Theory of Constraints Practitioners Alliance www.tocpractice.com

# The Search for Relevant Information

## Carol Ptak

**03 April 2018**

Theory of Constraints Practitioners Alliance www.tocpractice.com

# About the presenter

Carol Ptak is currently a partner with the Demand Driven Institute and was previously a Visiting Professor and Distinguished Executive in Residence at Pacific Lutheran University. Before going to academia she was Vice President and Global Industry Executive for Manufacturing and Distribution Industries at PeopleSoft, where she developed the concept of demand driven manufacturing.

Ms. Ptak spent four years at IBM Corporation, culminating in the position of Global SMB Segment Executive.

cptak@demanddriveninstitute.com

# About this webinar

Today organizations are frequently drowning in oceans of data with little relevant information and large stocks of irrelevant materials (too much of the wrong stuff) and not enough relevant materials (too little of the right stuff). When this occurs, there is a direct and adverse effect to return on investment. Sophisticated analytics of bigger and bigger databases does not solve the problem but rather deepens the ocean of data. Companies search for relevant information so that decisions can be made that will contribute to ROI. A company cannot just indiscriminately move data and materials quickly through a system and expect to be successful. This presentation will show how relevant information will drive sustained ROI.

# The Search for Relevant Information

**Carol Ptak**

**Demand Driven Institute**

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# Complex and Volatile is the "New Normal"

| Supply Chain Characteristics | 1965 | Today |
|---|---|---|
| Supply Chain Complexity | Low | High |
| Product Life Cycles | Long | Short |
| Customer Tolerance Times | Long | Short |
| Product Complexity | Low | High |
| Product Customization | Low | High |
| Product Variety | Low | High |
| Long Lead Time Parts | Few | Many |
| Forecast Accuracy | High | Low |
| Pressure for Leaner Inventories | Low | High |
| Transactional Friction | High | Low |

Today's supply chains look VERY different from 1960's supply chains when conventional planning rules were formulated but…

Conventional planning rules have not appreciably changed since the 1960s. MRP still plans today the way it did 50 years ago!

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# Topple Rates Increased 6X

"We investigated the longevity of more than 30,000 public firms in the United States over a 50-year span. The results are stark: Businesses are disappearing faster than ever before. Public companies have a one in three chance of being delisted in the next five years, whether because of bankruptcy, liquidation, M&A, or other causes. That's six times the delisting rate of companies 40 years ago. And the rise in mortality applies regardless of size, age, or sector. Neither scale nor experience guards against an early demise.

We believe that companies are dying younger because they are failing to adapt to the growing complexity of their environment. Many misread the environment, select the wrong approach to strategy, or fail to support a viable approach with the right behaviors and capabilities."

(Martin Reeves, Simon Levin, and Daichi Ueda, Harvard Business Review, January-February 2016)

"We believe that companies are dying younger because they are failing to adapt to the growing complexity of their environment."

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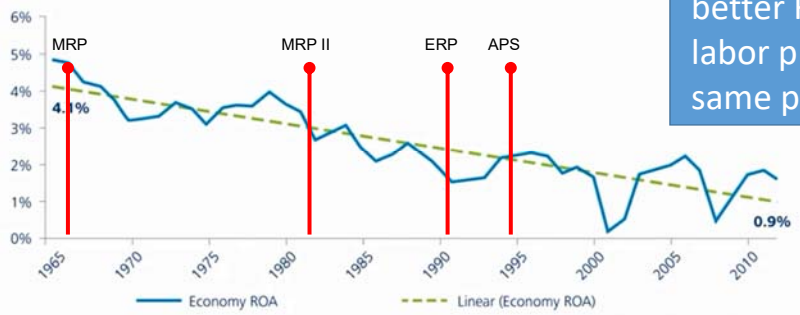
# Are We Doing the Wrong Things Faster?

Development and proliferation of planning systems has not enabled better ROA performance despite labor productivity doubling in the same period!

**Figure 1. Return on assets for the US economy (1965–2012)**




US firms' ROA fell to a quarter of its 1965 levels in 2012. To increase, or even maintain, asset profitability, firms must find new ways to create value from their assets.

Deloitte University Press DUPress.com

**What will it take to change this?**

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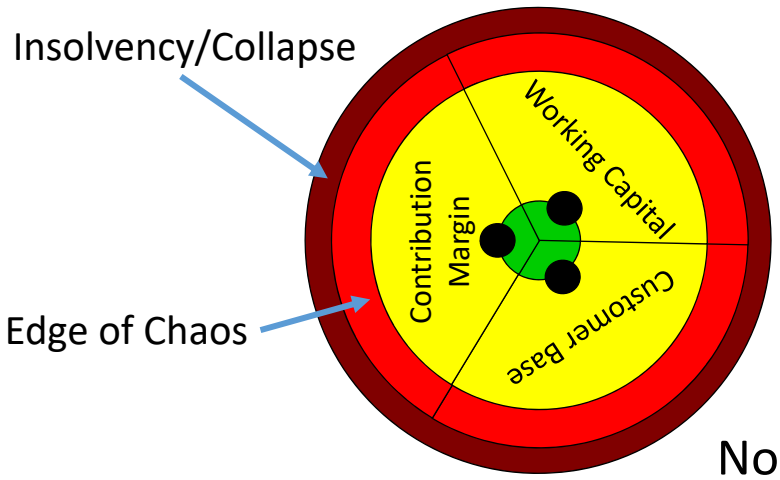
# Leadership's Challenge in a Complex World




- Working Capital = inventory & cash & credit
- Contribution Margin = cash generation rate
- Customer Base = market share, sales, service & quality

**Now and in the Future!**

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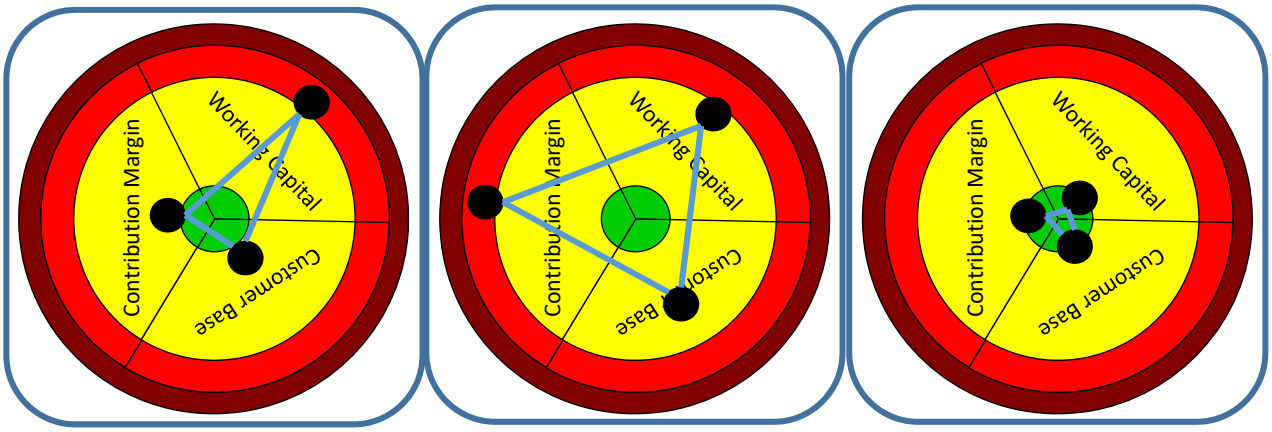
# Which Scenario is Healthier?

