



# ***Lessons from Implementing MTA in a Traditional MTO Company***

***Oded Cohen***  
***TOC Strategic Solution***



## Oded Cohen

Oded has nearly 35 years of experience in developing, teaching and implementing TOC methodology, solutions and implementation processes working directly with Dr. Goldratt all over the world. Among the countries to which Oded brings his expertise are the USA, Canada, Japan, India, China, the UK, Poland, Russia, Ukraine, Colombia, Chile, Peru, Turkey and many others.

Oded has authored multiple TOC articles and contributed to numerous TOC books.

Oded is the author of *Ever Improve – A Guide to Managing Production the TOC Way*, published in June 2010. Oded co-authored the book *Deming & Goldratt: The Theory of Constraints and the System of Profound Knowledge – The Decalogue*.

Together with Jelena Fedurko Oded has co-authored the book *Theory of Constraints Fundamentals*.

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## Structure

- 1. MTA – key injections**
- 2. The technical implementation**
- 3. Issues to be considered for the implementation**
- 4. The role of the pilot**
- 5. Outcomes of the pilot**
- 6. NBRs and how to address them**
- 7. More practical lessons**
- 8. What happens if we skip the pilot?**



## Introduction

The TOC solution for MTA is conceptually simple, practical and technically straight forward.

Yet, the change in the flow and in managing the flow is challenging.

The logic of moving from MTO to MTA is that there is potential to grow the manufacturing company by offering availability to the downstream chain.

The presentation here is based on companies that produce parts and kits for servicing the after market (automotive, agriculture and marine). (the OEM part of the business continues to be run under MTO).

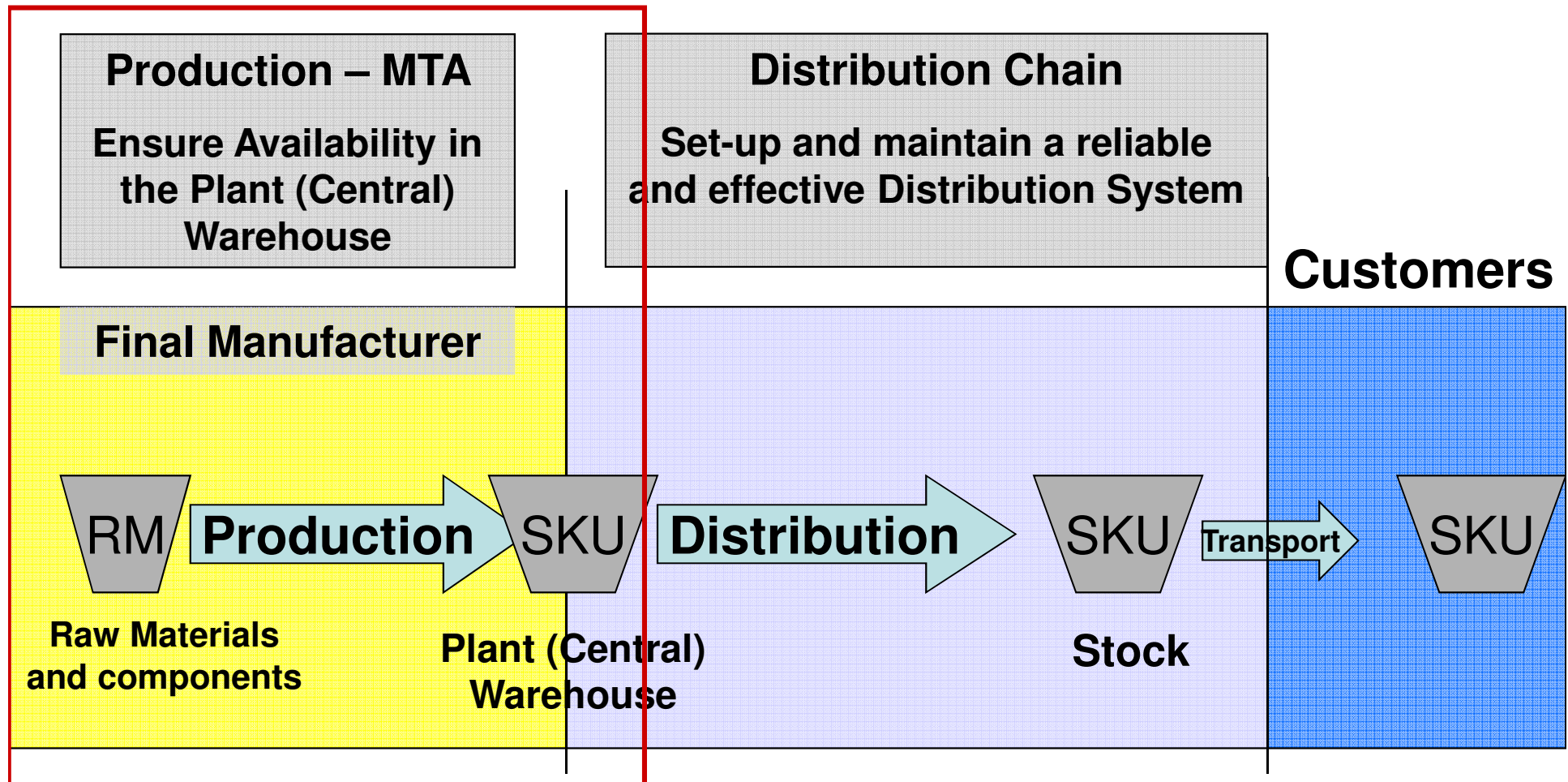
Operating MTO in environment that demands availability has created difficulties (limitations) to the system. Nevertheless, the system learned how to live with it and created rules and procedures.

These rules and procedures cause the major challenges to the MTA implementation.

The pilot – applying the solution to limited number of SKUs and a part of the down stream channels – is very important step in the implementation.



