



**Best Practices In Managing Tactical and  
Operational Risk and Uncertainty across all  
Functions of the Supply Chain**

*November 17, 2009*

*Pedro Rodriguez, Managing Director  
Supply Chain Sciences*

## **Outline**

***“Best Practices In Managing Tactical and  
Operational Risk and Uncertainty across all  
Functions of the Supply Chain”***

- **Overview**
  - Sources of tactical and operational uncertainty in the supply chain
- **Area of focus: Self-inflicted internal uncertainty**
  - Living with multiple plans in your own corporation
  - Trade-off between desired customer service levels vs. inventory investment

# Overview

- *Weather events*
- *Persistent Power outages*
- *Geopolitical risk*
- *Labor and equipment disruptions*
- *New technology introduction*



*Some companies discuss and have plans in preparation for some of these “catastrophic” events...*

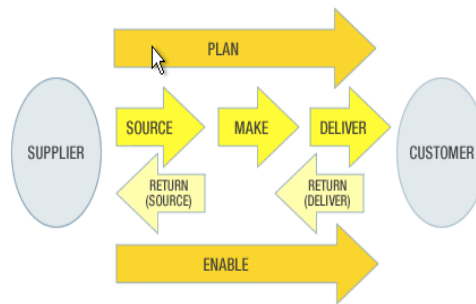
*These issues dominate press coverage and focus. What about the more mundane AND likely tactical sources?*

# Overview

## Key sources of tactical uncertainty in the Supply Chain: External

SCOR® Supply Chain Council

- *Supplier delivery*
  - *Average OTD*
  - *Time variance*
- *Delivered quality*
- *Commodity volatility*
- *Allocations*
- *Financial distress*
- *FOREX*



- *Demand uncertainty*
- *Returns and warranty*
- *Changing customer expectations (planned and unplanned)*
- *Competitor activities*
- *Customs time*
- *FOREX*

**What can be done about these?**

## Overview

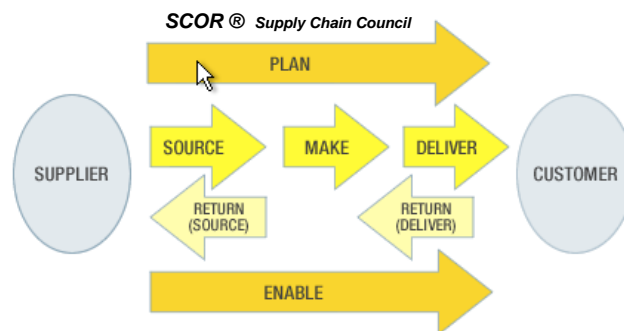
- **Real customer and supplier collaboration**
  - Share key planning data (inventory, downstream demand, planning parameters and forecasts),
  - establish agreed upon policies and business rules, and
  - share forward looking information across the planning horizon
- **Match commercial approach from front-end to back-end (balanced risk)**
- **Supplier development**
- **Second / double source key items**
- **Tactical hedging**

*All these are great but...*

- **We depend on external organizations and factors for our success**
- **Can we really take advantage of the initiatives if we are not internally ready?**

## Overview

### **Key sources of tactical uncertainty in the Supply Chain: Internal**



**Multiple plans running across the company:**

- **Demand**
- **Distribution**
- **Production**
- **Procurement**

**Service level and inventory trade-off**

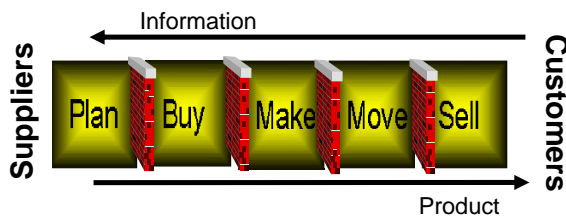
- **What service? For what parts?**
- **What is good inventory?**

## Living with multiple plans in your own company...

Even with ERP systems, EDI and other systems, multiple plans are followed by different teams in the organization...

