



What is TOC?

A basics workshop

**Presented (English) by: James F. Cox III PhD, TOCICO certified, CFPIM, CIRM
Jonah's Jonah, Professor Emeritus, Management Dept. Terry College,
University of Georgia**

**Presented (German) by: Christoph Lenhartz, MBA, TOCICO certified, Jonah
General Manager Europe, Middle East & Africa, Pinnacle Strategies
Chairman of the Board TOCICO**

Date: 3 June 2013

Presentation organization: The change question sequence

BROAD OVERVIEW OF TOC BASED ON THE 3 CHANGE QUESTION SEQUENCE¹:



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?

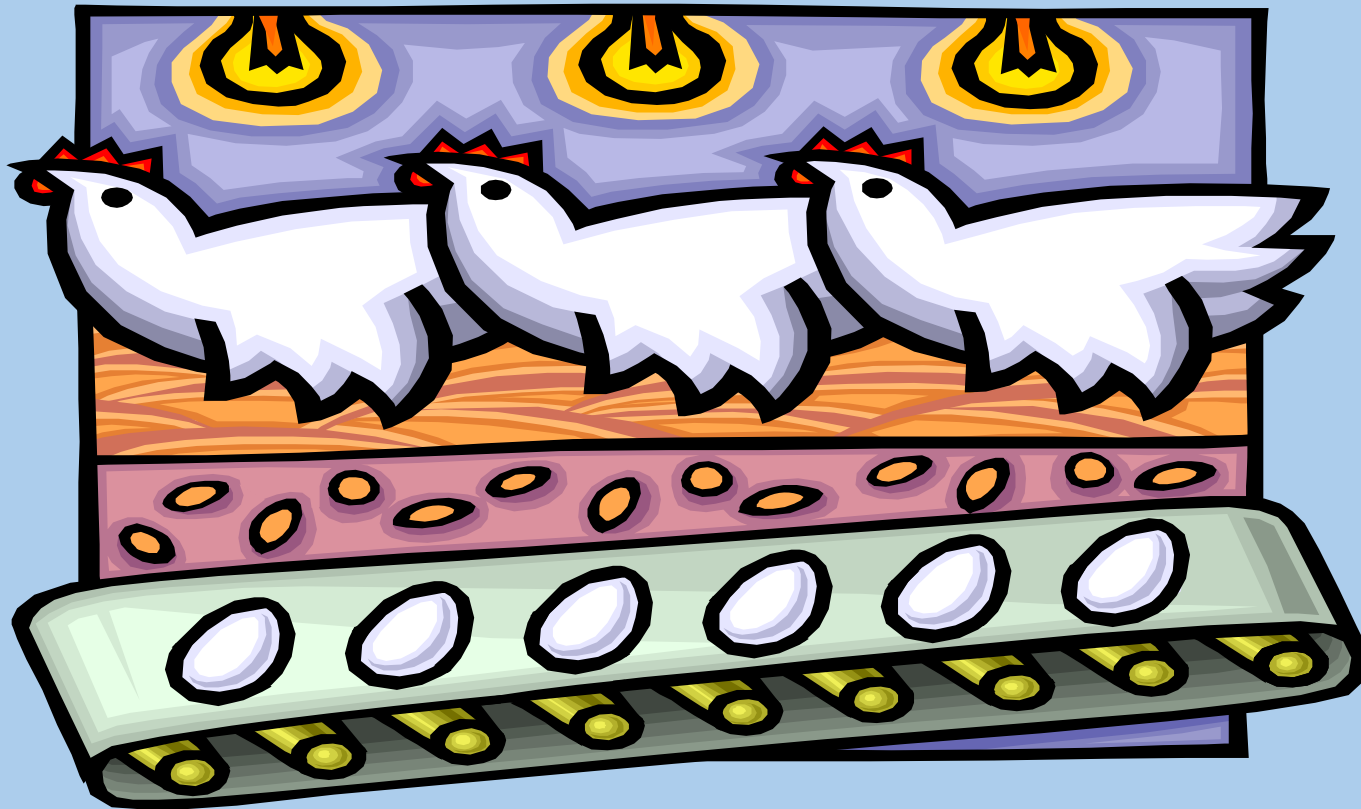
Functions (links) currently covered by TOC

- Organizations
- Operations / Production
- Finance / Measures
- Project Management
- Distribution / Supply Chain
- Marketing
- Sales
- Managing People
- Business Strategy

Summary Decision Making



TOC origins¹ and evolution



¹de Wet. 2007

1978 TOC origin¹: The chicken house problem



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.

¹de Wet. 2007

The chicken house solution: OPT



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 software¹ called "OPT" (optimized production timetable, later technology) to solve this manufacturing scheduling problem.

¹ Fry, Cox, and Blackstone, 1997

Goldratt, The Goal: Science¹

“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.”

¹Goldratt and Cox 1984. The Goal, Introduction.

2010 What is TOC?



Goldratt. 2010, Ch 1. TOC Handbook.

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.”

What is TOC?

FOCUS



Goldratt goes on to define “Focus: doing what should be done...”

Focusing on everything is synonymous with not focusing on anything...

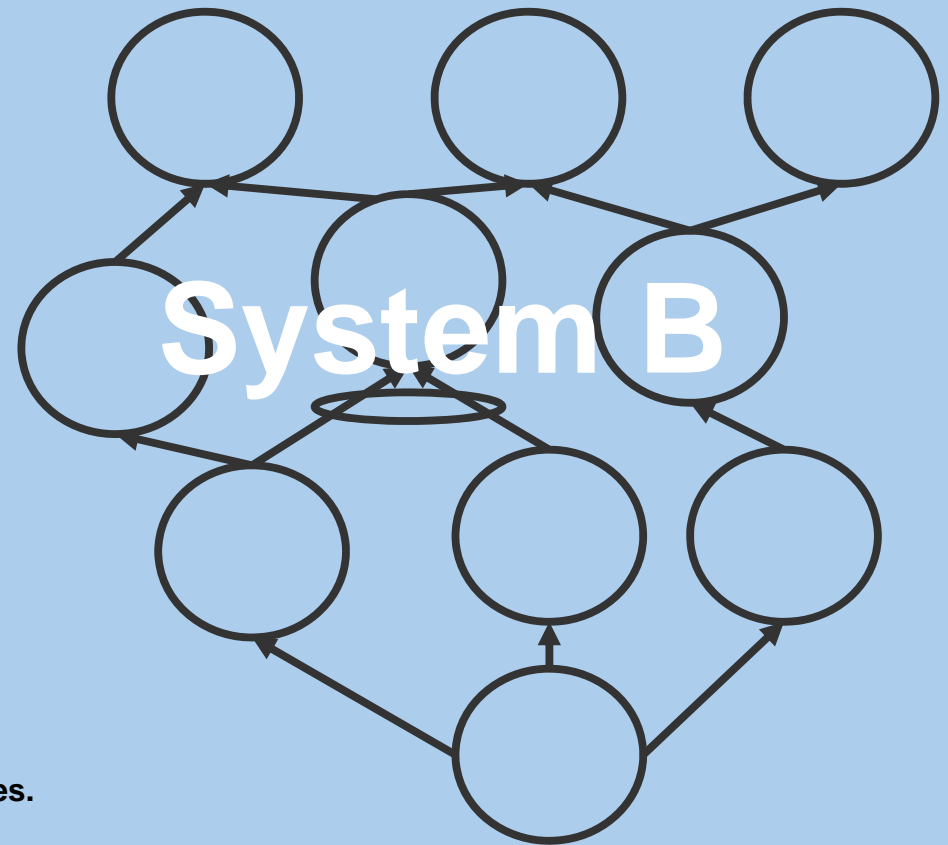
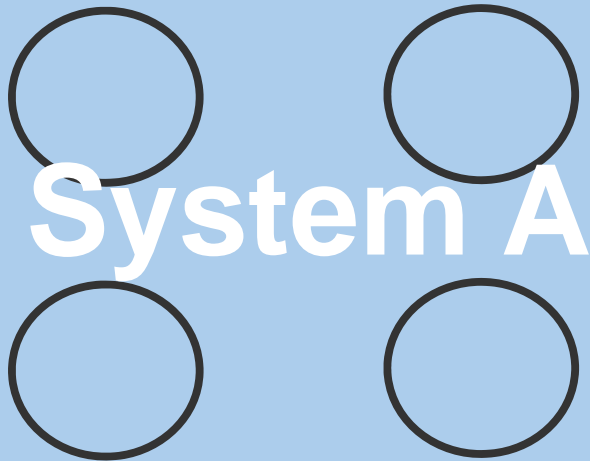
We don’t have a choice but to define focus more narrowly: do what should be done AND don’t do what should *not* be done.”

Goldratt. 2010, Ch 1. TOC Handbook .

