

38th TOCPA International Conference

28-30 March 2018, Paris, France

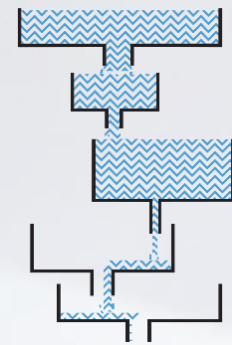
Using the Theory of Constraints to triple production flow in the dairy food and drink industry

Spyros Bonatsos

Charalambides Christis, Cyprus



Marris
Consulting



TOC and Cheese ???

How the design and implementation of the Theory Of Constraints managed to transform a halloumi cheese plant into the world's biggest halloumi manufacturing operation.

Theory Of Constraints thinking and implementation in practise with real plants, machines, vats, numbers and people.



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What is halloumi

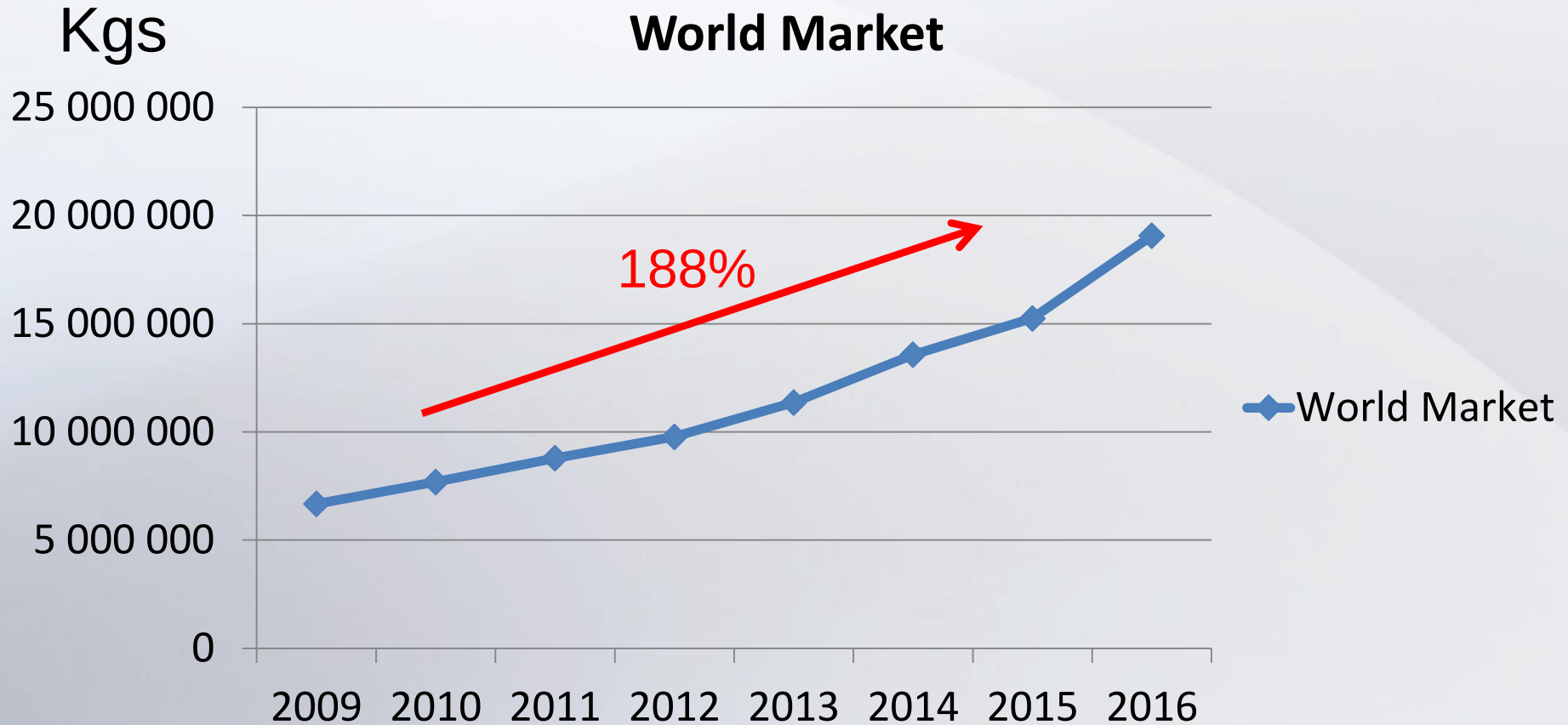


Sequence of Presentation

Why Change
What to Change
What to Change to
How to cause the change

