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The Right Stuff

How to Set Inventory Levels & Get Buy-in from the CFO

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CMS Montera.

CMS RoadRunner.

Innovation

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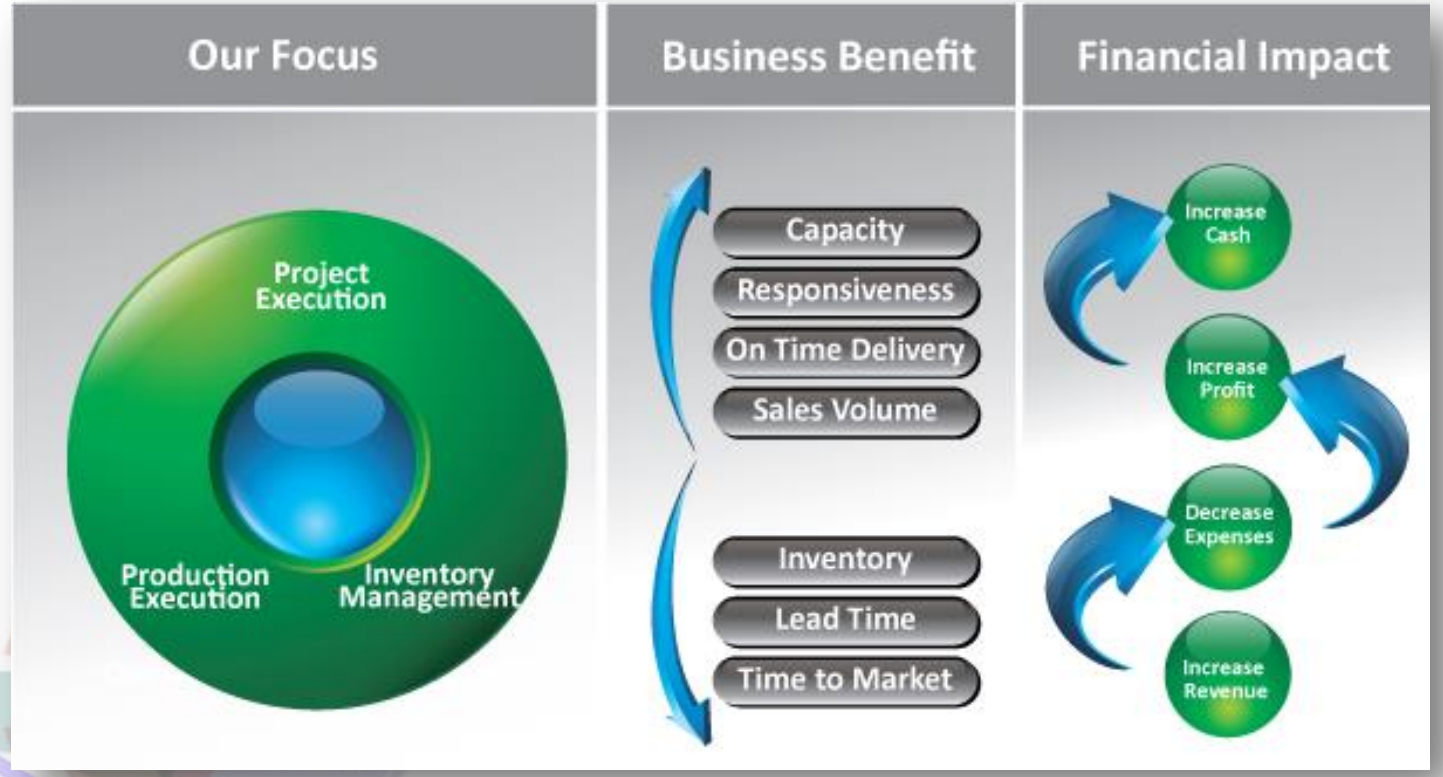
INNOVATION

Who is CMS Montera?