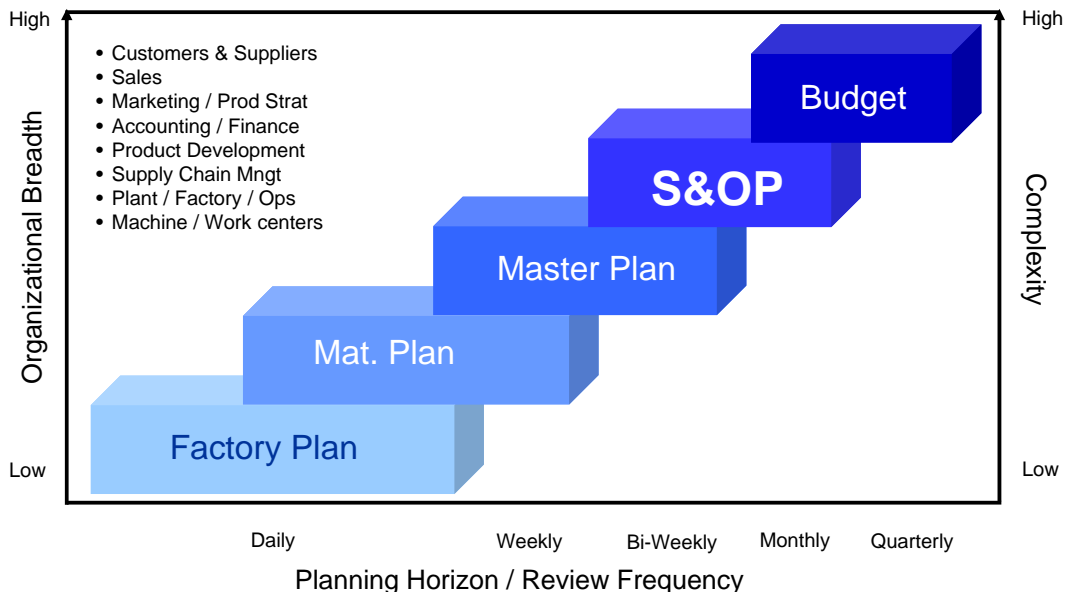
- Demand Plan
- Distribution
- Production
- Procurement

This uncertainty makes production people "forecast" demand, and procurement "forecasts" production !!!