Organizations / systems

Traditional organization focus versus TOC organization focus

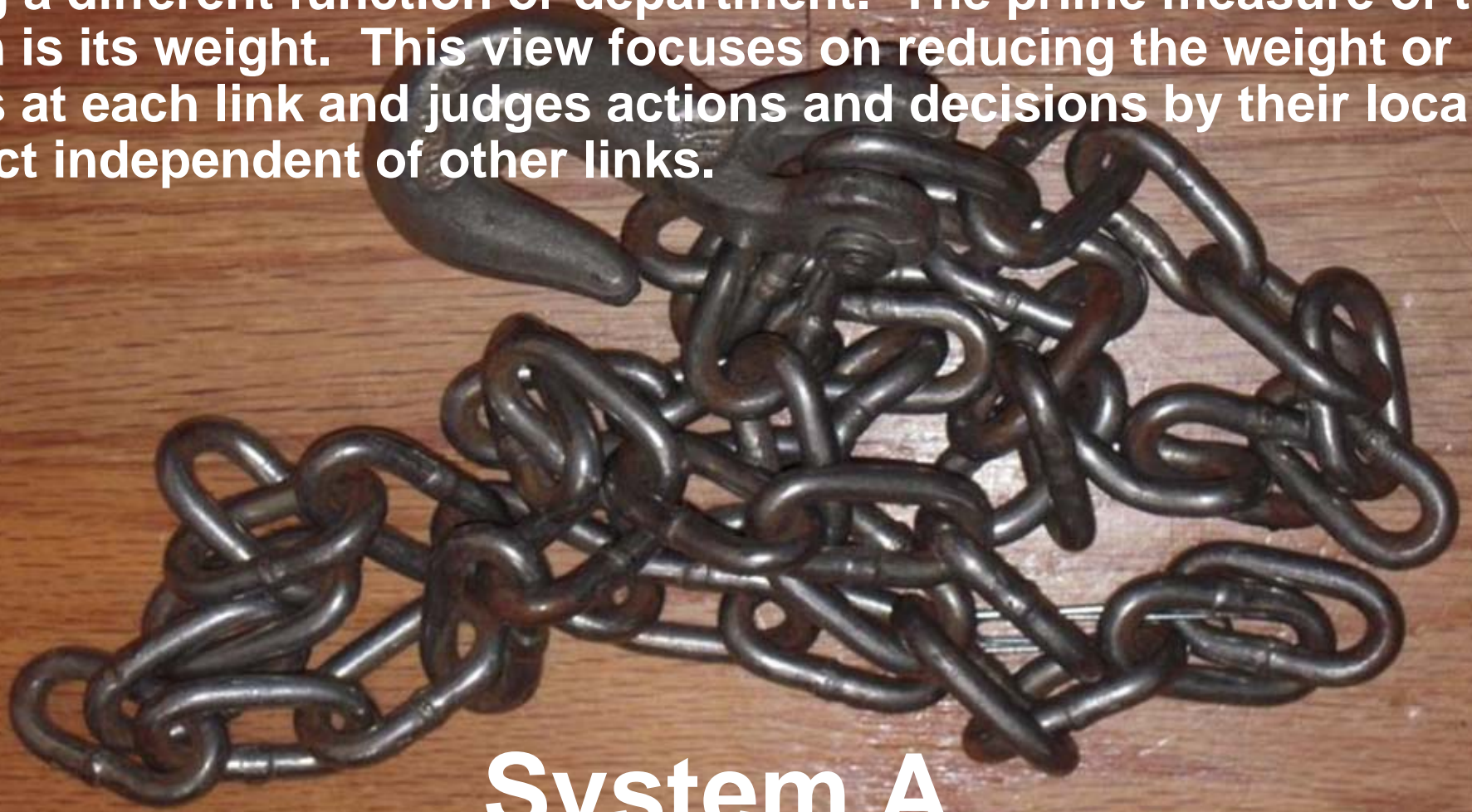
Which system is more complex¹? A or B?



¹Modified from Goldratt, 1999, Satellite program, Session 6 Sales.

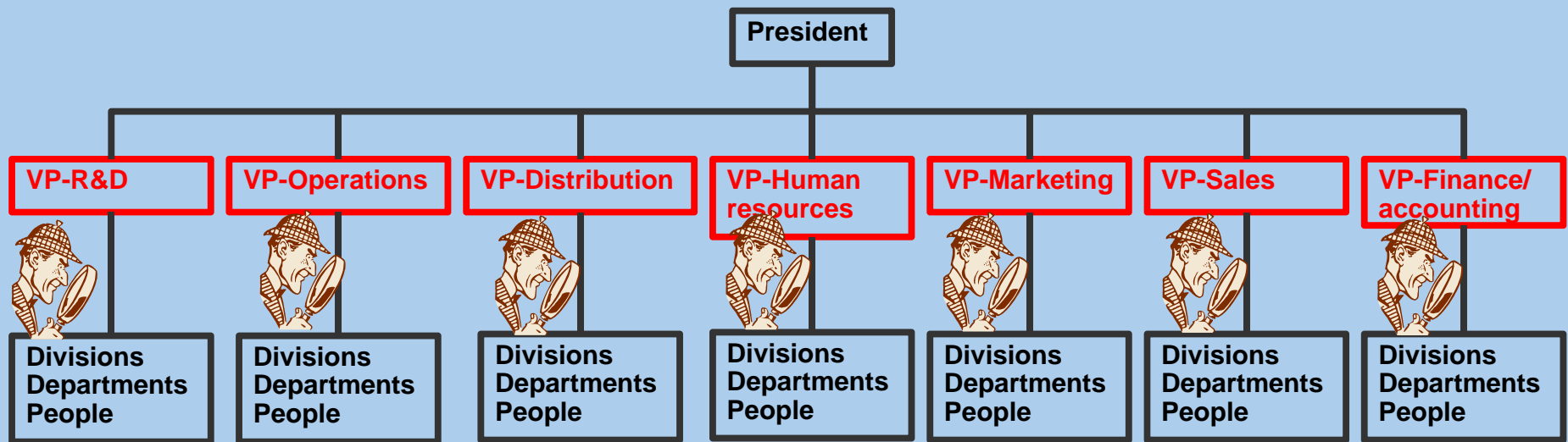
Traditional organization focus is cost world paradigm

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.



System A

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



How does this constraint impact the system goal?



Focus

Constraint

**System Goal =
Ever-flourishing
organization**

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

Align other links to support the weakest link (no more, no less).

15

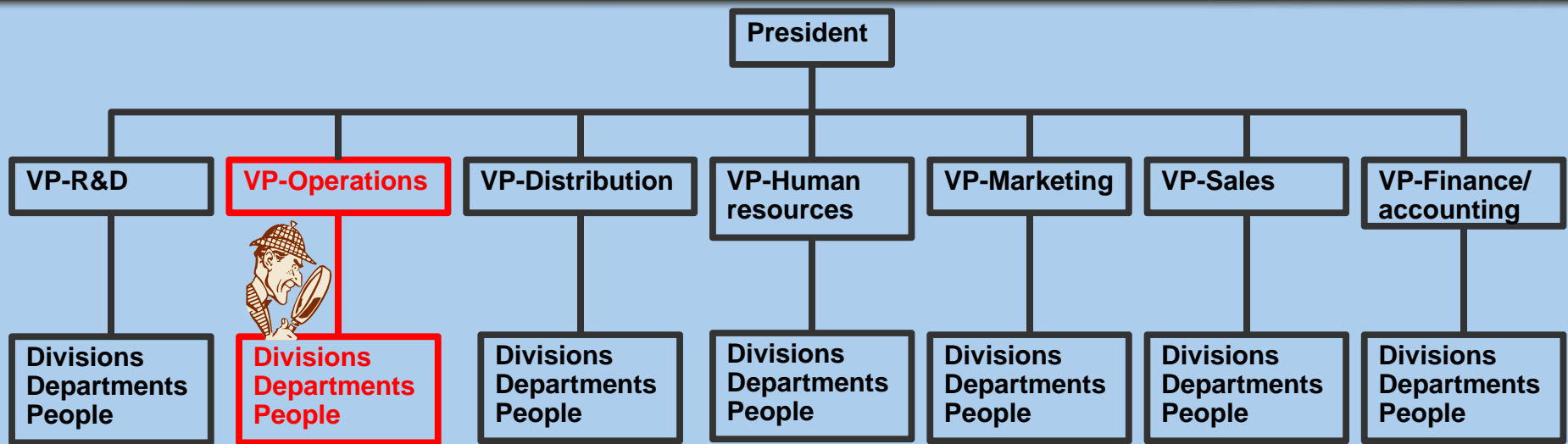
Fundamental assumptions of TOC

- 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



Operations

Traditional rules: Operations

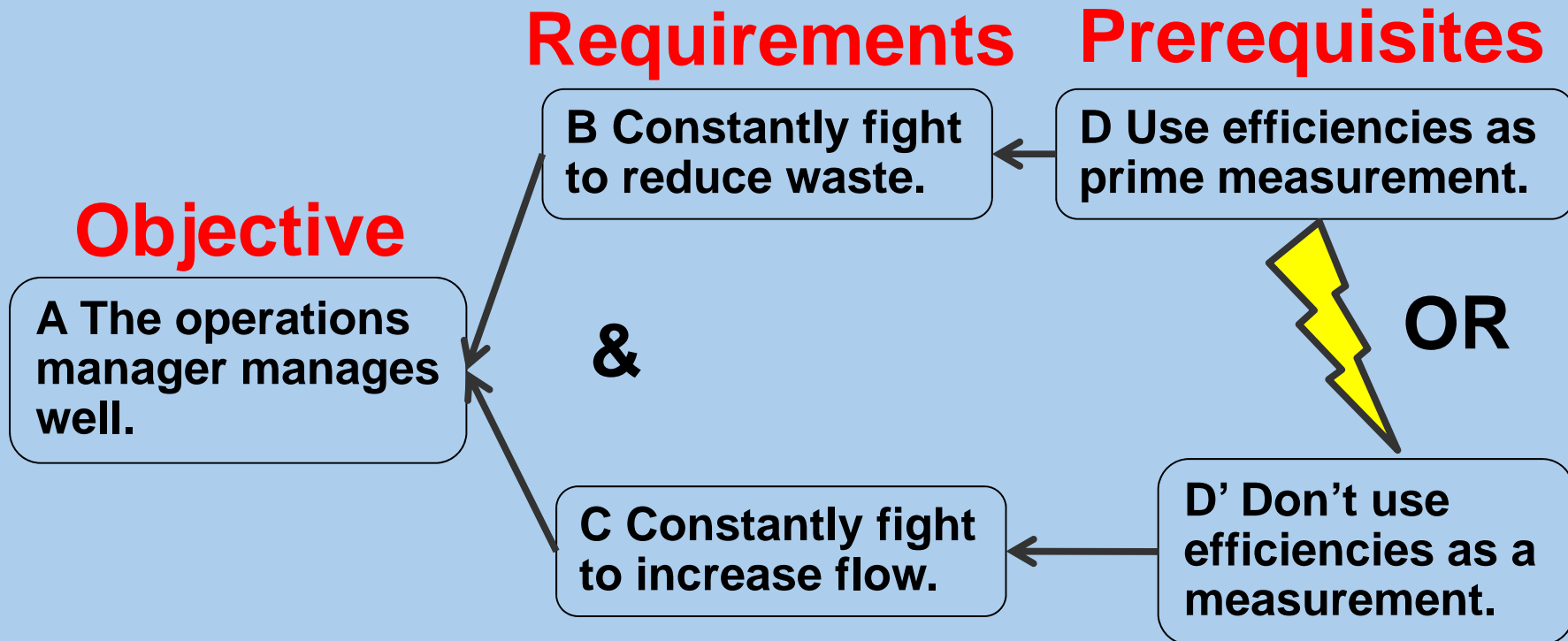


SYSTEM A PERSPECTIVE/ASSUMPTION: If each person / dept. / division works as efficiently as possible in their area / specialty, then the org. will be as efficient as possible at achieving the goal of the org. Policies, measures and behaviors focus on local improvements everywhere.