- CMS Montera Provides Management Solutions and Software to Accelerate Projects and Optimize Operations



Who is CMS Montera?

TOCICO CERTIFIED

CMS Montera practitioners:

- Seasoned industry professionals with executive experience
- International management consulting backgrounds (Ernst & Young)

Theory of Constraints (TOC) has been our primary focus since 2000

Certified by the Theory of Constraints International Certification Organization

Certified Management Consultants

CMS Roadrunner software installations in North America, Europe & the Middle East

INNOVATION

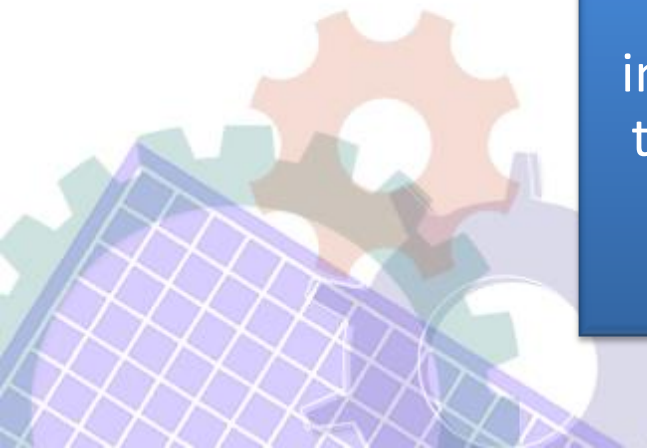
What This Presentation is About:

Operations & Finance are too often in disagreement about inventory levels

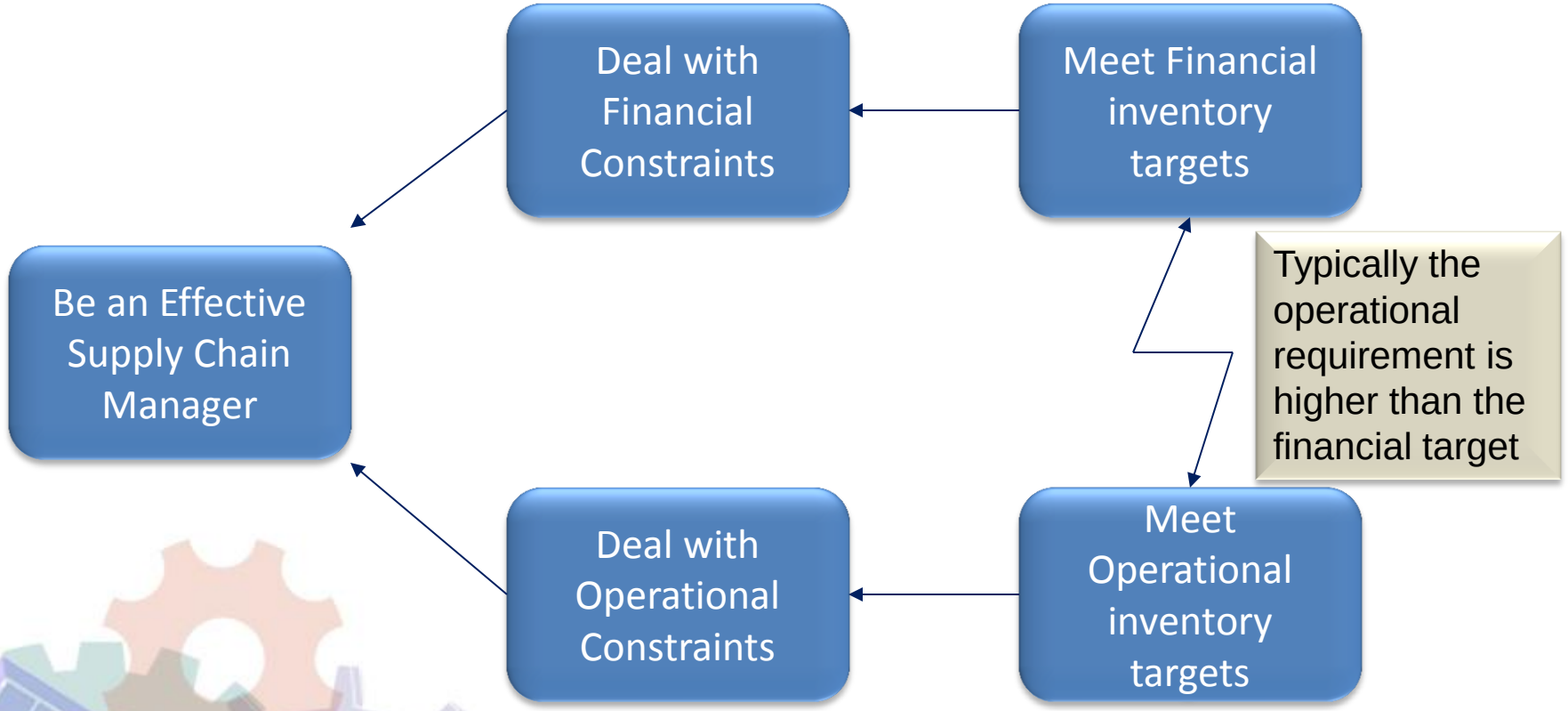
We need an approach that

- Recognizes operational constraints and assumptions
- Allows for a straight-forward investment calculation
- Shows the path to improving inventory turns and availability

Finance is not opposed to inventory – they want to see the business improve ROI & cash flow



Is there a conflict?



Operational Inventory Targets are a Function of…

Consumption Factors

- Lead-time tolerance
- The rate of consumption
- The variability of consumption

Supply Factors

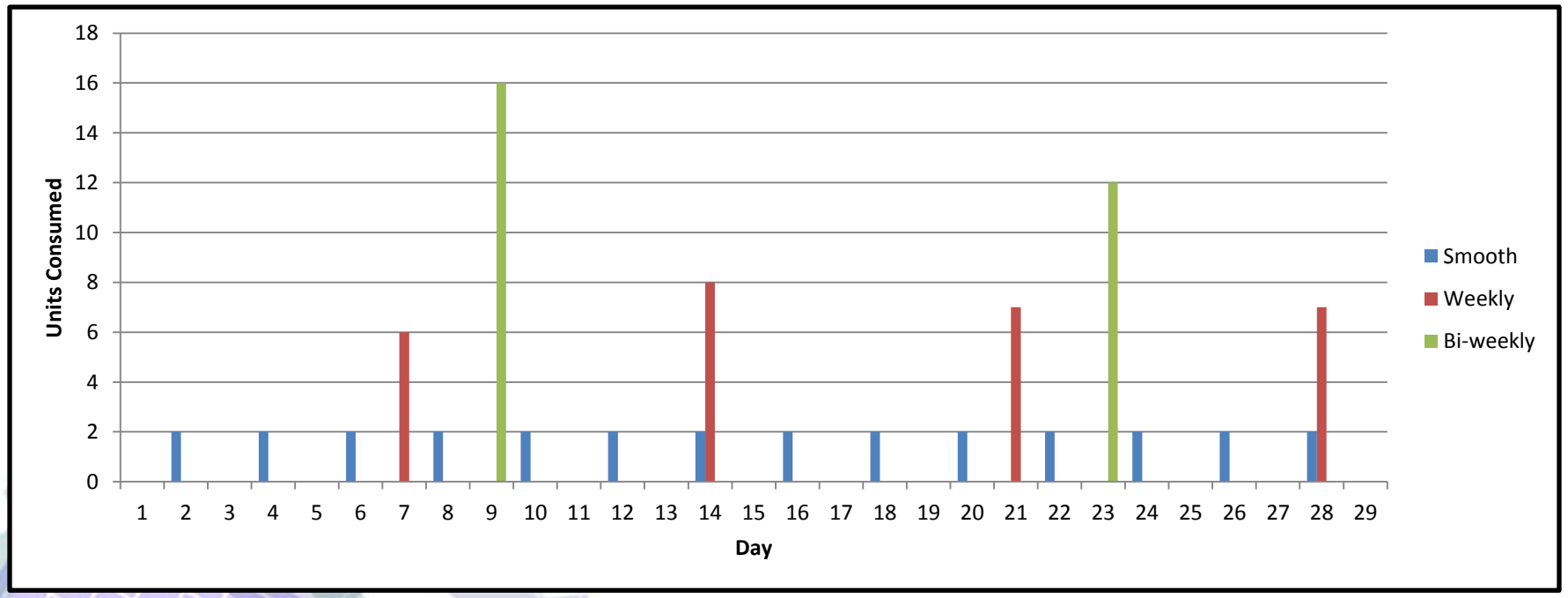
- The time to re-supply
- The frequency of re-supply
- The variability of re-supply
- Supply Order minimums