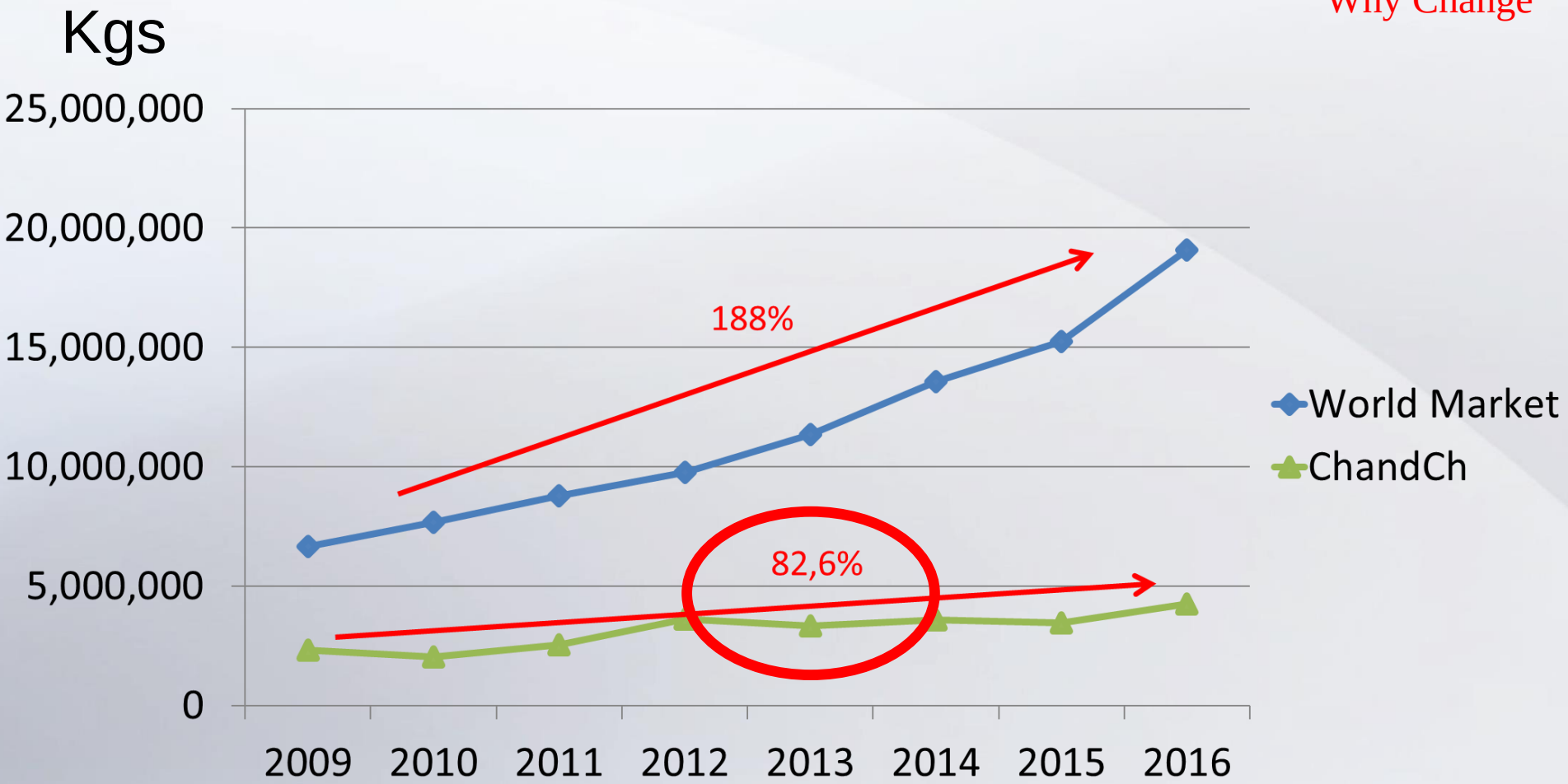
Halloumi Consumption - trend

Why Change



The world market and Ch&Ch

Why Change



Description of the process

What to Change

Coagulation
(Curd)



Halloumi
Boiling



Halloumi
Folding



Halloumi
Cooling



Brining
Process



Halloumi
Packing
Machines



Description of the process

What to Change



5 Categories of product – Many designs and logistics



Etc
Etc
Etc

Description of the process

What to Change

Coagulation
(Curd)



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Process

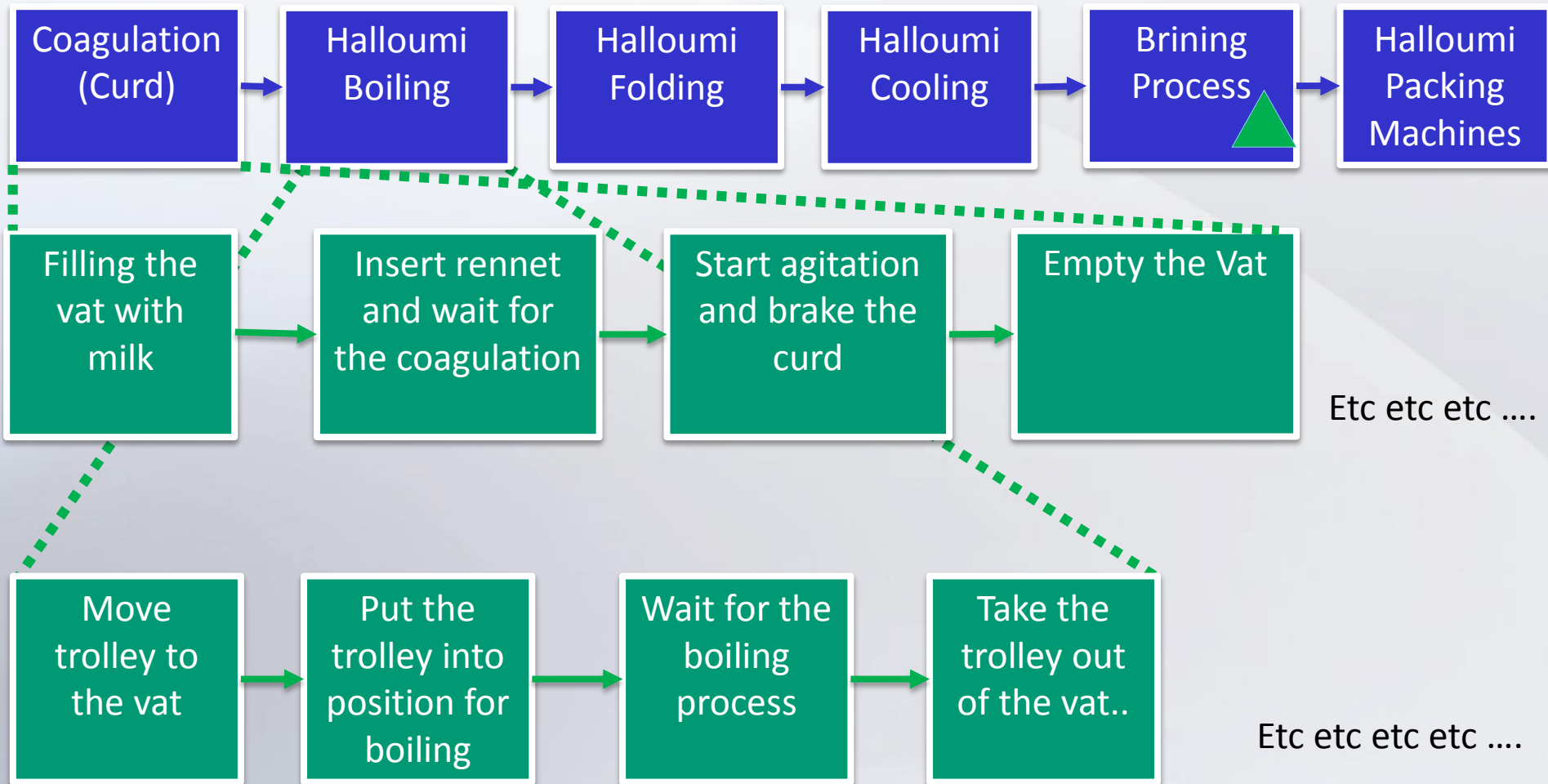


Halloumi
Packing
Machines

- We could produce 9 tons per day – with a lot of effort we could produce up to 11 tons per day
- Throughput thinking was absent.
- Capacity was driving behaviours.

