# It's just common sense, right? So why is it so uncommon?

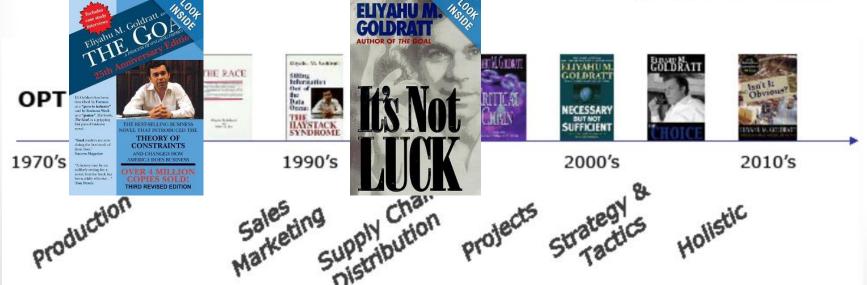
Professor Vicky Mabin
School of Management
and Associate Dean (Teaching and Learning)
Victoria Business School

Victoria University of Wellington Inaugural Professorial Lecture 12 November 2013

# The theory of constraints (TOC)

- Originator: Dr. Eliyahu Goldratt (1947-2011)
- Origins in the hard sciences (physics)
- Aims to continually achieve more of the goal of a system

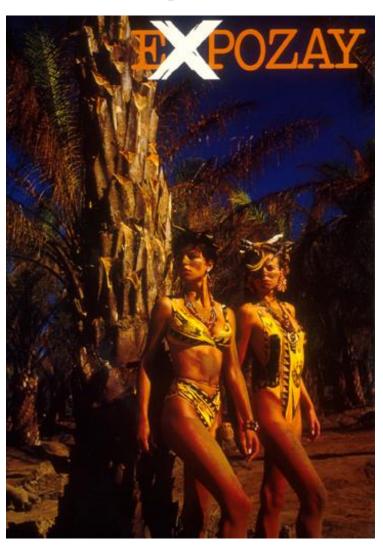




## Five Focusing Steps (5FS)

- 1. IDENTIFY the system's constraint(s)
- Decide how to EXPLOIT the system's constraint(s)
- **3. SUBORDINATE** everything else to the above decisions.
- **4. ELEVATE** the system's constraints.
- If the constraint has been broken,GO BACK to step 1
  - A Process of Ongoing Improvement

# Manufacturing







Cutting



Printing



Sewing



Finishing

## Step 1. **Identify** the system's constraint





### Step 2: **Decide** how to **Exploit** the Constraint

- Use constraint effectively
  - make the right products
- most efficiently

So...

- Avoid wasting time on the constraint
- Make only what's needed

# Step 3: **Subordinate** everything else to those decisions

- Borrow workers from elsewhere
- Set up 'off line'



Make sure Cutting cuts only to customer demand

### Step 4: **Elevate** the constraint

No big investment – just some custom made racks!



- Step 5: Go back to Step 1
- Do not let inertia become the system constraint!

## Second constraint: sewing

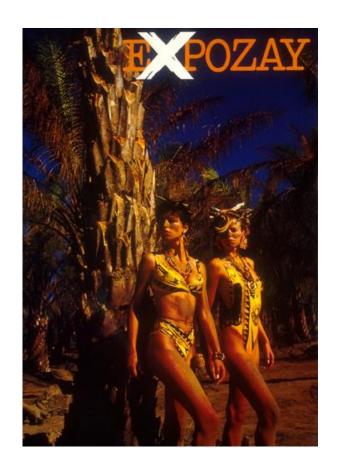




### And then ...

#### After

- 1. printing
- 2. sewing tackled the next constraints in turn:
  - 3. inventory
  - 4. marketing
  - 5. cut planning
  - 6. quality .....