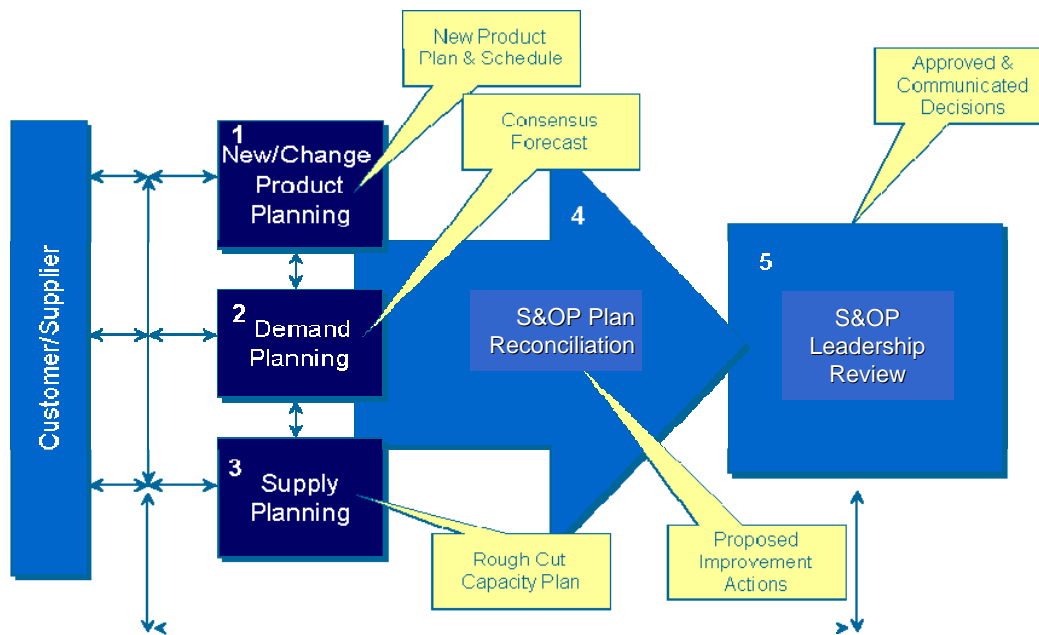


- Functional silos and competing goals
- Lack of accountability
- Reactive behavior
- Sub optimizing results (shifting cost, one month is productivity, the next is service, inventory and so forth)

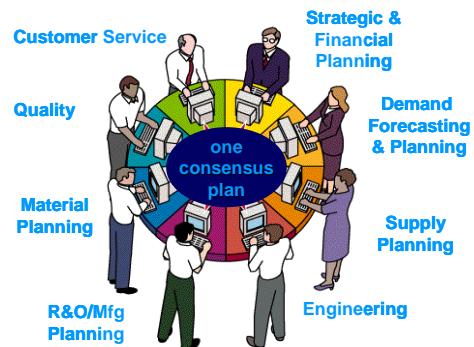
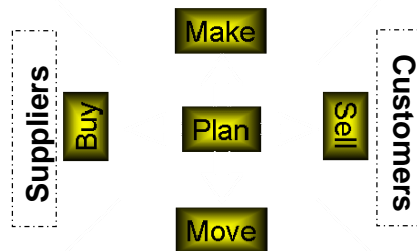
## Planning in the integrated supply chain spans all key stakeholders



# Five Step S&OP Process



**With an effective S&OP Process...  
The business is managed as an integrated supply chain**



- Collaborative and cross functional
- Defined ownership & organizational alignment
- Sharing knowledge and data
- Closed loop processes
- Aligned measures to the profit plan
- Proactive adjustments & event management

## Service Level and Inventory Trade-off

---

*Does your company go from inventory to productivity to service initiatives and conference calls from one period to the next?*

*This is a clear sign of internally created uncertainty in regards to the lack of an effective and sustainable **service and inventory optimization process***

## Closed-loop Inventory and Service Optimization Process

---

- ➡ 1. Segment Items
- 2. Align Goals and Strategy
- 3. Develop a Business Case
- 4. Review the Planning Decisions

## Step 1. Segment Items



The objective of categorizing parts is to assign business rules and targets to sets of parts to optimally balance **Risk and Return**

Typical Categorization Factors	Proposed Categorization Factors
ABC Class	<b>Velocity.</b> Number of weeks with activity • <i>Better mathematical estimate of risk of holding inventory than number of invoices per 12 months</i>
Coefficient of Variation	<b>Unit Cost.</b> Measures the financial risk of the investment and affects return.
Commodity	<b>Mission Criticality</b>
	<b>Customer Order Lead Time Expectation</b>
	Space
	New Items
	Seasonal Parts
	Product family, business, Commodity

## The InvOpt Process

1. Segment Items
- ➔ 2. Align Goals and Strategy
3. Develop a Business Case
4. Review the Planning Decisions

## Step 2. Align Goals and Strategy: Business Rules and Targets

---

**Business rules and assumptions** must be developed for key dimensions specific to your business that affect the service and optimization process:

- *Thresholds for part categorization values (for example: velocity, cost, size, seasonality)*
- *Multi-echelon stocking policies*
- *Cost of holding inventory*
- *Fixed transaction costs*
- *Transportation or space constraints*
- *Item criticality*
- *Customer lead time expectations*