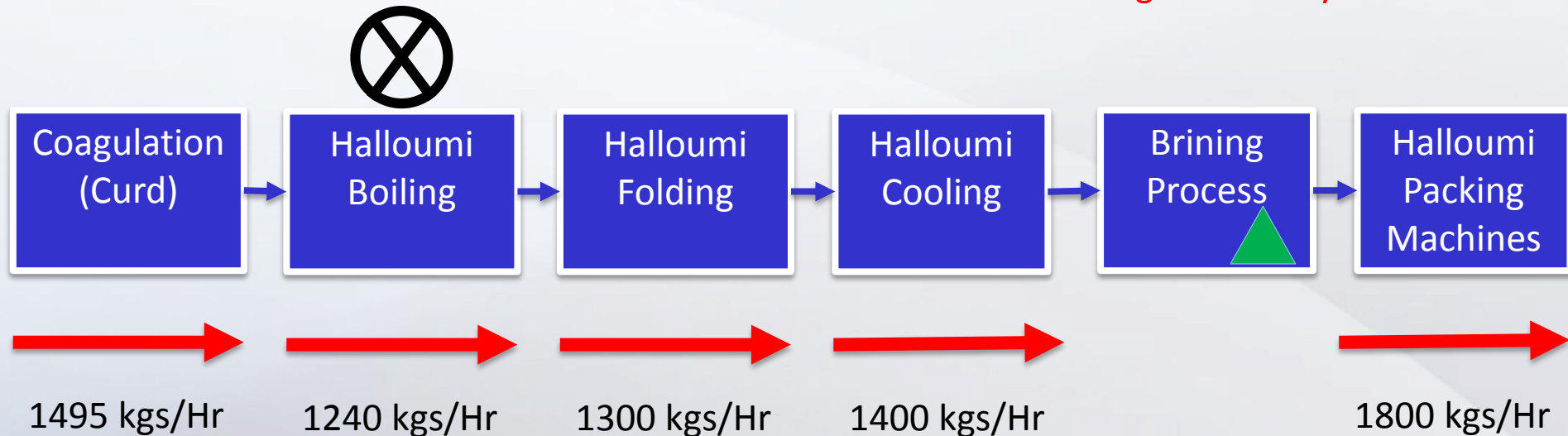
Function Block Diagrams

What to Change – Identify the Constraint



Description of the process

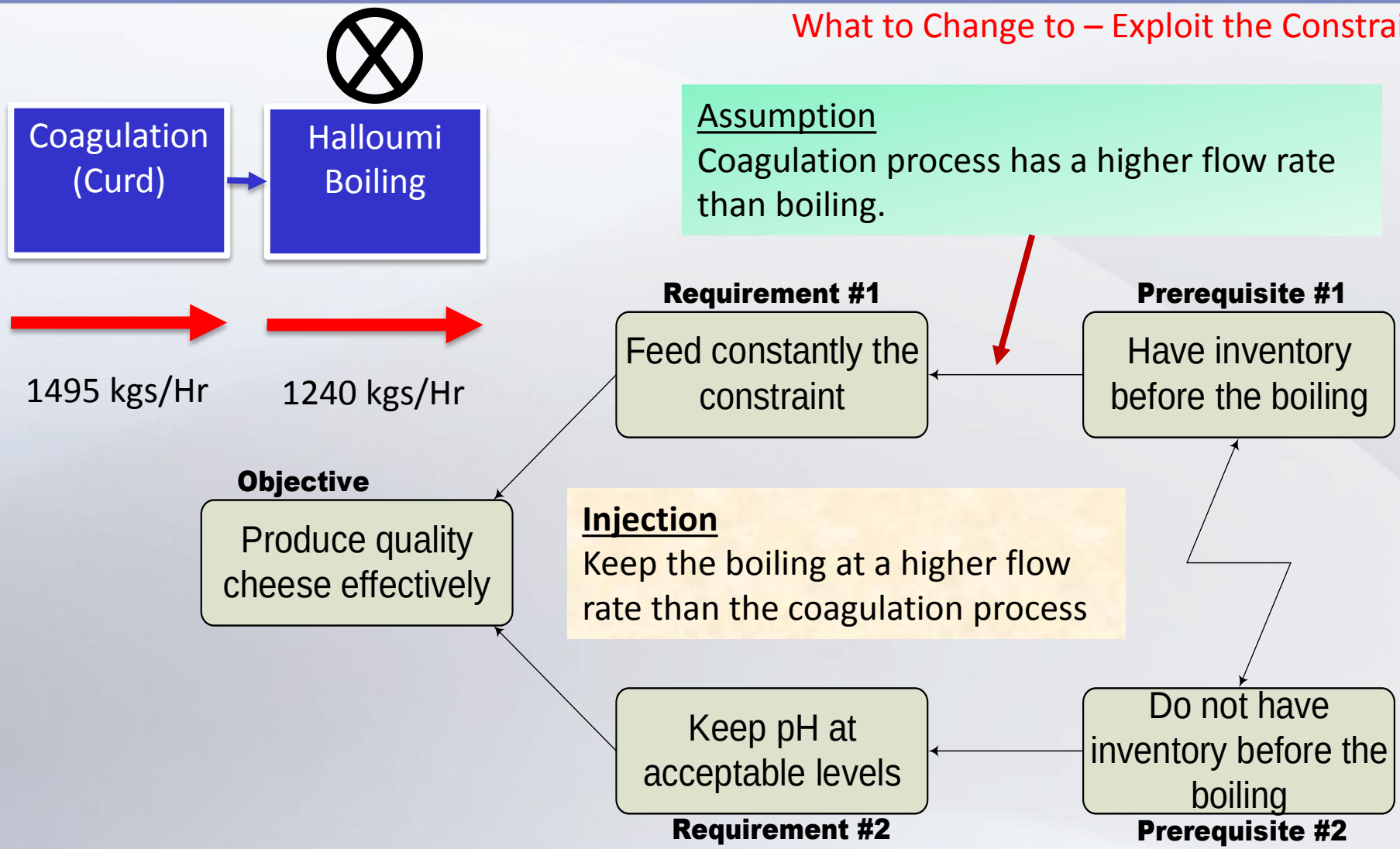
What to Change – Identify the Constraint



- In theory we could produce 12 tons in 10 hours. But this couldn't be achieved because...
- Throughput thinking was absent.
- Exploiting the constraint was a challenge.... Because....

