Inventory Optimization:
Striking the Right Balance

NORTHFIND
MANAGEMENT

Global leaders in Supply Chain Optimization

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Unlike many other consultancies, NorthFind Management offers a focused suite of planning and analytic services provided by a best in class team of seasoned industry leaders. Our approach is not simply based on theory; it is the product of proven experience and best-in-class technical expertise in our core disciplines.

Jonathon Karelse, CEO

Leaders in Supply Chain Management

NorthFind Management was founded with supply chain management as a cornerstone of its practice. Jonathon Karelse is widely recognized as a leader in demand planning and Sales and Operations Planning, and has brought his passion for continuous improvement to the NorthFind team. He has been recognized seven times as Best-of-the-Best in S&OP by APICS and the IBF.

Joining him at NorthFind are recognized leaders in their respective disciplines: inventory optimization and network design; strategic sourcing and supplier performance management; analytics and supply chain modeling; and more. Together, the NorthFind team represents the global benchmark for end-to-end supply chain performance.

1 Demand Planning and Forecasting
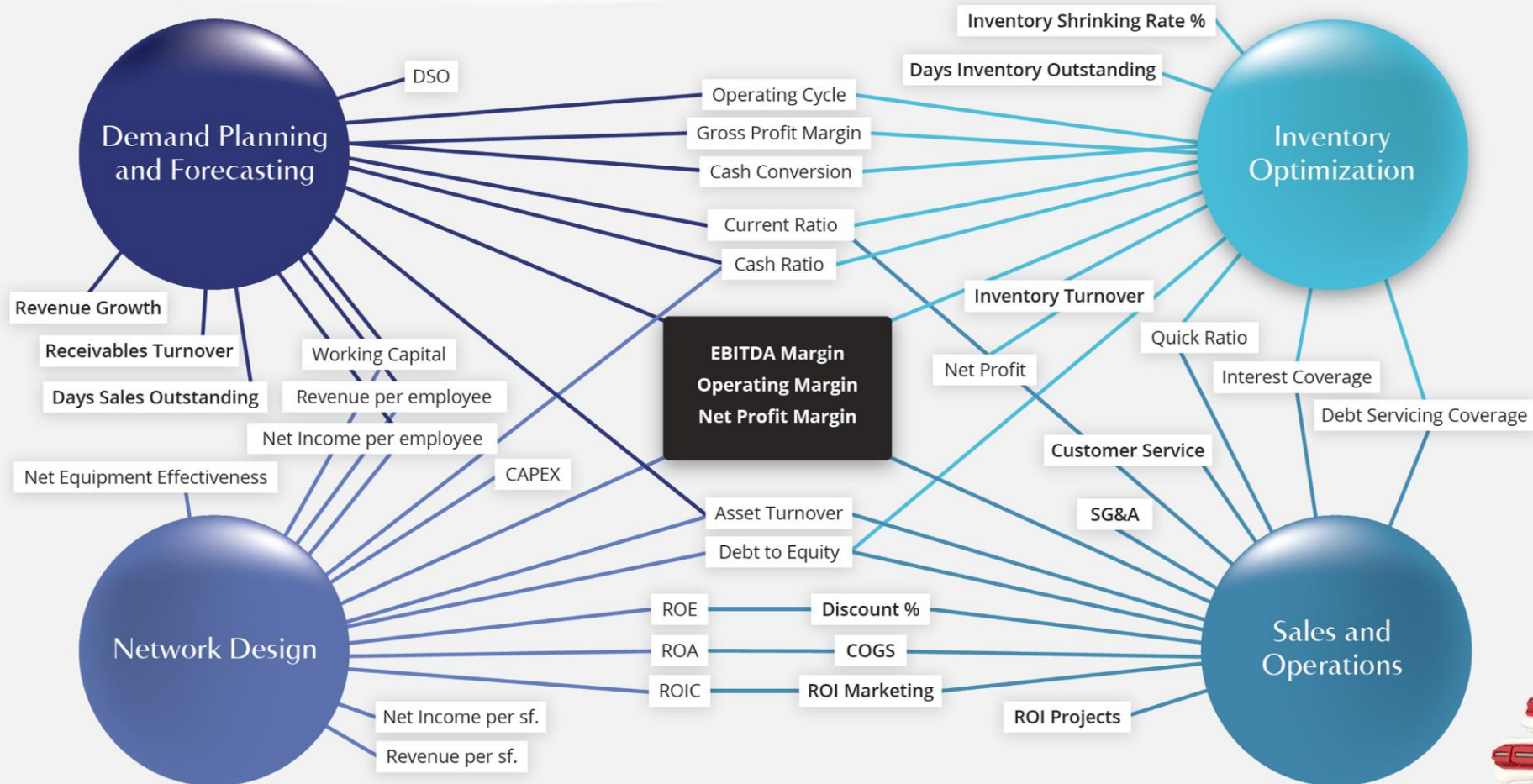
2 Inventory Optimization

3 Network Design

4 Sales and Operations Planning

Some of NorthFind Management's Supply Chain Optimization Clients…

Operations and Finance Links: Key Metrics

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Demand Planning and Forecasting

DSO

Operating Cycle
Gross Profit Margin
Cash Conversion

