SURVIVING AND THRIVING THROUGH SUPPLY CHAIN CHAOS

Demand Driven INSTITUTE™

The Global Authority on Demand Driven

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What Do We Know to be True?

The World Seems to be a Little Different These Days

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/Customer Tolerance	High	Low
Governmental Actions (e.g. regulations, tariffs)	Low	!#@&

The VUCA World is Here!

Demand Driven INSTITUTE™

Surviving and Thriving Through Supply Chain Chaos

VOLATILITY

The frequency and severity of disruptions is increasing.

It's, not "if" it is , "when"!

UNCERTAINTY

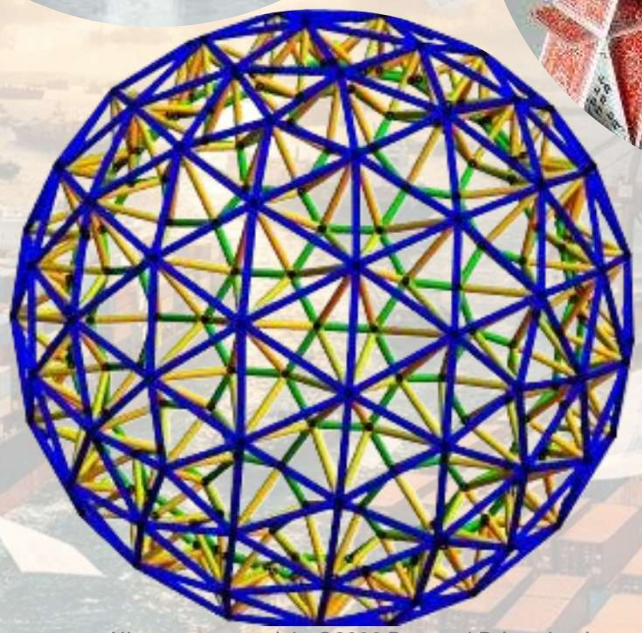
Warning: Disruptions are closer than they appear

It has become increasingly difficult to predict what will happen.

The three truths about forecasting:

1. **Forecasts start out wrong**
2. **The longer the forecasted time range the higher the error rate**
3. **The more detailed the forecast the higher the error rate**

COMPLEXITY



Today our supply chains have more connections and interdependencies leading to:

1. **Elongation – cumulative lead times have extended as we source and sell globally**
2. **Fragmentation – many more nodes and inputs makes effectively managing integration much more difficult**
3. **Fragility – even small initiating events can have devastating effects**

AMBIGUITY

It is becoming increasingly difficult to tell what is happening at any one point in time.

Supply chains are drowning in data but starved for relevant information.

Looking Ahead and Moving Forward

1. Leadership must start with the assumption that big disruptions ARE going to happen.
2. Leadership cannot build business and supply chain models based on profit maximization strategies that ignore the above conclusion!

THE Question

How do we design and build supply chains that can assume, mitigate and adapt to big disruptions?

Complex System Characteristics

1. **Nonlinearity.** Dynamic interactions and high degrees of inter-dependencies across and throughout a multi-dimensional structure. This means that a complex system is not just defined by its components; it is defined by both its components and the interactions of those components.
2. **Extreme sensitivity.** Lots of small initiating events occurring in a short time frame can produce significant nonlinear outcomes that may become extreme events. When complex systems are co-mingled or intertwined, such as highly integrated multi-echelon supply chains, these events can cascade across systems, resulting in a highly complex and evolving picture.
3. **Disproportionality.** Cause and effect are not proportional. A part that costs ten cents can halt the assembly of multimillion dollar end items as quickly as a $100,000 part.

