



TOCICO 2013 Conference

Basics Workshop: Finance and Measures

Presented By (English): Lisa Anne Ferguson, PhD, Founder and CEO of Illuminutopia.SM

Presented By (German): Christoph Lenhartz, MBA, Jonah, TOCICO certified, General Manager EMEA, Pinnacle Strategies, Chairman of the Board, TOCICO

Date: Tuesday, June 4, 2013

Topics

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- **The Goal, Financial and Operational Measurements**
- **How Traditional Cost Accounting Jeopardizes Performance**
- **Cost World and Throughput World Paradigms**
- **Cause-and-Effect Maps of Reality in Finance and Measures**
- **Making Decisions with TOC Measurements**



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Three necessary conditions for success

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**Provide satisfaction to
the market now as well
as in the future**



Modified from source: Goldratt, E. M., 1999,
Satellite Program Session 8 on Strategy
(www.toc-goldratt.com)

**Provide a secure and
satisfying environment to
employees now as well as
in the future**

**Make money now
as well as in the
future**

The real power of TOC: Focus

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Quotes from Eliyahu M. Goldratt in Chapter 1 of the Theory of Constraints Handbook (2010):

- “Focus: Doing what should be done.”
- “Tell me how you measure me and I will tell you how I will behave.”
- Focus also means we “... don’t do what should not be done.”

The measurements need to drive the correct behaviors based on these quotes and achieving the three necessary conditions on the previous slide.



The purpose of measurements

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Measurements...

1. ... indicate the **current state of the system:**

- Elevation
- Location
- Speed
- Direction

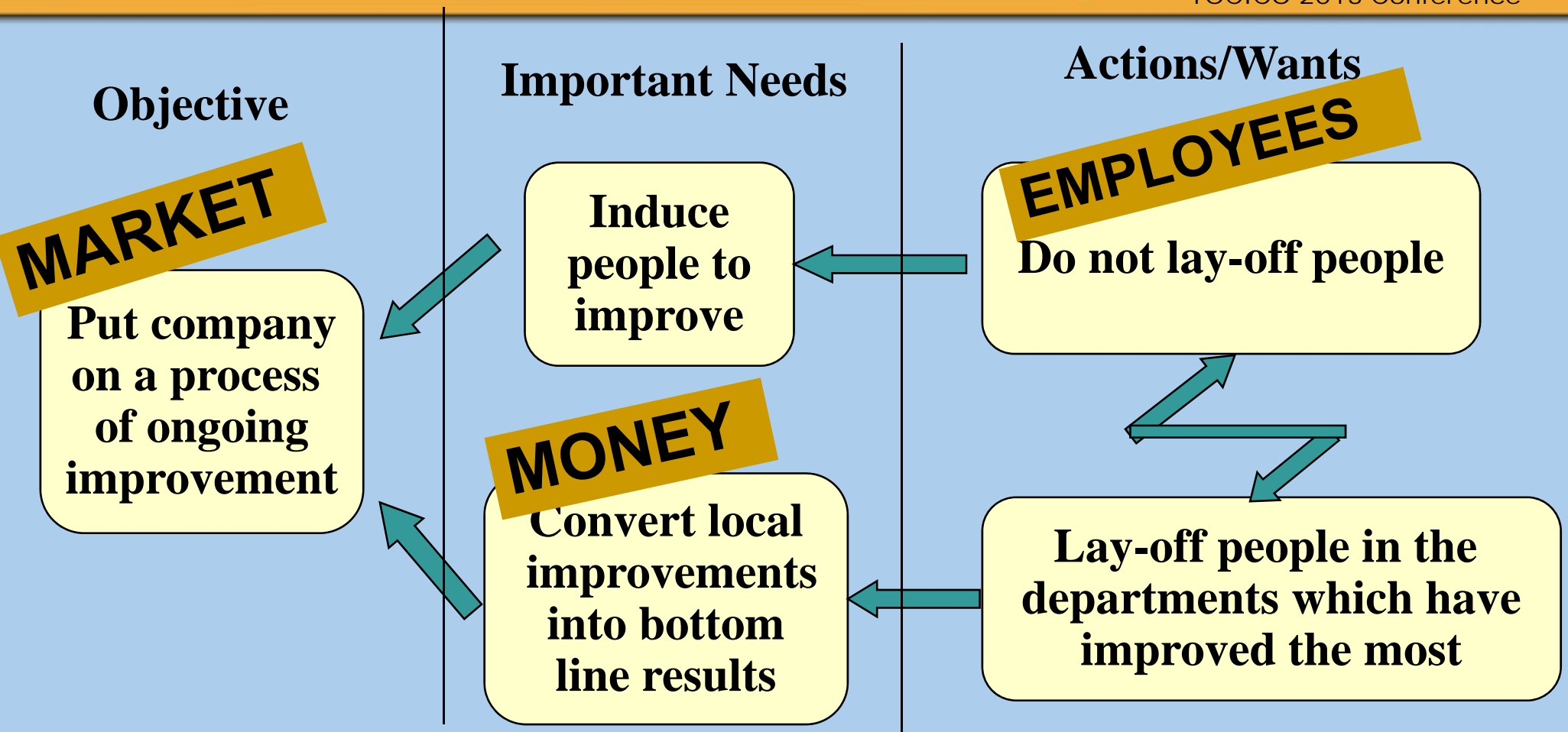


2. ... should entice all elements in the system
to align their local actions with the global goal



Measurement conflict

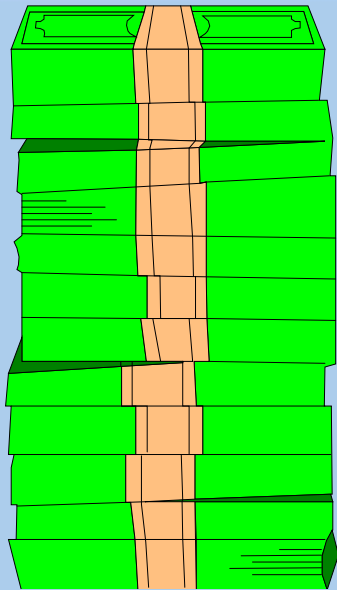
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Source: Goldratt, E. M., 1999, Satellite Program Session 8 on Strategy (www.toc-goldratt.com)

Financial measurements

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Net Profit
(absolute)



Return on Investment
(relative)



Cash Flow
(survival)

Which indicators do we use to tell us whether we're making more money?

Operational measurements

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- **Throughput (T)**: The rate at which the organization generates 'goal units' (i.e. the rate at which the system generates money through sales which is sales minus the totally variable costs (TVC))
- **Investment (I)** (formerly Inventory): The money tied up in the organization.
- **Operating Expense (OE)**: All the money the organization spends to generate 'goal units' (to turn investment into throughput)



Measurements

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Net profit:

$$\text{NP} = \text{T} - \text{OE}$$

Return on investment:

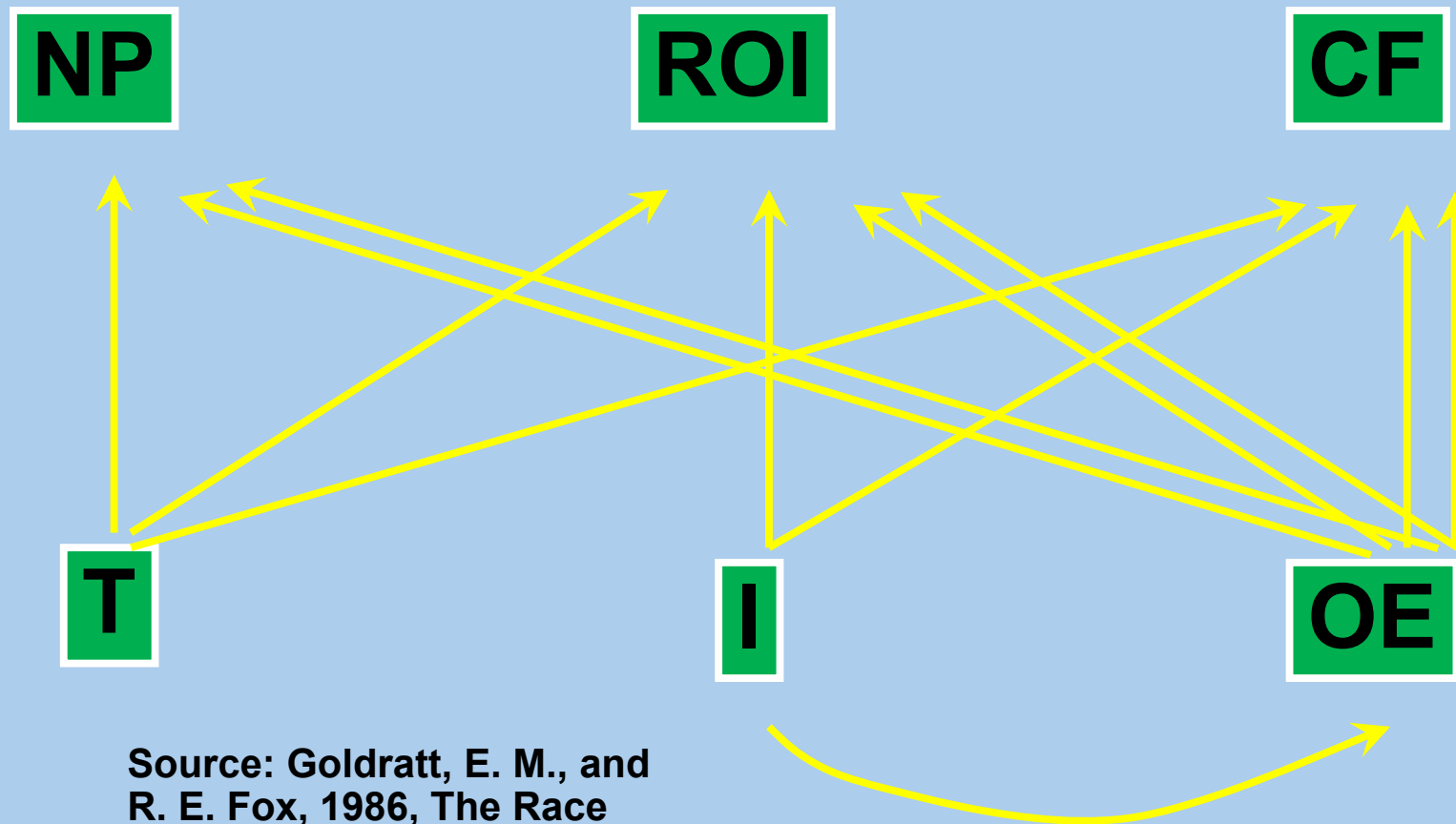
$$\text{ROI} = (\text{T} - \text{OE}) / \text{I}$$