## Supply Chain Management (SCM) Moving to TOC replenishment Solution - MTA



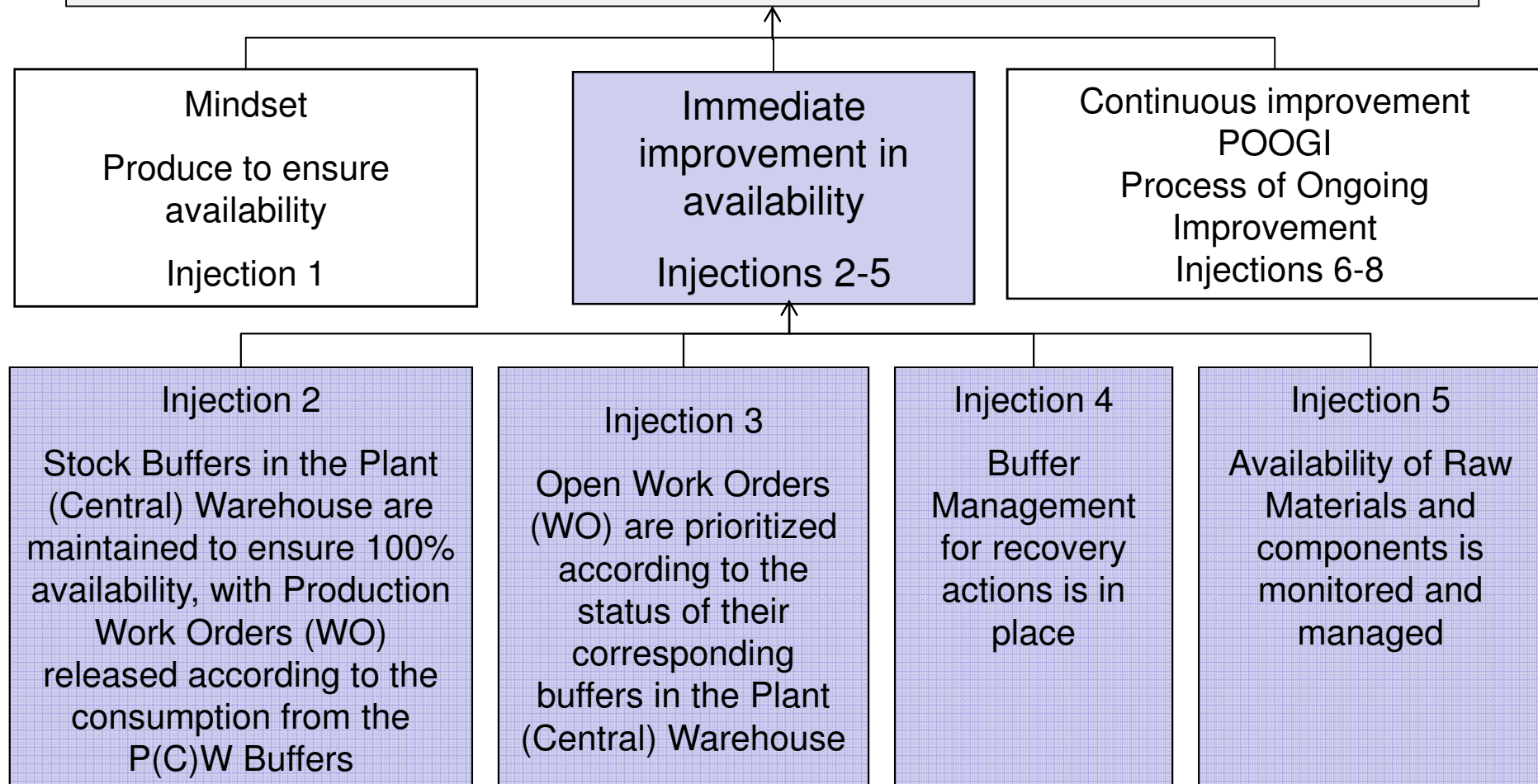


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### 1. The Key Injections of the TOC Solution for MTA

Tactics: Production and Material Management are on the  
TOC Replenishment system





## **1. MTA Key Injections - Challenges**

Injection 1 – Mindset and the measurements

- Commitment to availability
- Higher inventory turns (lower DIOH)

Injection 2 –

- The concept of Stock Buffer, initial size and DBM
- Giving the control to the Plant Warehouse by replenishing consumption
- Very short horizon production plan (more Ad-Hoc).

Injection 3 – setting priorities to WOs

Injection 4 – BM for recovery actions

- What to do with too many WOs in the Black and in the Red

Injection 5 – Availability of Row Materials and components





## **2. The Technical Implementation**

The IT software is simple but demands a lot of detailed work.

Many times companies develop their own software based on Excel,

The first challenge is setting up the Stock Buffer Sizes.

For injection 1 there is a need for a global view: Availability and Inventory Turns (or DIOH)

For Injection 2 – there is a need to deal with every SKU individually.

For that there is a need to have the daily control file that gives the inventory profile of every SKU which is under the MTA.

The file is simple (can be an excel file) but it demands a lot of calculations and data manipulations to present the relevant information for managing availability.





## Injection 2 - Mechanics

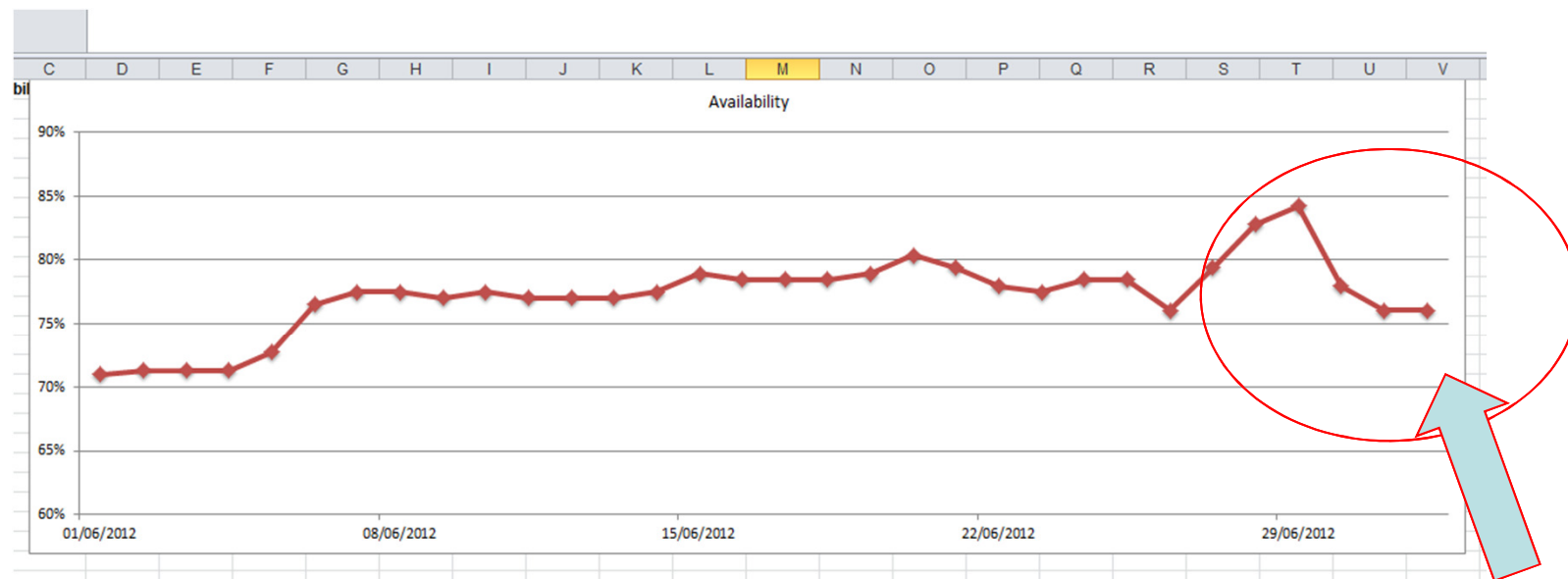
### Example – Daily Control File of Pilot SKUs in SFG Warehouse