Current Ratio
Cash Ratio

Revenue Growth
Receivables Turnover
Days Sales Outstanding
Working Capital
Revenue per employee
Net Income per employee
CAPEX

Net Equipment Effectiveness

Inventory Shrinking Rate %
Days Inventory Outstanding

Inventory Optimization

Inventory Turnover
Net Profit

Quick Ratio
Interest Coverage
Debt Servicing Coverage

EBITDA Margin
Operating Margin
Net Profit Margin

Customer Service

SG&A

Network Design

Asset Turnover
Debt to Equity

ROE   **Discount %**
ROA   **COGS**
ROIC   **ROI Marketing**

Net Income per sf.
Revenue per sf.

ROI Projects

Sales and Operations

Inventory: A Primer

Why Is Inventory An Issue?

- Consumes cash, and depresses cash flow; a factor of great concern to the security analysts evaluating the firm's stock

- Consumes expense dollars in the form of inventory holding cost, and generates inefficiencies in trying to operate very full warehouses
  - Cost of capital
  - Insurance, taxes
  - Obsolescence, damage
  - Cost of building
  - Cost of labor

- It will eventually create a need for additional warehouse space

- Inventory is a crutch that covers up process inefficiencies

- **Many firms look at inventory as an indicator for how efficiently the overall supply chain is functioning**

What Drives Inventory?

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Service and Time

Customer expected lead-time is shorter than lead-time it takes to respond to the demand.

– Planning Time

– Procurement Time

– Production Time

– Fulfillment Time

– Transit Time

Uncertainty

Unanticipated changes in supply and demand jeopardizes desired customer service levels