Consumption Factors

Lead-Time Tolerance	• As long as consumption won't wait for supply, we need to hold stock • We may also choose to stock if there is a capacity advantage
The Rate of Consumption	• As consumption increases, the inventory level should be greater – 2 units vs. 200 units / week
The variability or 'lumpiness' of consumption	• Stock requirements increase when demand comes in waves or batches

Consumption Variability

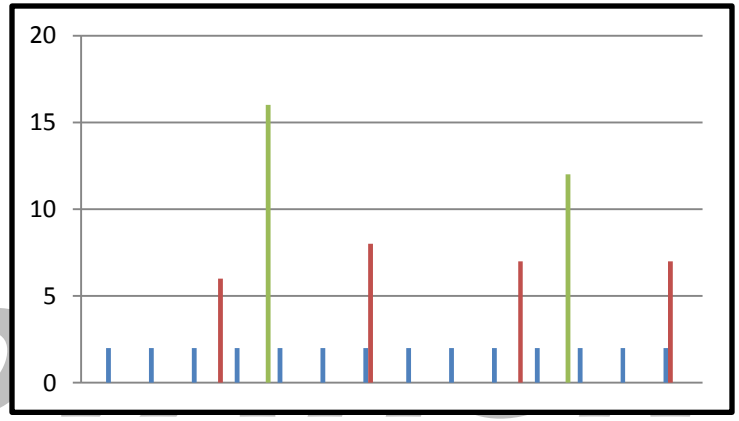
All 3 scenarios have the same total consumption across this time period, but the nature of the consumption requires very different inventory levels assuming the same lead time



Consumption Factors

- Average Consumption (AC) – the daily amount you expect to use
  - The time period should be related to when you want to consider resizing, and the amount of time required to adjust your inventories
- Maximum Consumption (MC) – the most you expect to use across a time period (or the most demand you want to cover)
  - The time period is related to how long it takes to re-supply
- MC:AC Ratios – a measure of the variability of demand across a time period

Scenario	Average	Maximum	MC:AC
Smooth	1 / day	4 in 4 days	1
Weekly	1 / day	8 in 4 days	8/4/1 = 2
Bi-Weekly	1 / day	16 in 4 days	16/4/1 = 4



Supply Constraint Definitions

Supply Lead Time (SLT)	• Normal time between placing an order and putting item in inventory

Order Lead Time (OLT)	• Normal Time interval between replenishments
	• 'perfection' is 1 day – but often not practical when:
	  • Many items to cycle through, limited time on machines
	  • Long setups, administrative inefficiencies, freight