Cash flow:

**Cash inflows – cash outflows
(in terms of changes in T, I and OE)**

Measurement relationships

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Source: Goldratt, E. M., and R. E. Fox, 1986, The Race

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Making decisions

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- 1 System**
- 2 Investments**
- 3 Make versus buy**
- 4 Sub-systems**
- 5 Product / service viability**

**Source of material:
Goldratt, E. M. and A.
(R.) Goldratt, 2003,
TOC Insights into
Finance and
Measurements**

**(Note: See the Insights
for more detailed
explanations of the
following material.)**

The problem

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Are the major problems the timeliness and accuracy of the judgments?

Or are the decisions based on the wrong measurements, thus leading to distortions in judgments?

Eli Goldratt claimed that the “current measurements are enemy number one of productivity.”

True story

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A large heavy agriculture equipment (tractor) manufacturer (\$10B/yr annual sales) hired a new CEO after a small loss one year (about 1980). The new CEO asked for a list of all manufactured parts and their costs. Outsourcing was mandated if it was cheaper to buy. This was done on a huge scale. The reality is the only savings is direct labor. A new list was created, thus resulting in more outsourcing.



True story (continued)

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The CEO also asked for efficiency calculations based on the fact that equipment can be utilized 24 hours. Since efficiencies were low, the plants were asked to increase production. The company borrowed money to build to forecast. The profit improved due to the increase in inventories (as a result of absorption costing). The company had products everywhere.

Distortions

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Make versus buy

The cost to make it internally was compared to the cost to outsource.

Investments

To exploit the significant equipment investments, the plants increased production even when it meant increasing producing to stock.

System

At the end of the year, the balance sheet and P&L statements improved.

True story (continued)

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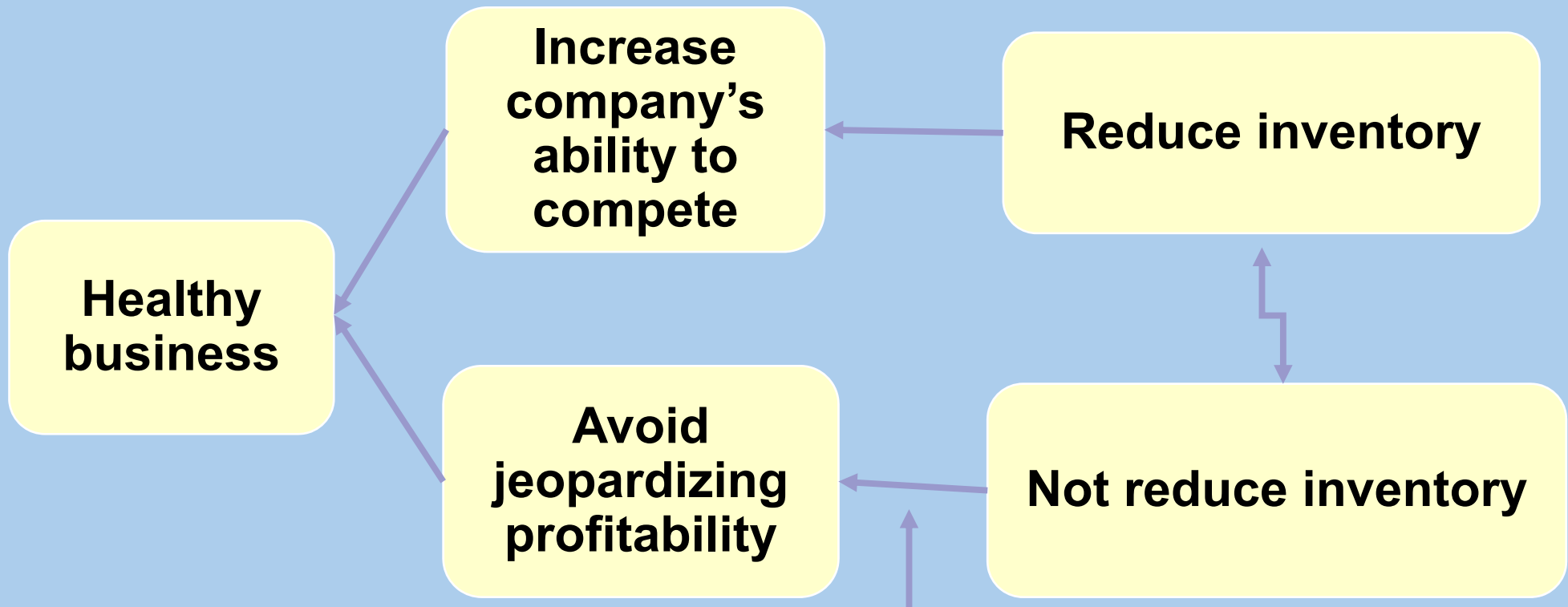
The CEO left the company not knowing what to do. The next year, the company fired 30,000 people. Tractors were dumped for a low price. Farmers borrowed money to buy. Many farmers failed after a drought of two years. Within a few months, the company performance deteriorated due to these decisions, almost driving it into bankruptcy.



- **Decisions are made based on impact to the Balance Sheet, Profit and Loss and Cash Flow Statements.**
- **The main distortion in the system relates to inventory.**
- **Inventory is a liability (reduces ability to compete), but is viewed in the financial statements as an asset. Overhead is allocated to inventory.**

The conflict

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Assumption: The financial statements regard inventory as an asset and a reduction in assets decreases profitability

Source: Goldratt, E. M. and A. (R.)
Goldratt, 2003, TOC Insights into
Finance and Measurements

Investments in equipment

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- **Judgments are made based on a return on investment (ROI) calculation of the estimated cost savings. Overhead is allocated to equipment.**
- **If the equipment is a non-bottleneck, the savings will not materialize.**
- **If the equipment is a bottleneck, the decision may be inaccurate. We need to consider the impact on throughput (T).**

Make versus buy

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- **Judgments are made by comparing the price to buy from the outside relative to the cost to make it internally. Overhead is allocated to the cost to make the part.**
- **If the part is only processed by non-bottlenecks, the savings will not materialize. Usually overhead is not reduced, nor are direct labor expenses. The only tangible savings are raw material costs.**
- **If the part is processed by a bottleneck, the additional sales should be considered, not reduced costs.**

Sub-systems

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- **Judgments are made based on making sub-systems profit centers and providing each with a Profit and Loss statement.**
- **Transfer prices become the selling price from one sub-system to another of the same company.**
- **Costs are allocated to sub-system parts.**
- **The transfer price is based on the costs of the sub-system, resulting in a lack of motivation to improve costs.**

Product / service viability

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Judgment is made by calculating “product cost” for each product/service.

Costs are allocated to the product/service.