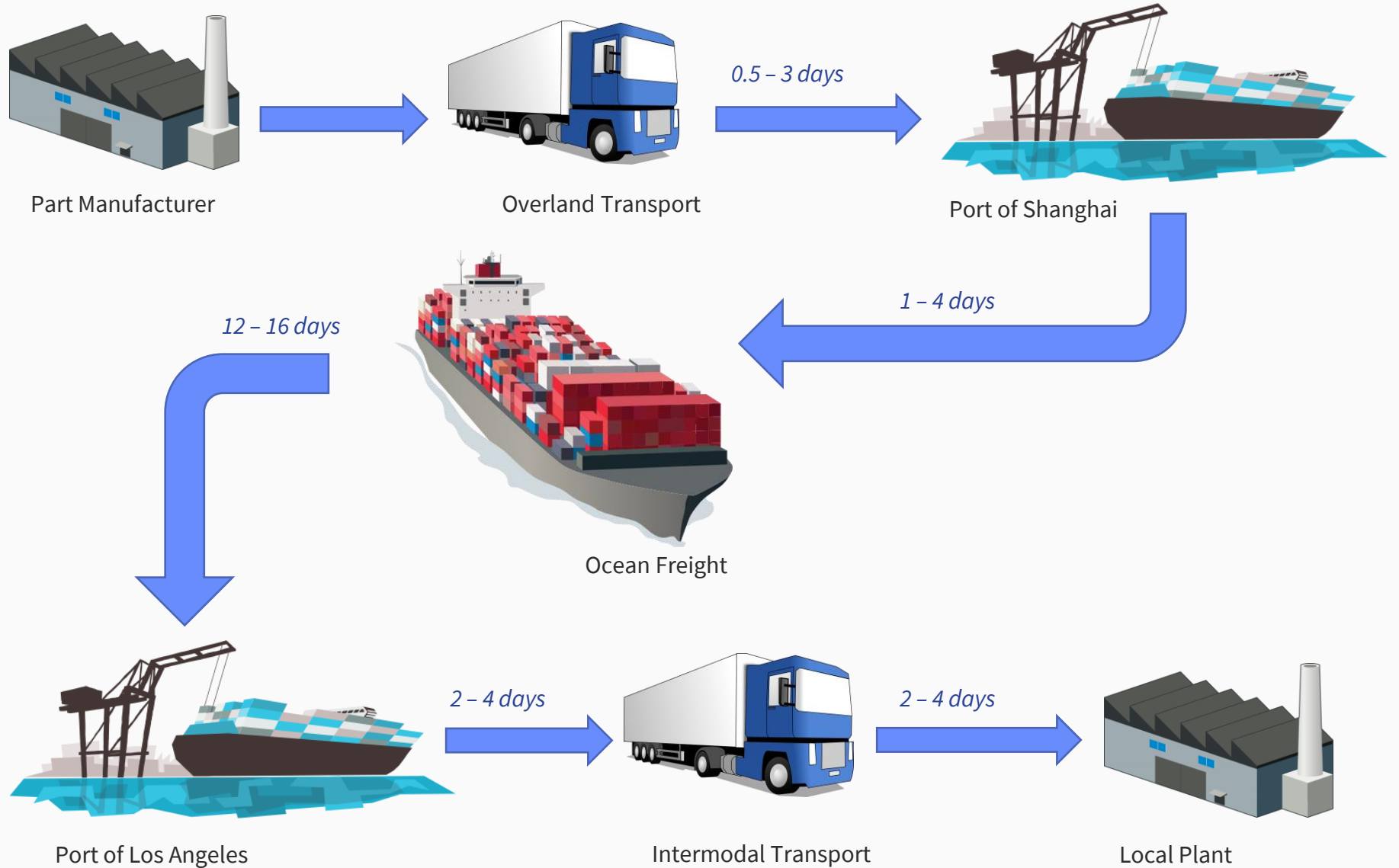– Demand (Quantities, Timing)

– Supply (Quantities, Timing)

Economics

Economic replenishment quantities & asset utilization offset inventory costs

– Purchase Quantity Discounts

– Economic Lot Sizes (manufacturing)