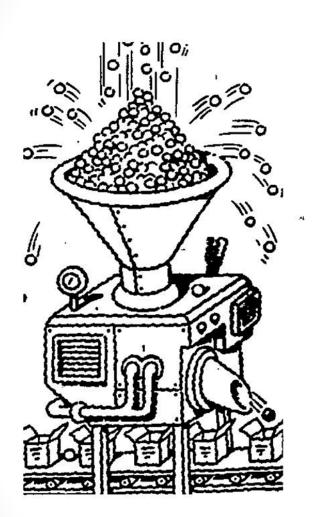


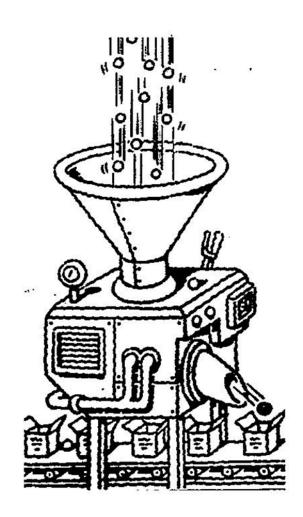
## After applying 5FS at Expozay

- Sales up 80% in 3 years
- Inventory down 13% in 8 mths
  - WIP down from 30k to 4k
- Operating expenses steady
- Quality, flexibility, responsiveness, and due date performance all improved
- Faster quotes for delivery dates

"Chaos was replaced by order"

Tony Alvos, Managing Director, Expozay International.

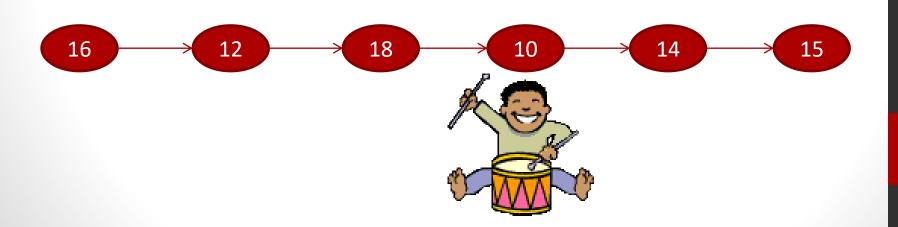




## Key lessons from The Goal



A chain is only as strong as its weakest link!



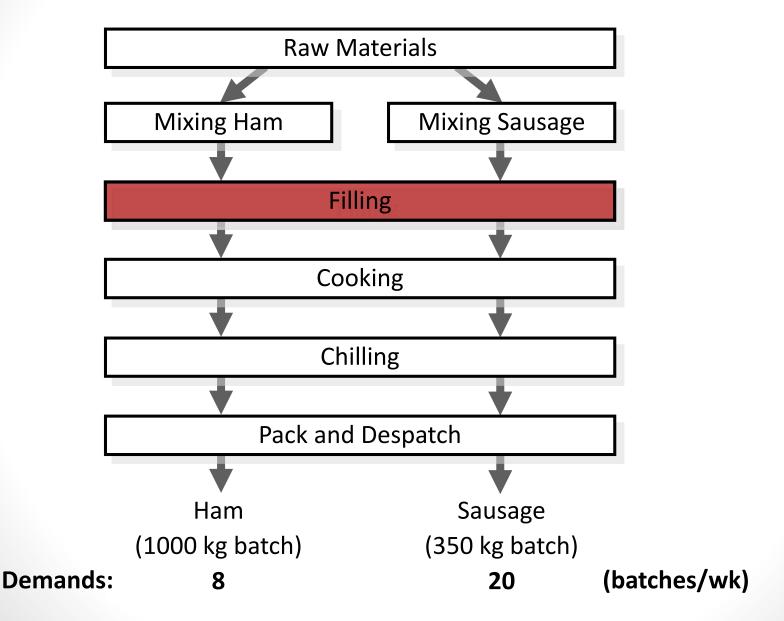
### Gould's Fine Foods

### • Situation:

- Two product lines:
   Sausages and Hams
- Shared production resources
- Couldn't meet demand
- High unplanned overtime



### **Process Flowchart**



# How to set priorities?

### TOC Product Mix Heuristic

	Hams	Sausages
Gross Profit	6	1
Time on Constraint (Filler hrs/batch)	8	1
Gross Profit per Constraint Hour	6/8 = 0.75	1

### Goulds Fine Foods - Results

#### Results

- Improved productivity:
  - Throughput improved by 70%
  - Unplanned overtime slashed
- Allowed Goulds to supply the market demand and increase profits without extra staff or capital