PQ example (section 5 of Insights into F&M)

Let's see an example using a "product mix" decision scenario

Problem information

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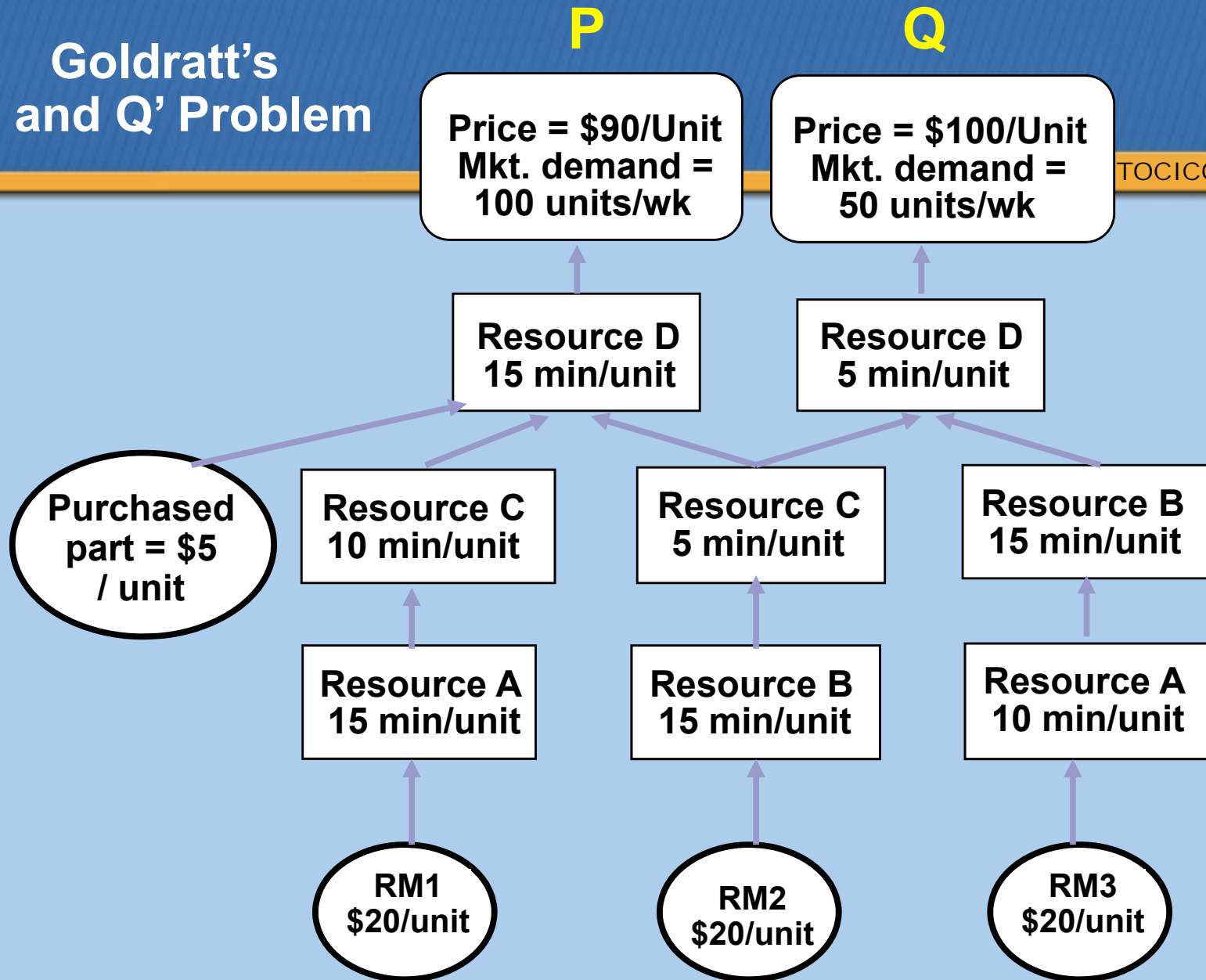
- **Operating expenses are \$6000/week (only costs not included are those of raw materials).**
- **Suppliers deliver on-time, complete orders at the set price.**
- **Resources work consistently producing perfect outputs (no downtime, absenteeism, breaks).**
- **One of each resource (A, B, C, D):**
 - **Each resource is available 5 days a week, 8 hours a day (2400 minutes).**
 - **Resources can not be cross-trained further.**

Problem information (continued)

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- **There are no setup times.**
- **Resources do not lose any productive time waiting for work (Therefore, we can assume that all of their time available could be utilized to produce output).**
- **Customers are willing to pay the set price and will buy all the output of P and Q delivered as long as it does not exceed market demand (which is known, not a forecast).**

Goldratt's 'P and Q' Problem



Resource requirements

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Resource	P	Q
A	15 min.	10 min.
B	15 min.	30 min.
C	15 min.	5 min.
D	15 min.	5 min.

Comparison of traditional and TOC decision-making

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Measurement	Product P	Product Q
Selling price	\$90	\$100
Cost of raw materials	\$45	\$40
Throughput (T)	\$45	\$60
Total production time	60 minutes	50 minutes
Production time on constraint (resource B)	15 minutes	30 minutes
T/constraint minute	\$3	\$2

Topics

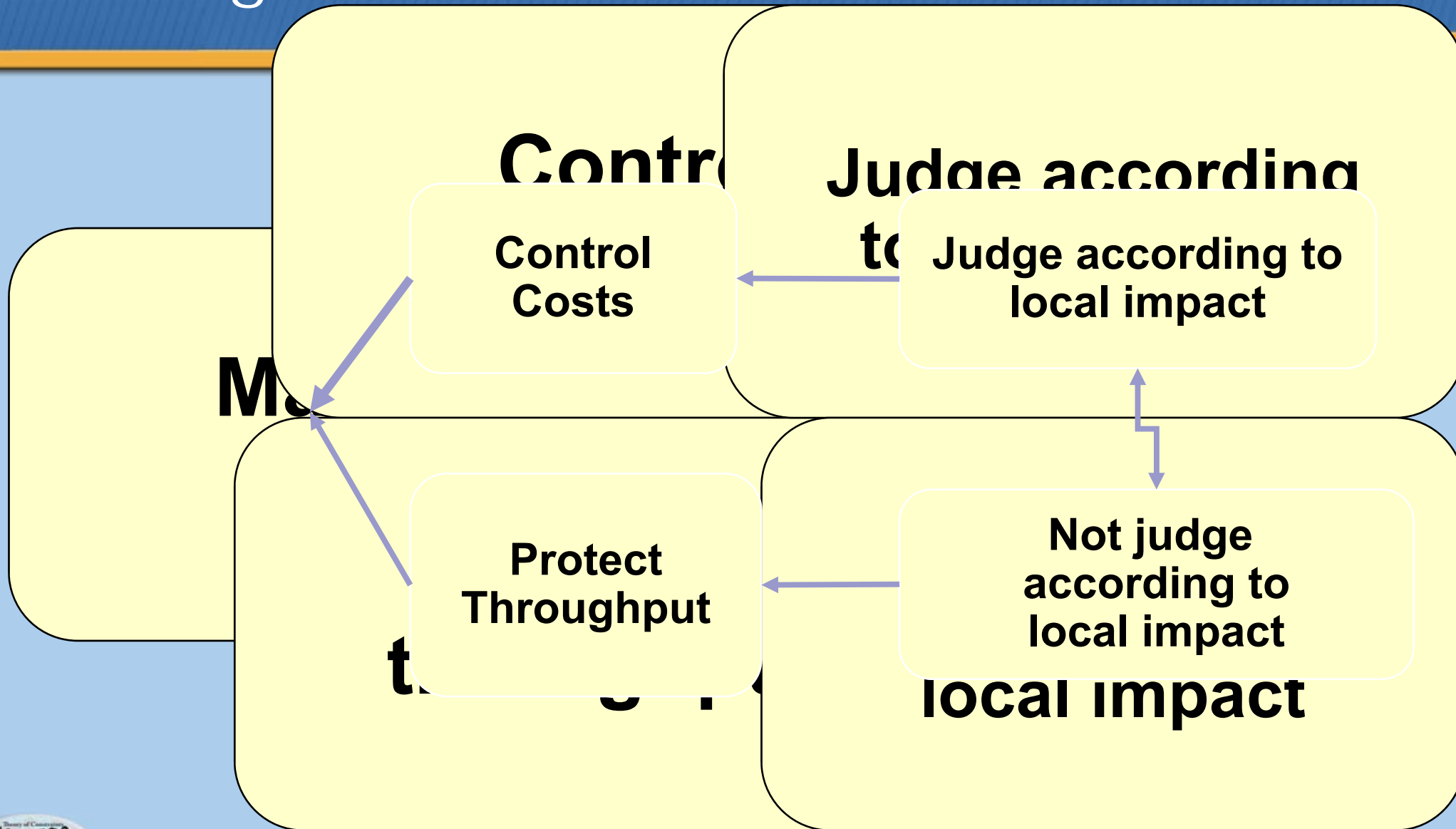
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Management's dilemma

Source: Goldratt, E. M. and A. (R.)
Goldratt, 2003, TOC Insights into
Finance and Measurements



Resolving the conflict

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Assumption: Local impact is EQUAL to impact on the organization

Manage Well

Control Costs

Judge according to local impact

Many decisions affect throughput and costs simultaneously

Protect Throughput

Not judge according to local impact

Assumption: Local impact is NOT EQUAL to impact on the organization

Source: Goldratt, E. M. and A. (R.) Goldratt, 2003, TOC Insights into Finance and Measurements

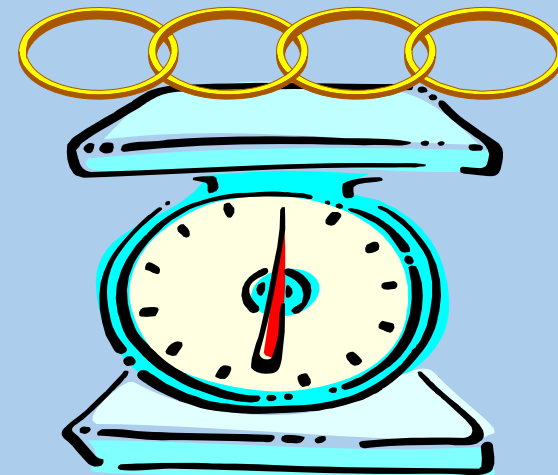
Local impact (Cost World)

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Chain analogy: measurement is weight

The additive rule applies – the total costs are the sum of the costs of each sub-system.