– Handling Quantities

– Transportation Quantities

– Capacity Balancing

– Customer Opportunity Costs

Cold Start Value Stream – The Sources of Uncertainty

Part Manufacturer

0.5 – 3 days

Overland Transport

Port of Shanghai

1 – 4 days

12 – 16 days

Ocean Freight

Port of Los Angeles

2 – 4 days

Intermodal Transport

2 – 4 days

Local Plant

Types of Inventory

Cycle Stock

Prebuild Stock

Merchandising Stock

Safety Stock

Pipeline Stock

Prebuild Stock

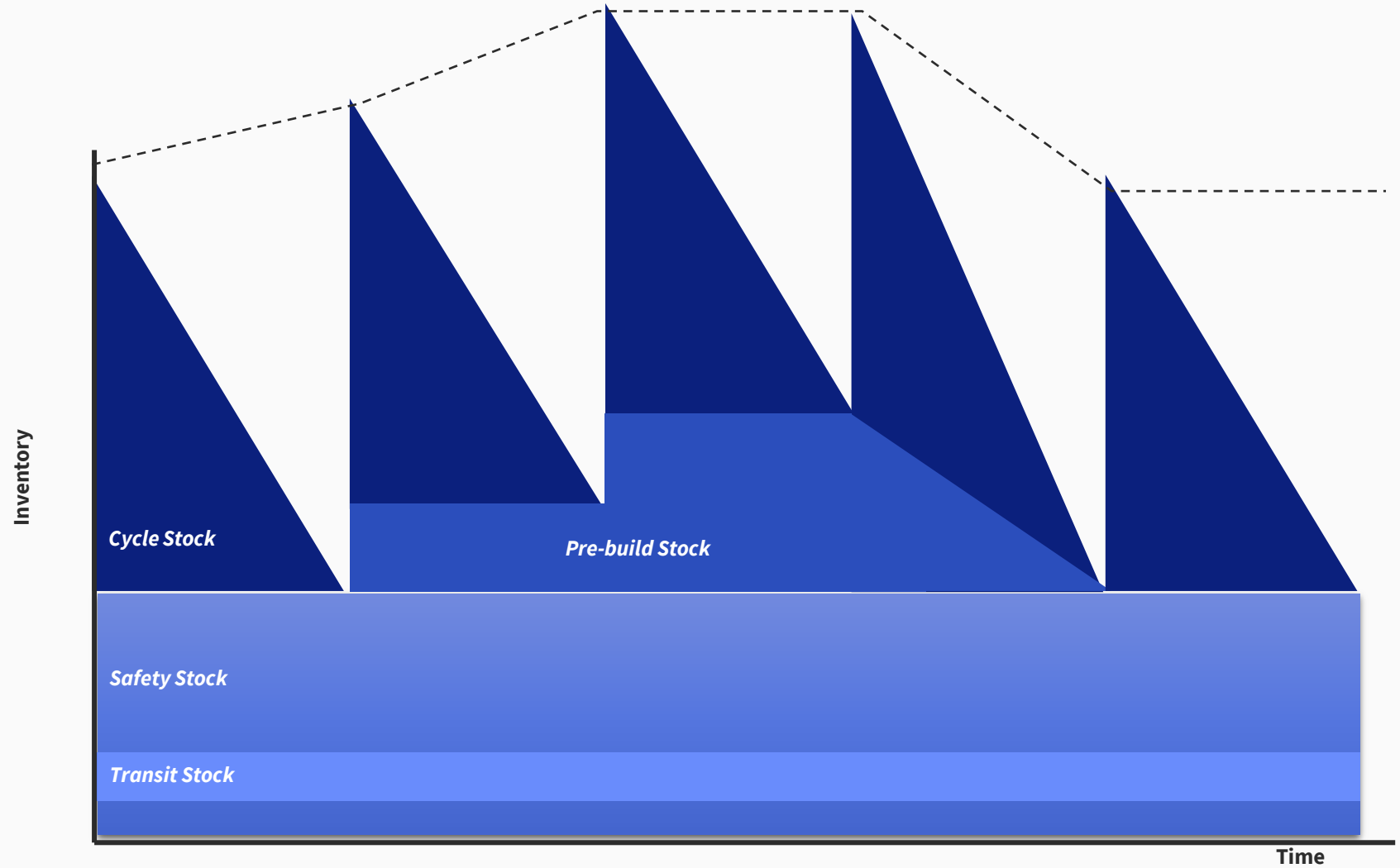The additional inventory kept to compensate for future capacity constraints

Merchandising (Retail) Stock

Cushion kept to maintain required minimum on hand inventories.

Physical pipeline stock

Represents the inventory in-transit

Inventory Optimization Impact

- **Improved ability to determine safety stock target for inventory at critical nodes in the supply chain:** 84% with Inventory Optimization vs only 49% with no optimization

- **Improved ability to replenish inventory into distribution buffers based on customer demand:** 69% with Inventory Optimization vs. only 43% with no optimization

- **Lower landed per unit costs:** Leaders have decreased their total costs by 0.5% compared to an 8.5% increase for Followers.