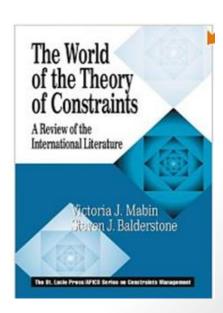
#### **Research spinoffs**

Synergies between Linear Programming and TOC's 5 Focusing Steps



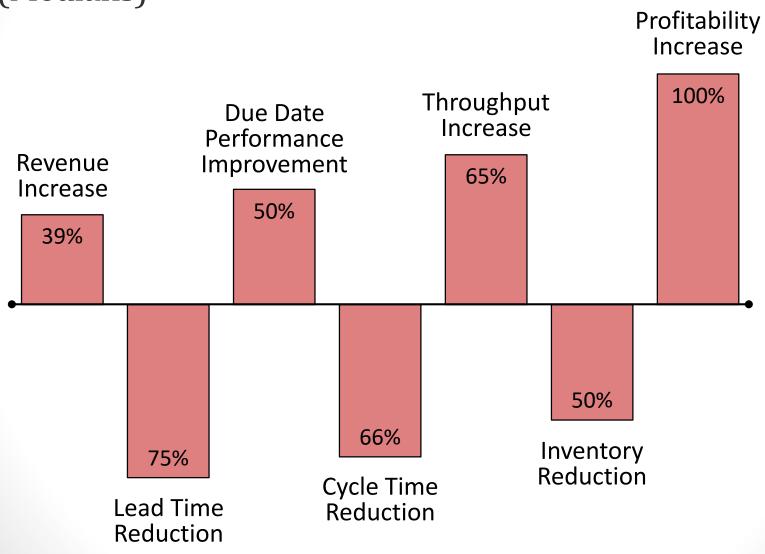
# Impacts of applying The Goal and 5FS Evidence from the international literature

- Published papers and books up to late 1990's
- 100 case studies, no failures reported
- Large measurable improvements from TOC
  - (better than from other methods)
  - eg 75% reduction in Lead time, 50% in Inventory!



## Improvements using TOC

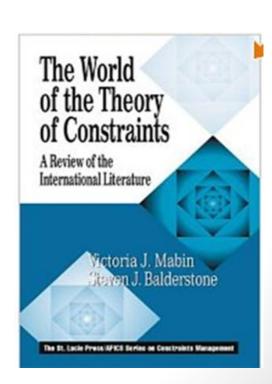
(Medians)



# Impacts of applying The Goal and 5FS Evidence from the international literature

### Observations:

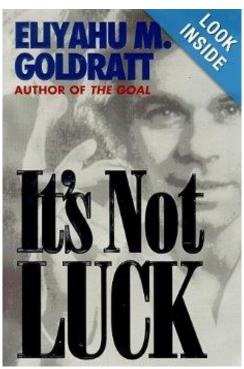
- Some BIG companies achieved BIG results
- Having already used other methods
- Worth sharing?!
- Most applications used only part of TOC



# TOC Thinking Processes It's Not Luck

How to develop solutions

Via a change process ...



# Key Questions to Guide Change ... and TOC Thinking Tools

1. Why change?

Goal Tree
Lists of Undesirable Effects

5. How to sustain the change?

Using the right measures; Repeat?

2. What to change?

Current Reality Tree Evaporating Cloud

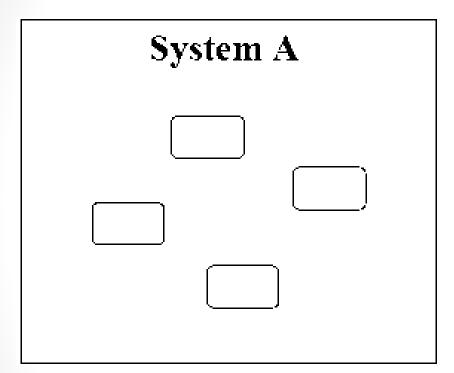
4. How to cause the change?

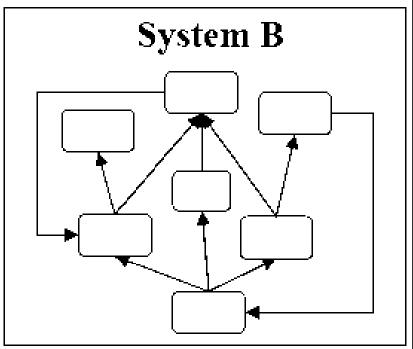
Prerequisite Tree/ IO Map
Transition Tree
Strategy & Tactics Tree

3. What to change to?

Evaporating Cloud Future Reality Tree Negative Branch Reservation

## Simplicity in complexity





"The whole is greater than the sum of its parts"