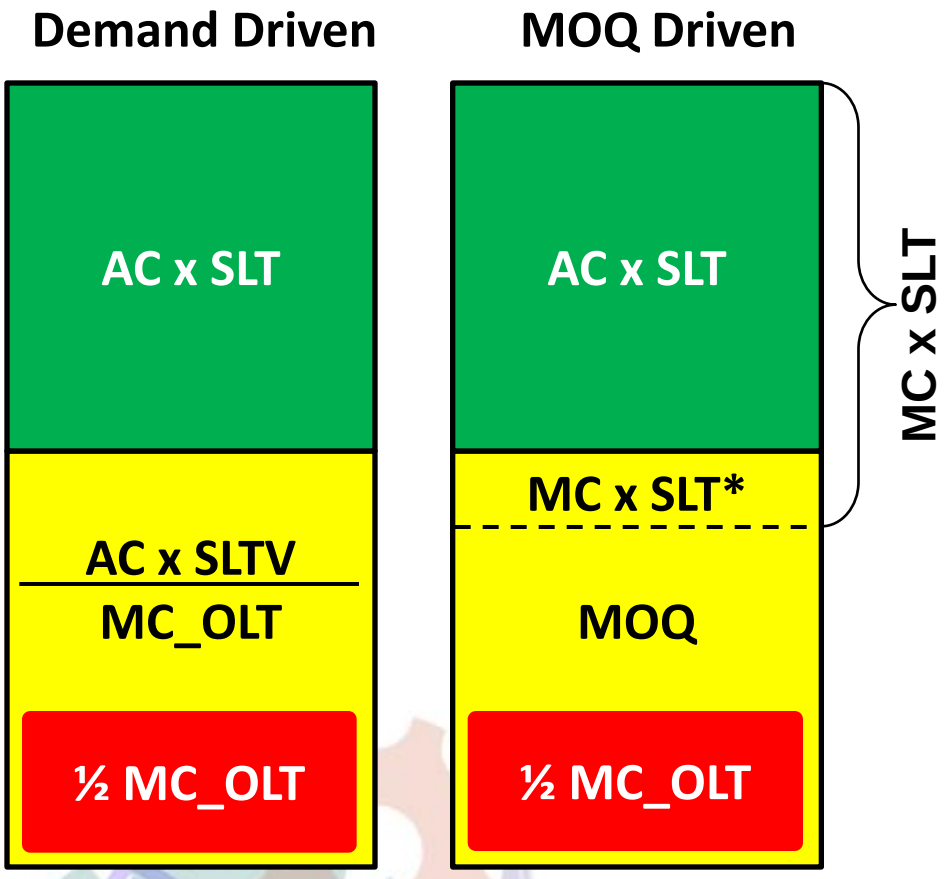
Supply Lead Time Variability (SLTV)	• extra provision for delays in supply – when an order is late, how late could it be?
Minimum Order Quantity (MOQ)	• what is the least you would normally run / buy at one time? • MOQ can cause an effect similar to increasing OLT

Consumption Calculations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Daily	0	5	0	5	3	0	1	0	5	8	4	10	3	0	1
C_OLT	13	13	9	9	9	14	18	27	30	25	18				

- Total Demand = 45
- AC = 45/15 = 3
- OLT = 5 days
- MC_OLT = the most demand in any 5-day period = 30
- OLT MC:AC = MC_OLT / OLT / AC = 30 / 5 / 3 = 2
  - This means the most used in a 5-day period is 100% higher than the average
  - The ratio drops as there are more points of consumption, or more consumption events in a time period