ACTION: Measure local efficiencies. Focus on making everyone everywhere as efficient as possible. Keep busy! Find work.

What to change?

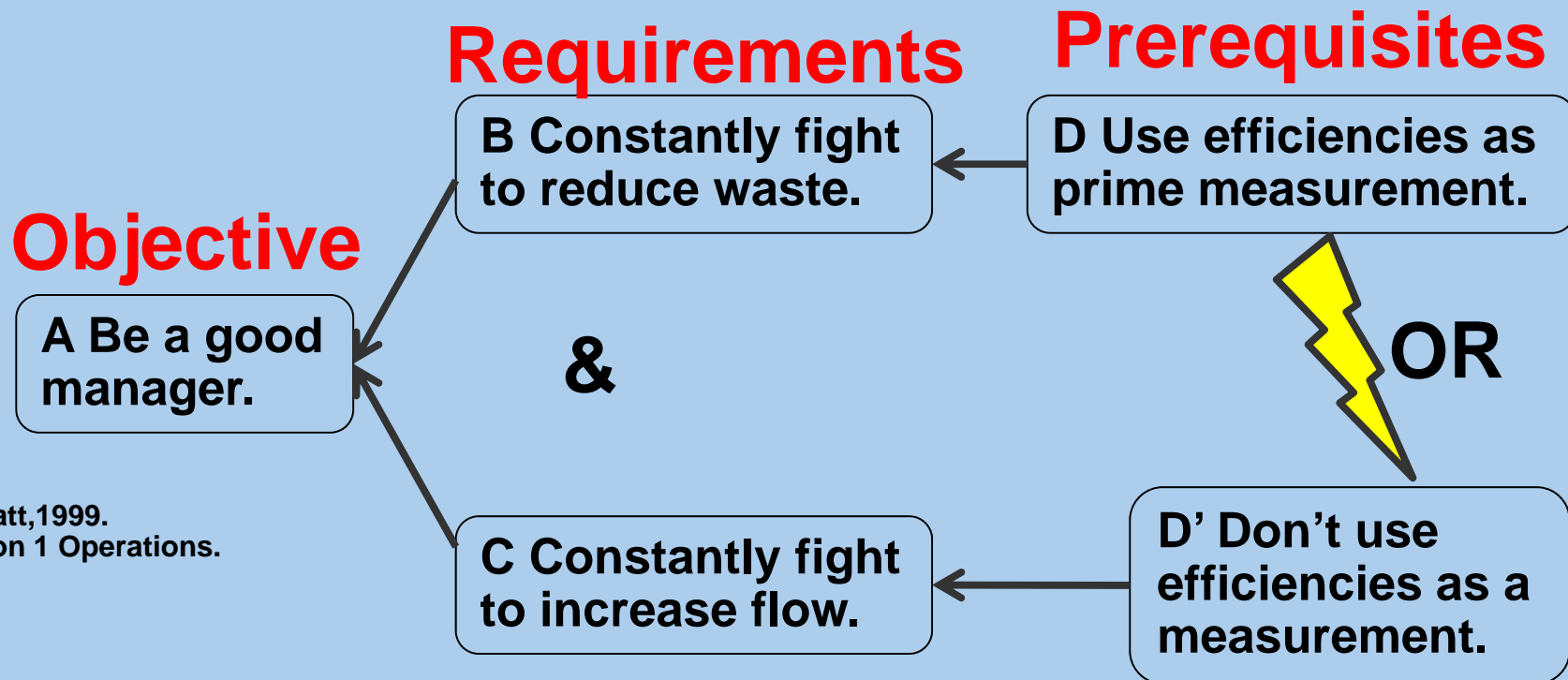
Core conflict cloud: Operations



Goldratt, 1999.
Session 1 Operations.

To what to change?

Drum buffer rope / buffer management



Goldratt, 1999.
Session 1 Operations.

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 accting.

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?

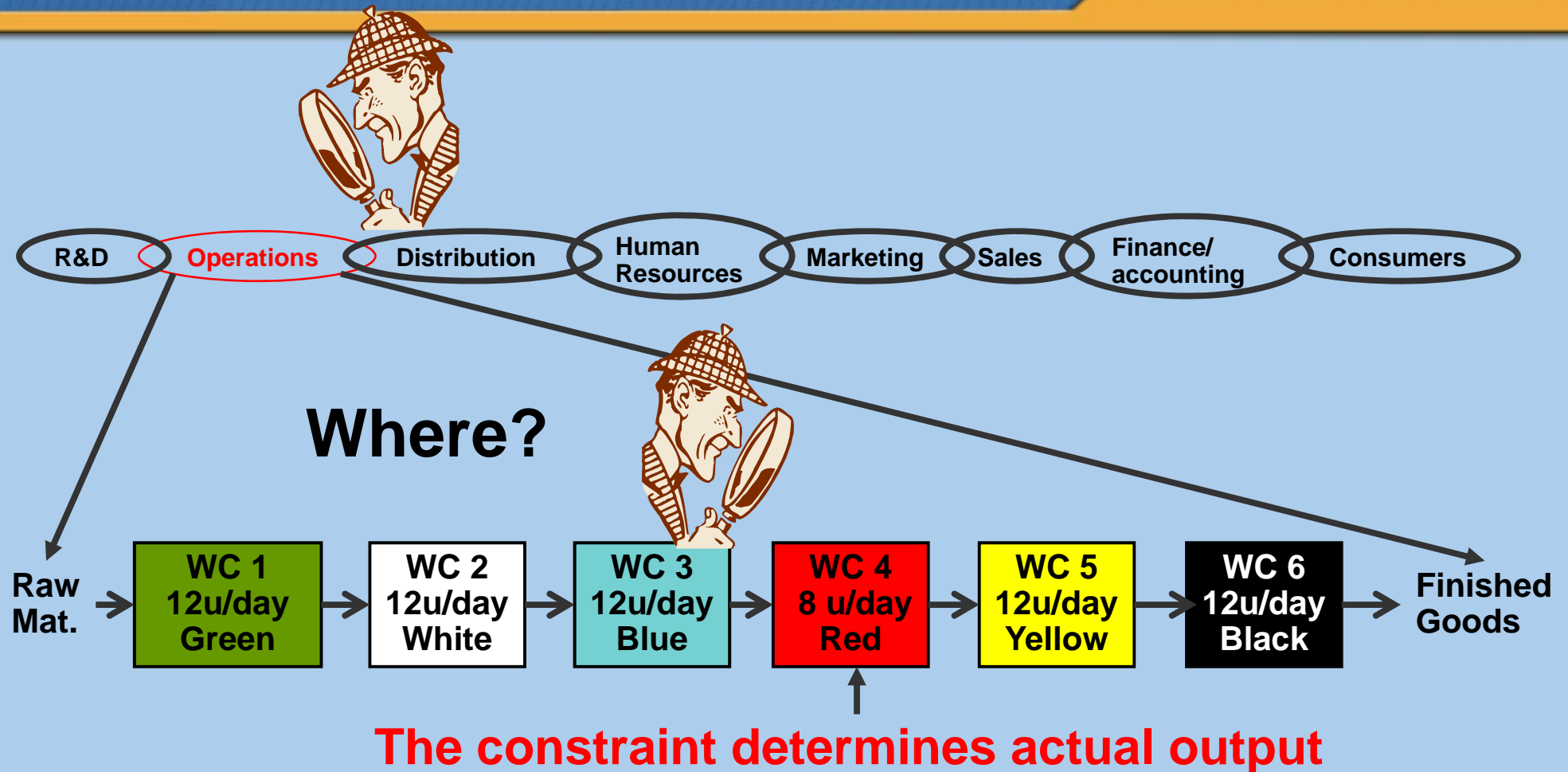
Process of ongoing improvement: 5 focusing steps

- 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.**

Goldratt .1988. pp. 453-4.



To what to change? An example



To what to change? 2009 Global rules of flow

Four concepts of flow¹ are:

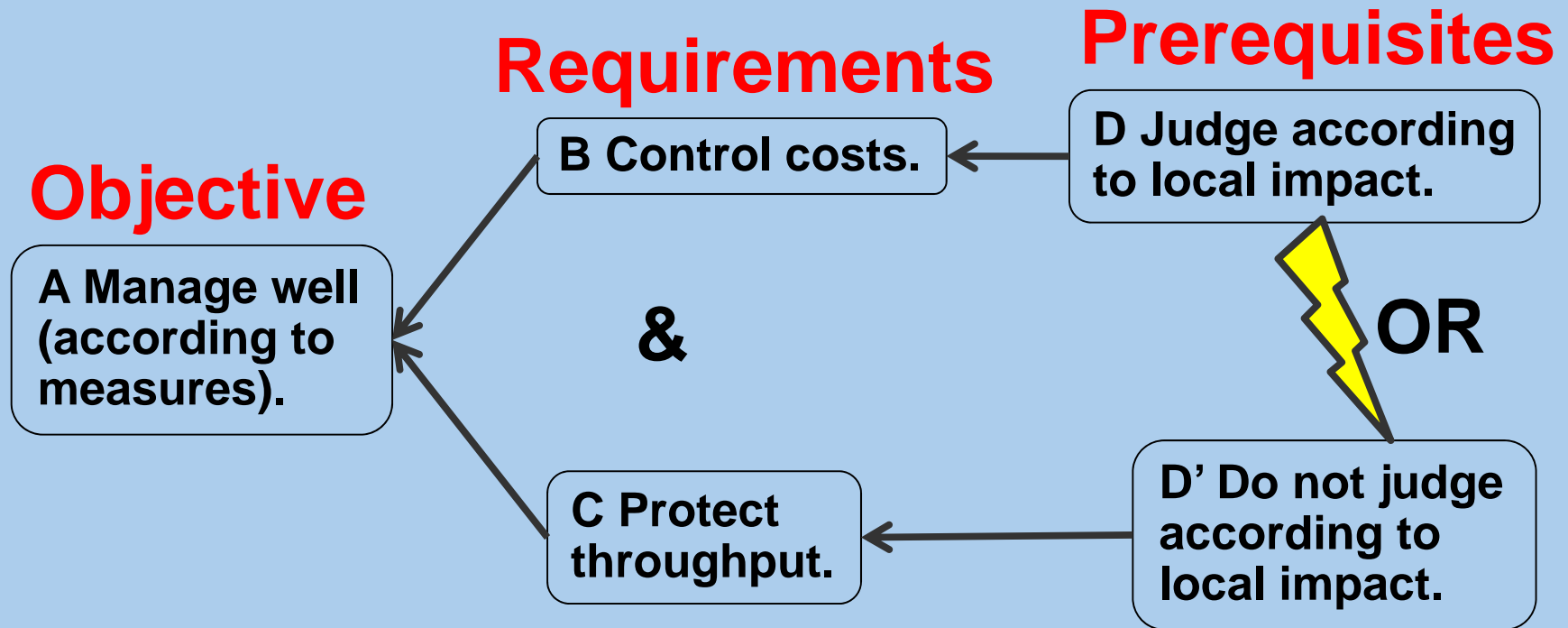
- 1. Improving flow (or equivalently lead time) is a primary objective of operations.**
- 2. This primary objective should be translated into a practical mechanism that guides the operation when not to produce (prevents overproduction).**
- 3. Local efficiencies must be abolished.**
- 4. A focusing process to balance flow must be in place.**

¹Goldratt, E. M. 2009b.