**Reducing the costs of a sub-system by X reduces total costs by X.
Therefore, local improvements are global improvements.**



- **Since global improvements are equal to local improvements, the way to judge decisions is according to the local impact only.**
- **To quantify local impact, we allocate costs.**

Time to THINK

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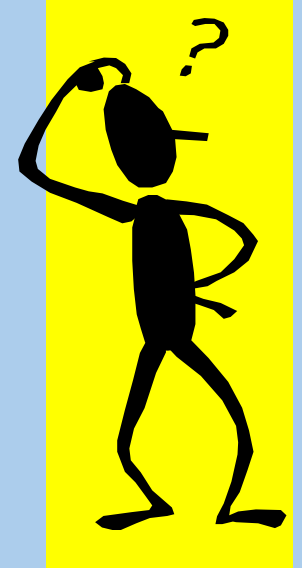
Managers will take actions to maximize local optima.

Do “easy” work first

then

A “good decision” is generally viewed as one that requires the least cost.

In the “cost world” an improvement in ANY link is an improvement to the chain.



Time to THINK

Do “easy”
work first

Large batches

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Managers will take
actions to maximize
local optima.

Minimize set-ups

Order large
quantities

Full truckloads

then

A “good decision” is
generally viewed as one
that requires the least
cost.

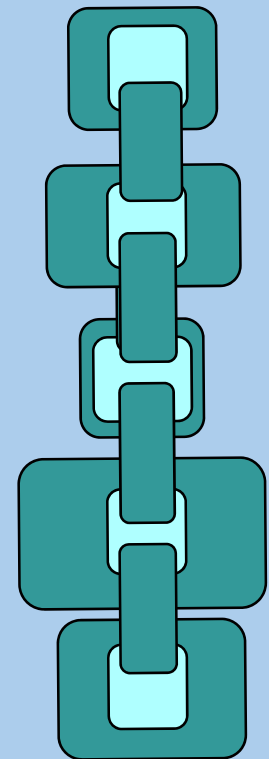
In the “cost world” an
improvement in ANY link is an
improvement to the chain.

What are some of the inferences you can draw about how
operational decisions are generally made?

Global impact (Throughput World)

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- **Chain analogy: measurement is strength**
- **The additive rule does not apply. Making one link stronger may not be a global improvement.**
- **Global improvement \neq sum of local improvements**



Time to THINK

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Managers must take actions to maximize global optima.

Process FIFO not just 'easy ones'



then

A "good decision" is one that increases T and reduces or does not increase I or OE..

In the "throughput world" the only way to improve the system is to improve the constraint.

Time to THINK

Process FIFO
not just 'easy
ones'

Small batches

Ignore set-ups

LTL
shipments

Buy small
quantities

Managers must take
actions to maximize
global optima.

then

A "good decision" is one
that increases T and
reduces or does not
increase I or OE..

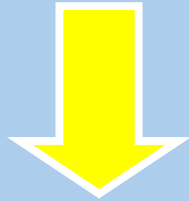
In the "throughput world" the
only way to improve the
system is to improve the
constraint.

What are some of the inferences you can draw about how
operational decisions need to be made in TOC?

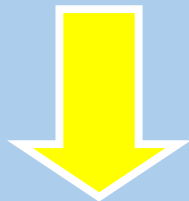
Cost World vs. Throughput World

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1. ↓↓ OE (cost)

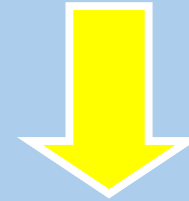


2. ↑↑ Throughput

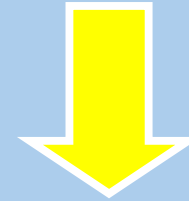


3. ↓↓ Investment

1. ↑↑ Throughput



2. ↓↓ Investment



3. ↓↓ OE (cost)

T, I and OE priorities

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- Our first priority is to increase T.
- Then, we focus on decreasing I, followed by decreasing OE, as long as we are not jeopardizing T.
- **Priorities** (from level 1 of Retailer Transformational Strategy and Tactic Tree (TSTT) by E. M. Goldratt, 2010):
 - “Realizing a Viable Vision (VV) - a jump in profitability while increasing sales exponentially year after year - turns a company into an Ever Flourishing Company.”
 - “For the Company to achieve the VV, its Throughput must grow (and continue to grow) much faster than Operating Expense.”

Should we cut costs or sell more?

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	Currently	Cut OE	Increase T
Sales Revenues	\$100	\$100	\$120
Totally variable costs (TVC)	5	5	6
<u>Throughput (T)</u>	<u>\$95</u>	<u>\$95</u>	<u>\$114</u>
Direct labor	30	24	30
Overhead	60	60	60
Operating Expense (OE)	90	84	90
<u>Net profit</u>	<u>\$5</u>	<u>\$11</u>	<u>\$24</u>

Modified from source: Newbold, R. C., 1998,
Project Management in the Fast Lane

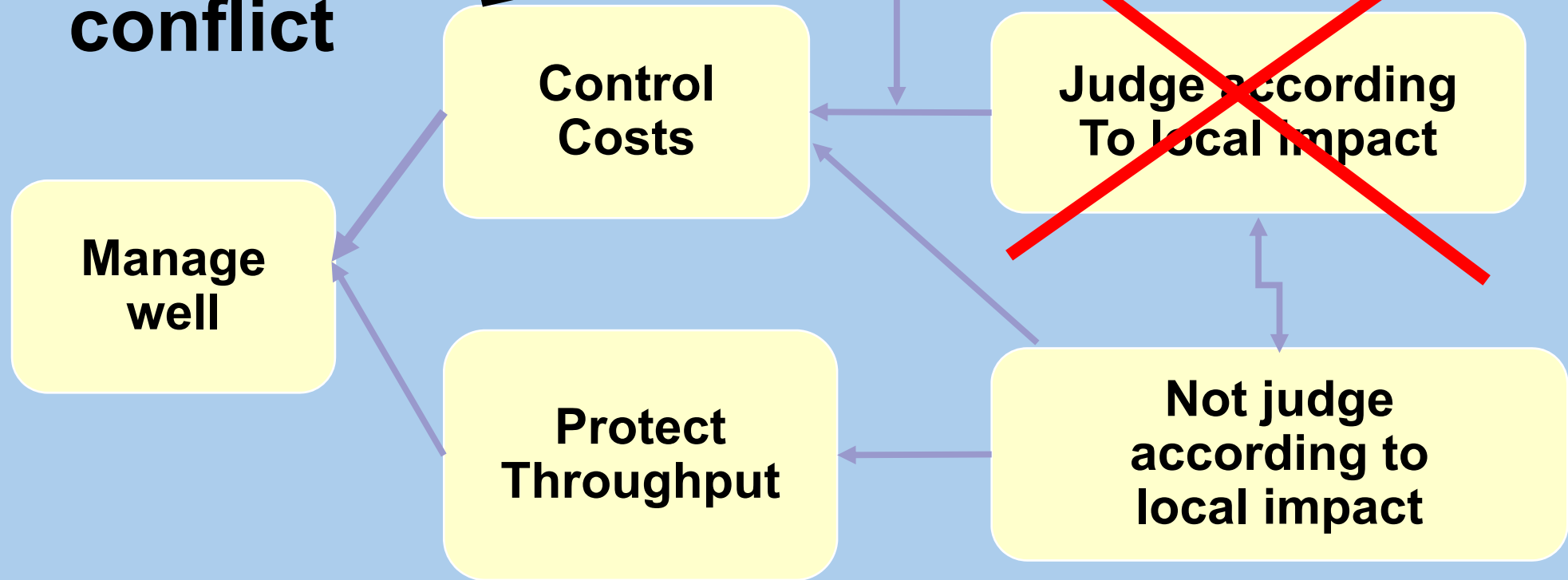


Resolving management's dilemma

There is no conflict

Assumption that local impact is EQUAL to on the organization

The assumption is invalid!



