meet the endangered original commitment.

&

C We do not jeopardize any other original commitments.

D We compensate for early mis-estimations / mis-commitments.

D’ We do not compensate for early mis-estimations / mis-commitments.

Goldratt, 1999. Session 3 Project Management Engineering
To what to change? Critical chain project management

Objective

A We meet our original commitment.

B We do whatever it takes to meet the endangered original commitment.

C We do not jeopardize any other original commitments.

D We compensate for early mis-estimations / mis-commitments.

D’ We do not compensate for early mis-estimations / mis-commitments.

Breakthrough injection: Use critical chain project management / buffer management (CCPM / BM) and throughput accounting (TA).

Goldratt, 1999. Session 3 Project Management Engineering
Distribution / supply chain
What to change?
Core conflict cloud: Distribution / supply chain

Objective
Distribution mgr. must A Manage well.

Requirements
Distribution mgr. must B Control costs.
Distribution mgr. must C Protect throughput.

Prerequisites
Distribution mgr. must D Hold less inventory.
Distribution mgr. must D’ Hold more inventory.

To what to change?
Distribution / replenishment

**Objective**
- Distribution mgr. must A Manage well.
- Distribution mgr. must B Control costs.
- Distribution mgr. must C Protect throughput.
- Distribution mgr. must D Hold less inventory.

**Requirements**
- Distribution mgr. must B Control costs.
- Distribution mgr. must C Protect throughput.

**Prerequisites**
- Distribution mgr. must D Hold less inventory.
- Distribution mgr. must D’ Hold more inventory.

Breakthrough Injection: Have the right inventory at the right place at the right time.

What to change?
Core conflict cloud: Marketing

Objective

A Marketing arrives at good pricing decisions.

Requirements

B The company has enough sales volume.

C The company has reasonable product profit margins.

Prerequisites

D Marketing acts upon the clients’ perception of value.

D’ Marketing acts upon the supplier’s perception of value.

&

OR

Modified from Goldratt, 1999. Session 5 Marketing.
To what to change?
Unrefusable offer / market segmentation

<table>
<thead>
<tr>
<th>Objective</th>
<th>Requirements</th>
<th>Prerequisites</th>
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<tbody>
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<td>A Marketing arrives at good pricing decisions.</td>
<td>B The company has enough sales volume. &amp; C The company covers its OE and Investment.</td>
<td>D Marketing acts upon the clients’ perception of value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D’ Marketing acts upon the supplier’s perception of value.</td>
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</tbody>
</table>

Breakthrough injection: In total the company must cover its operating expense and investment. Segment and prioritize the markets. Maintain a presence in all market segments. Insure markets are selected such that all markets should not suffer a downturn at the same time. Move to the more lucrative markets in good times.

Modified from Goldratt, 1999. Session 5 Marketing.
Sales
What to change? Core conflict cloud: Sales

Objective
A We bring the buyer to see the product as the best value.

Requirements
B Sales person shows value to the buyer.

&

C Sales person doesn’t cause the buyer to object.

Prerequisites
D Sales person presents the product.

OR
D’ Sales person doesn’t present the product.

Cox, et al., 2012, p. 159,
ToObject what to change? Unrefusable offer / buy-in processes

Objective
A We bring the buyer to see the product as the best value.

Requirements
B Sales person shows value to the buyer.
C Sales person doesn’t cause the buyer to object.

Prerequisites
D Sales person presents the product.
D’ Sales person doesn’t present the product.

Breakthrough injection: Create an unrefusable (mafia) offer (URO). A URO is a combined marketing and sales initiative that addresses the customer's core problem and creates a win-win solution for the supplier & customer. The buy-in processes are designed to overcome resistance to change.

Managing people — Respect
What to change?
Core conflict cloud: Managing people

A COMMON OBJECTIVE
A What is the lowest common objective both needs are trying to satisfy?

B SYSTEM NEED
B What need of the system is being jeopardized by the fire?

Lieutenant’s responsibility

Employee empowerment: Aligning responsibility & authority

C SYSTEM NEED
C What need of the system is protected by the rule?

The reason for the rule

D THE ACTION
D The lieutenant breaks the rule. (check if by doing so the corresponding need will be met.)

D’ THE SYSTEM RULE
D’ What rule prevents the lieutenant from putting out the fire?

Lieutenant’s lack of authority
A What is the lowest common objective both needs are trying to be satisfied?

B What need of the system is being jeopardized by the fire?

C What need of the system is protected by the rule?

D The lieutenant breaks the rule. (check if by doing so the corresponding need will be met.)

D’ What rule prevents the lieutenant from putting out the fire?