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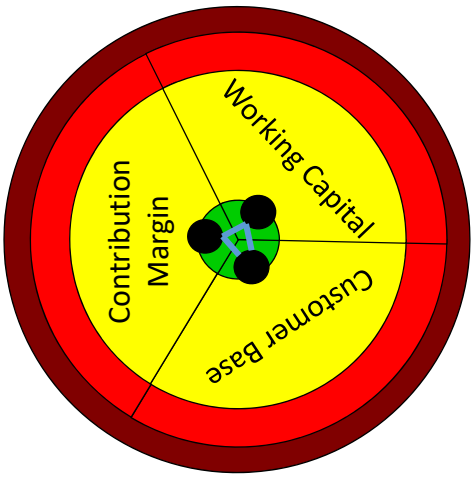
# Striving for Coherence




"A complex adaptive system's "success" depends on **coherence** of all of its parts. A subsystem's purpose has to be in alignment with the purpose of the greater system in order for there to be coherence. Without that alignment the subsystem acts in a way that endangers the greater system it depends on. Coherence must be at the forefront of determining the signal set, triggers and action priorities. To keep coherent, adaptive agents must ensure both their signal sets contain the relevant information to direct their actions and are not at cross-purposes with the goals of the systems it depends on."

From Demand Driven Performance – Using Smart Metrics (Smith & Smith, McGraw-Hill, 2013, p. 197)

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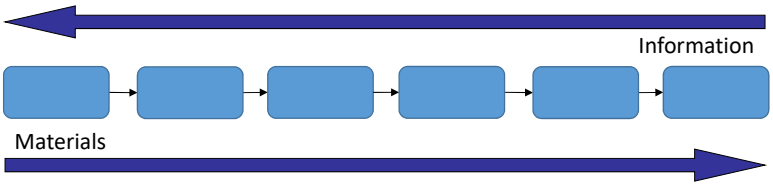
# Reorienting to Flow

All benefits will be directly related to the speed of FLOW of materials and information. George W. Plossl




**Protection and Promotion Flow =**

**ROI Maximization**

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## When flow is occurring:

- **Service** is consistent and reliable when a system flows well.
- **Revenue** is maximized and protected.
- **Inventories** are minimized.
- **Expenses** ancillary and/or unnecessary are minimized.
- **Cash flow** follows the rate of product flow to market demand.

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# Explaining Flow

$$\Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

Queuing Theory

The less time it takes products to move through the system, the less the total inventory investment

- The simple equation is Throughput * Lead Time = WIP or
- WIP/Lead Time = Throughput
- WIP/Throughput = Lead Time

It seem so obvious…

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**Flow** is the rate at which a system converts material to product required by a customer.

**Cash velocity** is the rate of net cash generation; sales dollars minus truly variable costs (aka contribution margin) minus period operating expense.

**Net profit/investment** the equation for ROI

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## The Missing Element for Flow

$$\Delta\text{Visibility} \rightarrow \Delta\text{Variability} \rightarrow \Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

**Variability** is defined as the summation of the differences between our plan and what happens.

Variability ↓ = Flow ↑

Variability ↑ = Flow ↓

**Visibility** is defined as **relevant information** for decision making.

Visibility ↑ = Variability ↓

Visibility ↓ = Variability ↑

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## The Biggest Question Becomes…

How do we gain visibility to relevant information in today's complex environments in order to manage to flow?

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# Four Prerequisites for Relevant Information

1. Understanding Relevant Ranges
2. Implement a Flow-Based Operating Model
3. Implement Flow-Based Metrics
4. Tactical Reconciliation (bi-directional) between Relevant Ranges

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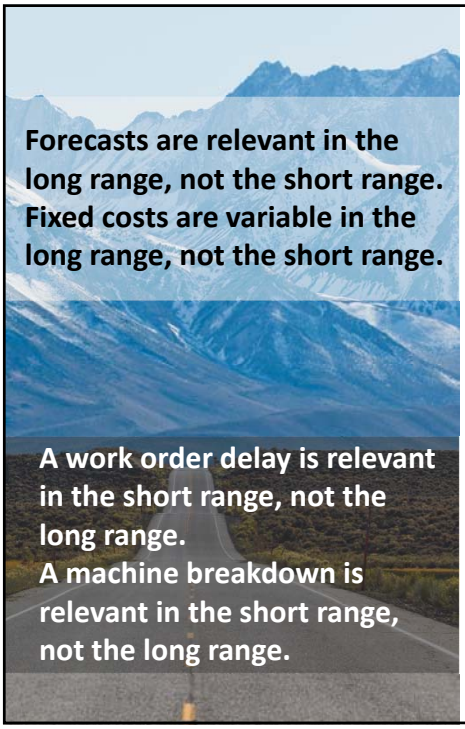


# 1. Relevant Ranges

- Relevant Range = The time frame in which assumptions are valid
- The assumptions and information that are valid and relevant will differ between these ranges.
- Force fitting irrelevant assumptions into the wrong range will lead directly to distortive information.
- Different relevant ranges are typically utilized by different personnel

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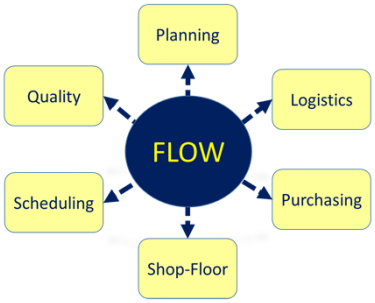
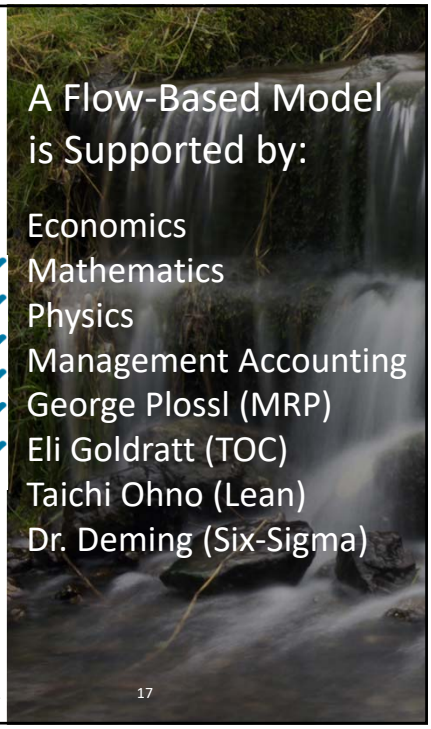
# 2. Flow-Based Operating Model

$$\Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta \left( \frac{\text{Net Profit}}{\text{Investment}} \right) \rightarrow \Delta\text{ROI}$$




| Function | Primary Objective |
|---|---|
| Planning | Synchronize supply and demand |
| Logistics | Connect sources to consumption points |
| Purchasing | Ensure material/component availability |
| Shop-Floor | Execute the schedule |
| Scheduling | Sequence activity to meet commitments |
| Quality | Meet specification |

There are VERY specific ways to design a flow-based operating model.