- **Lower out-of-Stock inventory costs:** Through automation and optimization, Leaders have decreased their out-of-stock frequency by 7.5% year over year. In contrast, Followers have seen a 0.9% increase in out-of-stock inventory rates.

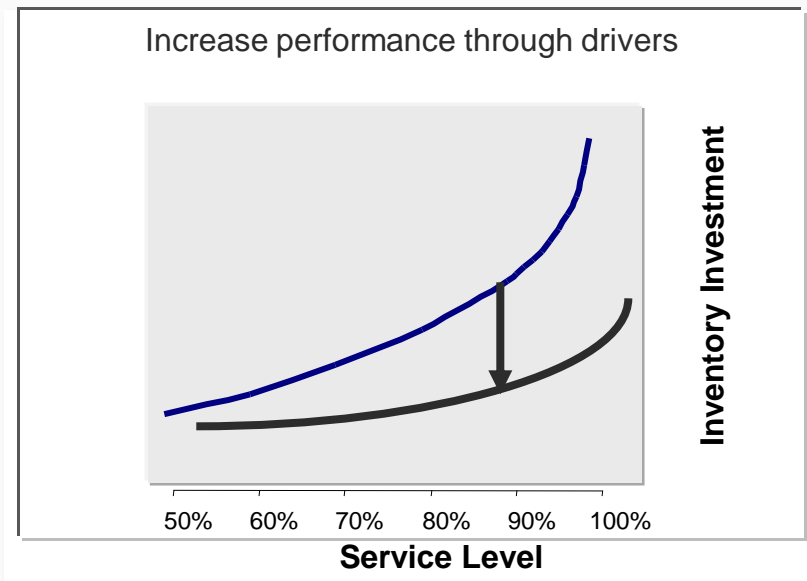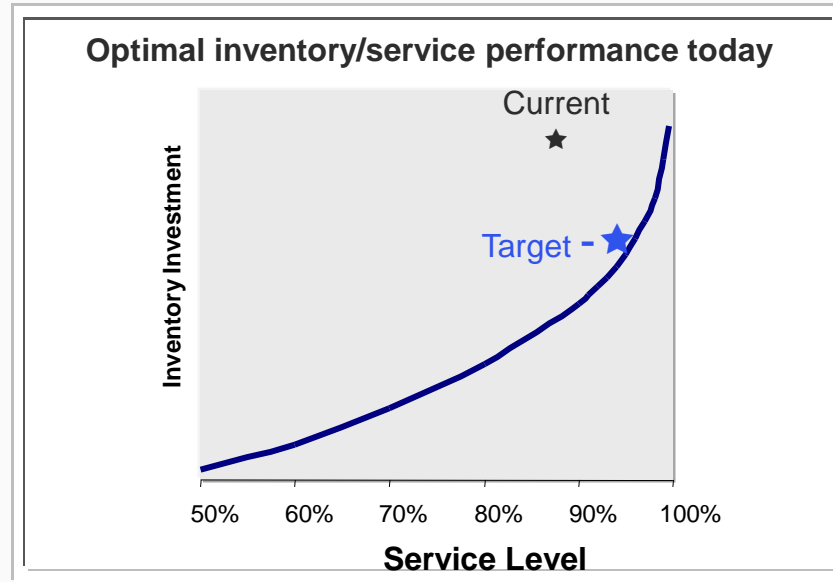Inventory and supply chain optimization

https://www.aberdeen.com/opspro-essentials/inventory-optimization-tradeoffs/
https://www.aberdeen.com/opspro-essentials/sets-supply-chain-optimization-leaders-apart-crowd/

Improving Turns and ROIC

Safety Stock Impact on Finance

- Safety stock equals a service factor times the variability of supply and demand.