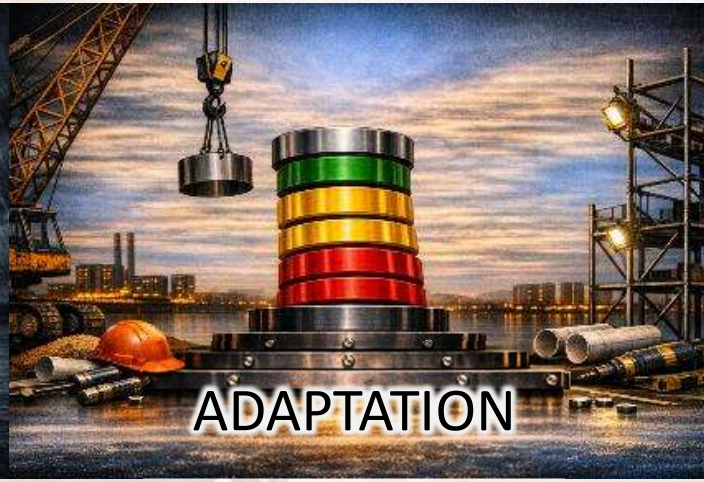
Some Immediate Implications

- **Systemic Measurements:**
  - We cannot simply measure the discrete components of the system.
  - We must measure both the components and their interactions at the operational, tactical and strategic levels.
- **Systemic Protection:**
  - We must protect against the risks associated with initiating events and the integrated nature of the system.
  - Can we protect everywhere? NO!
  - We must find critical or strategic places to protect.

Complex Systems Must Survive AND Adapt

"It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself."
- Leon Megginson

Key Aspects of Resilience



Operational **Tactical** **Strategic**

Relevant Range

Operational Shock Absorption

Stopping the transference and amplification of variability in both directions (demand signal distortion and supply continuity) at the operational level is vital.

Key Question: What places make the most sense to absorb disruptions and shocks both up and down the chain to mitigate the bullwhip effect?

Tactical Flexibility – Ranges of Capability

Operational models must be built with ranges of capability that will match the range of possibilities in the tactical horizon.

Key Question: How can we identify, build and keep visible a diverse set of tactical options?

Strategic Adaptation – What is it?

Adaptation refers to how a system reconfigures itself through time.

Key Question: How do we drive appropriate and timely changes to our capability and responsiveness in the face of external disruption and strategic shifts in direction?