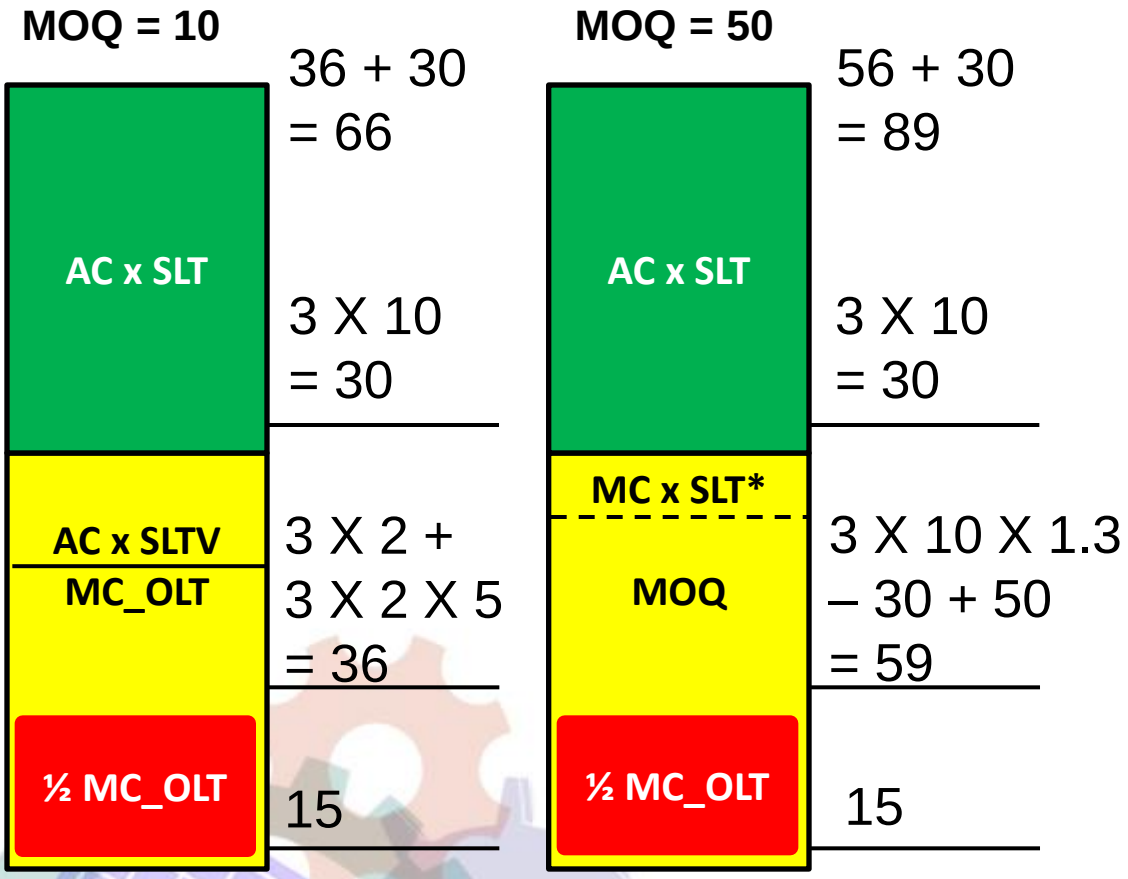
Agile Replenishment Buffers



*The MC x SLT protects for the most that will be consumed in an SLT, because there will usually not be any other orders outstanding when you get a replenishment signal on an MOQ buffer

- **Definitions**
  - **Supply Constraints**
    - OLT — Order Lead Time
    - SLT — Supply Lead Time
    - SLTV — Supply Lead Time Variability
    - MOQ — Minimum Order Quantity
  - **Demand**
    - AC — Average Consumption
    - MC — Maximum Consumption
    - OLT MC:AC — Ratio of MC to AC, across the OLT
    - SLT MC:AC — Ratio of MC to AC, across the SLT
- **Buffer Types**
  - Demand Driven — MC_OLT > MOQ
  - MOQ Driven — MC_OLT < MOQ
- **Relationships**
  - MC_OLT — OLT MC:AC x AC x OLT
  - MC_SLT — SLT MC:AC x AC x SLT
  - Buffered AC — Green Zone / SLT
  - # of Open Orders — Demand Driven = SLT / OLT
    MOQ Driven = Green Zone / MOQ

