Successfully Managing Volatility and Uncertainty

Carol A Ptak, CFPPIM, CIRM, Jonah, CDDP, CDDL

Partner

Our World Today?

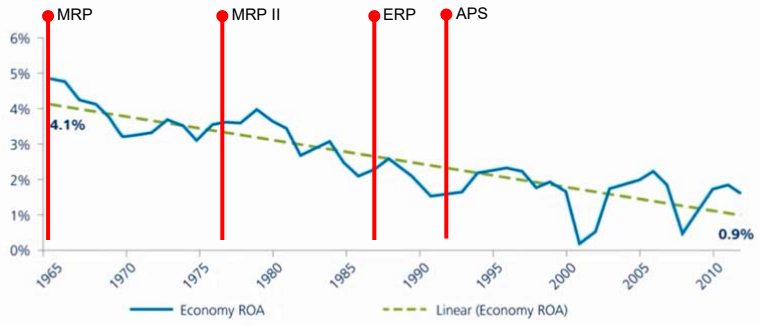
- Global supply relative to global demand? Global oversupply
- The practical life of Asset/Infrastructure? Shorter recovery life
- The massive effort invested in Forecast improvement? Forecast error is still on the rise - building the wrong things (FMCG = 55% to 60% accuracy)
- The effect of off-shoring and outsourcing to lower cost? Service levels declined, inventory up and expedite costs have increased
- The effect of billions invested in ERP? Companies are doing the wrong things sooner and faster and paying a premium to attempt to recover
- The effect of billions invested in Improvement Methodologies? Gains in resource productivity have not translated to sustainable system ROI

Clearly Organizations Do Not Understand What Drives ROI

ROI Decline & Information Technology Breakthrough

Business Reality – Return on Asset Decrease

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.

Source: Deloitte University Press DUPress.com

We can now do the wrong things faster!

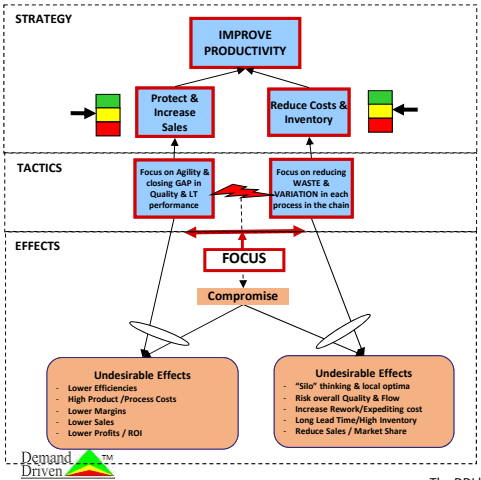
The Effect Of All Of Our Improvement Efforts = 0

Local Tactics To Improve ROI Conflict With Each Other!

- Can a drive to *increase quality* drive costs up and increase cycle time?
- Can a drive to *decrease costs* negatively impact quality and our marketplace?
- Can a drive to *increase sales* erode margins?
- Can a drive to *increase on time delivery or shorten our lead time* increase costs, inventory and erode quality?
- Can programs to *decrease inventory* starve the plant and result in increased delivery and overtime costs?

The Effects of These Organizational Conflicts

QUESTION: **What is the impact of such Organizational conflicts on the Effectiveness and Efficiency of the Organization as a Whole?**



Many times we get stuck between a "Rock and Hard Place"…

How do we deal with such Dilemmas?