WARNING: Optimization is NOT Adaptation

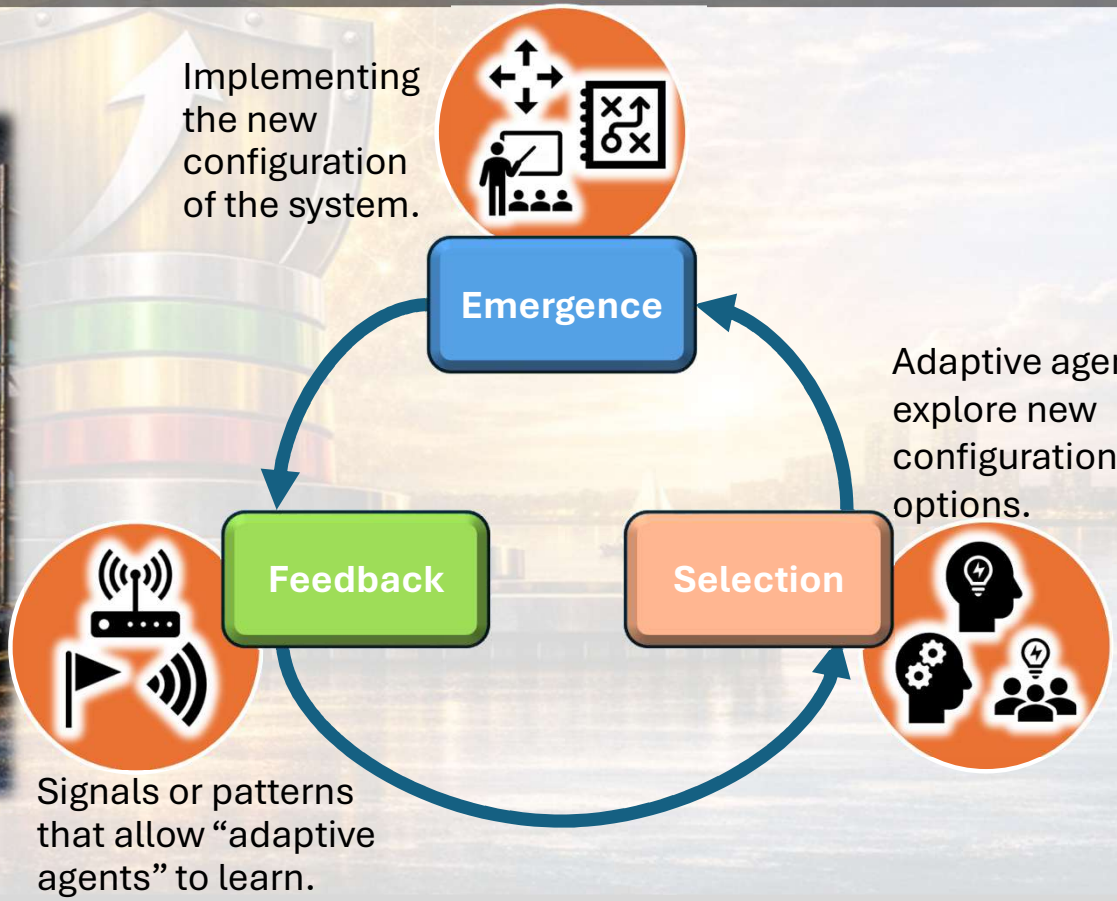
OPTIMIZATION

Complex systems CANNOT be optimized!

Complex systems must adapt through a cycle.

ADAPTATION

Strategic Adaptation – The Cycle



A Necessary Condition for Resilience

coherence [koh-heer-*uh*ns]

The subsystems' ability to align their purpose and actions with that of the system. Subsystems that are not in alignment can cause coherence to break down and push the system into chaos.

The alignment of local actions with the global objective is a key component for prevailing improvement disciplines.

LEAN	TOC	6 Sigma
		
Ohno	Goldratt	Deming

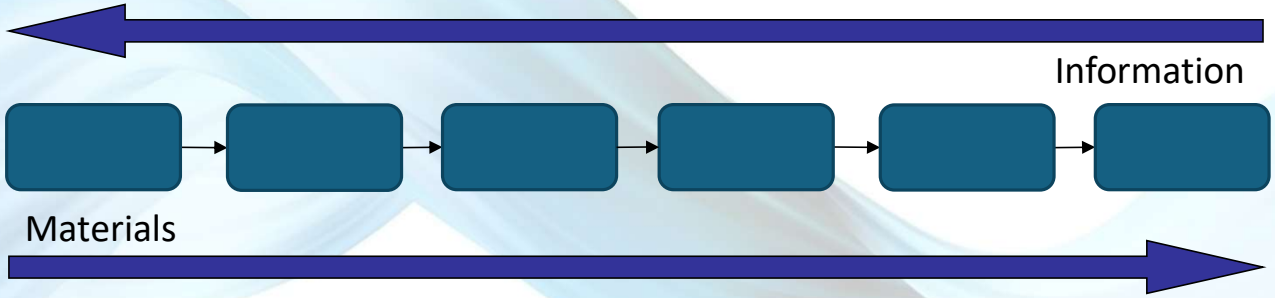
Coherence to What?

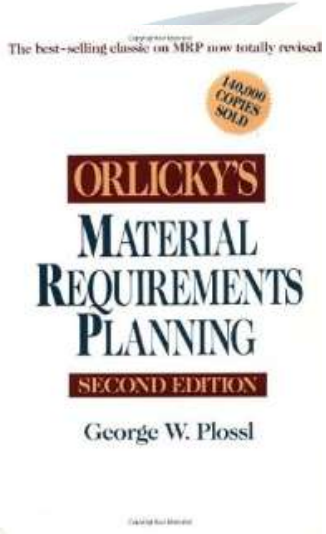
- What are we aiming for?
- What is the true objective of a supply chain, and how can the subsystems' purposes be best aligned to that objective?
- Is there a fundamental principle that can focus every supply chain and its subsystems?

Plossl's Law

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

George W. Plossl





What are all the Benefits?

The Benefits of Flow

HIGH SERVICE LEVELS

Flow is about aligning a company's assets to the market interface ensuring consistently high levels of service to your customers.

A STRONG DEFENSE

When service levels are consistently high a company's revenue stream and customer bases are well defended.

RIGHT-SIZED INVENTORY

When flow is occurring, inventory is appropriately turning. Inventory is an asset ONLY when it is enabling flow.

LESS COURSE CORRECTIONS

Building capability, plans and schedules around protecting and promoting flow means there will be less surprises in execution.

A COMPETITIVE WEAPON

The agility gained through a focus on flow allows a company to service markets in unique and highly competitive ways.

LESS EXPEDITE EXPENSES

Less surprises means there will be less required overtime, premium freight, third party warehousing, etc.

IMPROVED CASH VELOCITY

Good flow and less expedite expenses means that cash generation follows the rate of product to the customers.