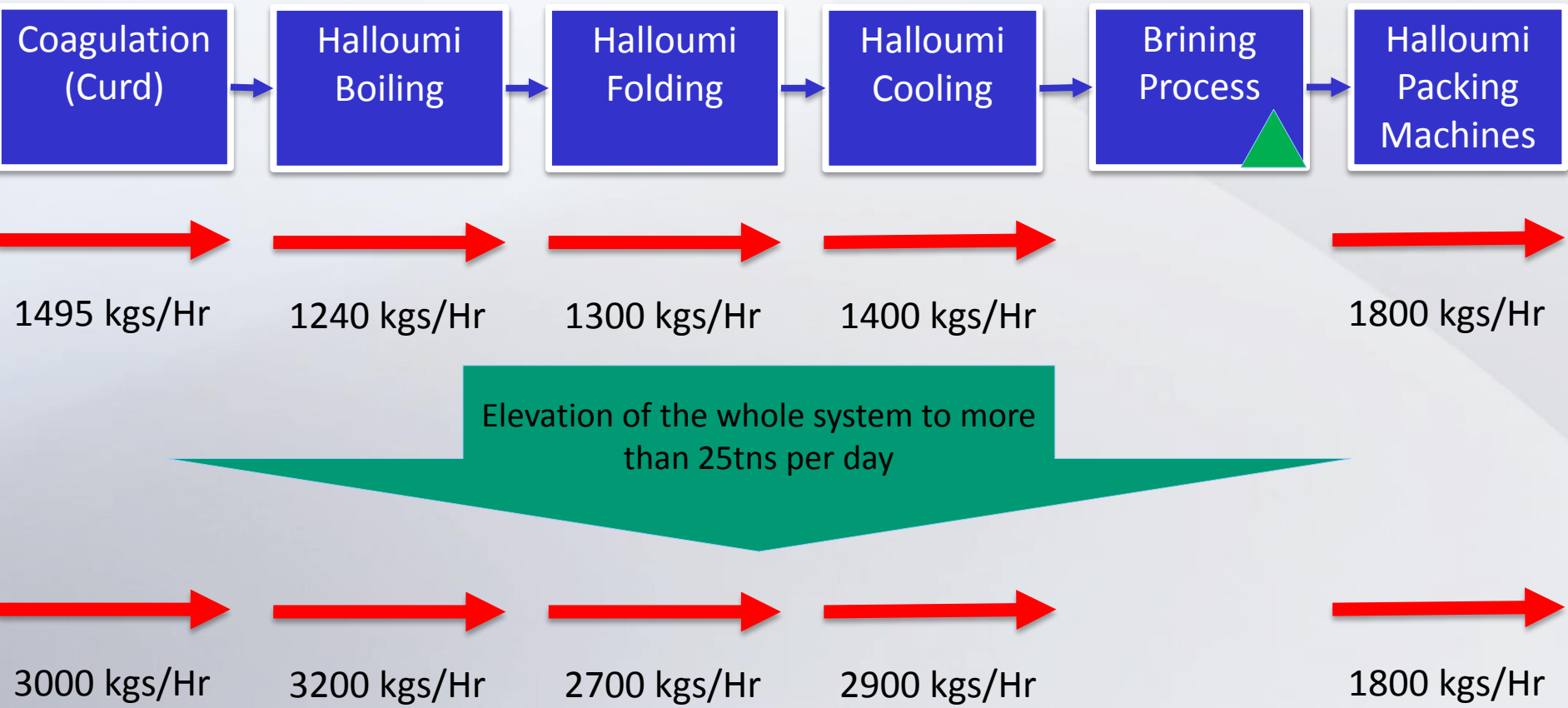
Subordinate to the constraint

What to Change to – Exploit the Constraint



Description of the process

What to Change to



Taken in consideration physical limitations



System Engineering Process

Theoretical Development

Requirement analysis.

Functional Requirements
Performance Requirements

An addition to the
Future Reality Tree
???

Functional analysis.

Decomposition
Requirement allocation
Interfaces
Functional Architecture

Synthesis.

Functional to physical
Technology and process solution.

Management of the process (Drum Buffer Rope)