	A	B	D	E	F	G	H	I	J	K
	Date	SKU - Name/Description	Buffer Size (Target Level) Buffer Size?	Minimum Order Quantity	Balance on hand	Buffer Status	In Production	Buffer Statistics - What is the WO waiting for?	Corrective Actions	Date of Expected Delivery
72	01/07/2012		144	1	0	100%	144			
73	01/07/2012		64	1	0	100%	128			
74	01/07/2012		58	1	0	100%	64			
75	01/07/2012		336	1	0	100%	321			
76										
77	01/07/2012		195	1	1	99%	200			
78	01/07/2012		437	1	7	98%	450			
79	01/07/2012		360	81	106	71%	260			
80	01/07/2012		25	1	8	68%	20			
81	01/07/2012		50	1	16	68%	40			
82	01/07/2012		34	10	11	68%	20			
83	01/07/2012		37	1	12	68%	0			
84	01/07/2012		130	1	44	66%	94			
85										
86	01/07/2012		89	1	31	65%	30			
87	01/07/2012		57	72	20	65%	72			
88	01/07/2012		23	1	15	35%	6			
89	01/07/2012		150	50	99	34%	50			
90	01/07/2012		309	1	206	33%	0			
91										
92	01/07/2012		75	1	51	32%	0			
93	01/07/2012		170	72	116	32%	0			
94	01/07/2012		60	1	41	32%	0			
95	01/07/2012		172	1	121	30%	0			
96	01/07/2012		58	1	42	28%	0			
97										
98	01/07/2012		247	81	252	-2%	0			
99	01/07/2012		152	81	162	-7%	0			
00	01/07/2012		73	1	81	-11%	0			
01	01/07/2012		59	1	112	-90%	0			
02	01/07/2012		02	1	45	06%	0			



## Injection 1 – Availability Reports

Example – Availability of a family of SKUs in the SFG Warehouse

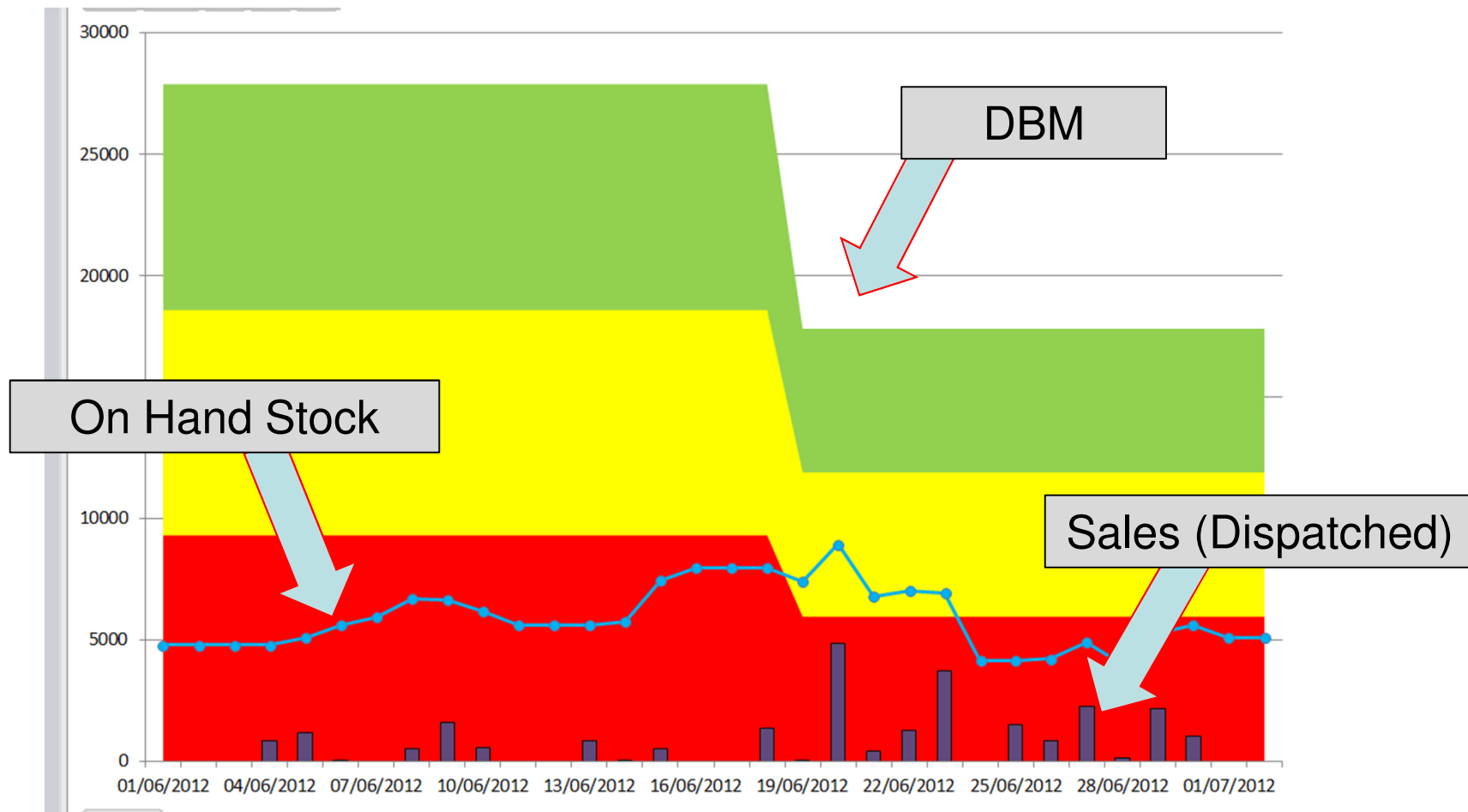


End of the month -  
Deliveries



## Managing every SKU for Availability with no excess inventory – Injection 2 for injection 1

Example of the profile of an individual SKU





## Managing the SKYs – Where to focus?

There is too much data!  
How not to lose the big picture?