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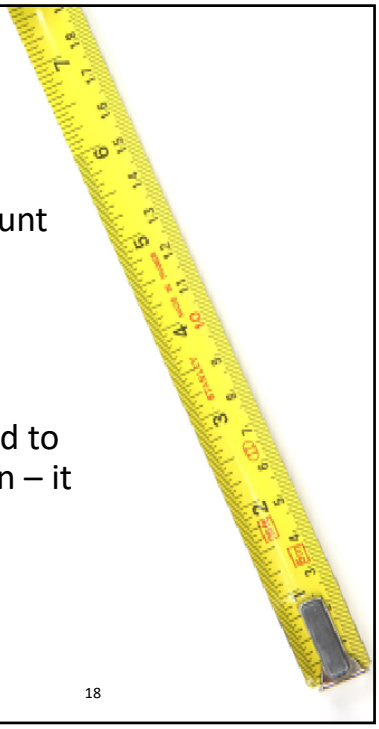
# 3. Flow-Based Metrics

- Any suite of flow-based metrics must take into account the other three prerequisites:
  - ✓The metrics must fit the range
  - ✓The metrics must fit the flow-based operating model
  - ✓The metrics must be reconcilable between ranges.
- Force fitting non flow-based metrics will directly lead to conflicts and distortions throughout the organization – it will obscure what is relevant!



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# 4. Tactical Reconciliation

- The assumptions and information between relevant ranges differ
- There is a need to reconcile the differences in a constant bi-directional and iterative fashion in order to drive adaptation
- Strategy must be influenced by operational capability and performance as well as how the model might perform under predicted conditions.
- Operational capability must be influenced by predicted conditions and/or strategic expectations in future time periods.

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# The Complete Equation for Visibility to ROI

$$\Delta\text{Visibility} \rightarrow \Delta\text{Variability} \rightarrow \Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

| Access to relevant information for decision making | The differences between our plan and what happens. | The rate at which a system converts material to product required by a customer. | The rate of net cash generation; sales dollars minus truly variable costs minus period operating expense. | The equation for ROI |
|---|---|---|---|---|

We must manage this equation across all relevant ranges!

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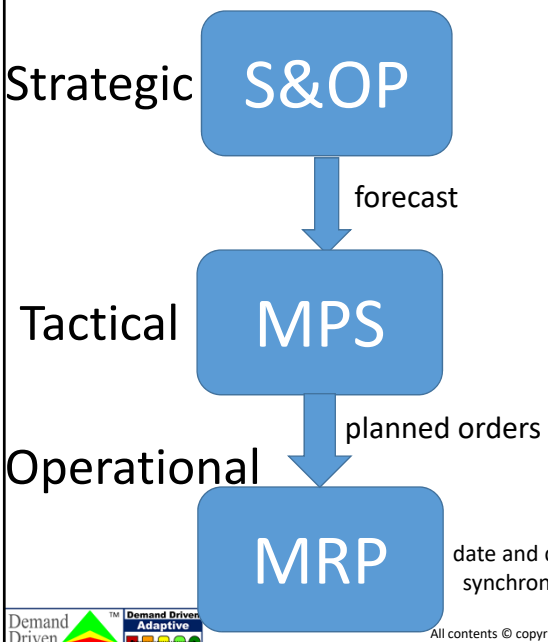
# Conventional Failure




**Relevant Ranges**

Convention fails to manage ranges properly.

**Flow-Based Metrics**

Any conventional flow-based metrics (e.g. due date performance) come into conflict with and are countered by the proliferation of cost-based metrics.

**Flow-Based Operating Model**

Many flow-based models have been proposed (e.g. Lean and TOC) but most have remained compartmentalized with only pockets of success.

**Tactical Reconciliation**

Reconciliation is not bi-directional – it is a one-way street. Reconciliation is also painful by introducing nervousness with every new MRP run and monthly S&OP updates.

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# Mismanagement of Relevant Range

Using Fully Absorbed Cost Metrics

Fully absorbed unit cost = direct material cost + labor cost + overhead costs.

Direct material costs are VARIABLE costs.
Labor and overhead costs are FIXED costs in the short range.

Combining VARIABLE and FIXED costs creates the false impression that fixed costs vary within the short range. They do not and that is why they are called fixed costs.

Using Forecast for Supply Order Generation

Forecasts drive planned orders in the MPS. These planned orders generate supply orders in MRP.

There are three rules about forecasts:

1. They start out wrong.
2. The more remote in time the extend the more wrong they are
3. The more detailed they are the more wrong they are.

Capacity, capital, materials and space are committed to signals that have significant rates of error associated with them!

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# No Flow-Based Operating Model

- Many flow-based models have been articulated but…
- Conventional S&OP, MPS and MRP are configured to be a push based model.
- This means that flow-based operating models like Lean and TOC typically remain compartmentalized and limited and most often conflict with the conventional system
- Is there a flow-based model that can be implemented at the system level?

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# Conflicting Views

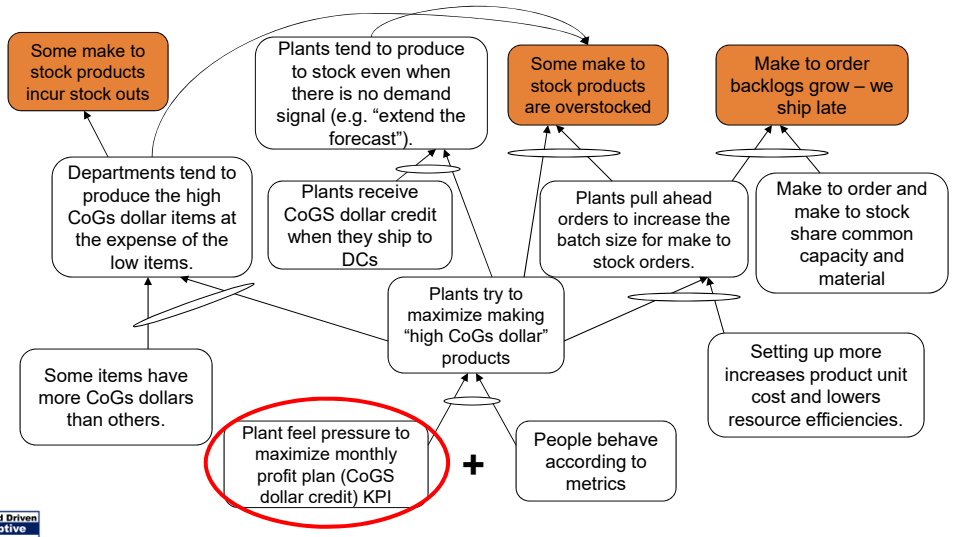
$$\Delta\text{Cost} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