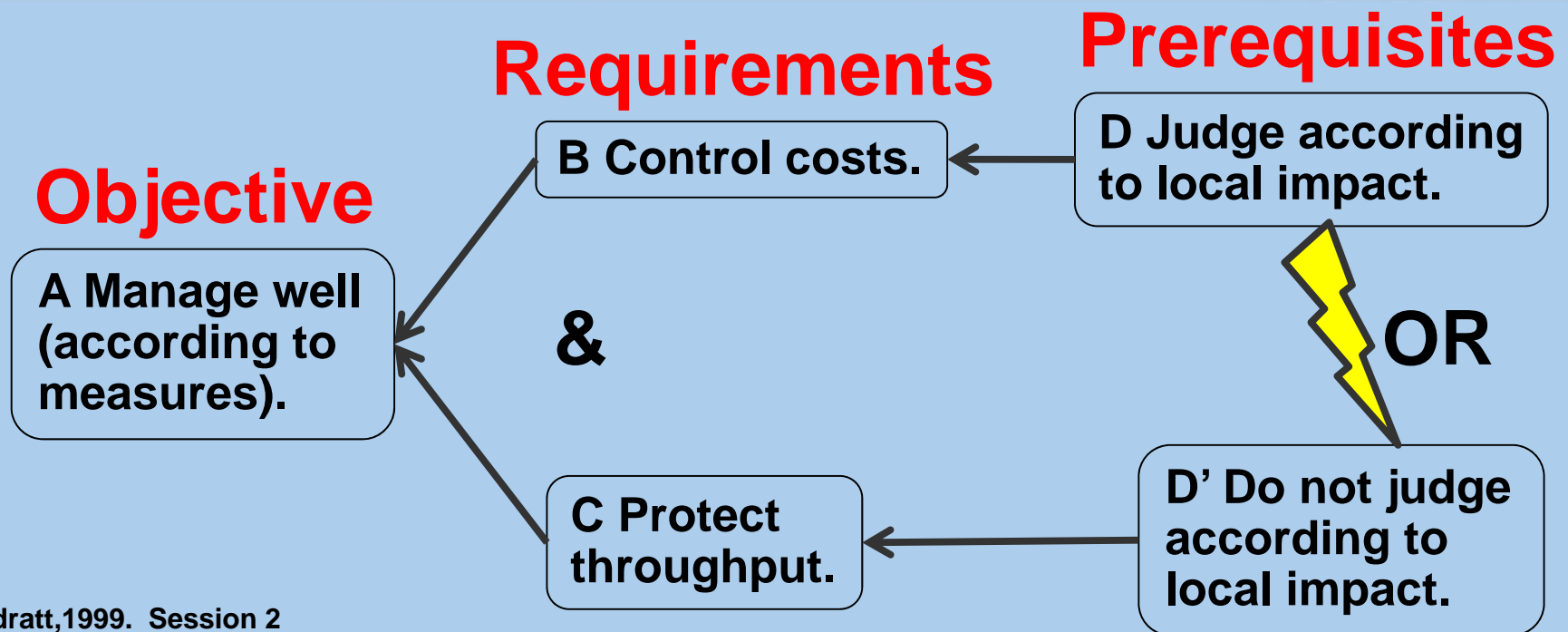
Finance / measures

What to change?

Core conflict cloud: Finance/measures



To what to change? Throughput accounting



Goldratt,1999. Session 2
Finance and Measurements.

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).

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)?

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

$$\text{Net profit} = T - OE \quad \text{Return on Investment} = \frac{\text{Net Profit}}{\text{Investment}}$$

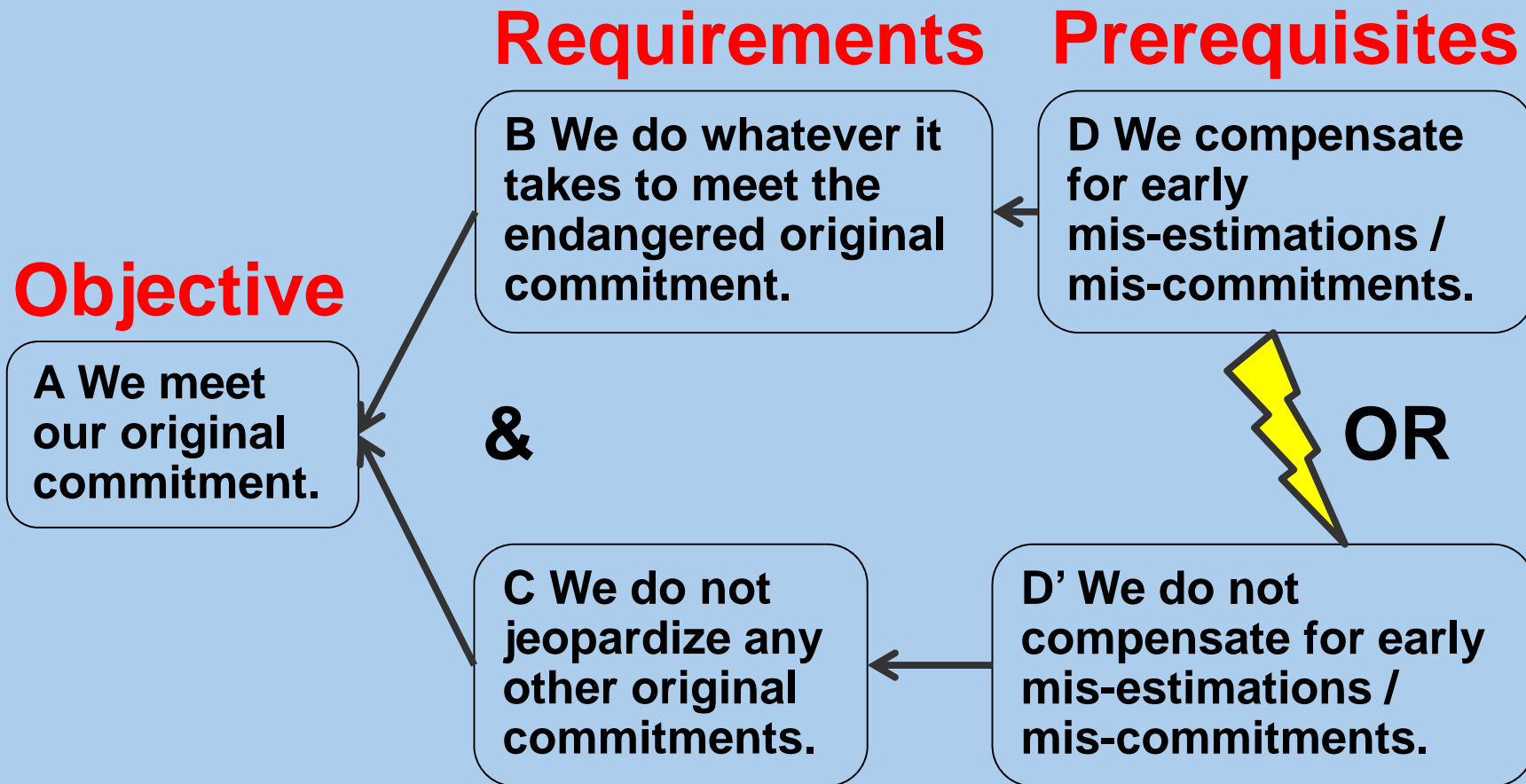
$$\text{Productivity} = T / OE$$

$$\text{Throughput} / \text{Inventory dollar days}$$

Projects

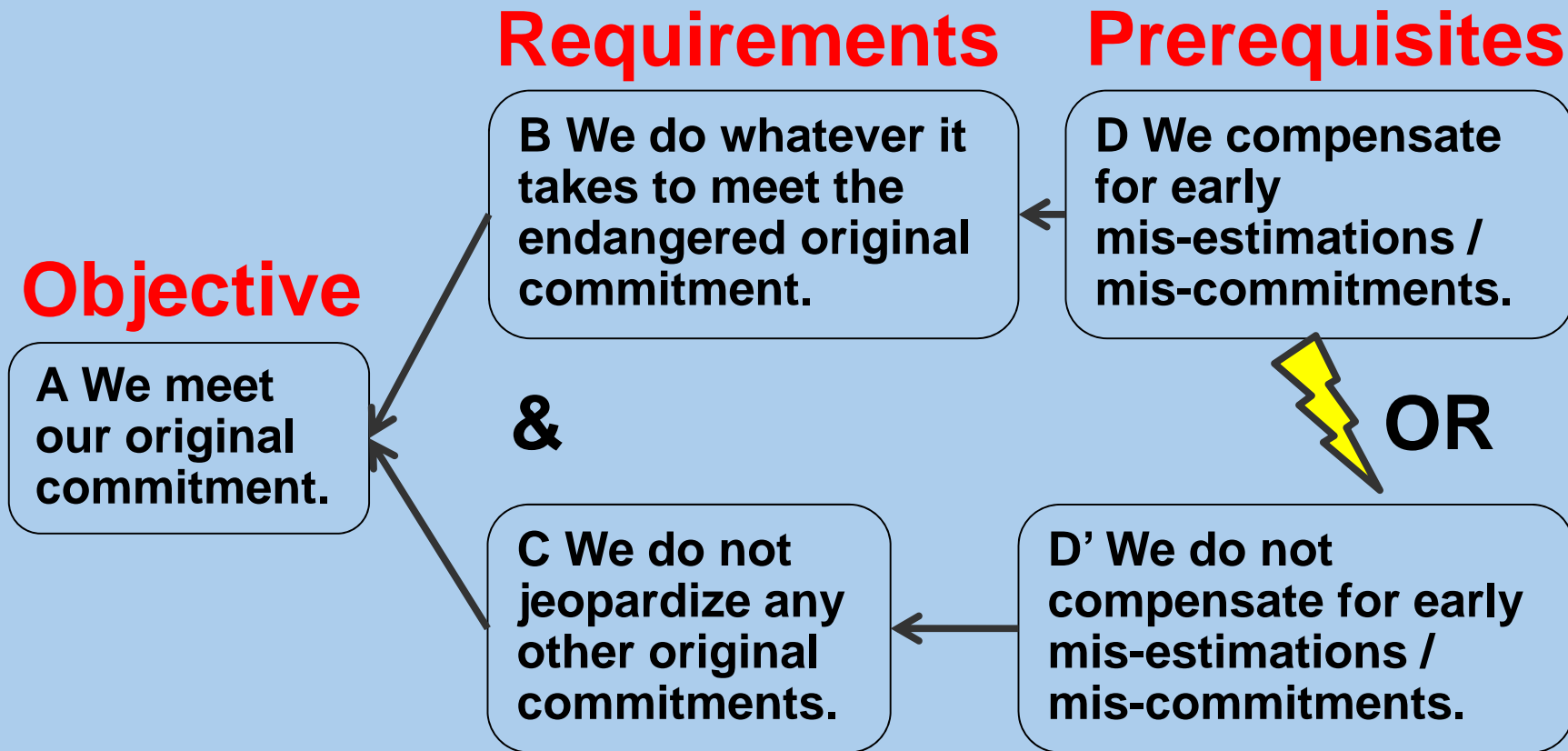
What to change?