IMPROVED ROI

Improved and growing cash velocity through the asset base creates higher returns on shareholder equity.

A Simplified Flow Equation

ΔFlow → ΔCash Velocity → ΔOperating Profit → ΔROCE

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

Cash Velocity is the rate of net cash generation; sales dollars minus truly variable costs minus period operating expenses.

Operating Profit is the amount of money a company earns after accounting for the costs of running its core business.

Return On Capital Employed assesses a company's ability to generate profit from the capital it has in use.

A version of this equation first appeared in *Demand Driven Performance: Using Smart Metrics* (Smith and Smith, McGraw-Hill, 2014)

A Common Objective Across Many Disciplines

MRP

Objective:
Synchronize
Demand & Supply

LEAN

Objective:
Reduce Waste

TOC

Objective:
Improve System
Throughput

6 Sigma

Objective:
Reduce
Variability

All have the same foundation - FLOW!

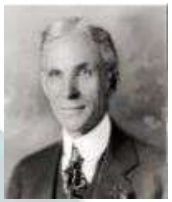
Is a Focus on Flow New?

TAYLOR

Objective:
Rate

Time standards & variances

FORD



Objective:
Scale

Vertically integration & mass production

BROWN

Objective:
Market

Market creation and segmentation

FLOW was THE Primary Building Block

Flow = Organizational & Operational Coherence

Organizational Function	Primary Objective
Finance	Drive shareholder equity
Sales	Capture demand
Marketing	Create brand awareness and demand
R&D/Engineering	Timely development and innovation
Operations	Utilize assets to meet demand

Department	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

What About Cost?

- Companies throughout the world obsess over cost performance at the strategic, tactical and operational level
- Cost strategies rely on predictable and consistent volume to attempt to maximize profit and ROI
- Many companies attempt coherence to cost by assuming this equation is valid.

$$\Delta\text{Cost} \rightarrow \Delta\text{Cash Velocity} \rightarrow \Delta\text{Operating Profit} \rightarrow \Delta\text{ROCE}$$

Two Different Perspectives

ΔFlow → ΔCash Velocity → ΔOperating Profit → ΔROCE

VS

ΔCost → ΔCash Velocity → ΔOperating Profit → ΔROCE

Are they really that different?
Would they really cause subsystems to behave differently?

COST vs FLOW

A **HUGE** DIFFERENCE IN PERSPECTIVE...

How much does the chain weigh?
How can we make it weigh less?

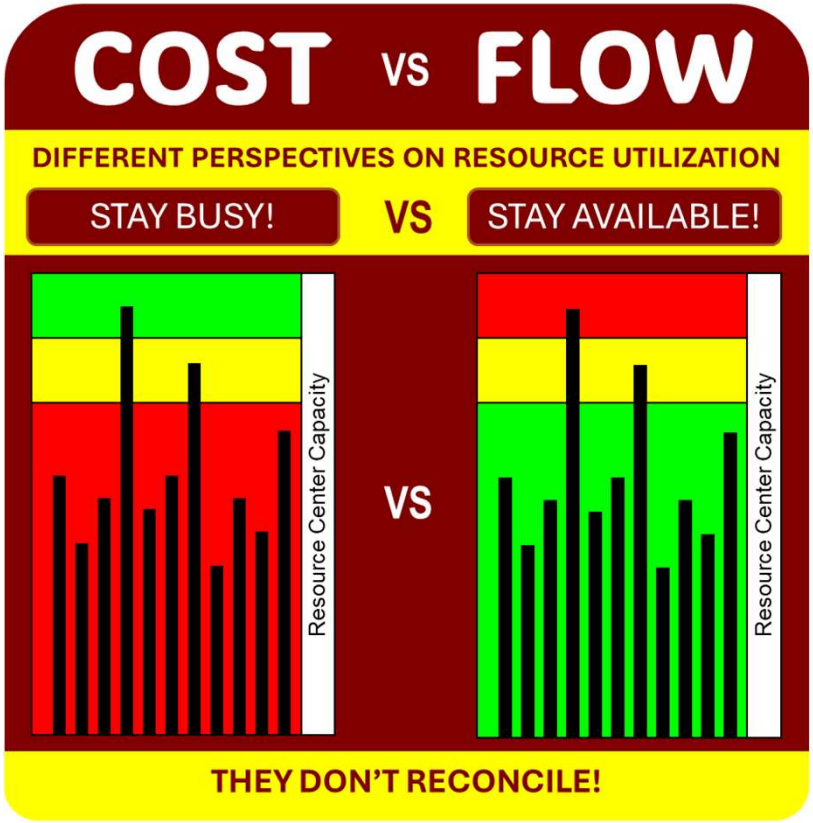
VS

How strong is the chain?
How can we make it stronger?