Breakthrough injection: Employee empowerment by aligning responsibility & authority, respect for others. Implement the Engines of Harmony.

What to change?
Core conflict cloud: Strategy

Objective
A Top management put the company on a process of ongoing improvement.

Requirements
B Induce people to improve.

Prerequisites
D Do not lay off people.

&
C Convert local improvements into bottom line results.

OR
D’ Layoff people in the departments that have improved the most.

Breakthrough injection: Construct a strategy and tactics tree based on a decisive competitive edge focusing on both organization stability and exponential growth. The S&T tree synchronizes actions within and across functions to the organization goal.

To what to change? Strategy and tactics tree

Strategy & Tactics Tree

Decisive Competitive Edge

R&D  Operations  Distribution  Human Resources  Marketing  Sales  Finance/accounting  Consumers

Build  Capitalize  Sustain

Present  Synchronized Actions  Future
Workshop topics

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• Operations
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Summary Decision Making
How to cause the change?

Develop a plan of action:

• For simple projects use the prerequisite tree.

• For complex projects use critical chain project management.

• For paradigm shifts use the strategy and tactics tree.
Fundamental assumptions of TOC

1. People are good ....

2. Every conflict can be removed ....

3. Every situation (or system), no matter how complex it initially appears to be, is exceedingly simple ....

4. Every situation can be substantially improved ....

FOCUS + assumptions = TOC derivatives

We simply need to look at reality and think logically and precisely about what we see. The key ingredient is to have the courage to face inconsistencies between what we see and deduce and the way things are done. This challenging of basic assumptions is essential to break-throughs. ...

References


For a comprehensive listing of Goldratt’s works, visit: http://www.tocico.org/?page=goldratt_bibliog
The authors would like to thank the following TOC experts for contributing to the conventional and TOC rules. We had far too many rules suggested to include all of them. The authors therefore chose representative rules:

Production: Eli Goldratt (OPT and flow rules)

Supply chain: Henry Camp and Eli Schragenheim

Accounting and measures: Lynn Boyd, Charlene Spoede Budd, and Debra Smith

Strategy: Alan Barnard and Lisa Ferguson

Marketing and Sales: Lisa Lang and Justin Roth-Marsh

Managing people: Christoph Lenhartz

Critical chain: Sanjeev Gupta, Rob Newbold, and Danny Walsh

Any errors are solely those of the authors.
Biographical sketch

James F. Cox III, Ph.D., TOCICO certified, CFPIM, CIRM, JONAH’s JONAH, Professor Emeritus, was the Robert O. Arnold Professor of Business at the University of Georgia. Prior to an academic career of over 30 years, he held positions in industry and the military. He taught Jonah workshops and numerous TOC workshops and programs.

Dr. Cox’s research has centered on TOC for over twenty-five years. He recently co-edited (with John Schleier) the TOC Handbook. He has written three books on TOC and has authored/coauthored over 90 articles in top academic and practitioner journals including Decision Sciences, the Academy of Management Review and Journal, Production/Operations Management Journal, MIS Quarterly, International Journal of Product Research, Production and Inventory Management Journal, and Industrial Engineering. He was the coeditor of the APICS Dictionary (five editions with John Blackstone) and more recently co-editor of the TOCICO Dictionary, 2nd edition.

Dr. Cox, an APICS member for over 30 years, held numerous chapter, regional, and national offices (BODs for 4 years, VP-Research for 2 years, Foundation BODs 9 years including 4 as president). He also served on the founding TOCICO Board of Directors and as its first director of certification. He has spoken at over 50 APICS and other professional organization chapter meetings, several regional seminars and several international conferences on TOC. He has received the APICS Voluntary Service Award and the TOCICO Lifetime Achievement Award for his contributions to the field. He is currently serving on the TOCICO Board of Directors.
Christoph Lenhartz, MBA, Jonah, TOCICO-certified, Certified Consultant (bdvb) is the current Chairman of the Board of TOCICO.

In over 20 years he has acquired a wide-ranging, international experience in industry, as a successful entrepreneur and also a leader of management consulting teams in high complexity TOC implementations. He has lead strategic, business transformation, supply chain management and IT projects and his expertise also includes post-merger integration of supply chain operations for major international groups.

As one of the leading TOC and management experts in Europe he is the General Manager Europe, Middle East and Africa for Pinnacle Strategies, a pioneer in operational excellence consulting based on TOC principles.

He has published articles on TOC and management topics in journals such as “Quality Progress” and has translated and written TOC-books in German. He is an appreciated speaker and teacher of TOC and related topics.

Christoph holds an MBA from Clemson University (USA), he graduated from the University Essen (Germany) as a Diplom-Kaufmann and has pursued post-graduate studies at Washington State University (USA).