Topics

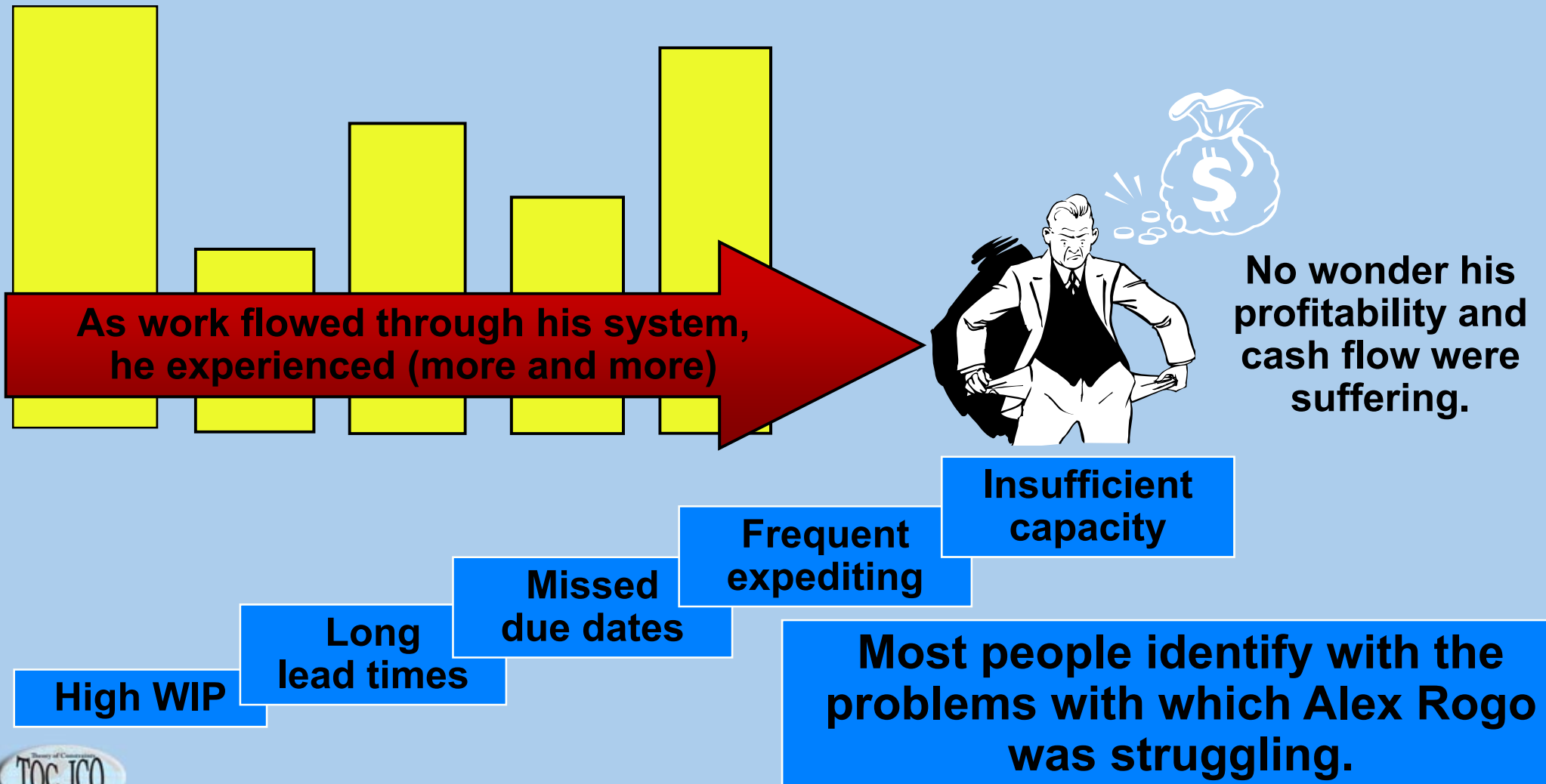
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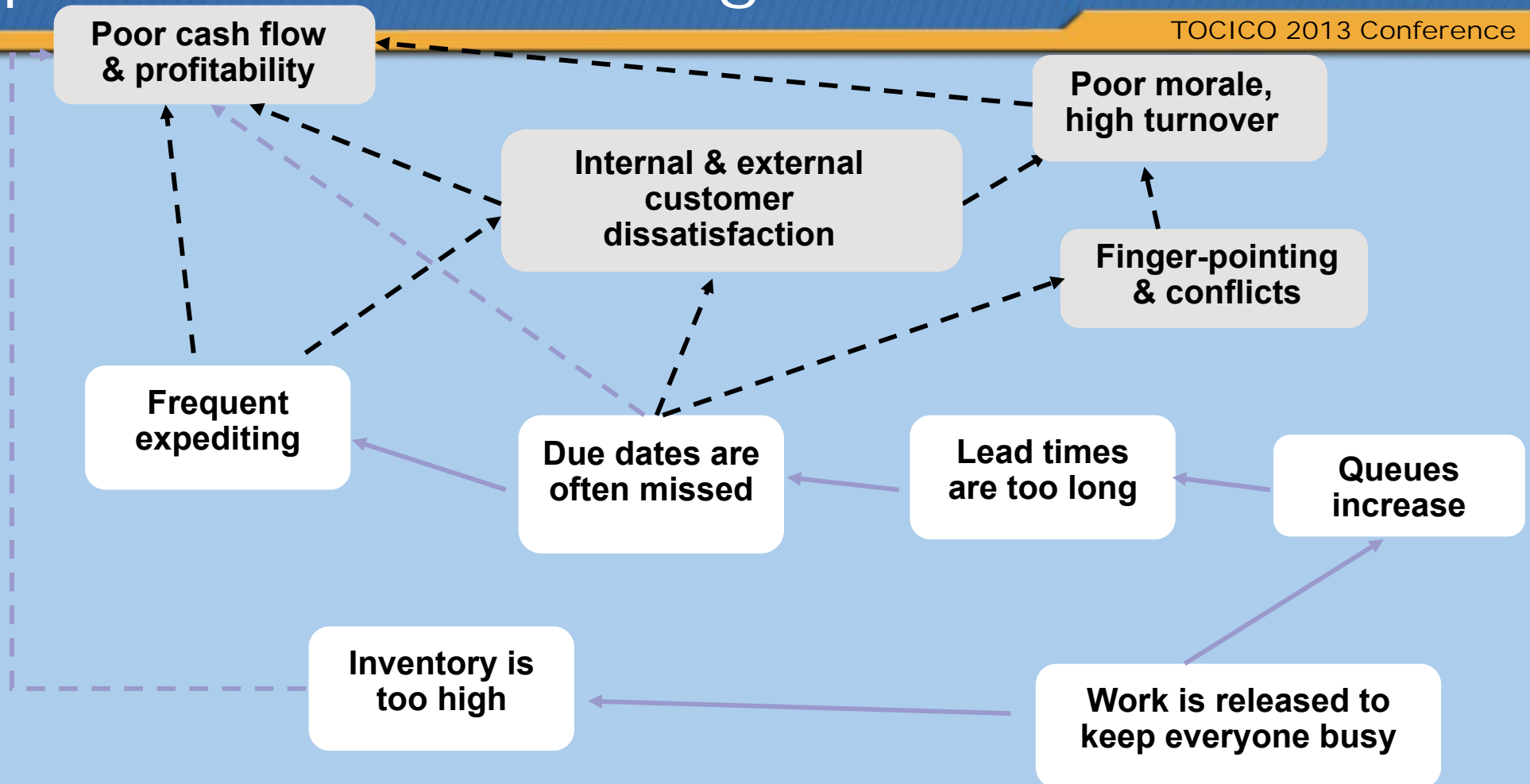
A reference environment for analyzing problems - The Goal

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The logical outcome of these problems remaining unresolved