**Cost-Centric View**

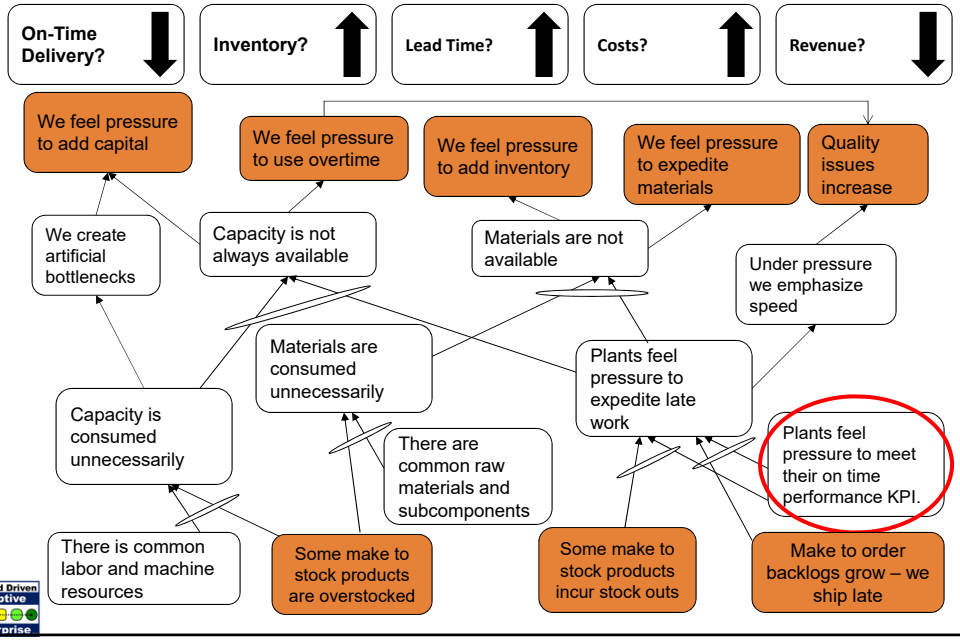
$$\Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

**Plossl's First Law of Manufacturing**

# Consequences of Focusing on Unit Cost




# Consequences of Focusing on Unit Cost



# Conflicting Metrics

- Convention has some flow-based metrics in use.
- Their effectiveness is limited by conflicting cost-based metrics.
- These conflicting metrics obscure what is relevant and introduce self-imposed variability within organizations as personnel oscillate between protecting flow and protecting cost performance.
- When flow is promoted and protected, costs are under control. The inverse, however, is not true.

$$\Delta\text{Flow} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

Due Date Performance
Fill Rates
Inventory Turns

$$\Delta\text{Cost} \not\rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\left(\frac{\text{Net Profit}}{\text{Investment}}\right) \rightarrow \Delta\text{ROI}$$

OEE
Fully Absorbed Unit Cost

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# Painful "Reconciliation"

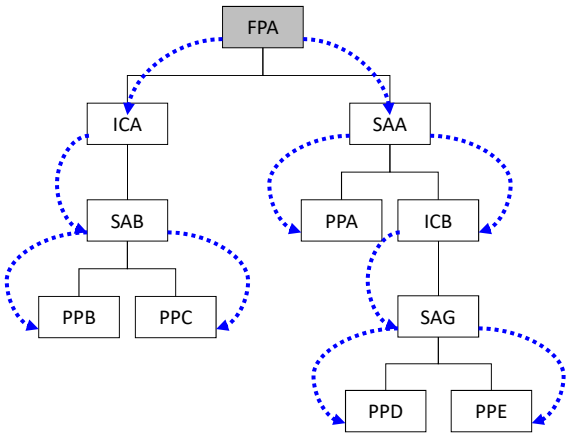
Tactical reconciliation is not bi-directional – it is a one way street.

New MRP Runs

MRP run results in massive cascading schedule changes as date and quantity changes at higher levels effect all connected lower level components.

System Nervousness and Bullwhip

Nervousness

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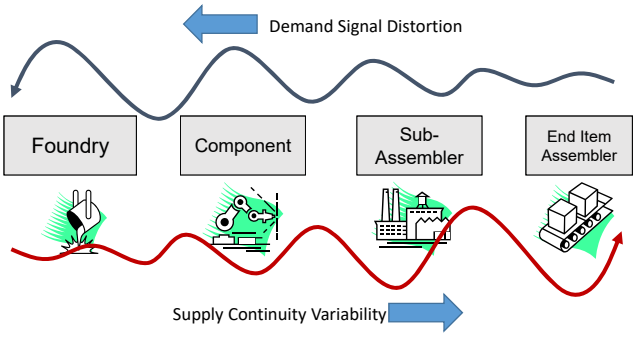
System Nervousness and Bullwhip

Bullwhip Effect

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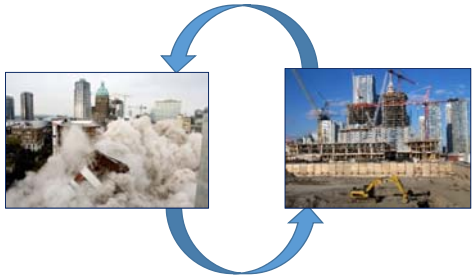
# Painful "Reconciliation"

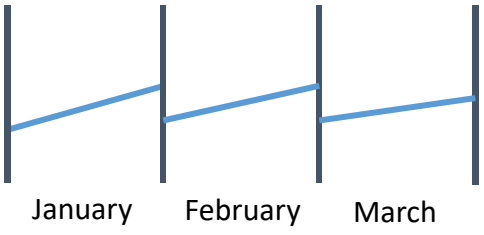
Tactical reconciliation is not bi-directional – it is a one way street.

Monthly S&OP Update

Monthly S&OP updates create massive shifts at the beginning of every month.



Tactical Demolition and Reconstruction

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Demand Driven Adaptive Enterprise™

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# What is Demand Driven?

Definition: Sensing changing customer demand, then adapting planning and production while pulling from suppliers – all in real time!

Origin: PeopleSoft (Carol Ptak, VP of Manufacturing and Distribution Industries)

It does not mean:

- Better forecasting
- Make to order everything
- Simple pull
- Inventory everywhere

Do we really need to be Demand Driven?

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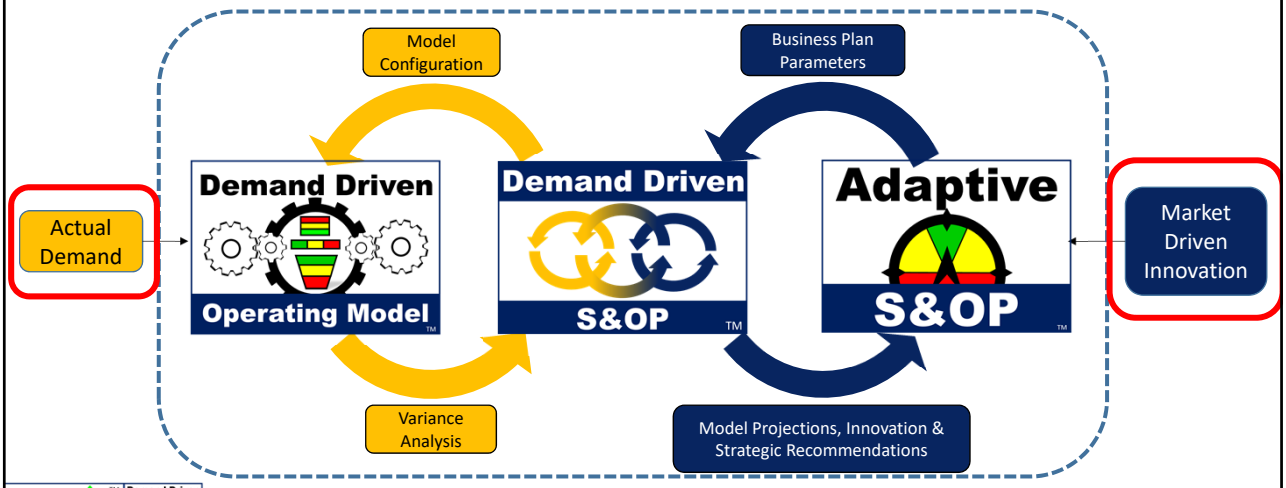
# Demand Driven Adaptive Enterprise Model