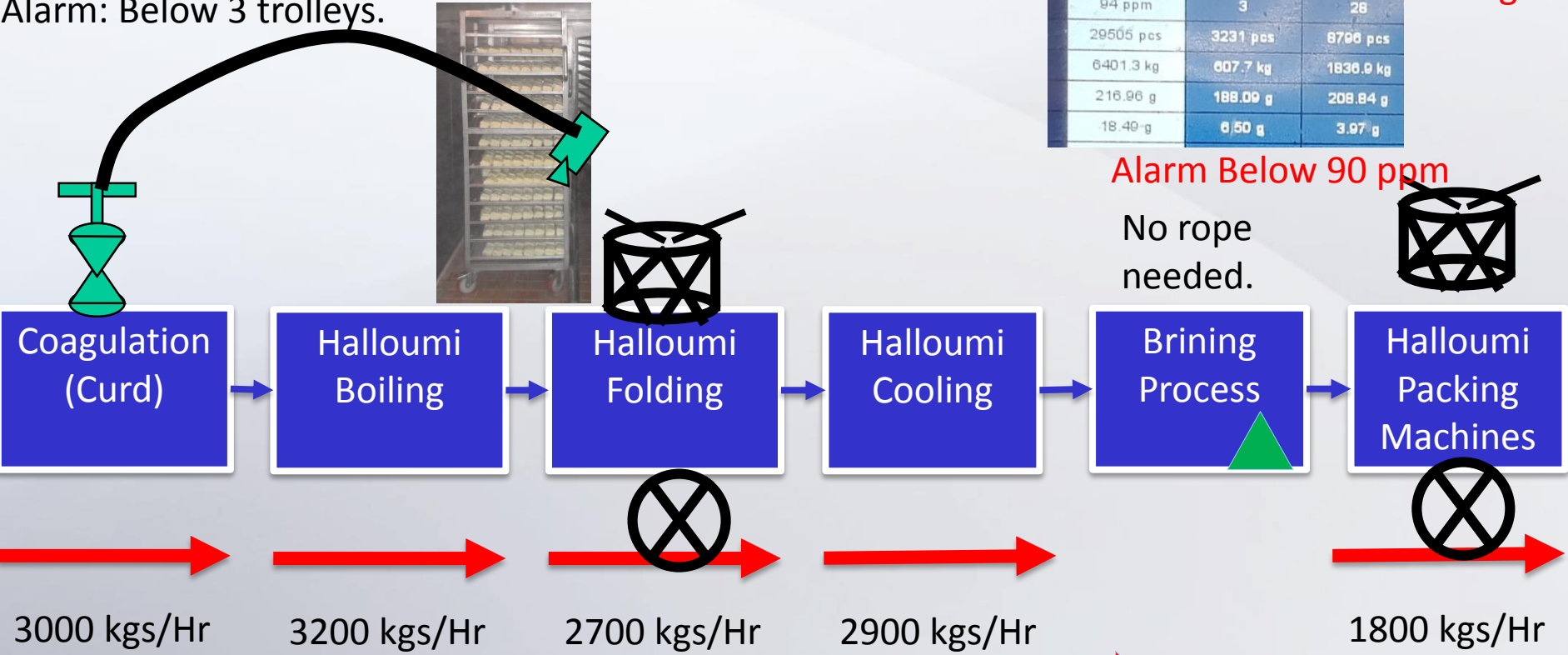
Buffer: 40 minutes (5 trolleys * 350kgs each)
Alarm: Below 3 trolleys.

	0 - 195 g	202 - 215 g
94 ppm	3	28
29505 pcs	3231 pcs	8796 pcs
6401.3 kg	607.7 kg	1836.0 kg
216.96 g	188.09 g	208.84 g
18.49 g	6.50 g	3.97 g

Change to

Alarm Below 90 ppm

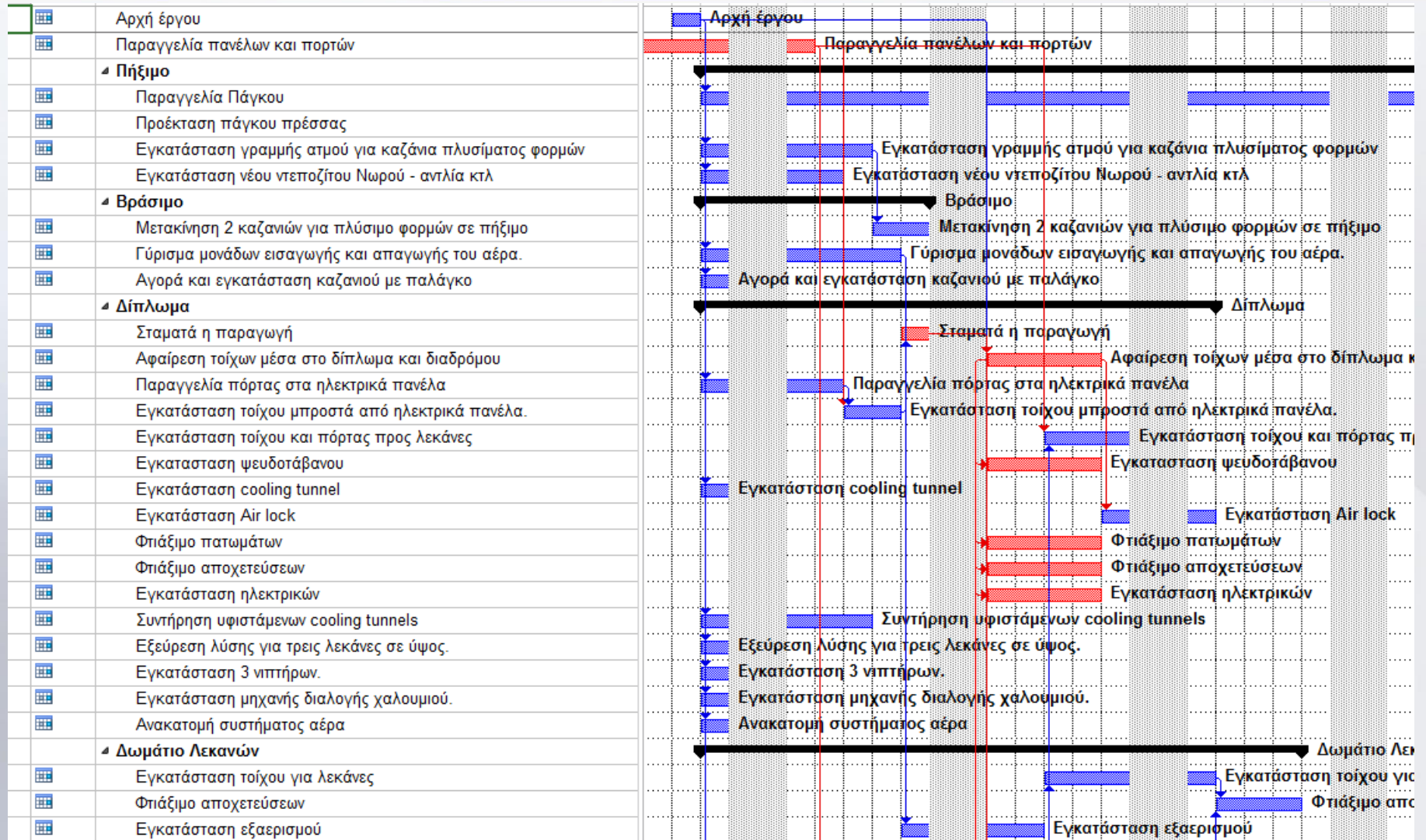
No rope needed.