Average Penetration

### Daily Buffer Penetrations per SKU

	16/08	17/08	18/08	19/08	20/08	21/08	22/08	23/08	24/08	25/08	26/08	27/08	28/08	29/08	30/08	31/08	01/09	02/09	03/09	04/09	05/09	06/09	Average Buffer Penetration
5																							100%
6	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	71%	76%	84%	84%	84%	95%	92%	84%	86%	94%	132%	132%	83%	104%	90%	82%	55%	55%	55%	100%	69%	71%	85%
10	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	45%	53%	48%	48%	51%	71%	78%	84%	84%
11	88%	100%	100%	100%	100%	100%	100%	69%	69%	69%	69%	69%	69%	56%	56%	76%	76%	76%	76%	83%	83%	83%	80%
12	100%	87%	83%	80%	80%	83%	89%	83%	98%	99%	100%	100%	47%	61%	74%	70%	61%	61%	73%	84%	72%	80%	80%
13	100%	100%	100%	100%	100%	100%	100%	14%	43%	66%	66%	66%	66%	52%	74%	76%	63%	51%	51%	64%	96%	100%	74%
14	53%	62%	62%	62%	62%	71%	71%	71%	76%	88%	66%	66%	64%	58%	58%	58%	69%	69%	69%	69%	73%	73%	67%
15	24%	29%	33%	33%	33%	34%	36%	50%	65%	65%	65%	65%	82%	84%	86%	86%	86%	86%	86%	89%	89%	89%	63%
16	81%	92%	75%	37%	37%	65%	65%	68%	80%	89%	89%	89%	73%	45%	47%	53%	40%	40%	40%	48%	68%	52%	62%
17	55%	90%	93%	93%	93%	68%	73%	71%	43%	44%	47%	47%	64%	69%	66%	60%	26%	26%	26%	65%	78%	73%	62%
18	58%	58%	58%	58%	58%	65%	68%	70%	64%	84%	84%	84%	91%	44%	56%	37%	23%	23%	23%	65%	74%	47%	62%
19	84%	58%	58%	58%	50%	53%	69%	70%	84%	72%	48%	48%	60%	44%	57%	71%	46%	46%	46%	71%	57%	44%	58%
20	51%	72%	82%	82%	82%	82%	37%	39%	39%	39%	81%	81%	81%	81%	58%	58%	16%	16%	16%	58%	58%	58%	58%
21	84%	97%	97%	100%	100%	100%	70%	70%	85%	85%	85%	85%	90%	62%	28%	28%	-13%	-13%	-13%	4%	18%	21%	55%
22	53%	38%	43%	43%	43%	59%	46%	19%	31%	38%	69%	69%	59%	63%	57%	68%	33%	33%	33%	93%	78%	69%	52%
23	46%	46%	46%	46%	46%	46%	20%	20%	27%	70%	70%	76%	98%	78%	78%	78%	35%	35%	35%	78%	59%	63%	52%
24	62%	61%	55%	55%	55%	58%	58%	55%	46%	53%	53%	53%	57%	53%	53%	51%	42%	42%	42%	42%	41%	39%	51%
25	44%	60%	64%	64%	64%	91%	100%	100%	100%	100%	100%	100%	31%	38%	-3%	0%	6%	6%	6%	17%	18%	18%	51%
26	45%	58%	52%	45%	45%	43%	30%	30%	44%	46%	46%	46%	65%	71%	67%	55%	55%	55%	55%	60%	58%	43%	51%
27	49%	54%	59%	25%	25%	27%	27%	43%	60%	52%	52%	52%	52%	52%	52%	52%	52%	52%	52%	57%	57%	57%	48%
28	40%	49%	49%	4%	4%	34%	99%	54%	1%	91%	91%	91%	99%	99%	5%	-1%	4%	4%	4%	39%	91%	73%	47%
29	23%	32%	32%	32%	32%	63%	67%	67%	30%	30%	30%	30%	35%	35%	35%	35%	90%	90%	90%	95%	28%	12%	46%
30	56%	59%	59%	46%	46%	49%	37%	37%	42%	48%	48%	48%	56%	56%	58%	42%	37%	37%	37%	40%	39%	39%	46%
31	55%	64%	51%	43%	43%	43%	35%	43%	39%	50%	50%	50%	50%	58%	41%	42%	49%	49%	49%	51%	27%	27%	46%
32	46%	62%	65%	42%	42%	43%	46%	48%	39%	50%	50%	50%	58%	39%	20%	37%	36%	36%	36%	51%	56%	56%	46%
33	50%	54%	60%	60%	60%	37%	37%	30%	36%	44%	44%	44%	48%	48%	49%	46%	39%	39%	39%	39%	45%	47%	45%
34	56%	68%	69%	43%	43%	43%	31%	31%	33%	40%	40%	40%	46%	46%	46%	39%	41%	41%	41%	43%	55%	58%	45%
35	43%	49%	67%	39%	39%	72%	34%	42%	20%	25%	25%	25%	49%	53%	56%	59%	36%	36%	36%	65%	68%	29%	45%
36	53%	53%	56%	28%	28%	38%	38%	40%	49%	49%	31%	31%	31%	42%	34%	43%	43%	43%	43%	80%	61%	70%	45%
37	87%	45%	32%	32%	32%	51%	57%	27%	36%	40%	40%	40%	36%	53%	59%	39%	54%	54%	54%	66%	33%	15%	45%
38	44%	57%	57%	28%	28%	30%	49%	55%	26%	12%	12%	12%	33%	45%	53%	24%	71%	71%	71%	100%	26%	26%	42%
39	50%	54%	58%	39%	39%	45%	34%	34%	36%	36%	36%	36%	33%	40%	30%	31%	45%	45%	45%	59%	53%	53%	42%
40	73%	51%	55%	51%	51%	47%	39%	40%	37%	42%	34%	34%	34%	40%	33%	32%	36%	36%	36%	38%	43%	47%	42%
41	51%	52%	55%	55%	55%	38%	41%	35%	28%	31%	37%	37%	50%	40%	33%	36%	32%	32%	32%	40%	41%	41%	41%
42	63%	46%	46%	46%	46%	83%	64%	43%	15%	27%	27%	27%	52%	63%	47%	54%	22%	22%	22%	22%	22%	22%	40%
43	36%	45%	49%	49%	49%	70%	9%	12%	24%	39%	39%	39%	50%	69%	7%	11%	51%	51%	51%	62%	62%	-2%	40%
44	53%	43%	45%	45%	45%	50%	51%	39%	37%	46%	46%	46%	50%	32%	36%	38%	26%	26%	26%	30%	31%	31%	40%
45	29%	100%	100%	71%	71%	71%	85%	14%	14%	14%	14%	14%	14%	83%	83%	-5%	-5%	-5%	-5%	9%	38%	38%	39%
46	87%	83%	65%	49%	49%	43%	28%	60%	47%	12%	12%	12%	24%	23%	40%	45%	27%	27%	27%	30%	31%	33%	39%
47	43%	49%	53%	53%	53%	18%	21%	21%	23%	26%	26%	26%	47%	71%	50%	54%	30%	30%	30%	41%	43%	43%	39%
48	52%	55%	53%	53%	53%	76%	50%	52%	-2%	13%	13%	13%	13%	23%	23%	25%	33%	33%	33%	44%	51%	74%	38%
49	92%	73%	47%	47%	47%	50%	51%	55%	59%	6%	6%	6%	33%	33%	36%	48%	17%	17%	17%	22%	26%	30%	37%
50	52%	54%	57%	57%	57%	27%	30%	36%	15%	17%	17%	17%	41%	25%	32%	8%	37%	37%	37%	62%	68%	30%	37%
51	19%	32%	32%	32%	32%	37%	39%	24%	27%	35%	35%	35%	44%	49%	28%	37%	47%	47%	47%	47%	48%	38%	37%
52	6%	6%	6%	6%	6%	6%	6%	6%	11%	69%	69%	69%	69%	67%	28%	33%	33%	33%	33%	58%	100%	67%	37%
53	51%	38%	38%	38%	38%	38%	38%	38%	38%	38%	38%	38%	38%	47%	48%	58%	38%	38%	38%	38%	46%	46%	37%



### **3. Issues to be considered for the implementation *(as raised by the implementation team)***

#### **1. How to handle Final Assembly?**

#### **Major Concerns of Top Management at the outset**

- 2. How to handle the dealers?**
- 3. Payment terms for the dealers. [some had concerns that the elasticity of the sales will have significant impact on cash flow. this is actually a NBR]**
- 4. Motivation – How do we handle the pay for our people?  
(given that at current reality people are paid buy piece?)**
- 5. RM Budget – how should we plan and control it? What will be the impact on cash flow?**





### **3. Issues to be considered for the implementation**

#### ***Final Assembly***

The company produces and sells packaged kits, as well as just the parts of the kit. It is a “T” plant with high level of commonality.