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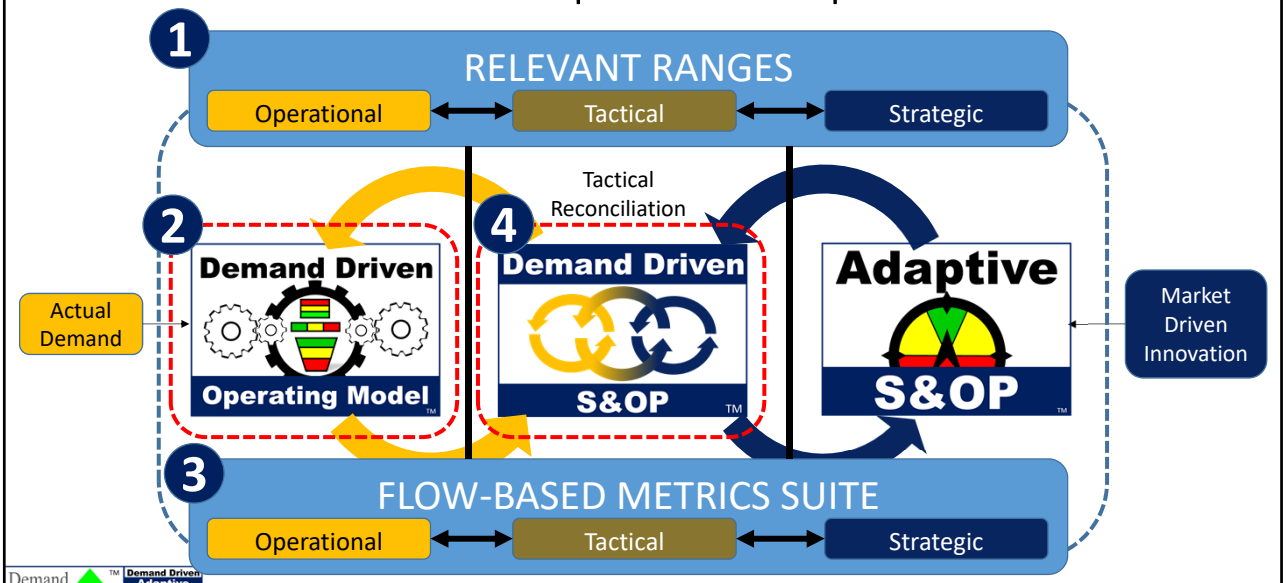
# Demand Driven Adaptive Enterprise Model

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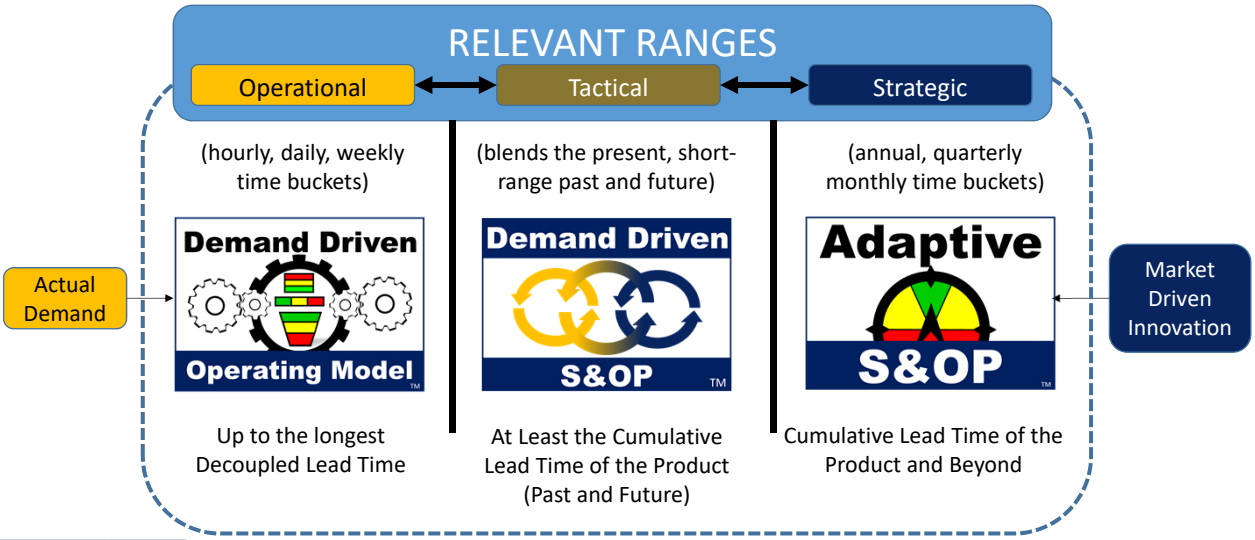
# 1. Relevant Ranges in the DDAE Model

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# 2. The Flow-Based Operating Model

Combines elements of MRP, DRP, Lean, Theory of Constraints, Factory Physics and Six-Sigma.

Paces operations to **actual demand**

Strategically places **decoupling points** for lead time compression and variability (bullwhip) mitigation.

Strategically places **control points** for schedule synchronization

Protects decoupling and control points through stock, time and capacity buffers

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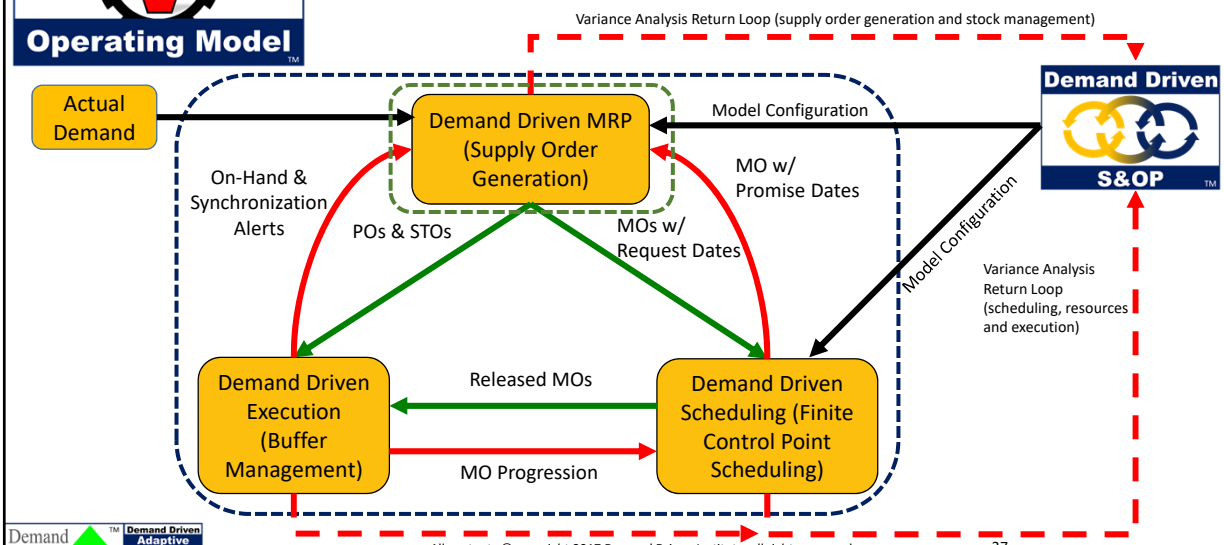
# 2. The Flow-Based Operating Model