From 9 tns/10 hrs **Tripled** To 27 tns /10 hrs

Gantt Chart

How to cause the change



Fever Chart data

Project	
Project CCPM Start Time	29/10/2011
Project Buffer starts on	18/02/2012
Due date - End of Project Buffer	31/03/2012
Now (Today)	10/02/2012
tasks CCPM Completed (days)	52
Now - CCPM Start time	104
Project CCPM Length	112
% Time Project CCPM Consumed	93%
%project complete	46%
%CCPM time consumed - %project time consumed	46%
% Project Buffer consumed	93%
Project Duration	154
Project Buffer Length (days)	42
Project Buffer consumed (days)	39
CCPM remain (days)	8
Time to finish/submit (Days)	50
Time to finish/submit (Weeks)	7
Project Buffer remain (days)	3



17/12/2011	24	39
19/12/2011	24	43
22/12/2011	24	48
27/12/2011	24	57
29/12/2011	26	54
30/12/2011	27	57
30/12/2011	28	55
31/12/2011	29	54
31/12/2011	30	52
02/01/2012	30	55
03/01/2012	46	25
06/01/2012	46	30
10/01/2012	46	38

How to cause the change

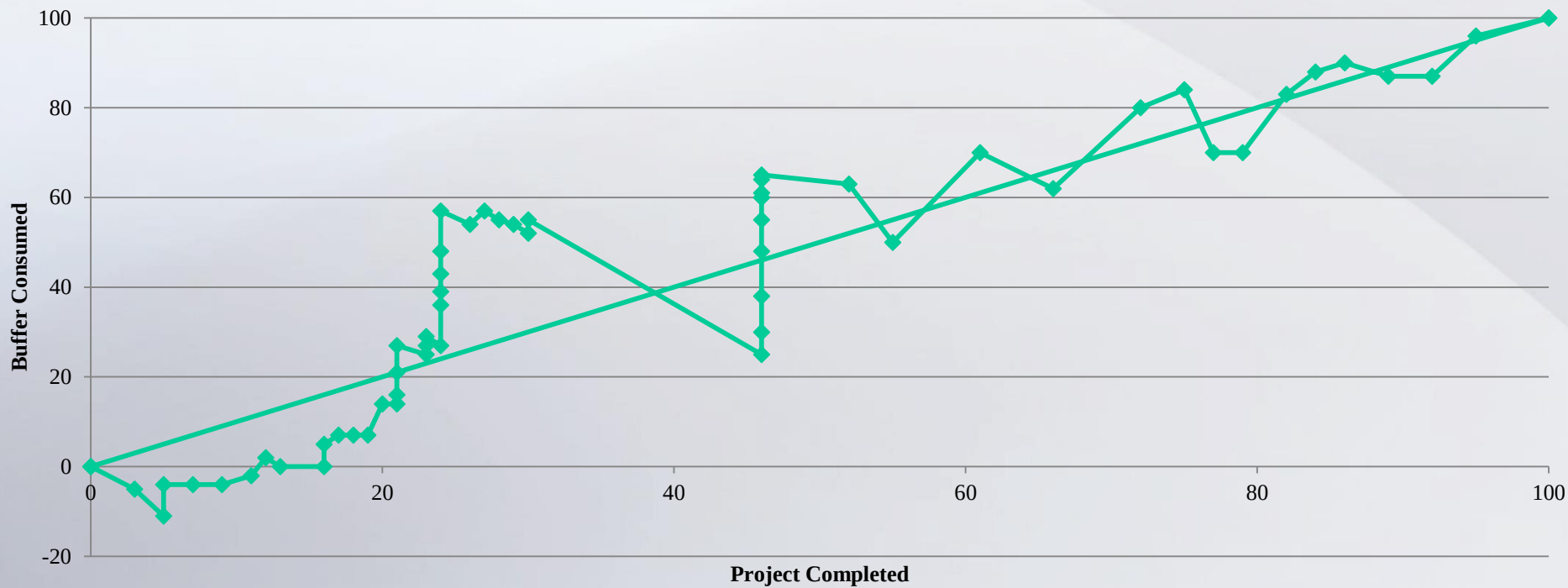
Task Name	Task Scheduled in days	Task Completed in days
Project	112	52
Task Name	Duration	
Building Works	77	
Utilities Installations	14	
Set up Machinery	14	
Piloting	7	
Detailed Tasks	76	49
Building Works	21	
Σταματά η παραγωγή		