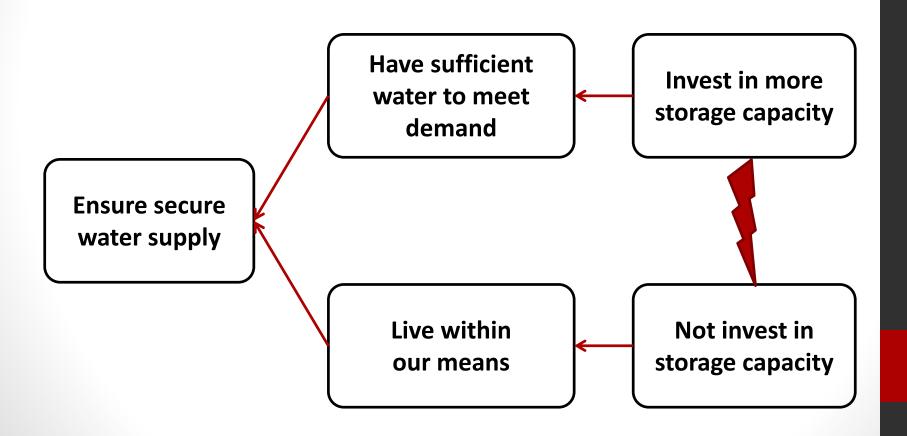
# Some Local Applications of the Thinking Processes

- Banking
  - "TOC provided framework and tool kit to help manage and lead a major bank merger, harnessing resistance to change" Steve Forgeson, Area Manager, Westpac
- Manufacturing:
  - "Led to fundamental shift in the way we think, unlocked potential we never realised we had." Lawrie Evans, Managing Director, Astra Print
  - Milk products (Fonterra)
- Regulatory issues: electricity, telecoms, education
- Resource management: water, biofuels
- Health: Hospitals, elder care, smoking, ...
- Distribution networks
- Projects

### Water

# - the case of Kāpiti district

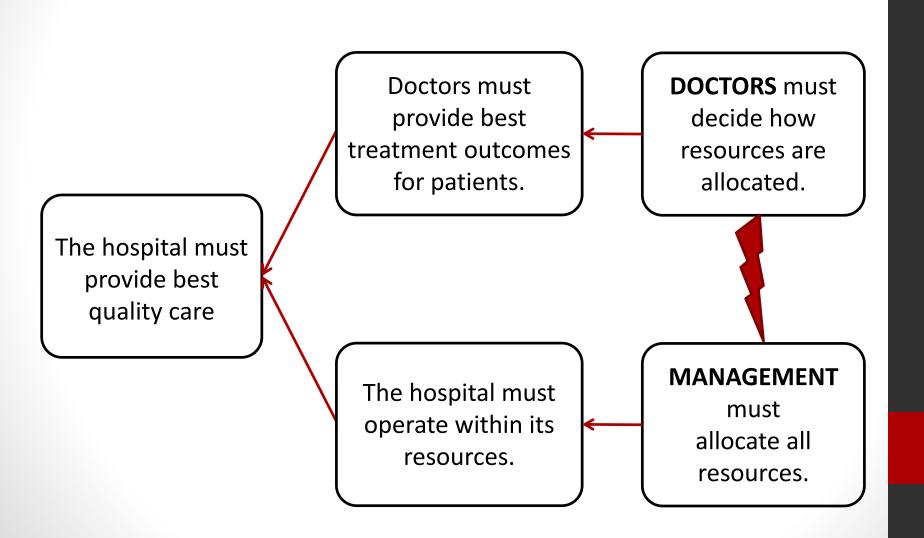
Finding a solution using TOC's Evaporating Cloud



#### Healthcare **Individual Evaporating Clouds** Clinicians want to Clinicians must have retain current method 100% accurate patient hospital of data verification in information . the EHR. The Hospital must operate UDE: clinicians do not support **Combined Evaporating Cloud** efficiently & new verification system. provide quality patient care. Managers want to Managers must have adopt new method new EHR on time & The hospital must of data verification within budget. Doctors must be able in new EHR. provide best to demand how treatment resources are outcomes for allocated. Doctors must make patients. Doctors must schedule treatment decisions appointments. that exceed contract volumes. The Hospital The Hospital must deliver **UDE:** The Hospital does must provide UDE: the over-delivery of services the best that are not funded. not consistently deliver treatment best quality for patients. best quality care. care. Nurses must only Nurses are well provide treatment trained and work within contract within resources. volumes Management must The hospital must allocate all operate within its Pharmacy staff must resources. resources. Pharmacy must be prioritised to respond quickly to work in production demands Hospital pharmacy must UDE: bottlenecks in pharmacy provide production, high workloads timely and causing staff dissatisfaction excellent service to all patients. Pharmacy staff must Pharmacy staff must be rostered in have job satisfaction. medicines information.