**Business targets** are the measure of success running the business. They need to be well understood to drive the optimization engines and to focus the activities of the planning team:

- *Service Level targets by category*
- *Inventory days/turns*
- *Gross Margin Return on Inventory (GMROI)*
- *Logistics productivity (number of transactions, effect of lot sizing)*

## The InvOpt Process

---

1. Segment Items

2. Align Goals and Strategy

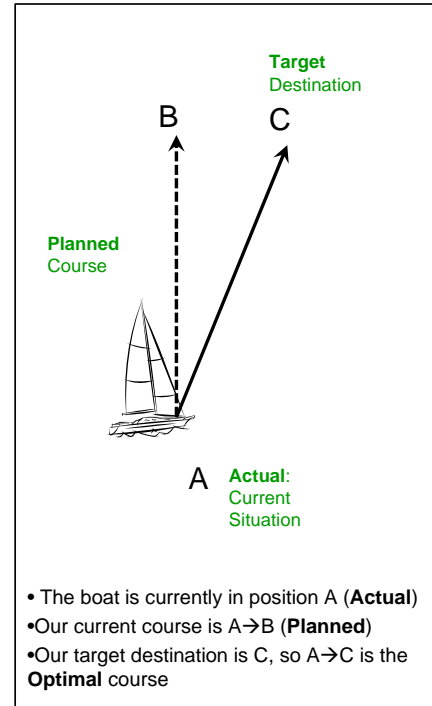
 3. Develop a Business Case

4. Review the Planning Decisions



## Actual vs. Planned vs. Target Inventories

- **Actual Inventory** = Quantity on hand \* Unit cost
- **Planned Inventory** = Average quantity of inventory the company should have on hand derived from the current parameters in your system
  - Average Inventory =  $\frac{1}{2}$  (Lot Size) + Safety Stock
- **Target Inventory** = Average inventory if the planning parameters were optimized to achieve your target service level:
  - Lot Size = F(Fixed transaction cost, holding cost)
  - Safety Stock = G(Lead time, lotsize, uncertainty, service)  
*with the current supply chain attributes: lead times, supplier performance, warehouse capacity*



## The InvOpt Process

1. Segment Items
2. Align Goals and Strategy
3. Develop a Business Case
- ➡ 4. Review the Planning Decisions and Execute New Plan

# Example: A Business Case

Business Case by ABC, Velocity

Drop Filter Fields Here

statAnnualCOGS ActualOnHand\$ PlannedOnHand\$ TargetOnHand\$ Counter

Drop Column Fields Here

ItemABC ItemVelocity

		Grand Total				
		statAnnualCOGS	ActualOnHand\$	PlannedOnHand\$	TargetOnHand\$	Counter
⊞ A		\$279,770	\$27,482	\$25,037	\$31,455	78
⊞ B		\$728,001	\$168,053	\$75,431	\$112,527	170
⊞ C		\$1,085,337	\$336,774	\$226,104	\$190,725	174
⊞ D	FAST	\$388,084	\$92,927	\$55,476	\$74,845	11
	INACTIVE	\$0	\$6,590	\$1,295	\$1,295	5
	MODERATE	\$482,906	\$173,395	\$88,344	\$174,570	25
	SLOW	\$264,008	\$175,097	\$157,713	\$159,568	65
D Total		\$1,134,998	\$448,008	\$302,827	\$410,278	106
⊞ E		\$251,807	\$74,171	\$132,289	\$117,730	488
Grand Total		\$3,479,913	\$1,054,489	\$761,689	\$862,714	1,016