Buffer Sizing Example



- AC = 3
- OLT MC:AC = 2
- SLT MC:AC = 1.3
- OLT = 5
- SLT = 10
- SLTV = 2

Financial Performance

Aggregate & Item Level

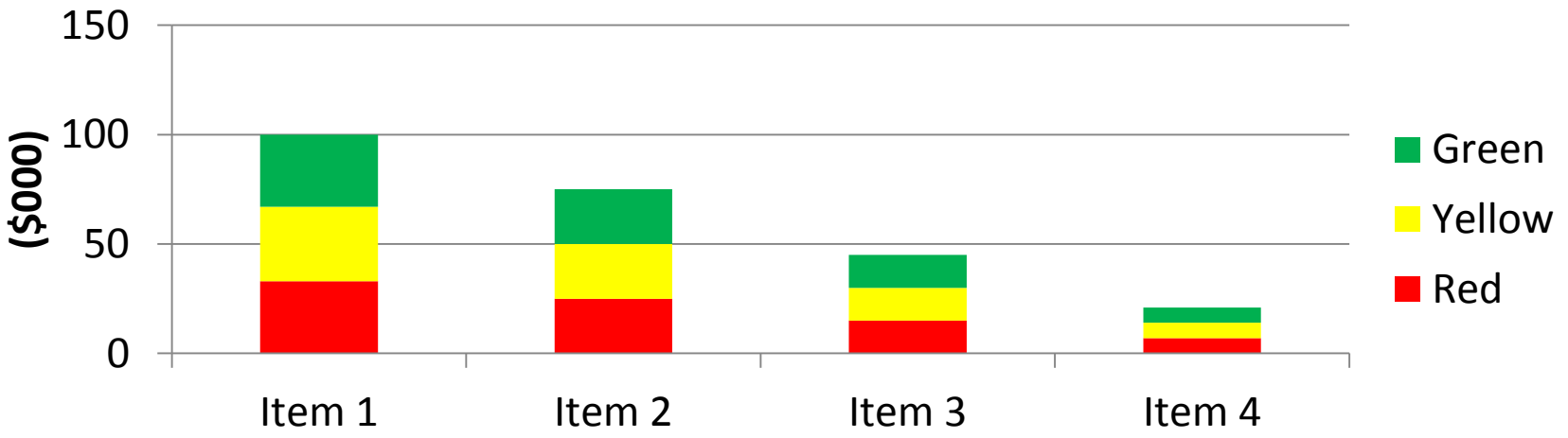
Expected Inventory Levels

- Conservative estimate is that levels will average top of yellow across all buffers
- Experience shows this is often closer to 75% of yellow

Expected Turns

- AC of each item can be extrapolated into estimated annual usage (EAU)
- Convert to dollars, divide by Expected Inventory Levels from above