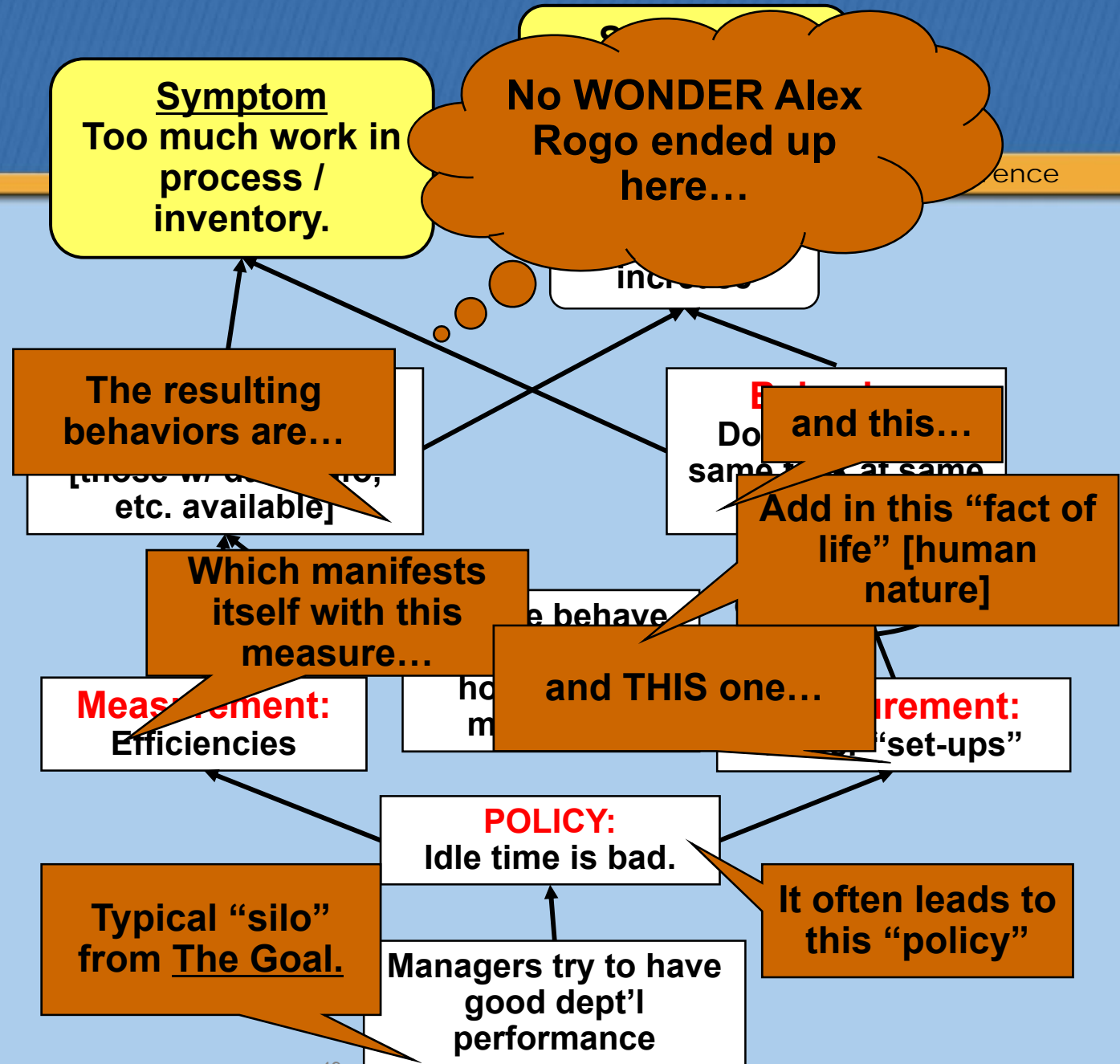
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***Alex Rogo's problems in The Goal
The significance of interdependency...***

Current reality

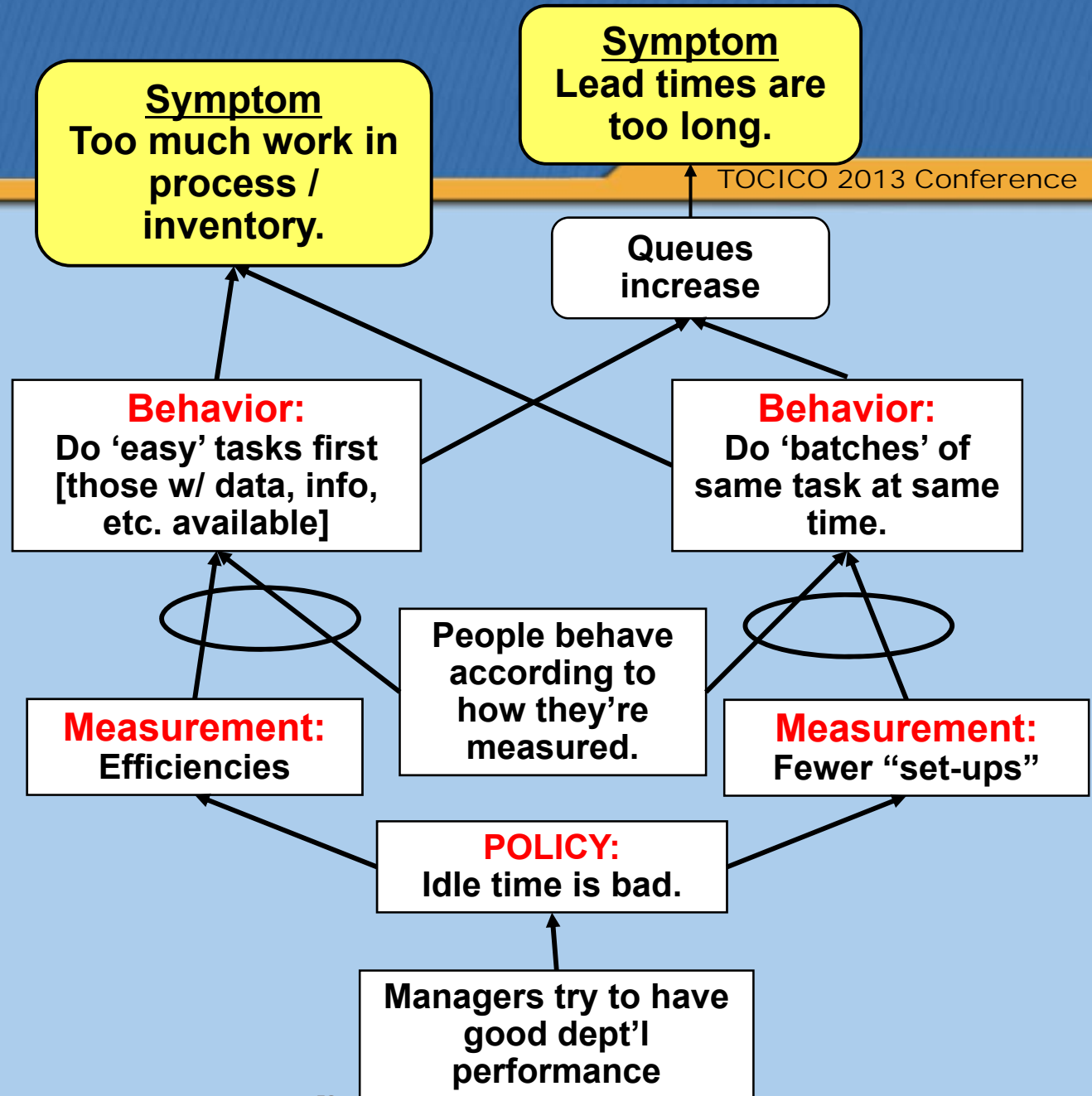
TOC cause-effect tools help clearly delineate the policies, measures and behaviors that lead to EACH specific symptom.



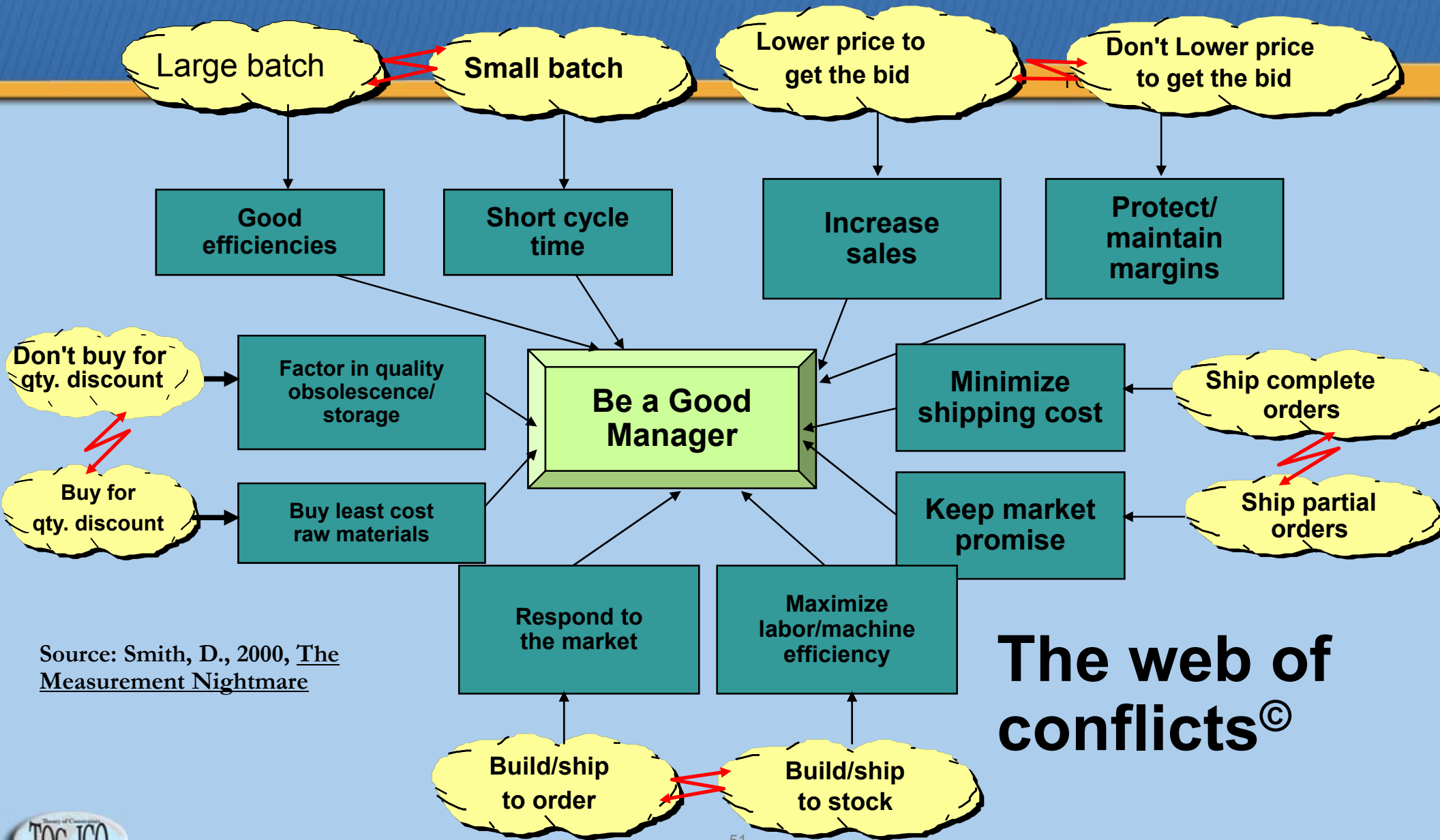
Current reality

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TOC cause-effect tools help clearly delineate the policies, measures and behaviors that lead to EACH specific symptom.