- Forecast error is a surrogate for the variability of demand

- Service factor:

Service Level	K factor	% Change in Safety Stock vs. 80% Service Level
80%	0.84	
90%	1.28	52%
95%	1.64	95%
99%	2.33	177%
99.9%	3.72	342%

Optimal inventory/service performance today

Increase performance through drivers

Balance in the short run
- PFEP
- SKU Rationalization
- Inventory (SLOB) Management

Change the game in the long run
- Forecast accuracy
- LeadTime Reductions
- MDM Initiatives

Inventory Optimization: PFEP

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Inventory Optimization

Few companies have a larger risk/benefit asset than their inventory.

And most have a one-size-fits-all approach to inventory management, or no formal approach at all.

The result is slow-moving and obsolete inventory, cash tied up needlessly, and poor service levels to customers.

NorthFind Management employs a Plan For Every Part approach to inventory optimization which balances the demand signal, replenishment realities, and the financial impact of each part to create an inventory model which meets the unique requirements of each part.

The results of this approach have yielded tens of millions of dollars of cash-flow improvement for our clients, and dramatically-improved service levels for their customers.

CURRENT POSITION

OPPORTUNITY

INVENTORY VALUE ($)

SERVICE LEVEL (%)

AS-IS   TO-BE
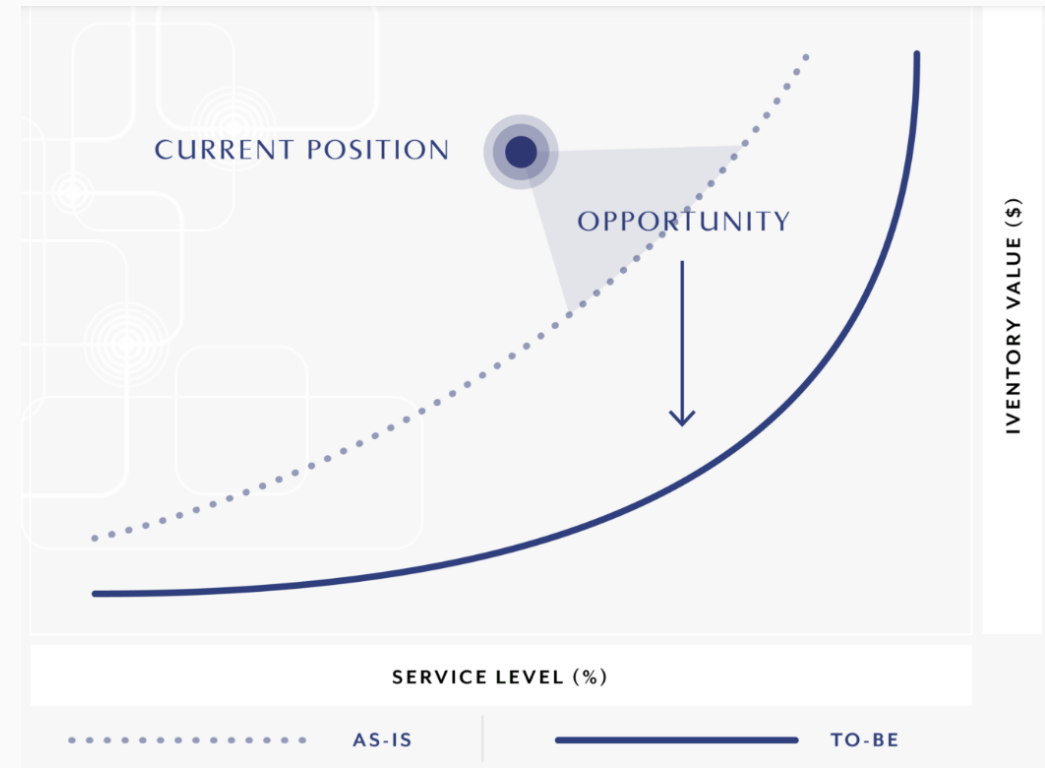
Plan For Every Part – Part Segmentation

Modeling your company's portfolio in terms of their predictability and profit contribution allows for a more effective and strategic approach to planning.