It is possible to give better level of service with less inventory if the company maintains a warehouse of semi finished goods (SFG) and Kit To Order (KTO)

Kitting Buffer (KB) = 3 days

Q: Where do we put kits ready before the shipping day?

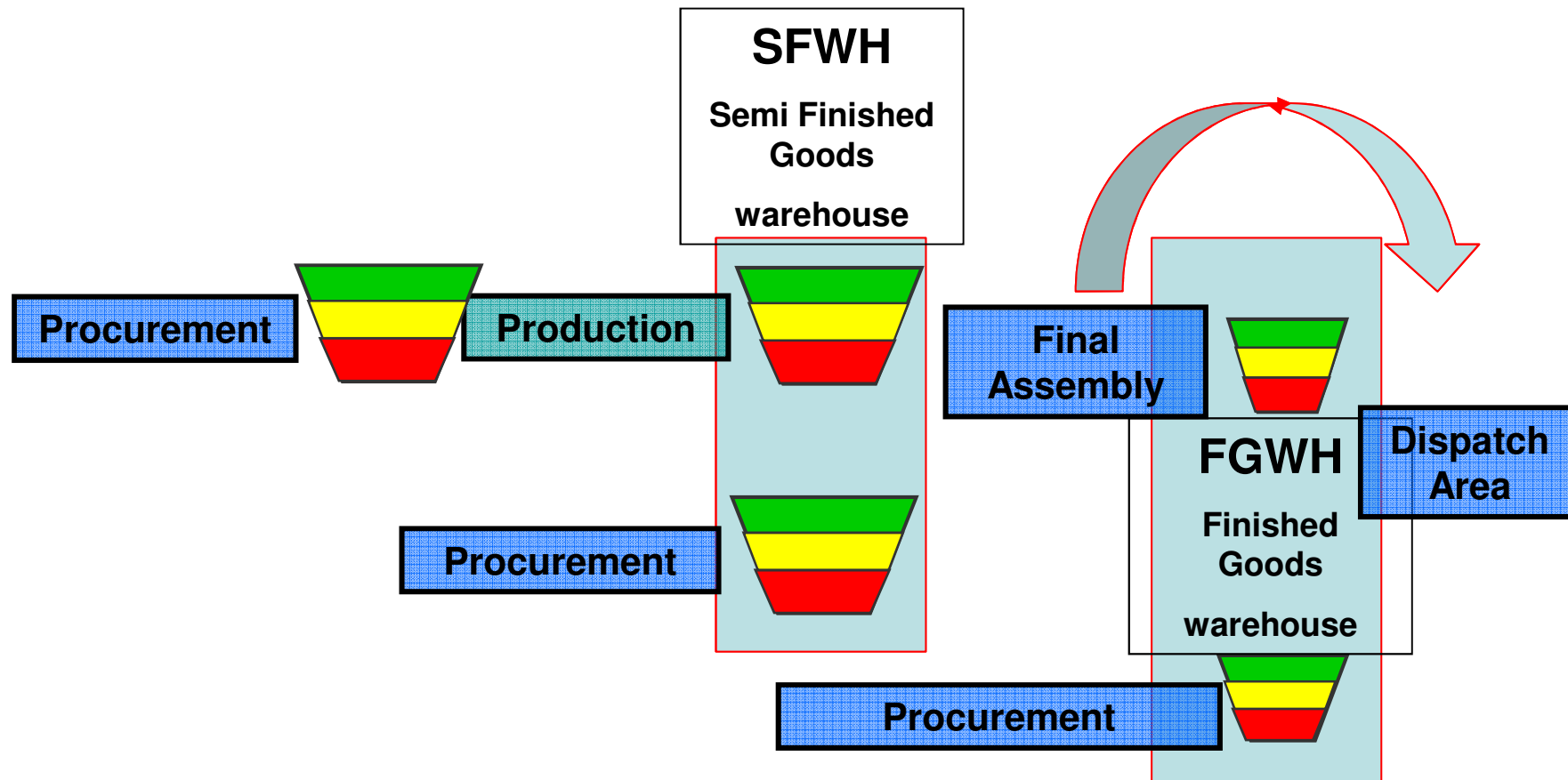
A: Arrange the shipping dock with marks of the truck ready to be loaded to the trucks. What is assembled is put in the marked area for loading.

Q: Shall we have FG Buffer?

A: Yes, but a small one – to restore some kitting capacity and for minimum batch of low runners.



## General Structure of the implementation







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### **Suggestion to the Dealers**

#### **How to handle the dealers?**

Why to consider the dealers at this stage of the implementation?

The pattern of working with the dealers is causing picks in demand.

Certain products are in shortage due to a BN situation causing the dealers to order more than consumption and stock.



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### **Suggestion to the Dealers**

#### **How to handle the dealers?**

How to involve the dealers with MTA?

Suggestion to the dealers:

No need to give order for 20-50 days

Daily inventory

Buying back (excess)

Flat scale of discount (like the competitors)

Covering transport cost – no need to send tracks to collect

Ensure availability : 70% 1/week, 20% 1 per 2 weeks, 10% - once every 4 weeks

Sales representative will search for shops and attach them to the dealers.

Direct sales will be given to the closest dealer.



## **Major Concerns of Top Management at the outset**

**Motivation – How do we handle the pay for our people?  
(given that at current reality people are paid buy piece)**

Suggestion:

Reduction in Scrap. Set the level of scrap of the last 6 months as the norm. Pay for improvement , punish for deterioration (assuming is legally possible).