## What to change?

- core conflict

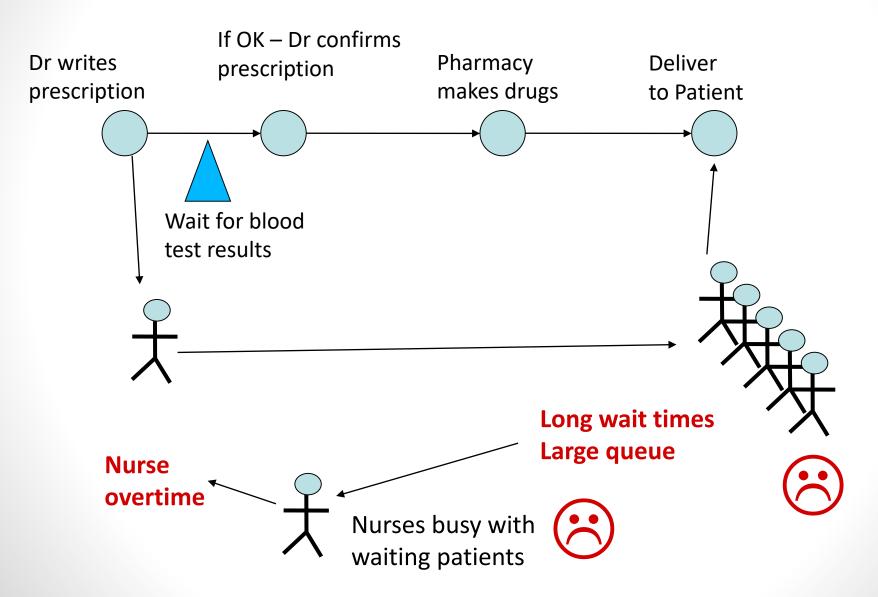


## Back in the hospital pharmacy

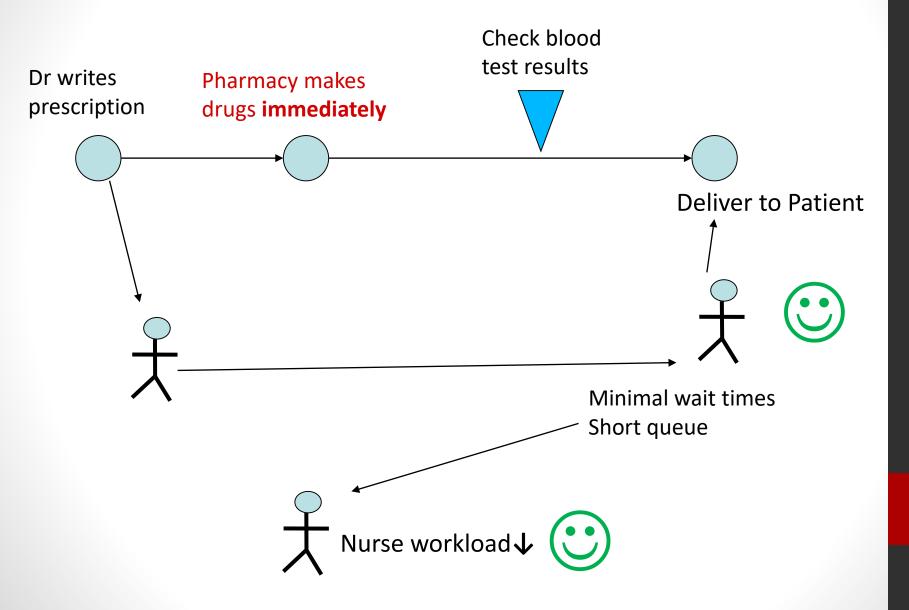
### Problem symptoms:

- Long waiting times for patients in cancer centre
- Fluctuating workload
  - Idle time and overtime
- Increasing stress levels for staff