Common conflicts in the functions



Source: Smith, D., 2000, The Measurement Nightmare

The web of conflicts[©]

Using a strategy and tactics roadmap to understand why organizational conflicts exist

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Many times, conflicts are only experienced at the lower level – those at the top are many times not even aware of these conflicts and bad compromises that cause the current UDEs

Modified from Barnard, A. and L. A. Ferguson, 2003, *Goldratt Thinking Program*

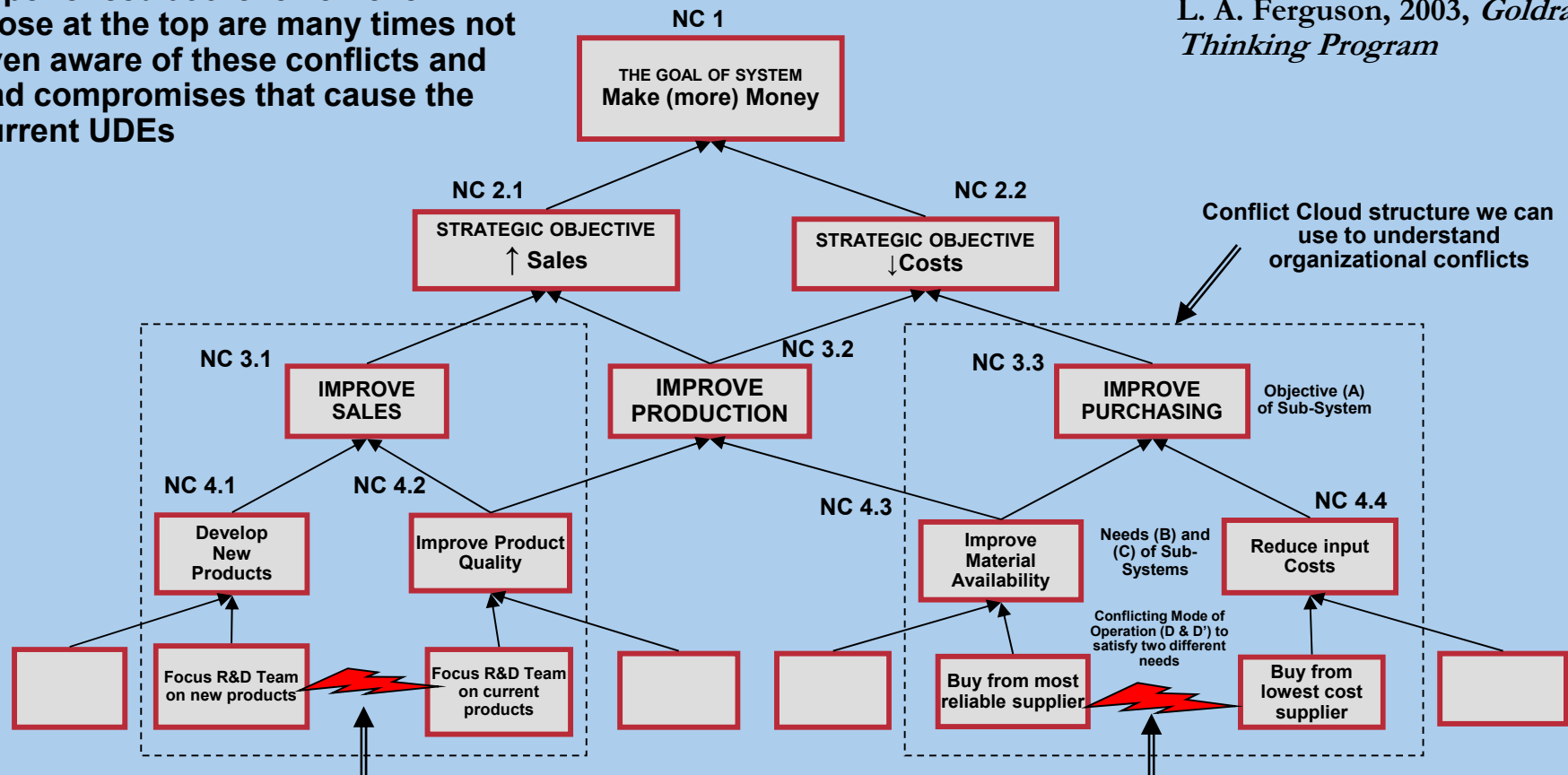
Level 1

Level 2

Level 3

Level 4

Level 5



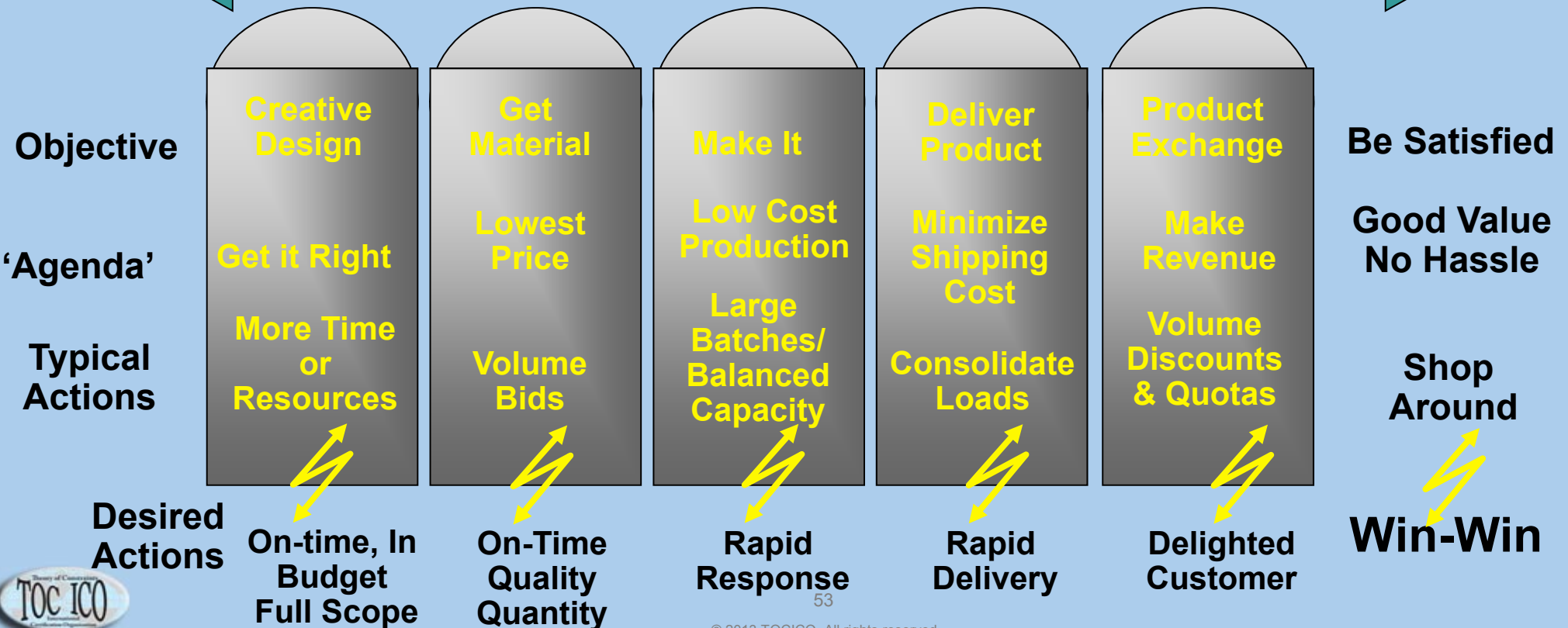
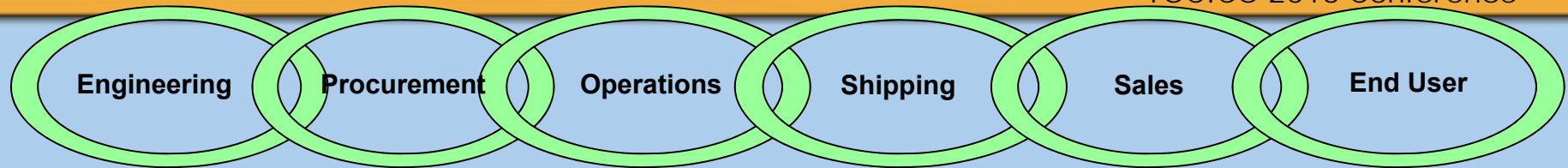
Organizational conflicts (and their associated UDEs) will exist as long as there are **resource constraints** (same resources are required to improve different parts at the same time) during times when sales exceeds capacity