# Example B: Review Process and Prioritized Actions

Product ID: P1390 Location ID: 1010 Business Case Summary

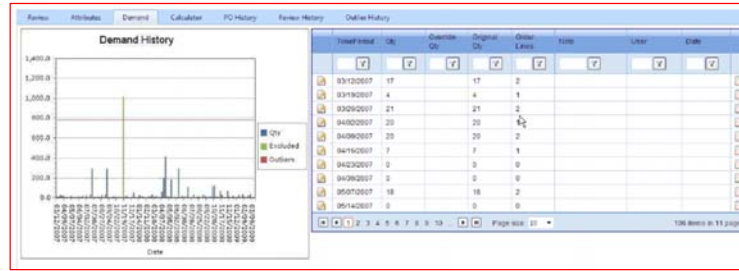
Accept All Deline All Finish Review Revise Review

Review Type	Old Value	New Value	Review Action	Override Value	Note	Reviewed
Lot size	6	24	Accept			
Safety stock	12	14	Accept			

**Demand History (Monthly)**

	Actual	Planned	Target	Difference
<b>Service</b>				
Service level %	100.0 %	95.5 %	98.0 %	2.5 %
Avg customer delay (days)		0.3	0.2	
<b>Inventory</b>				
Inventory on hand qty	14.0	15.0	26.0	11.0
Inventory on order qty	18			
Avg inventory \$	\$333	\$356	\$618	\$261
Annual cogs \$	\$8,245			
\$ per order line (minimize)				\$1.06
Weeks of supply	2.1	2.2	3.9	1.6
Inventory turns	24.8	23.1	13.3	-9.8
Changes to trigger order	0			
<b>Parameters</b>				
Forecast (monthly)		24		
Lead time (weeks)	2.1	2.5		
Lot size	7	6	24	18
Safety stock		12	14	2

# Example C: Decision Supporting Tools and Reports



**Demand Outlier Management**

## Attributes

Review	Attributes	Demand	Calculator	PO History	Review History	Outlier History
<b>Basic</b>						
Location						
Item		4HC00				
Desc		WASTEBASKET 28 1/8 QT				
ABC		A				
Stocked						
Prod Item						
Unit cost		\$1.95				
Unit price		\$8.21				
Unit margin		\$6.25				
Annual coqs		\$2,801				
Cubic feet		1.3				
Effective holding cost		257 %				
<b>Planning Strategy</b>						
Item cost		VERY-CHEAP				
Item velocity		SUPERFAST				
Item space		FILFIE				
Target service level		99.00 %				
<b>Action &amp; Alerts</b>						
Action		Review				
Planning alert		Under%				
Investment alert		Invest5				
Space alert		INCube				
<b>Demand Statistics</b>						
Avg demand weekly: 28.61						
Std dev demand weekly: 67.92						
Annual quantity: 1,488						
Num order lines: 135						
Num weeks with activity: 74						
Fraction unplanned demand: 0.10						
Auto outlier threshold: 775						
Num outliers: 0						
Avg demand (unfiltered): 38.30						
Std dev demand (unfiltered): 117.67						
<b>Supply Statistics</b>						
Num supply orders: 22						
Supply on time delivery: 83.0 %						
Avg lead time (weeks): 1.7						
Avg order quantity: 130.5						
<b>Review Statistics</b>						
Num reviews:						
Last review date:						
Last review by:						
Next review date:						
Eligible for review:						
Review status:						

## What-if calculators

Review	Attributes	Demand	Calculator
<b>Quick Calculator</b>			
Avg Demand		<input type="text" value="28.61"/>	
Std Dev Demand		<input type="text" value="67.92"/>	
Lead Time		<input type="text" value="2.1"/>	
Lot Size		<input type="text" value="1.20"/>	
<input type="radio"/> Reorder Point <input checked="" type="radio"/> Safety Stock			
Safety Stock:	<input type="text" value="56"/>	<input type="text" value="94.51%"/>	
Target Service %	<input type="text" value="0.99"/>	<input type="text" value="261"/>	
<input type="button" value="Calculate"/>			
<input type="button" value="Button"/>			

For more information contact us at:

[prodriguez@supplychainsciences.com](mailto:prodriguez@supplychainsciences.com)

And join our "Inventory Optimization" group at LinkedIn