Financial Performance Example



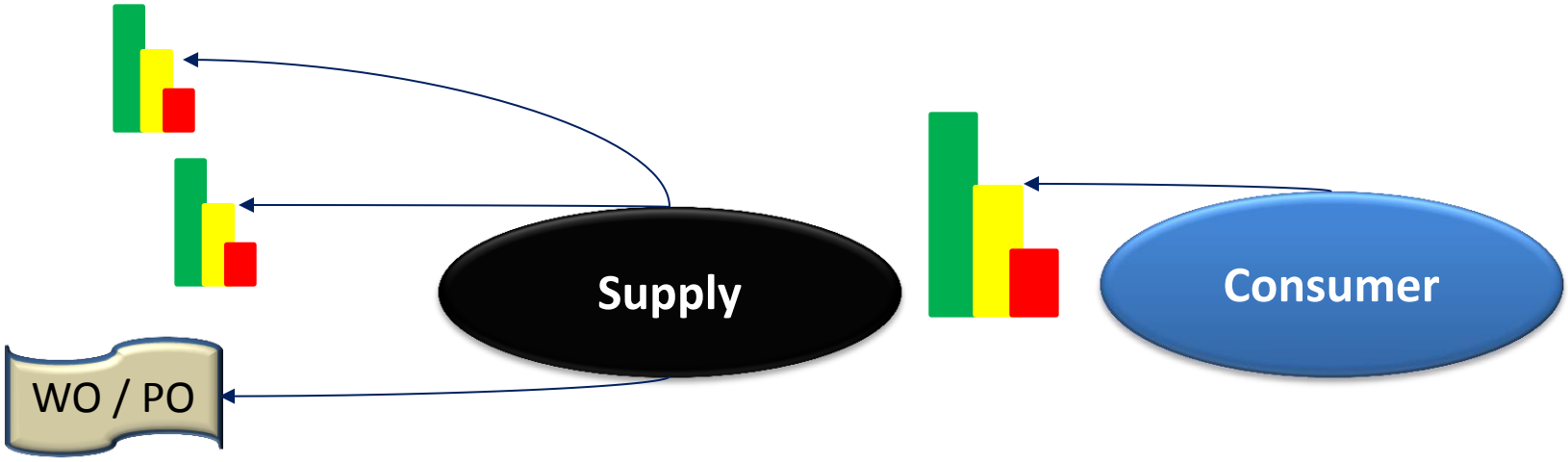
	Item 1	Item 2	Item 3	Item 4	Total
Unit Cost	$ 15.00	$ 6.00	$ 3.00	$ 3.50	
Yellow Units	4,500	8,325	10,000	4,000	
Expected Inv $	**$ 67,500**	**$ 49,950**	**$ 30,000**	**$ 14,000**	**$ 161,450**
AC	250	100	100	125	
EAU $	$ 1,368,750	$ 219,000	$ 109,500	$ 159,688	$ 1,856,938
Turns	**20.3**	**4.4**	**3.7**	**11.4**	**11.5**

Transition

- You may find significant differences in target inventories vs. current inventory levels
  - The time it takes to reduce on hand balances to target is affected by
    - The rate of consumption
    - Non-cancellable supply
  - The time it takes to increase on hand balances to target is a function of supply lead time

	Item 1	Item 2	Item 3	Item 4	Total
Expected Inv $	$ 67,500	$ 49,950	$ 30,000	$ 14,000	$ 161,450
Current Inv $	$100,000	$55,000	$60,000	$5,000	$ 220,000
Gap	$32,500	$5,000	$30,000	($9,000)	$60,000
AC$	$3 750	$600	$300	$438	
Days to Target	9	9	100	7 (SLT)	

Agile Purchasing & Replenishment



Supply replenishes the buffer within the replenishment time, which will cascade back to drive additional demand for components and purchased parts

A stock buffer is placed between consumption and supply

The buffer covers consumption across the replenishment time, with provisions for demand and supply variability

Consumption point draws inventory as required (could be shipments to customers, or manufacturing pulling materials & components from stock)

Actions to improve turns & availability

Initially:

- Lowering the OLT (replenishing the same part more frequently) is the best way to increase inventory turns
- Lowering MOQ is also good, but may have a limited overall benefit on slow-moving items
- Focus attention first on the items with the biggest $ targets and imbalances

Ongoing:

- Instill discipline in adhering to the Agile Purchasing & Replenishment system
- Use red-yellow-green system to identify items that require attention
- Highlight items whose consumption is significantly different than originally modeled

An Agile Replenishment Case Study

Client

- Large industrial manufacturer (extrusion and injection molding) and distributor – 5 plants and 18 warehouses. Highly seasonal product with downward price pressure and raw material cost increases.

Result

- Implemented Agile Replenishment, enabled by CMS RoadRunner, in all plants & warehouses over 12 months. 50% inventory reduction with a 15% sales increase (in a declining market).

Quote

- "We have been able to accomplish this [higher sales with much lower inventories] only because TOC helped us manage our business priorities and define the appropriate sizes of the inventory stock buffers across the supply chain. I am confident we now know what to produce to meet customer demand, which is inherently different than the sales forecast."

Conclusion

The best way to gain buy-in from finance is to educate them on why inventory levels are what they are

Agile Purchasing & Replenishment (APR) provides a transparent process to set & execute a high-performance replenishment system

APR also provides a framework to improve turns and availability of stock

Thank You!

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