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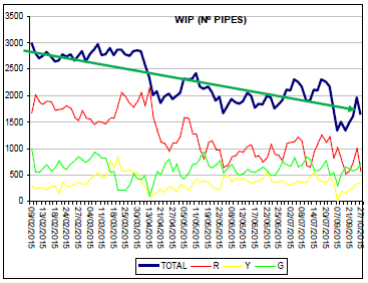
# Designed for Flow




AFTER IMPLEMENTATION

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Lead Time

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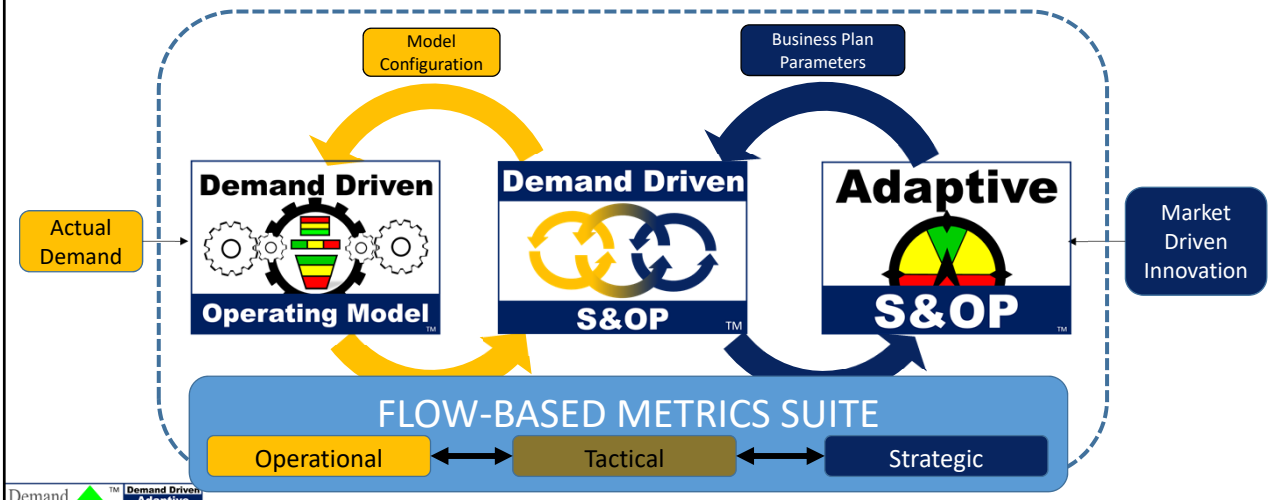
# 3. Flow-Based Metrics

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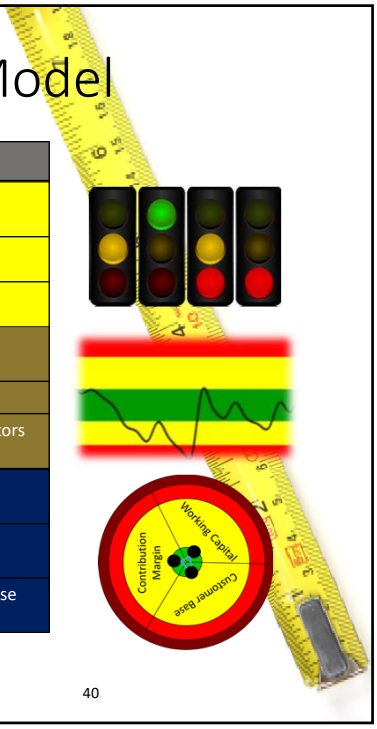
# Flow-Based Metrics in the DDAE Model

| | Metric Objectives | The Message Behind the Objective |
|---|---|---|
| Operational | System Reliability | Execute to the model, plan, schedule and market expectation; |
| Operational | System Stability | Pass on as little variation as possible; |
| Operational | System Speed/Velocity | Pass the right work on as fast as possible; |
| Tactical | System Improvement & Waste Reduction (Opportunity $) | Identify and prioritize obstacles/conflicts to flow |
| Tactical | Local Operating Expense Control | Spend minimization to capture the market opportunity |
| Tactical | Strategic Contribution | Maximize system return according to relevant model factors (volume and rate) |
| Strategic | Contribution Margin (cash generation rate) | Drive innovation (internal and external) and growth to increase cash generation capability (RATE) |
| Strategic | Working Capital (inventory & cash & credit) | Ensure proper levels of working capital to protect and promote flow in the short and long term |
| Strategic | Customer Base (market share, sales & service & quality) | Ensure and grow a solid base of business for the enterprise (VOLUME) |

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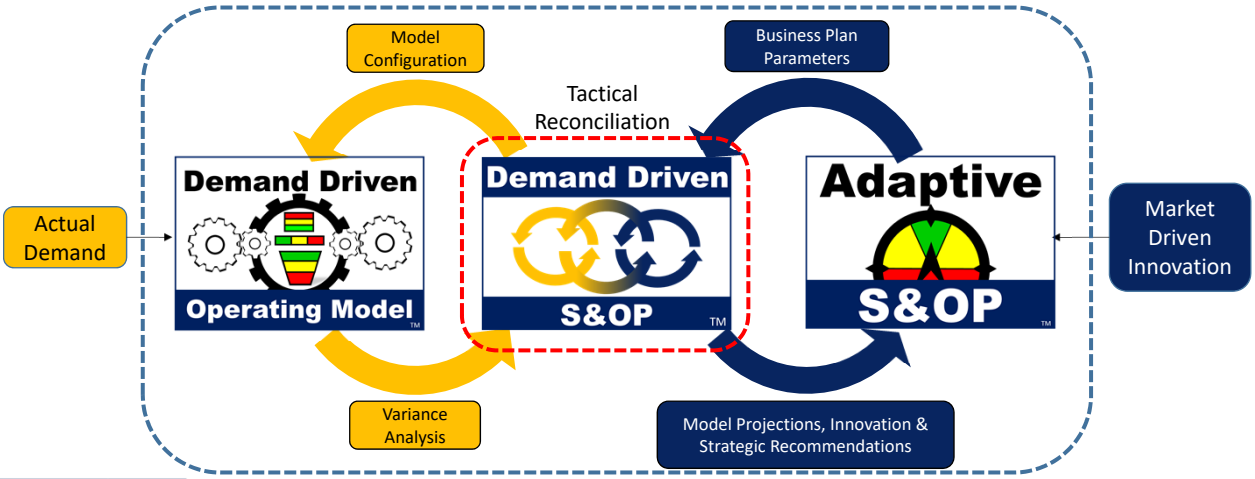
# 4. Tactical Reconciliation

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# Tactical Reconciliation

The elements of DDS&OP

- Tactical Configuration/Reconciliation (shaping model to the evolving business strategy)
- Tactical Review (Demand Driven Variance Analysis)
- Tactical Exploitation (short range supplements to flow when necessary)
- Tactical Projection (projecting model performance under different scenarios)
- Strategic Recommendation (ideas for better model performance needing senior–level approval)