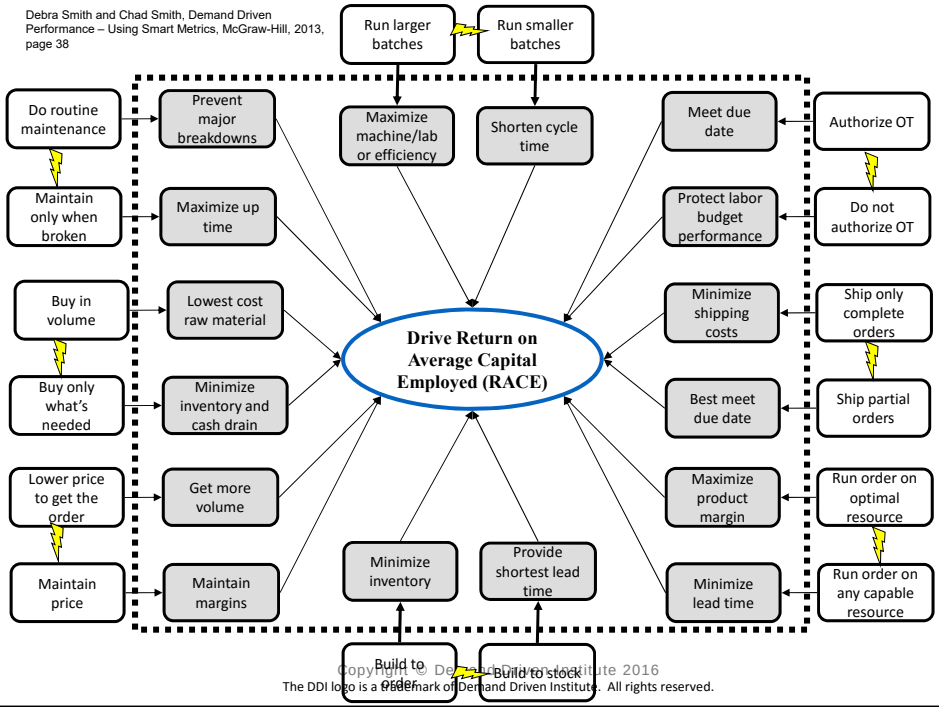
We compromise. It's called a compromise because we end up cutting short on one or both of the Necessary Conditions for the Overall Objective.

This tends to produce an "oscillating" effect between the two sides – a continuous set of trade-offs.

This "Oscillation" between 2 sets of symptoms has devastating effects on Overall System Performance.

Symptoms continue to persist because we fail to end the compromise and conflict.

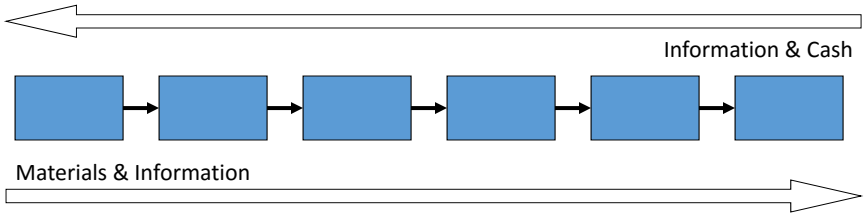
Debra Smith and Chad Smith, Demand Driven Performance – Using Smart Metrics, McGraw-Hill, 2013, page 38



System Flow as a Strategy Foundation

"All benefits are directly related to the speed of FLOW of materials and information through a system."

George W. Plossl, a Father of MRP



Caveat: Both Materials and Information must be RELEVANT

- **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 better follows the rate of product flow to market demand.**

Formula Connecting Flow to ROI

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

Plossl's First Law of Manufacturing the connection to ROI

- 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 (also known as throughput dollars or contribution margin) minus period operating expense.
- Net profit/investment is the equation for ROI.

Demand Driven Performance – Using Smart Metrics, Smith and Smith, McGraw Hill , 2013, p72

"The greatest obstacle to discovering the shape of the earth, the continents and the oceans was not ignorance but the illusion of knowledge."

Daniel Boorstin

WHAT TO CHANGE?

The assumption that we understand the systems we are trying to control and manage.

What Have We Missed?

ΔVisibility → ΔVariability → Necessary Realization For Flow

ΔFlow → ΔCash Velocity → Δ $\left(\frac{\text{Net Profit}}{\text{Investment}}\right)$ → ΔROI

Plossl's First Law of Manufacturing and the focus of flow improvement

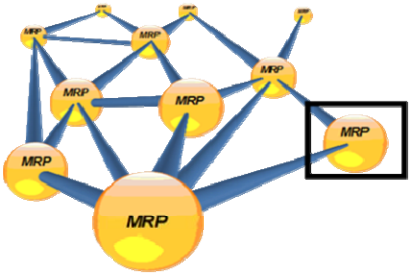
- **Visibility** is defined as relevant information for decision making.
- **Variability** is defined as the summation of the differences between what we plan to have happen and what happens.

Can we even define what is relevant information and quantify its impact on FLOW and ROI?