Core conflict cloud: Project management



To what to change?

Critical chain project management

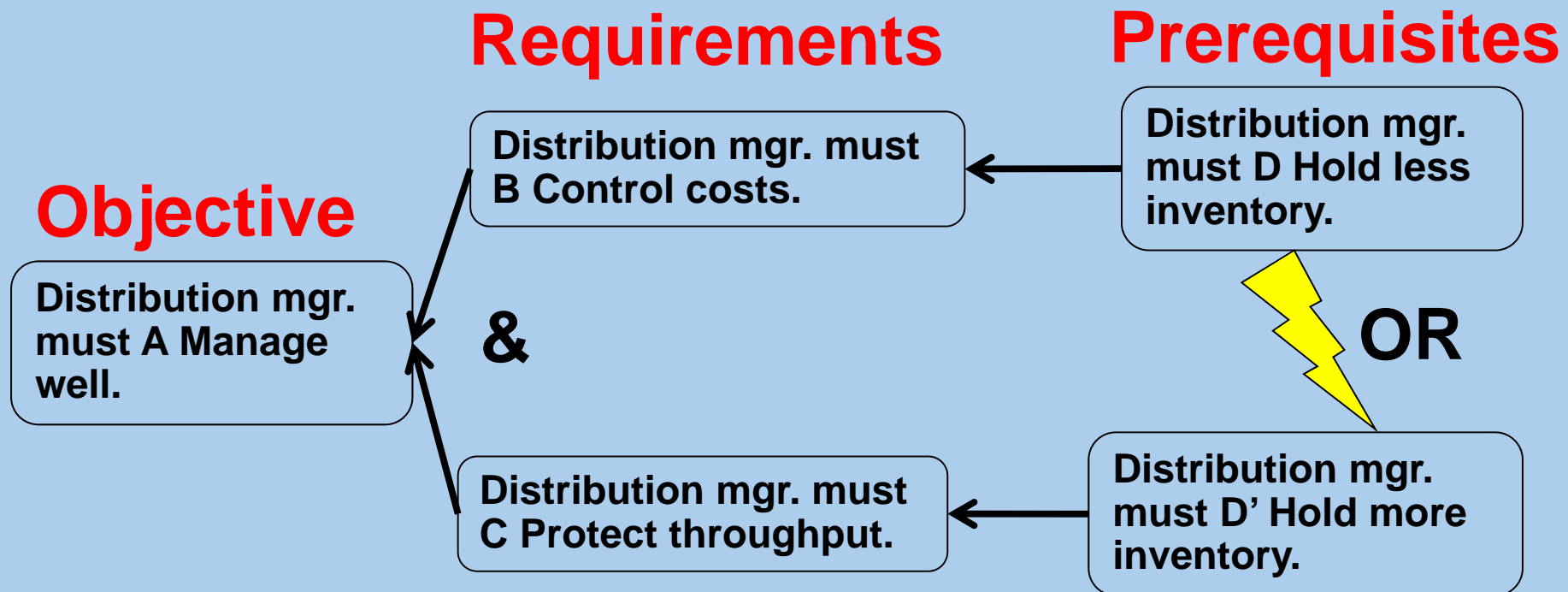


Breakthrough injection: Use critical chain project management / buffer management (CCPM / BM) and throughput accounting (TA).

Distribution / supply chain

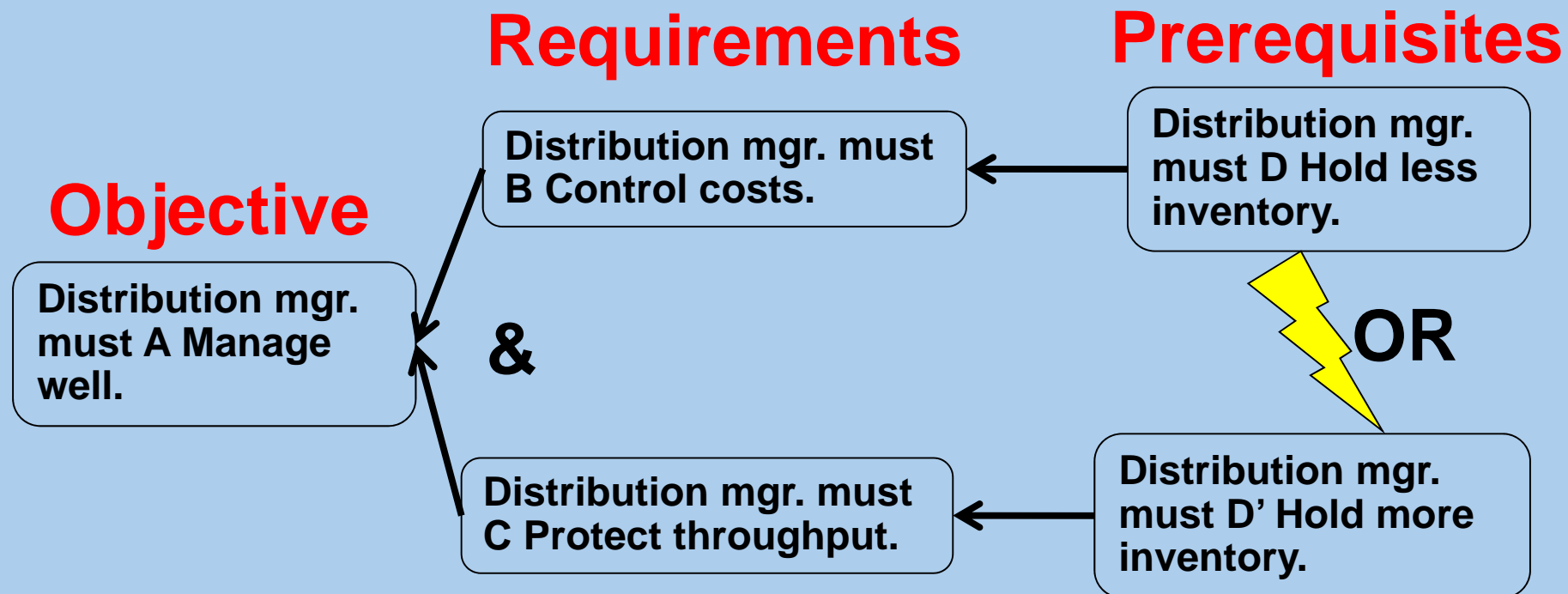
What to change?

Core conflict cloud: Distribution / supply chain



Goldratt, 1999. Session 4 Distribution and supply chain.

To what to change? Distribution / replenishment

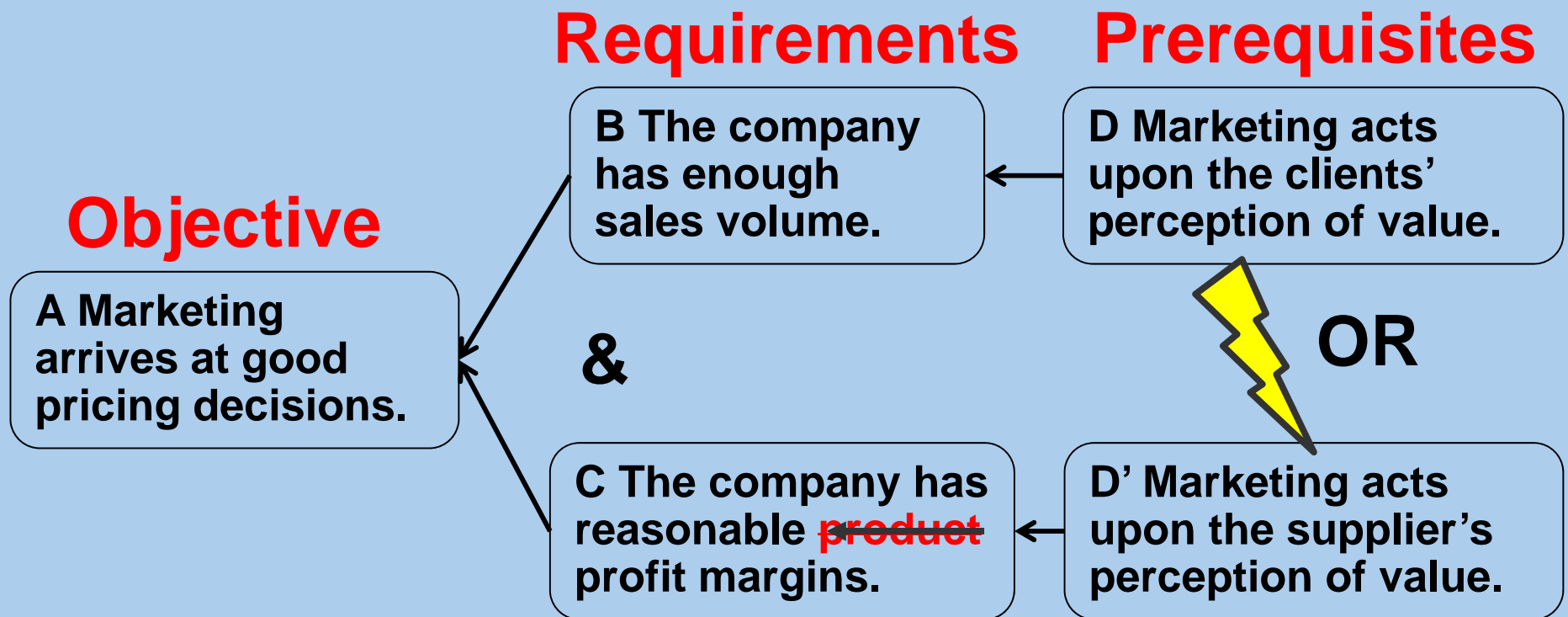


Breakthrough Injection: Have the right inventory at the right place at the right time.