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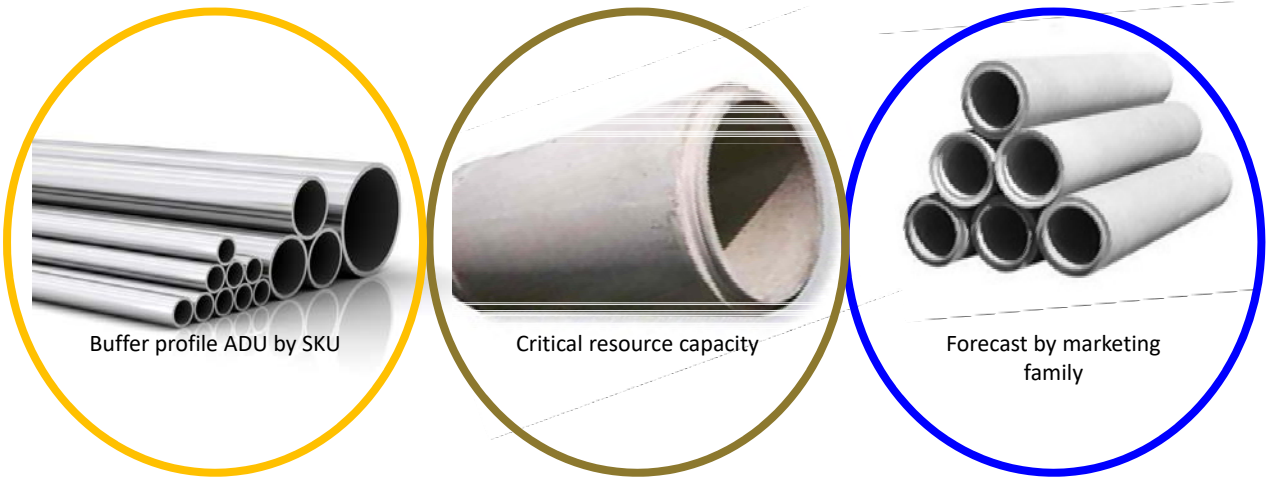
# DDS&OP Provides the Required Translation



Buffer profile ADU by SKU

Critical resource capacity

Forecast by marketing family

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# Managing The Tactical Relevant Range -Past, Present and Future

- Tactical Relevant Range = At Least the Cumulative Lead Time of the Product in the past and future (CLT x 2)
- **The Past** is the variance analysis feedback loop from the Demand Driven Operating Model (How has the DDOM performed recently?)
- **The Present** is major conflict resolution between competing activities, business lines or open orders in the DDOM (Where are breakdowns or threats to flow occurring?)
- **The Future** is short range model plan, projected model performance as well as short range sales exploitation tactics (How will the DDOM perform in the near future?)

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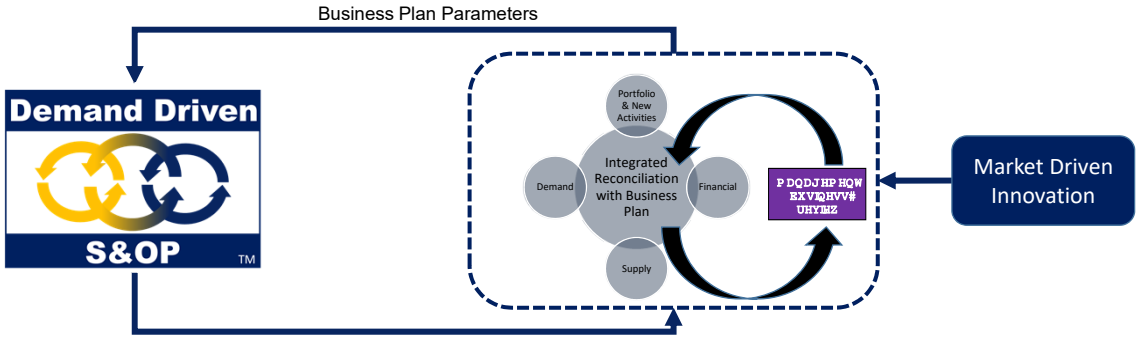
Adaptive Sales and Operations Planning is the integrated business process that provides management the ability to strategically define, direct and manage relevant information in the strategic relevant range and across the enterprise. Market Driven Innovation is combined with Operations Strategy, Go-to-Market Strategy and Financial Strategy to create strategic information and requirements for tactical reconciliation and strategic projection to effectively create and drive adaptation.

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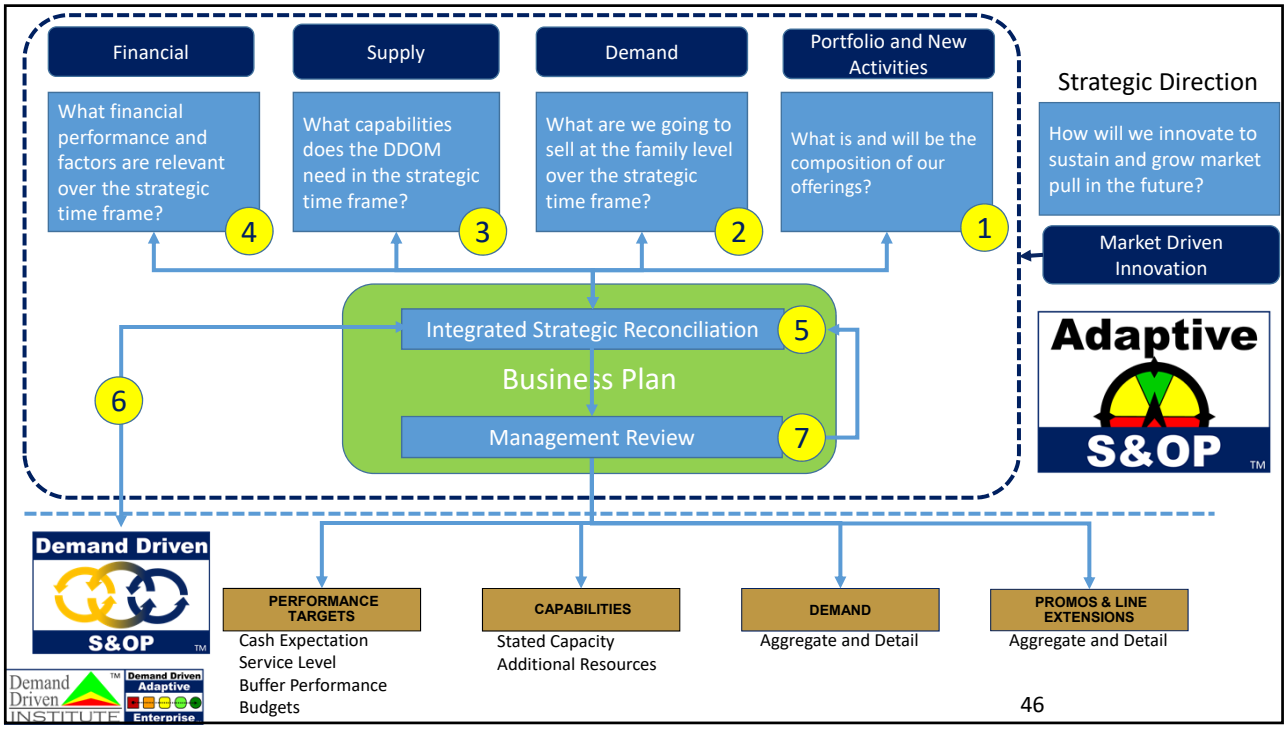