Fever Chart

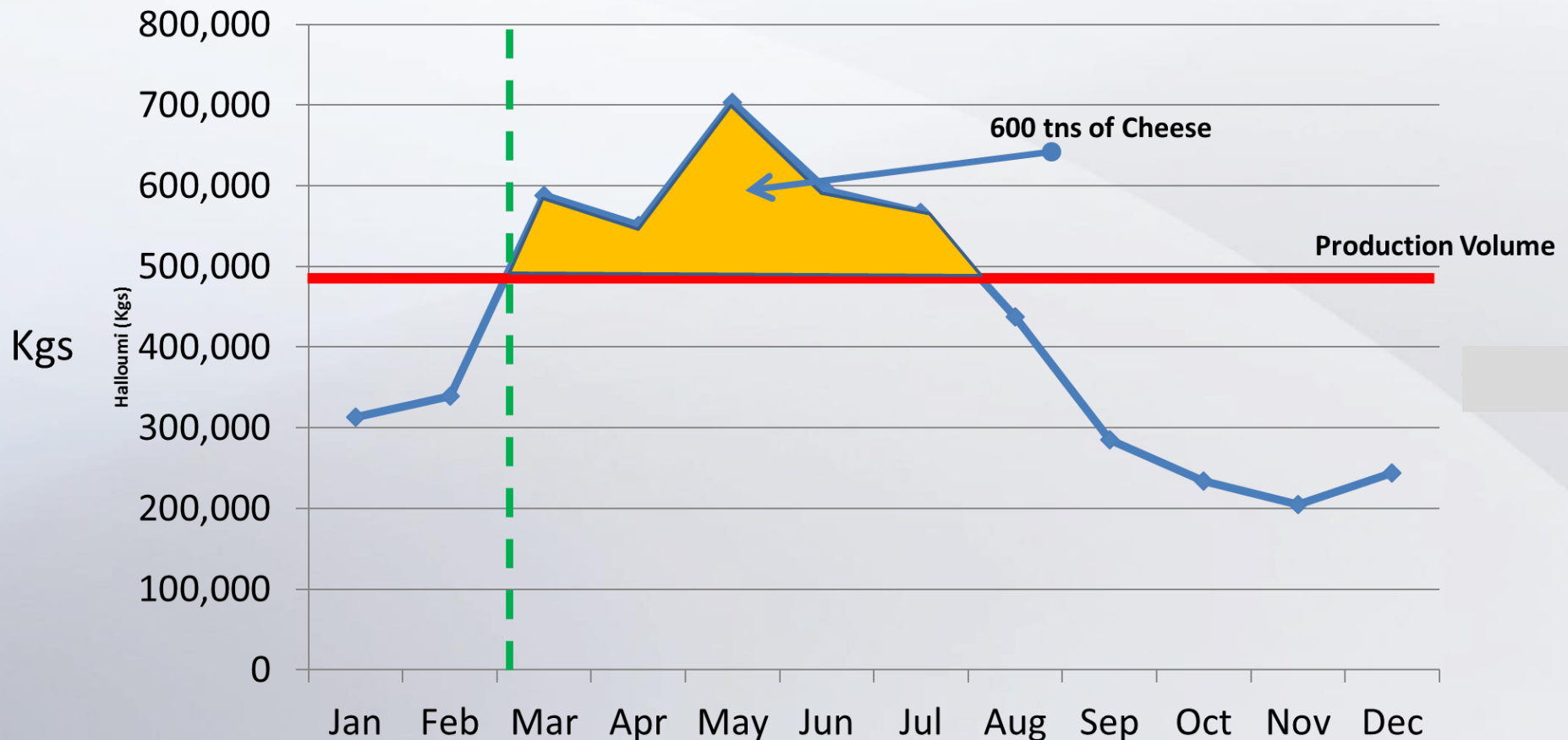
Scatter with Straight Lines
and Markers

How to cause the change

Fever Chart - PROJECT Status

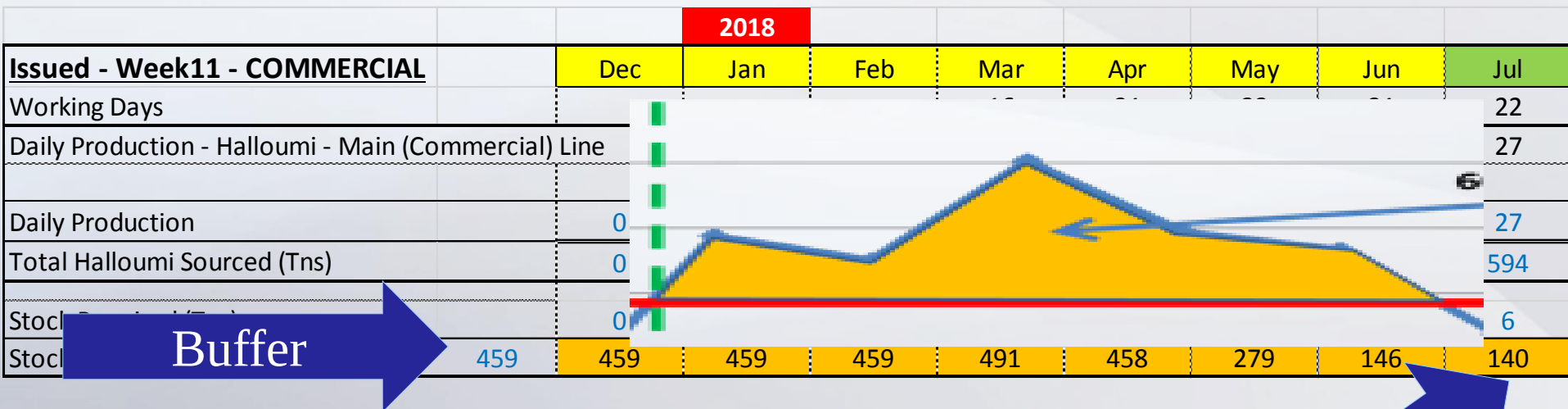


Effects of Seasonality