Organizational conflicts (and their associated UDEs) exist as long as the **policy or metric** to improve one part is in direct conflict with that needed to improve another part

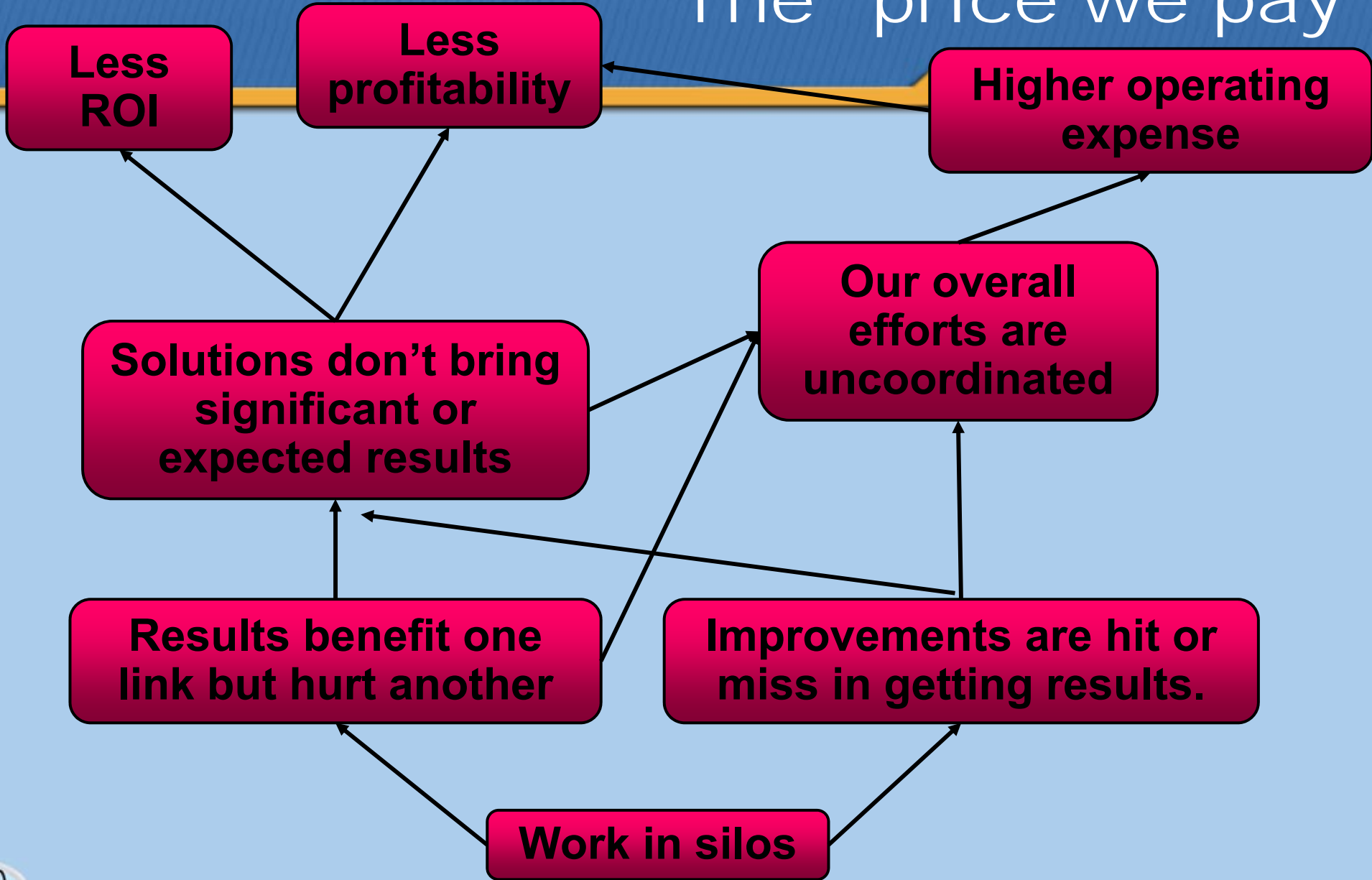


The "silo" effect and solution

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The "price we pay"



The solution

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- **We need a mechanism to judge local decisions in line with the Throughput World paradigm.**
- **We need to focus on strengthening the chain.**
- **To do so, we need to focus on the weakest link.**
- **What are the steps we need to follow?**

Five focusing steps (5FS)

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- 1. IDENTIFY the system's constraint(s).**
- 2. Decide how to EXPLOIT the system's constraint(s).**
- 3. SUBORDINATE everything 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.**

Source: Goldratt, E. M., and J. Cox, 2004, The Goal, (3rd revised edition)

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Making decisions using TOC

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- 1 System**
- 2 Investments**
- 3 Make versus Buy**
- 4 Sub-systems**
- 5 Product / service viability**

~~ALLOCATION~~

Making decisions using TOC

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Use T, I and OE to make decisions

1 System

Inventory = TVC

2 Investments

Consider effect on constraint

3 Make versus buy

Do not allocate fixed costs

4 Sub-systems

Apply T to each area; no transfer prices; Use inventory-dollar days (IDD) and throughput-dollar days (TDD)

5 Product / service viability

Use T/constraint increment (i.e. minute or square foot)

Measurements for Interfaces

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- **“As long as the end customer has not bought, no one in the supply chain has really sold.”**
- **Primary measurement: Throughput Dollar Days (TDD)*:**
 - **“Things that should have been done and were not.”**
 - **Thus, reliability is endangered.**
- **Secondary measurement: Inventory Dollar Days (IDD)*:**
 - **“Things that should not have been done, but nevertheless were.”**
(excess inventory)
 - **Thus, effectiveness was jeopardized.**

Modified from source: Goldratt, E. M., and A. (R.) Goldratt, 2003, TOC Insights into Distribution and Supply Chain



Throughput Dollar Days (TDD)

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- **Every delay is measured, not just being late, but also by how many days.**
- **The financial value of the sale should be measured as well.**
- **TDD is the summation (over all products not yet supplied) of the throughput times the number of days from receipt of the order to shipment.**
- **Target: zero TDD**

Inventory Dollar Days (IDD)

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- **Every area (department) carrying inventory can be measured according to:**
 - The value of the item (only the raw material purchasing costs are considered)
 - The number of days each item remains in the area
- **The IDD is a snapshot: how much money is stuck in the area and for how long.**
- **Summation (over all products/parts in inventory) of the value of the inventory (at TVC) times the number of days each stays in the warehouse / department.**
- **Target: reduce IDD**

IDD and inventory turns

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Inventory turns is the current common measurement of the effectiveness of flow in the system

Definitions

- **Inventory turns = Throughput / Inventory**
- **It measures the average of how much inventory is being held (waiting) in a certain area. (For example, two days' or weeks' worth of the inventory that is needed, based on current average demand, is being held in that department.)**

Shortcomings

- **Being an average, it does not clearly help us identify the problematic area; it does not provide information regarding variability.**
- **In addition, the dollar value of the inventory is not specifically considered.**
- **Thus, the combined effect of time (delays) and money is provided only at a very global level.**



How to measure performance

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Measurements of **policies and decisions**:

Primary measurement: Throughput (T)

Secondary measurements: Investment (I) and Operating Expense (OE) (reduce these, but not at the expense of the primary measurement)

Measurements of **execution**:

Primary measurement: TDD

Secondary measurements: IDD and local operating expense (reduce these, but not at the expense of the primary measurement)

Modified from source: Goldratt, E. M. and A. (R.) Goldratt, 2003, TOC Insights into Distribution and Supply Chain

Local performance measure criteria

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- **Relatively few measures**
- **Within control of the individual or department**
- **Real-time information provided**
- **Tied to the constraint and the five focusing steps / process of ongoing improvement (POOGI)**
- **Focused on improving flow**



About the presenter

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Lisa A. Ferguson, PhD, is the founder and CEO of Illuminutopia,SM an organization that is focused on “Illuminating the way to utopia for individuals, organizations and society” (www.illuminutopia.com and www.illuminutopia.org).

Dr. Ferguson is the author of the chapter on Strategy and Tactic trees in the *Theory of Constraints Handbook*. Professor Ferguson has taught several programs on how to write S&T trees. Until June 2008, Dr. Ferguson spent a year working one-on-one with Dr. Eli Goldratt, the founder of the Theory of Constraints (TOC), while learning how to write. Professor Ferguson has trained TOC Experts and Supply Chain Logistics implementers in India, Japan and the U.S. as a faculty member of Goldratt Schools. Professor Ferguson has a PhD in Business (in Operations Management (OM)) and an MBA in Finance and OM. Dr. Ferguson taught operations management full-time at a university for 10 years.

Dr. Ferguson was a TOCICO board member from 2008 to 2011 and is TOCICO certified in Supply Chain Logistics, the Thinking Processes and Critical Chain Project Management.



About the presenter

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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).