NBRs

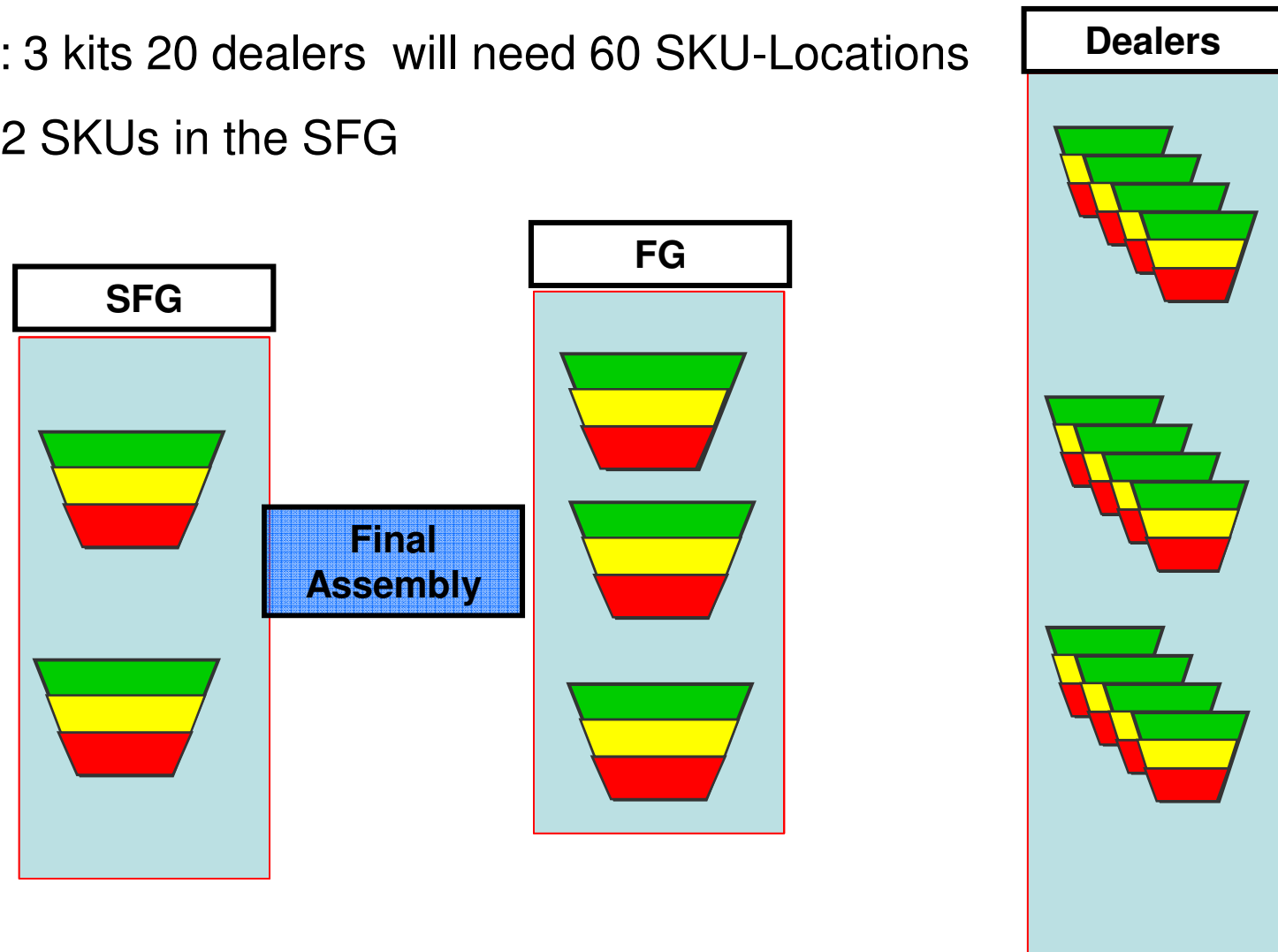
1. Diminishing return
2. Rewarding for lousy performance
3. Potential slow down of work
4. Cannot prevent “new ideas” how to make thing worse (so to be paid for improving them).



## 4. The Role of the Pilot

We suggested: 3 kits 20 dealers will need 60 SKU-Locations

3 kits means 12 SKUs in the SFG





## **The Stakeholders in the pilot**

- 1. Top Management**
- 2. Production (owners)**
- 3. Logistics**
- 4. Maintenance**
- 5. Tooling**
- 6. Suppliers within the group**
- 7. China – RM, assemblies, products**
- 8. Suppliers**
- 9. Sales**
- 10. Dealers**
- 11. Accounting Department**



## **5. Pilot - outcomes**

### **Pilot was run for one month**

1. Sales – no increase
2. Transport - +15-20% (previous decision that coincided with the MTA)
3. OE – no impact
4. FG Inventory – minus 30%, SFG – no change
5. WIP – down in general, (for one production area - reduction of 15%)
6. Impact on production – Kitting up, labor hours up
7. Kitting – used to work to monthly plan which was “great”. Smaller batches – cause difficulties.
8. A Major concern – one supplier that provides C-type parts. They work to monthly plan. They supply to the plant as well as to their own customer (on MTO).



## **5. Pilot - outcomes**

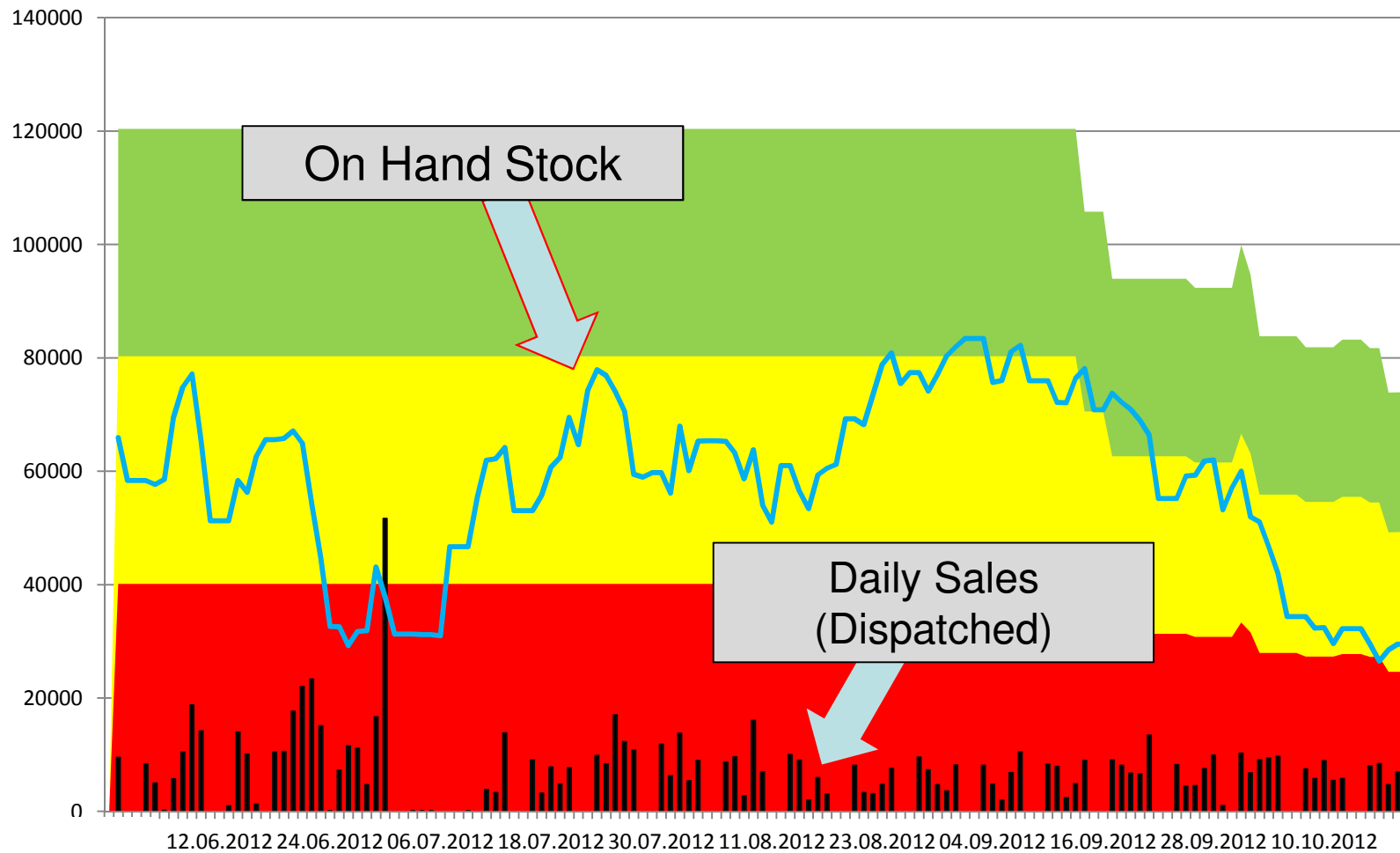
**Results after 2 months – with increased number of SKUs under MTA -**  
Improvements and achievements:

- Uniform distribution of shipments on time, normalizing the distribution of products to dealers
- Simplify the process of planning and focus on the most problematic positions
- Rapid response to changes in demand production
- Increasing the number of proposed improvements through better understanding of problem areas, increase employees' initiatives
- Changed the motivation based on TOC (production management, foremen, workers)





## A Typical profile of a SKU under MTA





## **Pilot – outcomes - Negative**

**Results after 2 months – with increased number of SKUs under MTA –**  
**Problems and Difficulties:**

- Consideration of the lines with a high degree of load
- There has been a fall in the volume of products shipped after implementing MTA dealer network due to the large presence of the latest products
- Due to a decrease in shipping network, and the collection of third-party supplies semi-finished stocks saw an increase in the holding
- The inertia of consciousness and commitment of staff to the old methods of management influence the rate of implementation of the new approach to the management of the entire holding
- Introduction of new management principles require global changes in all areas of



## **6. Potential NBRs**

1. Short term loss of sales
2. The impact of the MTA parts and products on the MTO SKUs
3. Overloading the production area with orders for filling up the buffers
4. Can the company support the increased inventory in order to achieve the target level of all MTA SKUs?
5. Attempts to regulate the consumption – regional warehouses
6. Handling Dealers
7. What to do with Bottlenecks
8. Managing the assembly
9. What to do with semi-finished products?



## **6. NBR – Loss of sales (sort term)**

Impact of MTA on sales (14/9)

Dealers had 3 months of stock (around 600m)

They moved to replenishment of 1,2 or 4 weeks (as before). They were given “mafia offer” to entice them to accept the new way.

Availability went up

Target stocks were based on past consumption – which was artificially inflated (based on speculations)

Target stocks will go down to one month

1/8 stock was 570

14/9 is down to 500

Sales are 200 per month

Replenishment is a bout 140-150 per month. Lost sales of 100 in 2 months.

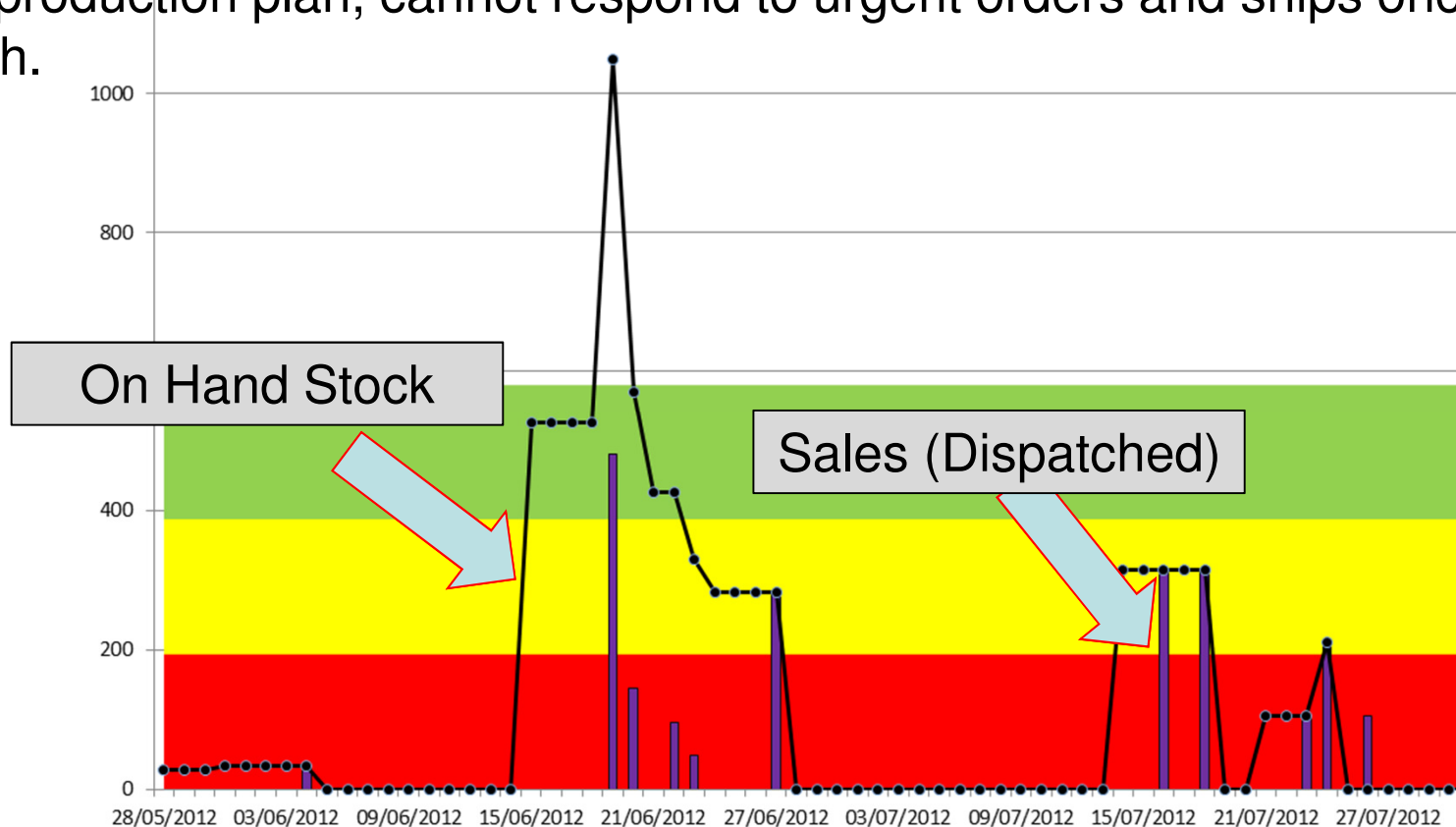
At the same time – MTO orders went down from 120 to 75 per months. Another 90 m. loss. TVC is 42%



## Supplier with monthly plan

### The Problem:

The supplier gets a plan for the month from PPC, produces according to their own production plan, cannot respond to urgent orders and ships once a month.