Marketing

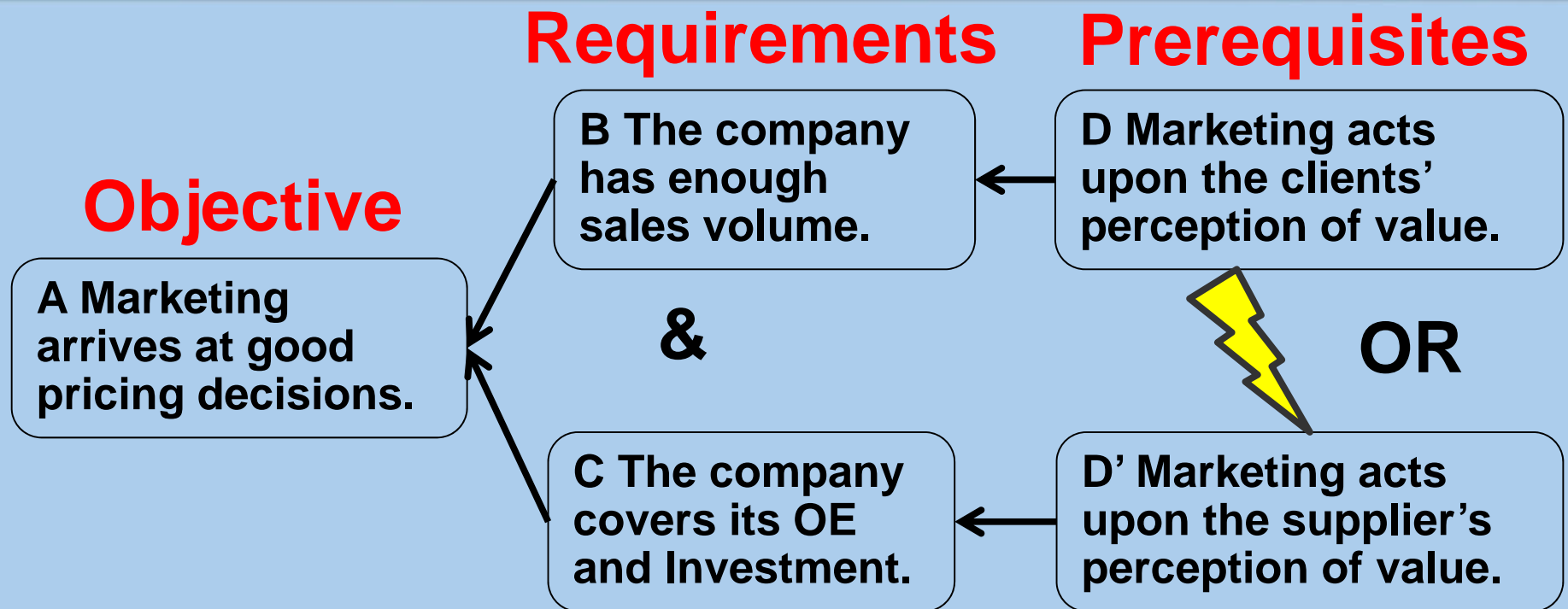
What to change?

Core conflict cloud: Marketing



To what to change?

Unrefusable offer / market segmentation

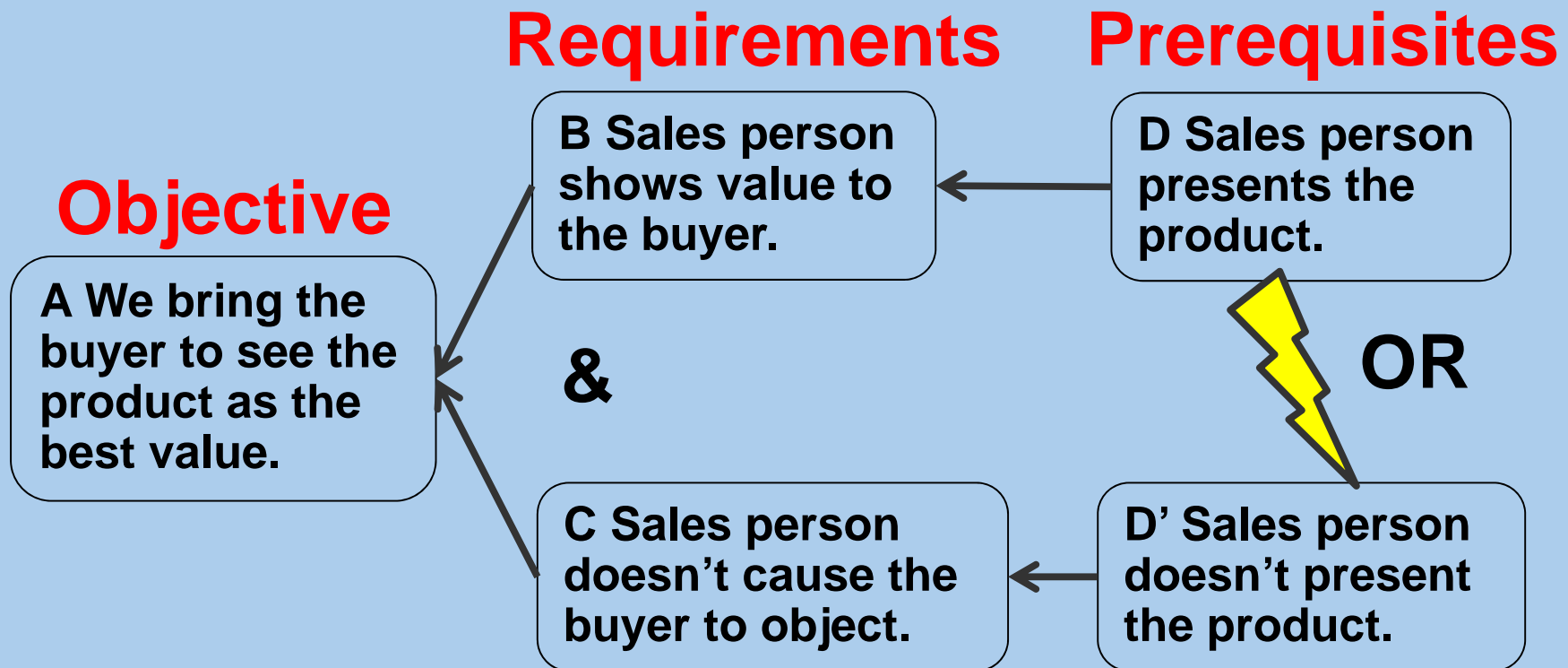


Breakthrough injection: In total the company must cover its operating expense and investment. Segment and prioritize the markets. Maintain a presence in all market segments. Insure markets are selected such that all markets should not suffer a downturn at the same time. Move to the more lucrative markets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

Sales

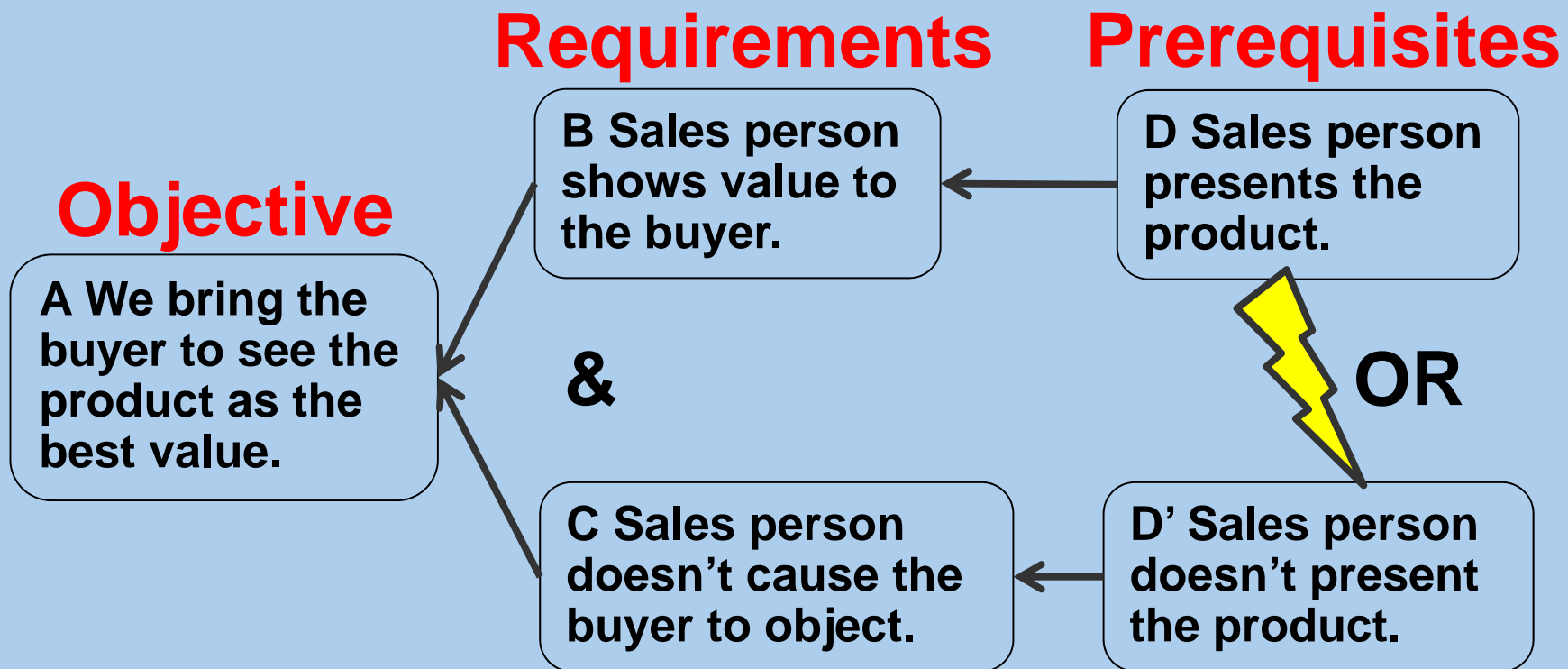
What to change?