Demand Driven Performance – Using Smart Metrics, Smith and Smith, McGraw Hill , 2013, p72

Today's Supply Chains are Complex!

Embedded at the heart of every node is an ERP system and with all of its problematic forecast planning and cost centric rules that are the major source of the "Bullwhip Effect"



Supply chains are both more fragmented and more connected:

- The wrong rules inside each node transfer variability
- The greater amount of connections amplifies variability

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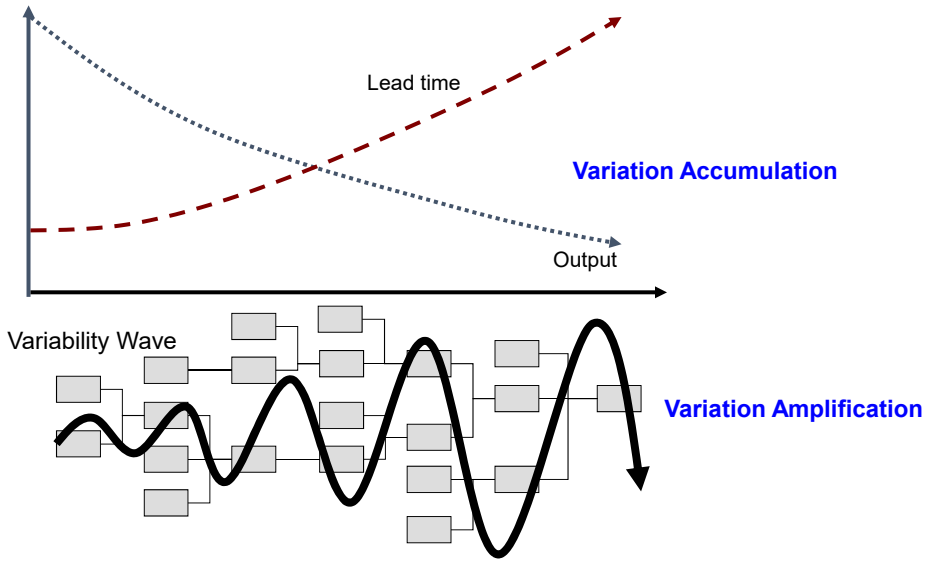
Variability Accumulation & Amplification



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Enter Complexity & Chaos

"Complexity" represents the middle area between order at one end and chaos at the other. Thus complexity is sometimes called the edge of chaos. If we think of order as ice and chaos as water vapor, complexity would be liquid water."

Dr. Christopher Langton, founder and research scientist at the SFI

The science of CAS has to do with structure and order, especially in living systems including:

- The development of the embryo,
- Ecosystems,
- Social organizations - Business and nonprofit organizations and their interactions with the technological-economic environment.

The Edge of Chaos - Emergence or Death

Complex Adaptive Systems (CAS)

- Dynamic – They move from state to state over time as they interact;
- Interconnectedness guarantees a response to every action that can only be understood by understanding the connections to the whole.
- The more complex the greater the distance between cause and effect;
- Extreme sensitivity to initial conditions – lever point phenomena aka the "butterfly effect"; Cause and effect are not proportional!
- Complex systems cannot be optimized BUT they can do something better…… Learn, Adapt and Emerge to a higher order or Die!

Complex Adaptive Systems (CAS)

- CAS have well defined rules and predictable behaviors that govern system flow and cost behavior.
- Conventional thinking, rules and tools are based on a linear system rule set and mathematics.
- CAS rules are different and many are the opposite.

Most business leaders, operational personnel and academics don't know or understand these differences, their implications/opportunities

CAS Are Very Different

System Traits	Linear	Nonlinear Complex
The Method to Understand the System	Linear systems can be understood by studying the individual part; the whole is the sum of its parts	Nonlinear systems can only be understood by mapping the dependencies and interconnections
System Predictability	Linear system "state" is stable and predictable	Nonlinear system "state" is dynamic and no predictions remain valid "too" long
System Output Behavior	The output of a linear system is proportional to it's inputs	The output of nonlinear system is governed by a few critical points – the lever point phenomena

CAS Are Very Different

System Traits	Linear	Nonlinear Complex
Mathematical Models of the System	Gaussian statistical model (normal bell shaped distribution curve) - The sum of the averages are a predictable model of the system and the tails of the statistical distribution are ignored as anomalies	Paretian statistical model – The tails of the distribution identify the few critical points that define the relevant information predict and manage nonlinear complex systems. They contain the lever point phenomena
System Output Maximization	A linear system can be optimized	A nonlinear system cannot be optimized but it can continually learn and improve

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Subsystem's Coherence Determines CAS Success

The more quickly CAS agents learn, self regulate, adapt and change the more successful they are at maintaining coherence.