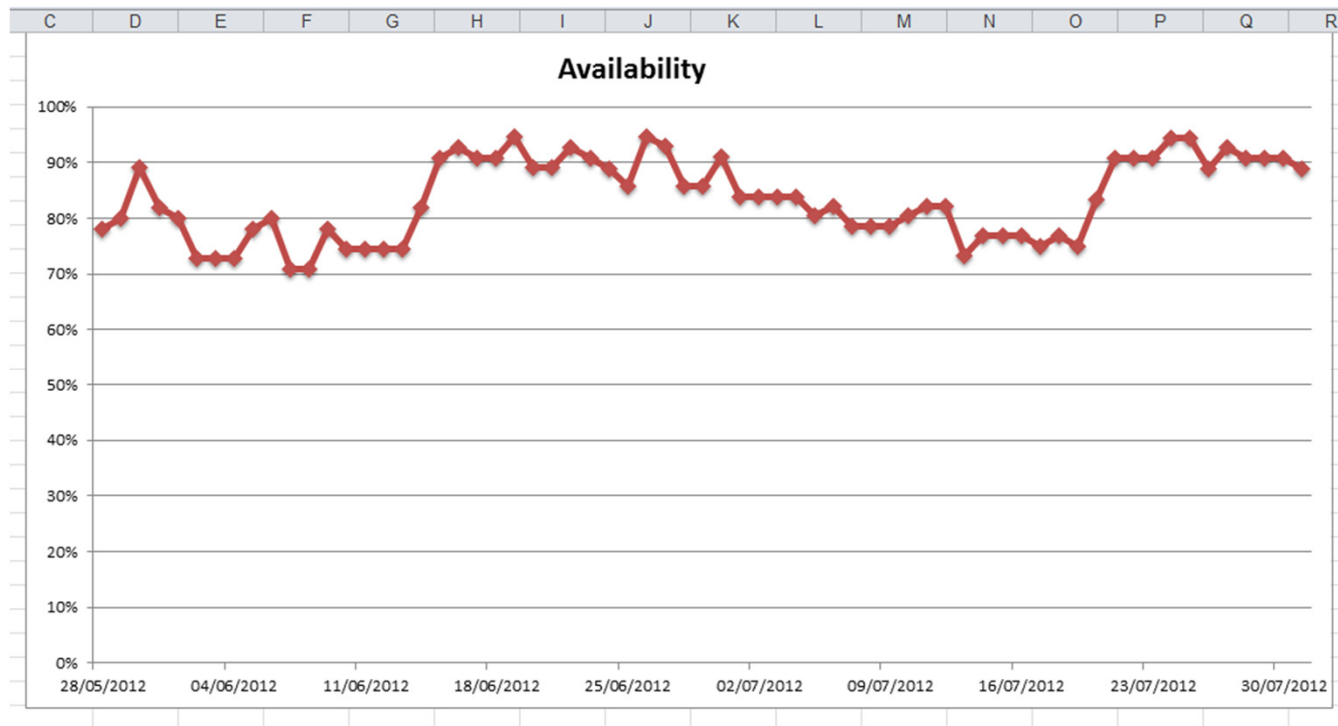




## Supplier with monthly plan

### The Problem:

During the first month of the pilot PPC could not influence the deliveries from the supplier





## **Supplier with monthly plan**

### **The way it was handled:**

1. The supplier gets a plan for the month from PPC – production planning and control department
2. PPC sends frequent updates to the plan in accordance with Buffer Status – Black or Red - of the parts in the SFG store
3. If the parts are in WIP – they are expedited. If not – they are on the wait to be released.
4. PPC has a special report (excel) to monitor the supplier. The report contains some special fields such as:
  - Buffer Size (Target Stock)
  - Cause of delay (waiting for?)
  - In order
  - Expected date of arrival to the plant (7 day transport)
  - On hand
  - In production





## **Supplier with monthly plan**

### **What should be the Target Level?**

Considerations:

1. The part is produced once a month
2. It is unknown when it will be produced. Once it is produced – it takes 7 days of transport
3. PPC calculated: 1 week order process time, 4 weeks in production, 1 week transport and 2 weeks OLT. Total replenishment time – 8 weeks
4. Buffers were very large. The supplier did not have capacity to fulfill the demand and hence the majority of parts were in red or black.



## **7. Practical Lessons**

Concerns:

1. How to budget the purchasing
2. How to incorporate it in the cash flow



## **Assessing the levels of inventory and what can be learned from the findings**

FG profile      TVC 28-30%

1/9      81m

10/9      68m

Dead stock – 10 m (5-7 days)

46 m. – 18.4 days (6m 2.5 m)

38m – 15.2 days

SFG profile

1/9      118m

8m kitted (3 days)

22 Sister company

59 China (4 m once a month)

22 own production

8 other local suppliers

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88 m 35.8 dioh

TVC of sales: 30-40%



## How to Budget

**RM Budget – how should we plan and control it? What will be the impact on cash flow?**

RM

Suppliers +  
frequency

Consumption

Buffers (targets)

WIP

Sum of of all  
targets

SFG

FG

Sum of

Buffers (targets)

**Budget for the month = TVC of the replenishment, +/- Delta  
T.L +/- Delta of what is missing for the T.L.**



## **A Critical Lesson**

### ***When the company is in a crisis***

**What to do when the company is in a cash crisis?**

**Will MTA Save the company?**

#### **Considerations**

**What happened in reality**

**FG inventory went down from 90m to 45 min (18 to 9 dioh)**

**Saving 13-18m of RM**

**This is not enough – need to increase sales**

**Dealers to sell more to wholesalers (no knowledge of the availability at their level)**

**Need to introduce new shops – 500 potential ones, 20 signed up, investment in sales reps**



## **8. What happens if the pilot is skipped**

Due to the financial pressure the company decided to skip the pilot and to apply the MTA solution to all stock SKUs

The company was not ready for the implications of the MTA.

As NBR were not addressed prior to the start the company faced many NBRs during the implementation

The pilot has also to establish the conditions in which increased availability cause increase in sales. Without that - the improvements are only internal and not always can justify the investment in implementing MTA