Core conflict cloud: Sales



Cox, et al., 2012, p. 159,

To what to change? Unrefusable offer / buy-in processes

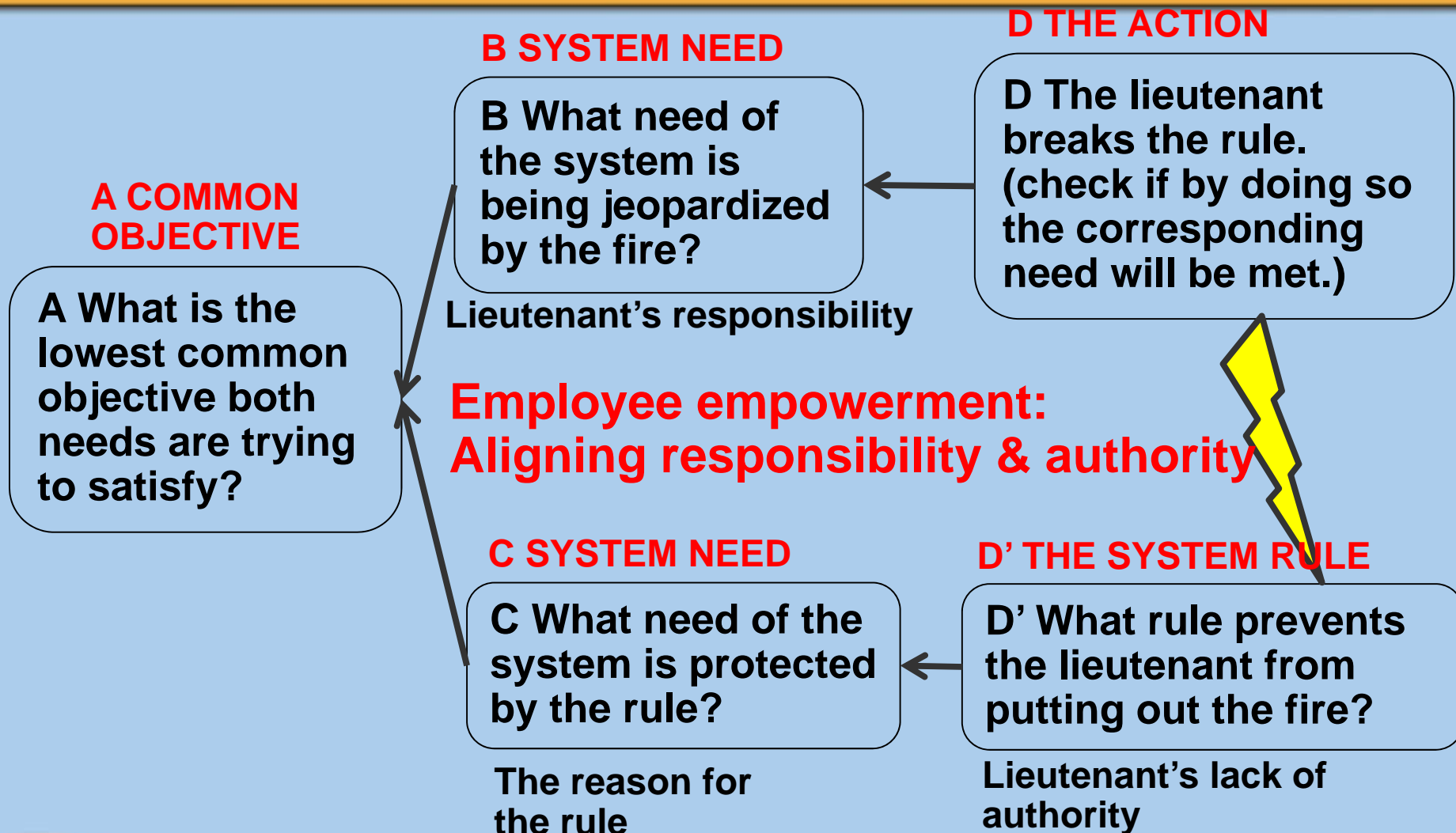


Breakthrough injection: Create an unrefusable (mafia) offer (URO). A URO is a combined marketing and sales initiative that addresses the customer's core problem and creates a win-win solution for the supplier & customer. The buy-in processes are designed to overcome resistance to change.

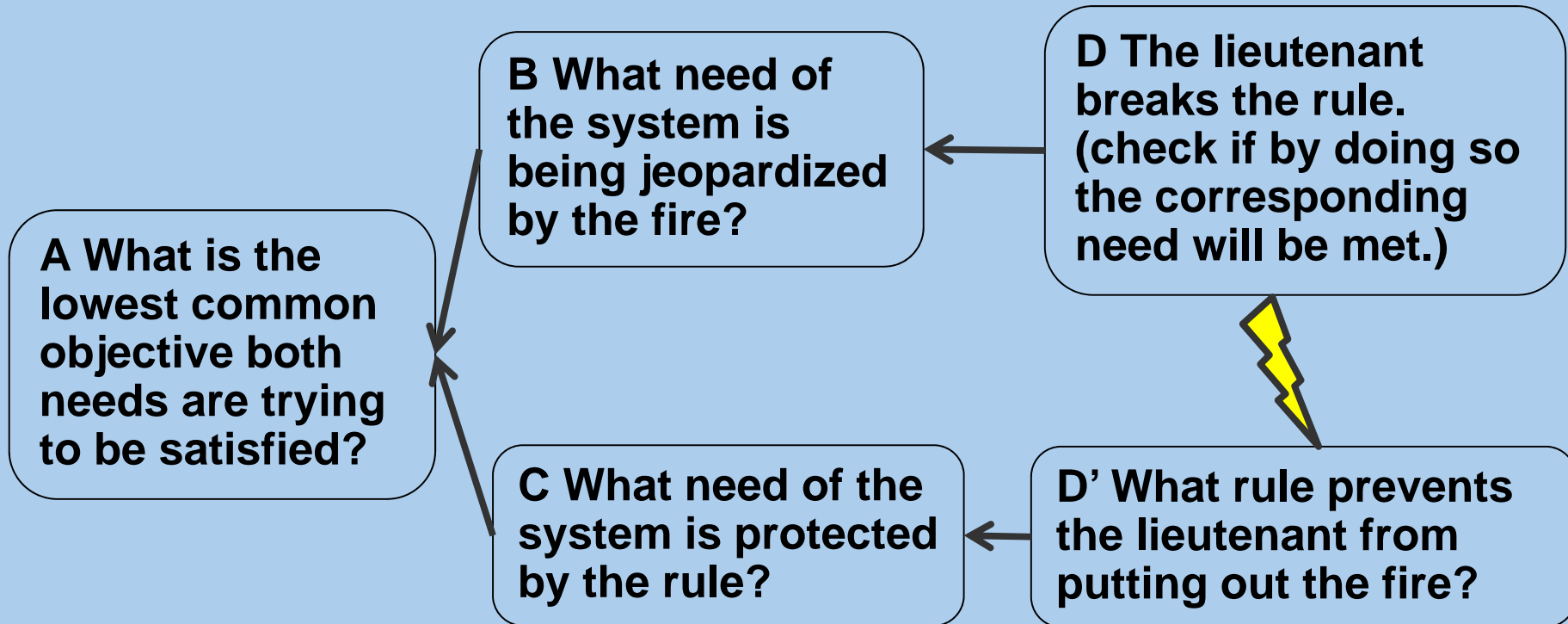
Managing people — Respect

What to change?

Core conflict cloud: Managing people



To what to change? Respect / empowerment

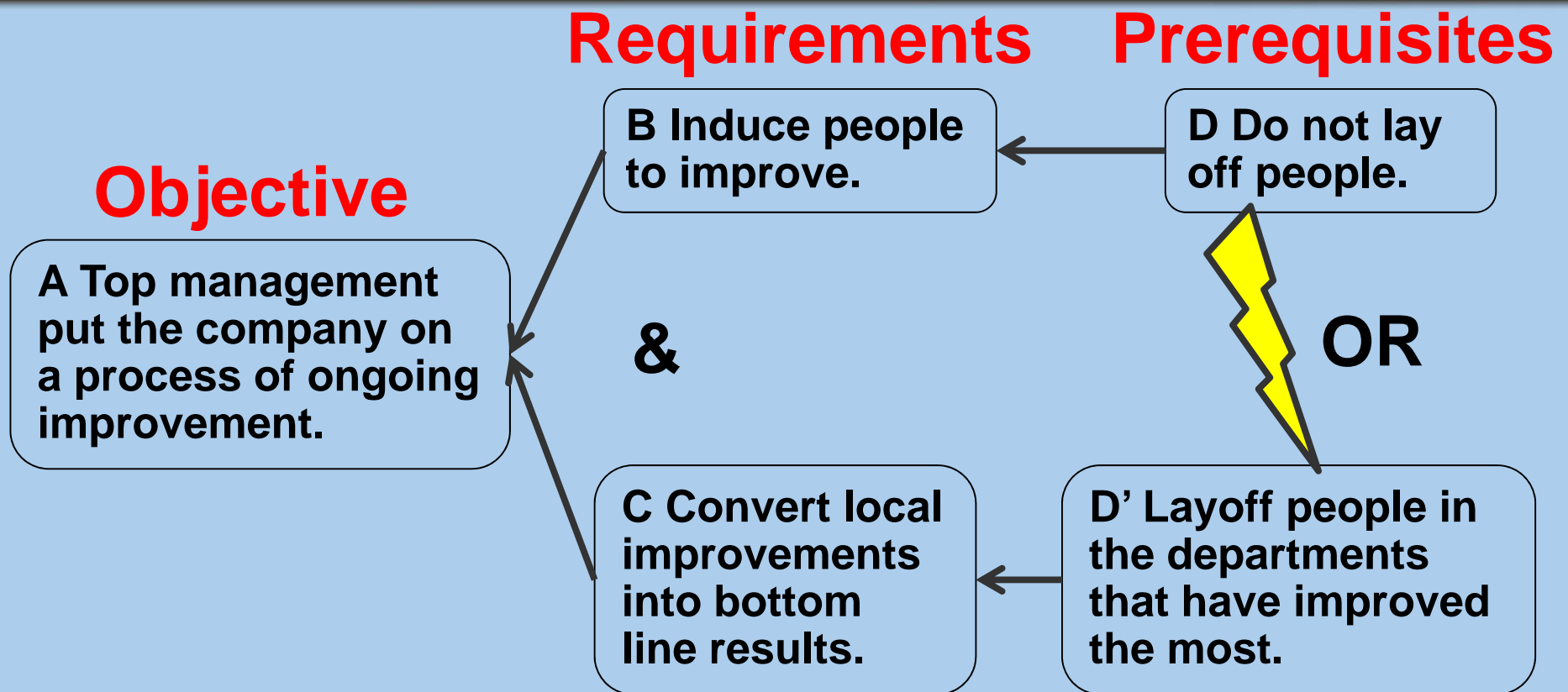


Breakthrough injection: Employee empowerment by aligning responsibility & authority, respect for others. Implement the Engines of Harmony.