Organisms and Organizations that are successful live, learn and thrive on "the edge of chaos".

You can't win if you don't know the "Rules"!

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Getting Smarter – A Blueprint for Change

1. Install the Right "Thoughtware" in the Organization.
2. Become Demand Driven.
3. Deploy Smart Metrics to Operate and Sustain the new model.

Step 1 – Thoughtware
Manage Flow With Relevant Information

ΔVisibility → ΔVariability
The Solution

Visibility to the flow of relevant information and materials across the supply chain ensures system coherence and speeds flow:

- Aligns priorities, schedules and execution
- Speeds conflict resolution
- Defines when and where to act
- People will self organize to solve/act

You can't measure what you can't see!

Step 2 - Become Demand Driven

1. Embrace Flow and it's implications;
2. Design the Demand Driven Operating Model;
3. Protect Decoupling and Control points from variation;
4. Bring the model to the organization;

The Demand Driven Adaptive System Embraces Flow

ΔVisibility → ΔVariability →

Core Conflict Area

ΔFlow → ΔCash Velocity → Δ $\left(\frac{\text{Net Profit}}{\text{Investment}}\right)$ → ΔROI

Plossl's First Law of Manufacturing and the Demand Driven Model

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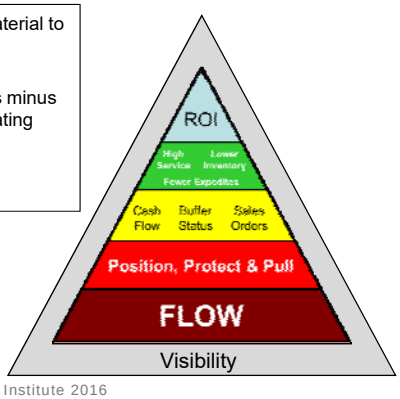
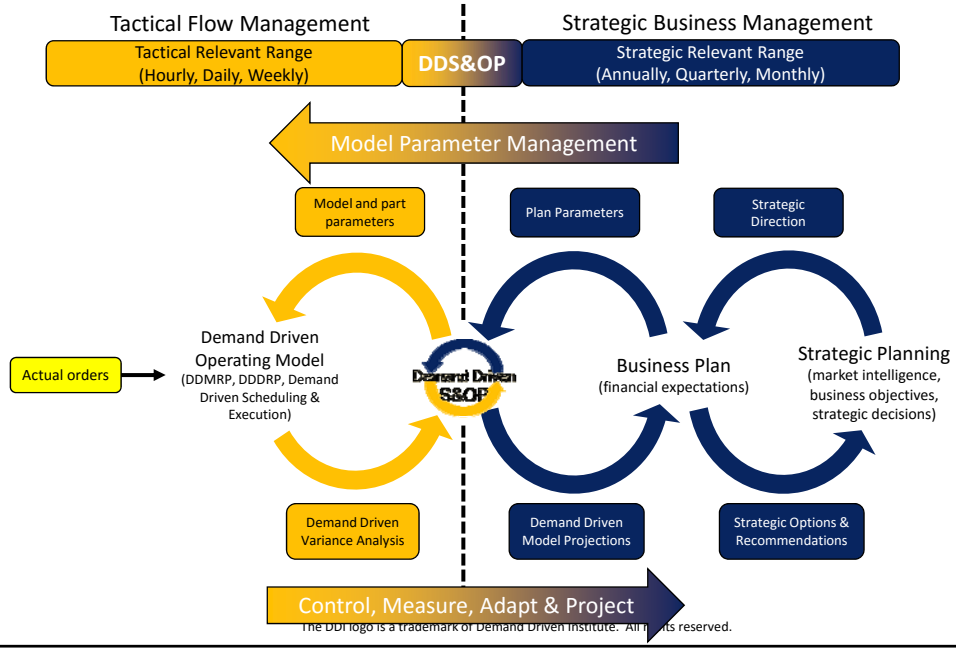
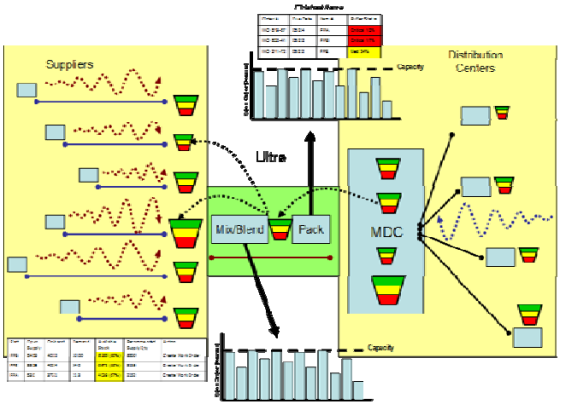