But does that really matter?

YES!

AN EXAMPLE



Calculation Approaches	LINEAR A + B + C = ABC	SYSTEMIC A → b → C = b
Labor and Overhead	Labor and overhead rates are VARIABLE with unit volume in the operational and tactical periods.	Labor and overhead rates are largely FIXED in the operational and tactical periods.
Margin Maximization	Focus on lowering unit cost.	Focus on service, responsiveness and direct material cost reduction.
Volume Maximization	Lower price with larger order minimums.	Focus on service, lead time and uniquely defensible offers.
Budget Performance	Focus on actions to achieve standard unit cost in the period.	Leverage capability into the market for positive cash contribution in the period.
Batching Practices	Size and run batches for best cost performance.	Size and run batches for best total flow performance to the market.
Improvement Approach	Cost reduction through increased resource efficiency or labor content.	Identify the largest sources of variation and look to minimize their impact on system flow.

Coherence to Cost Destroys Resilience

- When the volume is not realized in the predicted way there are three bottom line effects:
  1. Too much of the wrong
  2. Too little of the right
  3. Additional expenses to attempt corrections
- Assets are fundamentally misaligned to the market
- The larger the disruption, the greater the misalignment
- The bigger the misalignment the lower the chance of survival

The Economist

"A focus on maximum efficiency harms resilience."

"Supply Chain Resilience for an Era of Turbulence," Economist Intelligence Unit, March 2021, pp. 2–3 [report commissioned by the Association for Supply Chain Management (ASCM)].

The Cost Accounting Reality

This is not a valid equation!

ΔCost ⇸ ΔCash Velocity → ΔOperating Profit → ΔR

↗ ΔCost **This is the link between flow and cost!**

ΔFlow → ΔCash Velocity → ΔOperating Profit → ΔROCE

- Cost is a consequence of flow within a defined period.
- The better the flow through to the market in a period the better the calculated cost (units sold/variable and fixed costs).
- If you want good cost control, you MUST have good flow control!

Cost is what is calculated, flow is what is managed!

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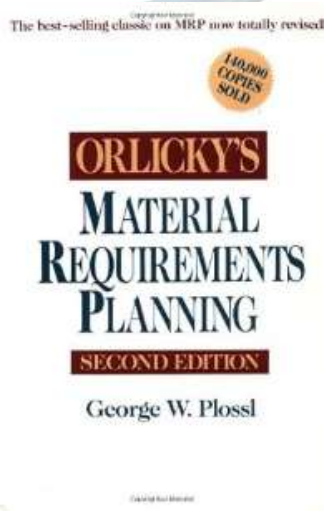
George W. Plossl

The corollaries:

1. When a business focuses on flow performance, better cost control will follow. The opposite, however, is NEVER true.
2. Something is **productive** if and only if it leads to better promotion and protection of system flow.
3. Something is **efficient** if and only if it leads to better promotion and protection of system flow.



Let's Summarize

1. The VUCA World is here!
2. The VUCA World brings disruptions (when not if)!
3. Your company and its supply chain is a complex system.
4. Complex systems rely on resilience to survive disruptions in the short term.
5. Complex systems rely on adaptation to survive in the long term.
6. Resilience and adaptation require coherence.
7. Coherence to flow is the key to resilience and adaptation (and maximizing ROCE) in the VUCA World.

How Can My Company Embrace Coherence to Flow?

1. Design a flow-based supply chain model
   - Teach your people at all levels about flow. Give them the right *thoughtware!*
   - Strategically place decoupling points.
   - Place appropriate levels of protection at the decoupling points to stop the transference and amplification of bidirectional variability (bullwhip).
   - Align order generation to actual demand.
   - Install feedback loops and appropriate technology to drive adaptation of the model.
2. Adopt supporting metrics at the operational, tactical and strategic levels
   - Review all metrics for fit and function.
   - Remove metrics that impede or distort flow.
   - Install metrics that protect and promote flow.

BUT MOST IMPORTANTLY…

Don’t be a Dodo