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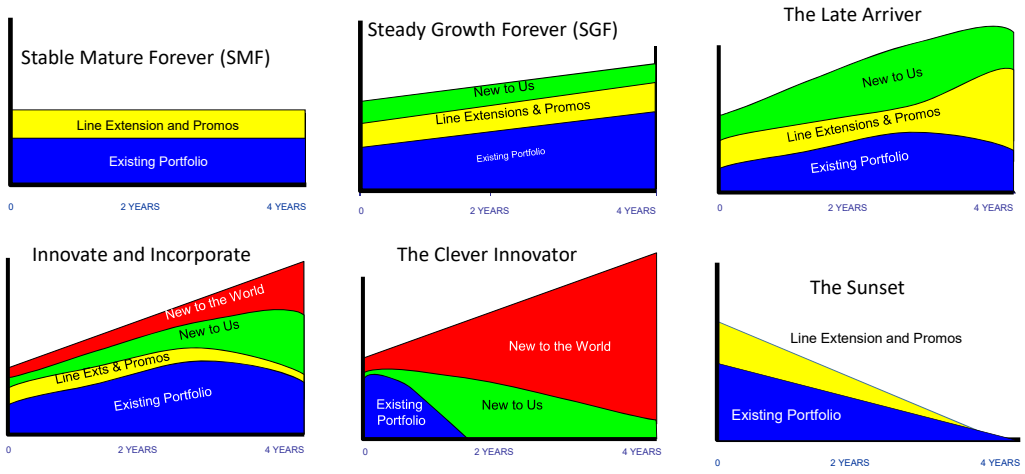
# Adaptive S&OP Requires you to Understand Your Business

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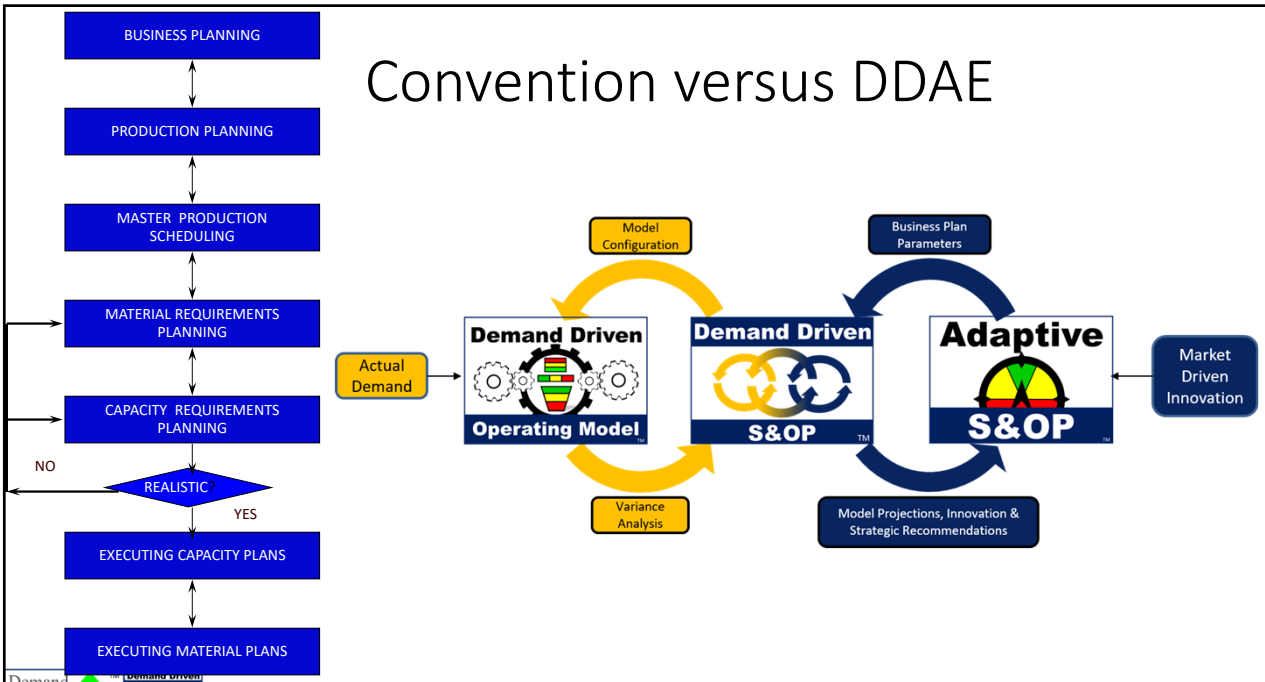
# Convention versus DDAE

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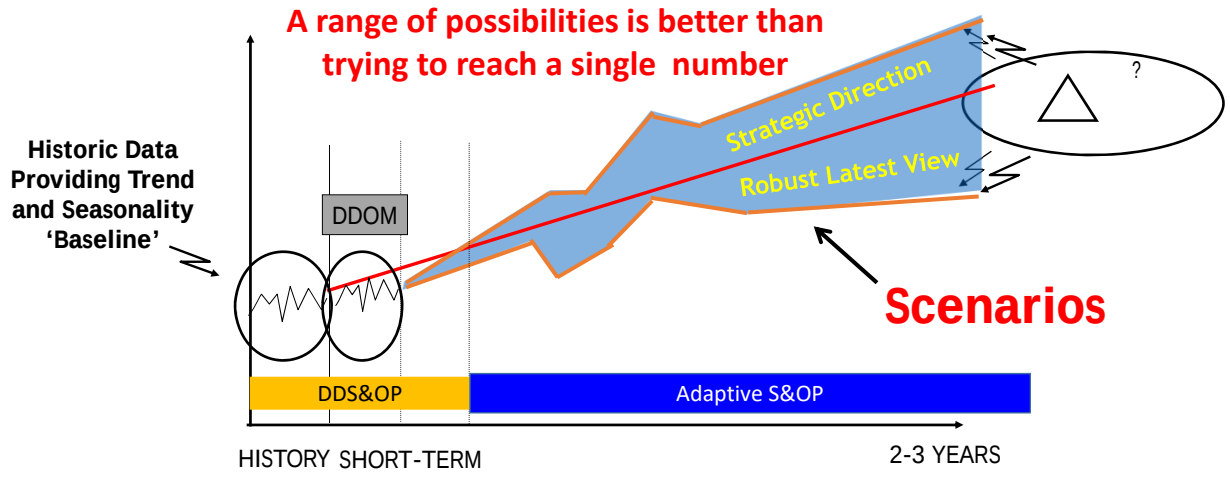
# Roughly Right rather than Precisely Wrong

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# How to Get Started?

| | |
|---|---|
| DDAE III | Sensing, Adapting and Innovating across the supply chain (customers and suppliers) for continual ROI improvement. Mature DDAE Model. |
| DDAE II | Leverage the Demand Driven Operating Model capability across the enterprise and into the market. DDS&OP and Adaptive S&OP in place. |
| DDAE I | Synchronizing and leveraging operational capability for better flow performance. Expand the implementation of a Demand Driven Operating Model. |
| Stage 2 | Begin to emphasize flow-based operational efficiency with the preliminary implementation of DDMRP. |
| Stage 1 | Focused on cost-based operational efficiency (Cost reduction AND Responsiveness in conflict). |

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# A Final Element - Thoughtware is a Must!

- Thoughtware BEFORE hardware and software! Invest in people's ability to think and problem solve systemically.
- If you can't think systemically then you can't observe, identify and resolve distortions to relevant information and materials at the systemic level.
- That means your organization is INCAPABLE of thinking and adapting for FLOW at all levels.
- Ensuring and maintaining a framework for the four pre-requisites for relevant information should be the primary job of senior management

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