## Problematic situation

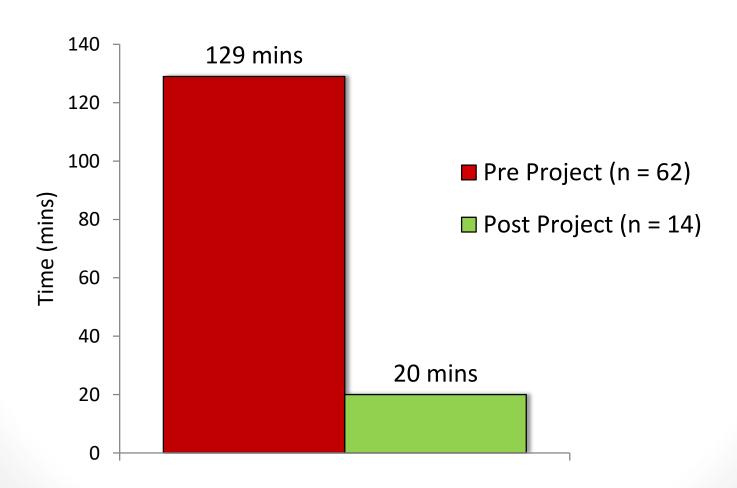


## What to change to? Pilot solution

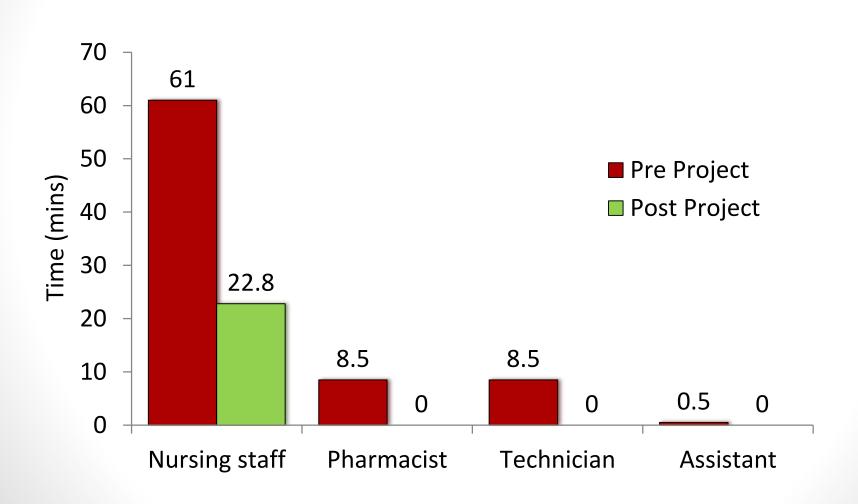


# Impact on Waiting Times

Average Overall Patient Waiting Times Pre and Post Project

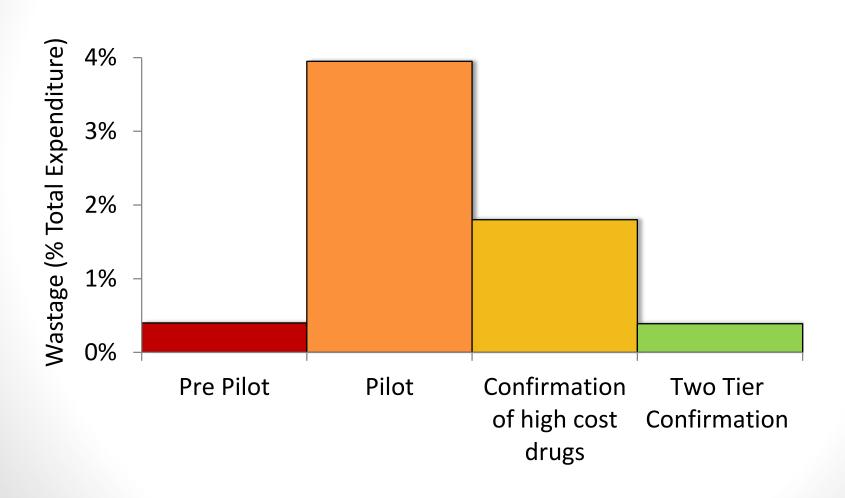


## Impact on Staff Overtime

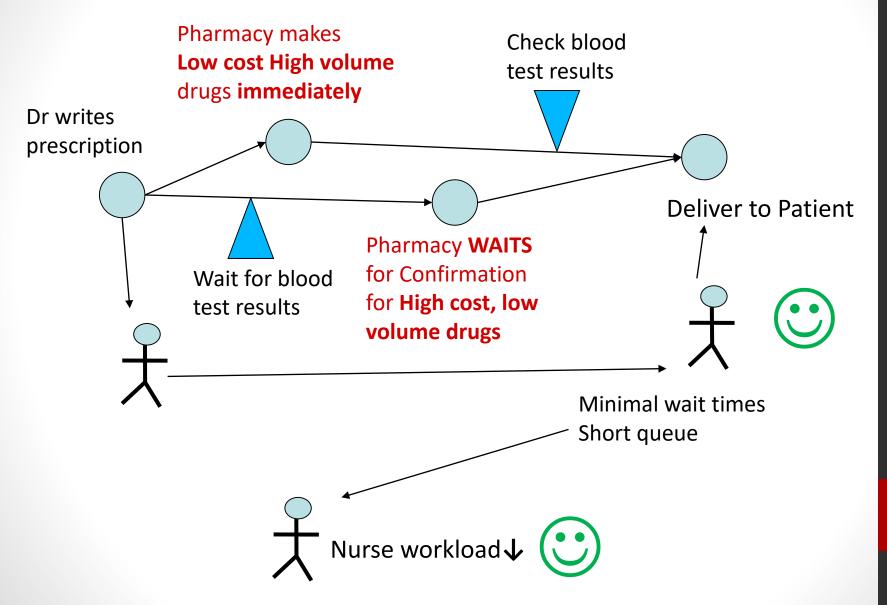


## Impact on Wastage Cost

(% Total Expenditure)



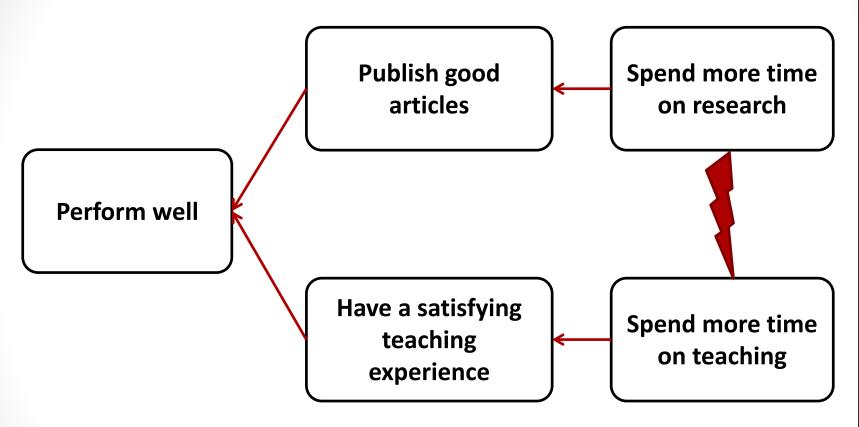
## What to change to? Win-win solution



### **Education**

- TOC for Education worldwide movement
- At Victoria:
  - Setting up 'Assurance of Learning' processes
  - Designing and implementing new policies/operations
  - Regulatory issues: tuition fees/institutional funding
  - Strategic issues: inter-school organisational structure
  - Improving student research thesis completion
  - Improving teaching and learning experiences

### An Academic's Dilemma?



#### **Key Questions:**

- How can we spend more time on teaching AND publish good articles?
- How can we spend more time on research AND have a satisfying teaching experience?

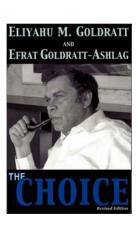
### Goldratt's tenets

#### "I smile and start to count on my fingers:

- 1. people are good
- 2. every conflict can be removed
- 3. every situation, no matter how complex it initially looks, is exceedingly simple
- 4. every situation can be substantially improved; even the sky is not the limit
- 5. every person can reach a full life
- 6. there is always a win-win solution

#### Shall I continue to count?"

Goldratt (2008) The Choice, North River Press, Greater Barrington, MA, p158 Goldratt and Goldratt-Eshlag (2010) The Choice – Rev Ed. P168.



## Further Reading

- Dettmer, The Logical Thinking Process
- Scheinkopf, Thinking for a change
- Yean, Thinking Smart
- Cox & Schleier (Eds). TOC Handbook, McGraw-Hill, 2010,
- Cox & Boyd (Eds). TOCICO Dictionary, 2<sup>nd</sup> ed, McGraw-Hill, 2012
- Ronen, Focused operations management for ... health services organizations, Jossey Bass (2006)
- Ricketts, Reaching the Goal: How managers improve a services business using Goldratt's Theory of Constraints, IBM Press, 2008.
- Papers on cases referred to in this talk available on request.