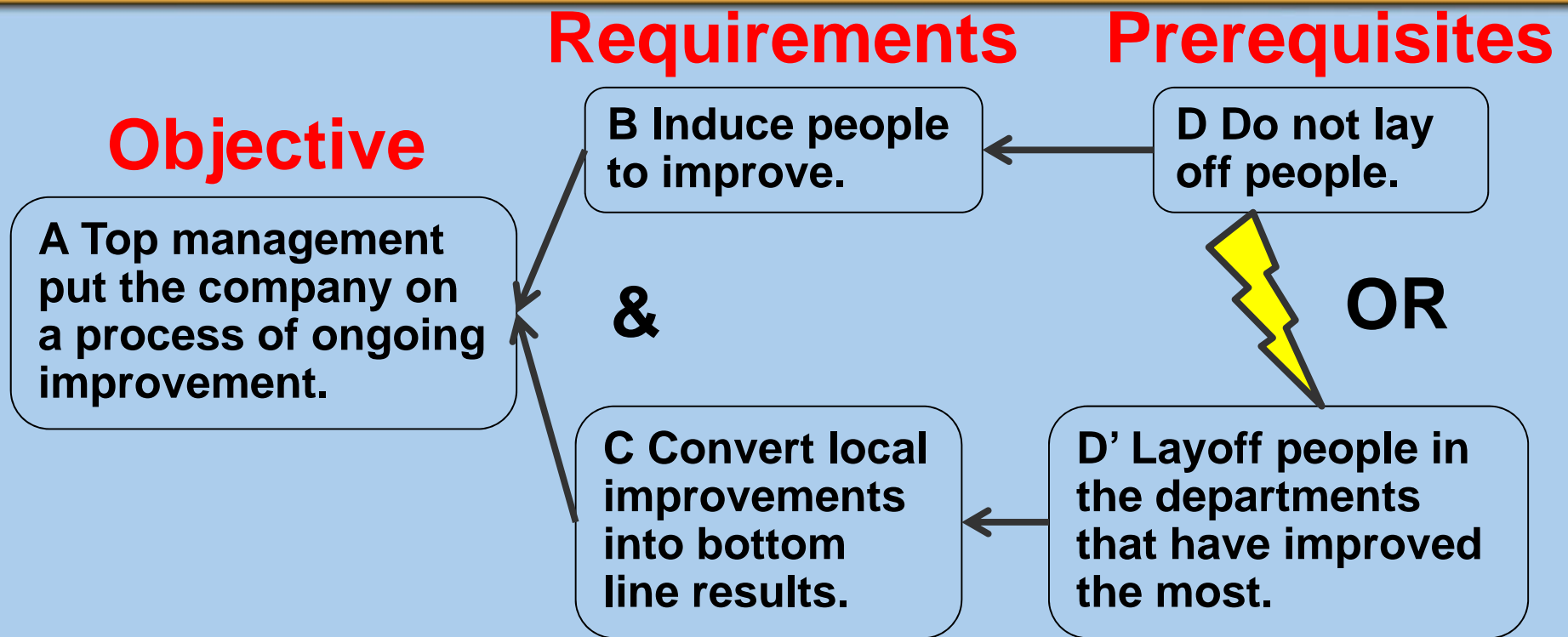
Strategy

What to change?

Core conflict cloud: Strategy



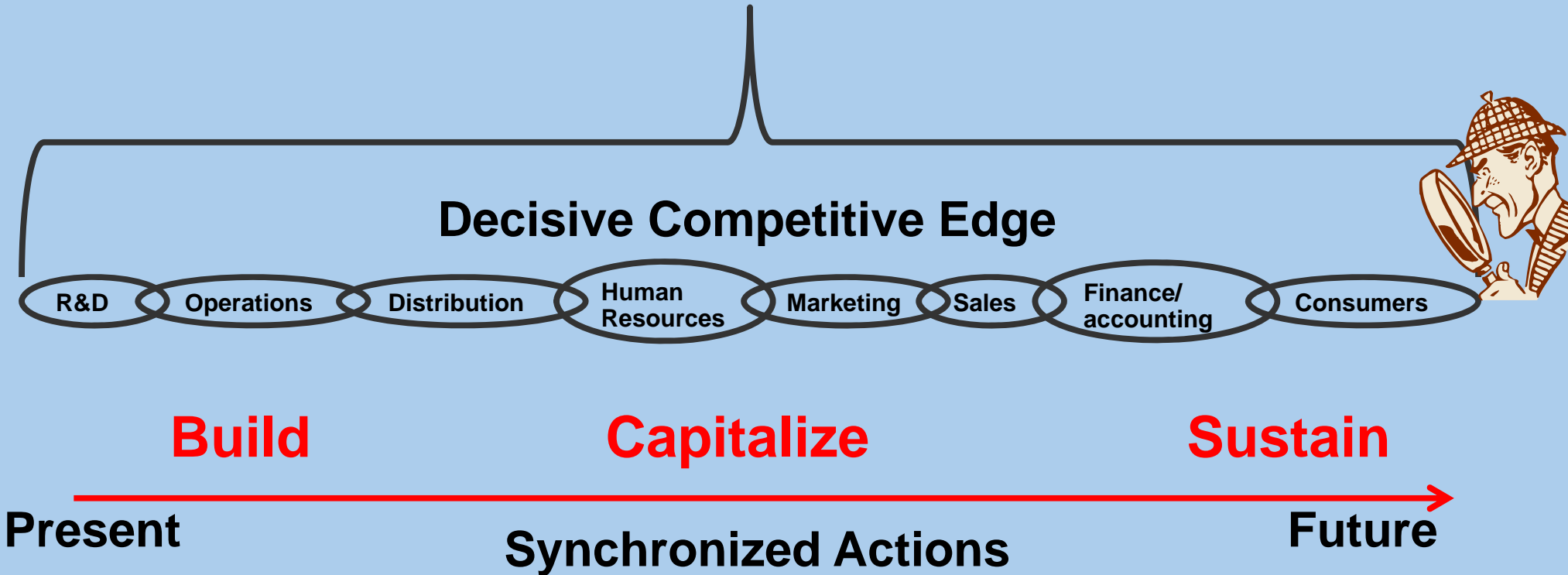
To what to change? Strategy and tactics tree



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



Summary

Workshop topics

What is TOC?

Functions (links) currently covered by TOC

- Organizations (manufacturing, services, gov't, etc.)
- Operations
- Finance / Measures
- Project Management
- Distribution / Supply Chain
- Marketing
- Sales
- Managing People
- Business Strategy

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**

Goldratt, 2008. Chapter 18.



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. ...

Goldratt and Cox. 1984. The Goal: Introduction



References

- Cox III, James F., Lynn H. Boyd, Timothy T. Sullivan, Richard A. Reid, and Brad Cartier, 2012, *The Theory of Constraints International Certification Organization Dictionary*, Second Edition . New York: McGraw-Hill Publisher. URL = <http://www.tocico.org/?page=dictionary>
- de Wet, Phillip. 2007. The physicist and the amazingly stupid business people. *Maverick*, Volume 2 Issue 4, February 22, pp. 56-58, 70, 72.
- Fry, Timothy D., James F. Cox, and John H. Blackstone, “An Analysis and Discussion of the OPT Software and Its Use,” *Production and Operations Management Journal*, Vol. 1, No.2, Spring 1992, pp. 229-242.
- Goldratt, E. M. 1988. “Computerized shop floor scheduling,” *International Journal of Production Research* 26(3):443–455.
- Goldratt, E. M. 1990. *The Haystack Syndrome. Sifting Information out of the Data Ocean*. Croton-on-Hudson, NY: North River Press.
- Goldratt, E. M. 1994. *It’s not Luck*. Great Barrington, MA: North River Press.
- Goldratt, E. M. 1997. *Critical Chain*. Great Barrington, MA: North River Press.
- Goldratt, E. M. 1999. *Goldratt Satellite Program Sessions 1–8. (Video series: 8 DVDs) Broadcast from Brummen, The Netherlands: Goldratt Satellite Program. Session 8: Strategy & Tactics*.
- Goldratt, E. M. 2008. *The Choice*. Great Barrington, MA: North River Press.
- Goldratt, E. M. 2009a. *Isn’t it Obvious?* Great Barrington, MA: North River Press.
- Goldratt, E. M. 2009b. *Standing on the Shoulders of Giants*. *The Manufacturer*, June.
- Goldratt, E. M. 2011. *Never say: I Know*. Chicago, ILL: TOCICO International Conference. Presented by Lisa Scheinkopf.
- Goldratt, E. M. and Cox, J. 1984. *The Goal: Excellence in Manufacturing*. Croton-on-Hudson, NY: North River Press.
- Goldratt, E. M. and Fox, R. E. 1986. *The Race*. Croton-on-Hudson, NY: North River Press.

For a comprehensive listing of Goldratt’s works, visit : http://www.tocico.org/?page=goldratt_bibliog



Acknowledgements

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.

Presenters

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.



About the presenter

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).