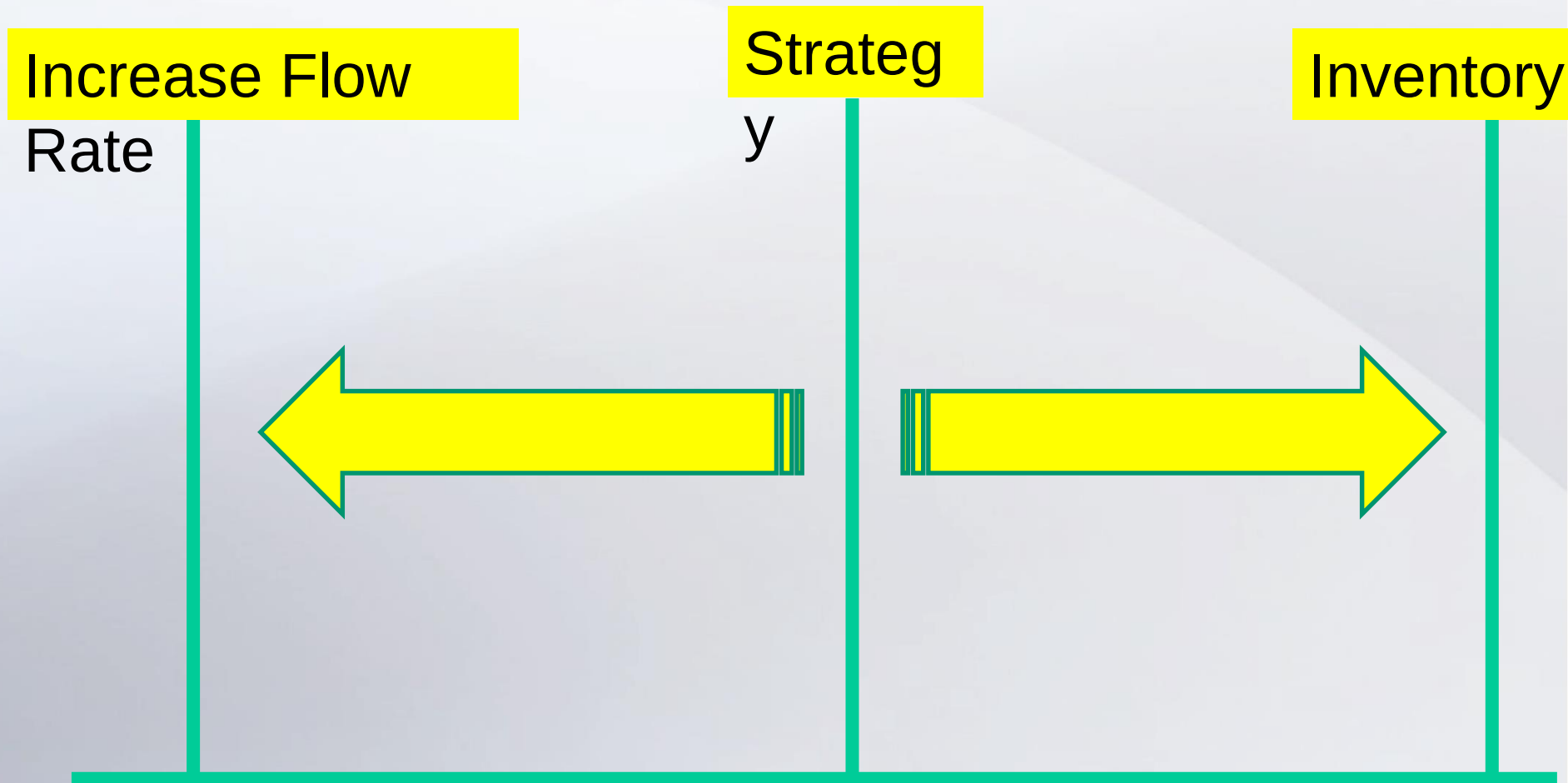


Buffer Management

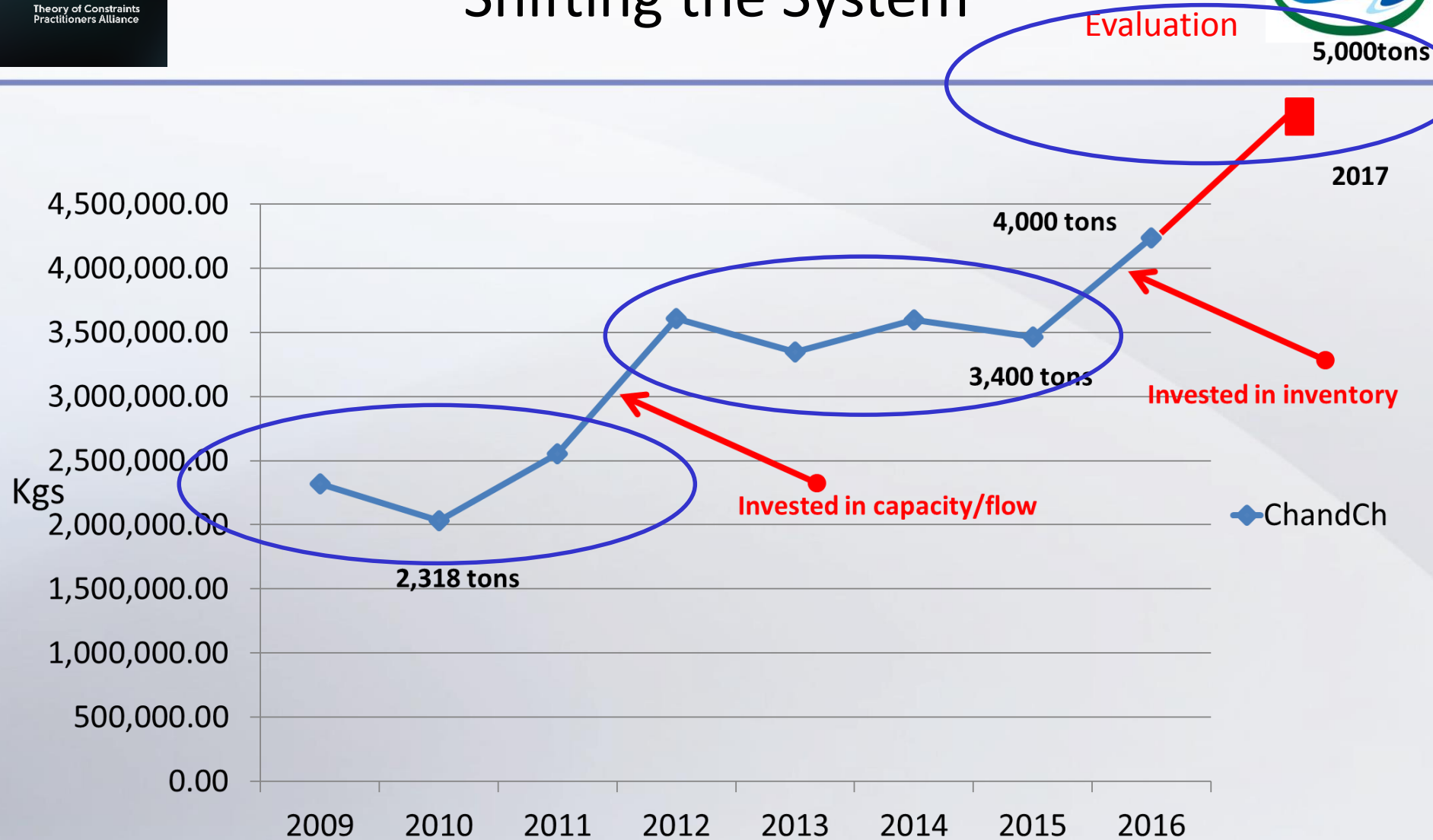
How to make the change stick



Strategy against seasonality



Shifting the System



Exports Award 2017



Thank you for your patience !!!

Questions ?????