Demand Driven Adaptive System Schema

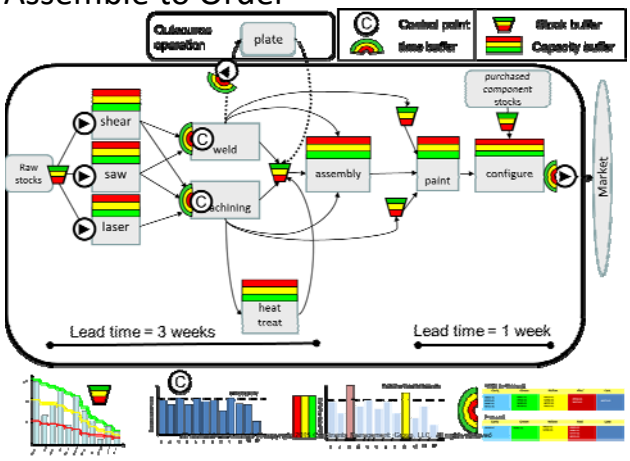


The Market Strategy Is In The Demand Driven Design

Make to Stock



Assemble to Order



Deploy The Operating Model

Demand Driven Model

ΔVisibility → ΔVariability →

Core Conflict Area

- Demand Driven Flow map of connections and interconnections
- Create Short, independent planning horizons
- Strategic control points govern and leverage the system output
- All buffers use Paretian models to identify lever point phenomena events to signal action, priority and opportunity.
- Visible buffer and control point status use a Paretian view to create a learning feedback loop to drive improvement.

Operating the Demand Driven Model (Tactical Time Frame)

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

Plossl's First Law of Manufacturing

Smart Metrics are:

- Visible and real time relevant information;
- Drive planning & execution to Flow;
- Measure quantity and time;
- Highlight plan status to actual (variation);
- Record and trend the sources of variation
- Provide focused investment and improvement;

Connect Flow to ROI!

Step 3 – Deploy Smart Metrics

Smart Metrics Have 6 Objectives

Improve a Demand Driven Model

	Metric Objectives	The Message
Day to Day Operations Control	System Reliability	Execute to the plan/schedule/market expectation;
	System Stability	Pass on as little variation as possible;
	System Speed/Velocity	Pass the right work on as fast as possible;
Strategic Decisions	System Improvement & Waste (Opportunity $)	Point out and prioritize lost ROI opportunities.
	Local Operating Expense	Spend minimization to capture the market opportunity
	Strategic Contribution	Maximize throughput dollar rate and throughput volume according to relevant factors

"Systems' with good adaptive mechanisms continue to innovate. This is more a mechanism of exploration than exploitation"

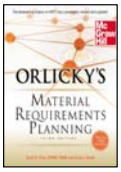
Nobel Prize winner John Holland, "Signals and Boundaries – Building Blocks for Complex Adaptive Systems

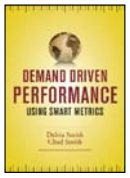
A nonlinear system cannot be optimized but it can continually learn and improve and emerge to a higher order.

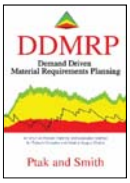
over and over again!

Questions?

- Demand Driven Books:







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