It requires only the most basic data, and rudimentary spreadsheet skills.
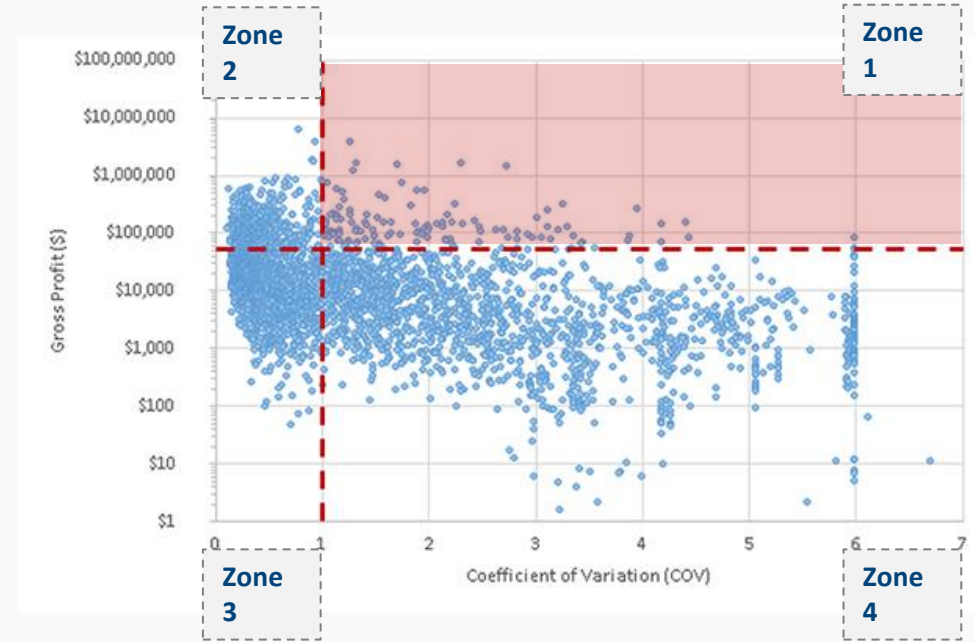
Plan For Every Part

NorthFind's approach to forecasting and demand planning rests on the belief that since not all parts are created equal, neither should their associated planning processes be the same.

We begin with data cleansing and analysis to create a matrixed Plan For Every Part, with some parts resting more heavily on statistical methods, and others requiring business intelligence and analyst intervention.

The result is a demand planning process that is optimized for each part, and using our proprietary Comet Chart forecasting performance analysis, the process can be continually fine-tuned and improved.

The result is improved asset utilization; improved forecasting performance; and often reduced workload for Sales and other non-planning stakeholders.

The chart above is an example of NorthFind's Demand Planning profile segmentation (Plan For Every Part), allowing Clients to employ differentiated forecasting approaches to their product portfolio

Inventory Strategies – PFEP (Plan For Every Part)

Zone 2
- High $
- Low CV

Zone 1
- High $
- High CV

Zone 3
- Low $
- Low CV

Zone 4
- Low $
- High CV

- Methodology for deciding how to plan for a given Finished Good

- 4 main categories
  - Make to Stock: stable part
    - Coefficient of variance is less than 1
    - Decent volume and frequent occurrence
  - Make to Forecast: requires input from customer view
    - Coefficient of variance is greater than 1 but less than 1.5
    - Decent volume, could be NPI and/or EOL so volume and occurrence could be low
  - Make to Order: High risk for S&E
    - Coefficient of variance is high
    - Volume and occurrence is low, could be single customer item
    - Assumption cold start lead time is acceptable to customers
  - Assemble to Order:
    - Coefficient of variance is high at the end unit level
    - Decent volume based on multiple customers demand
    - Assumption cold start lead time is unacceptable for market
  - MTS: Zone 2 & 3
  - MTF: Zone 1 & 4
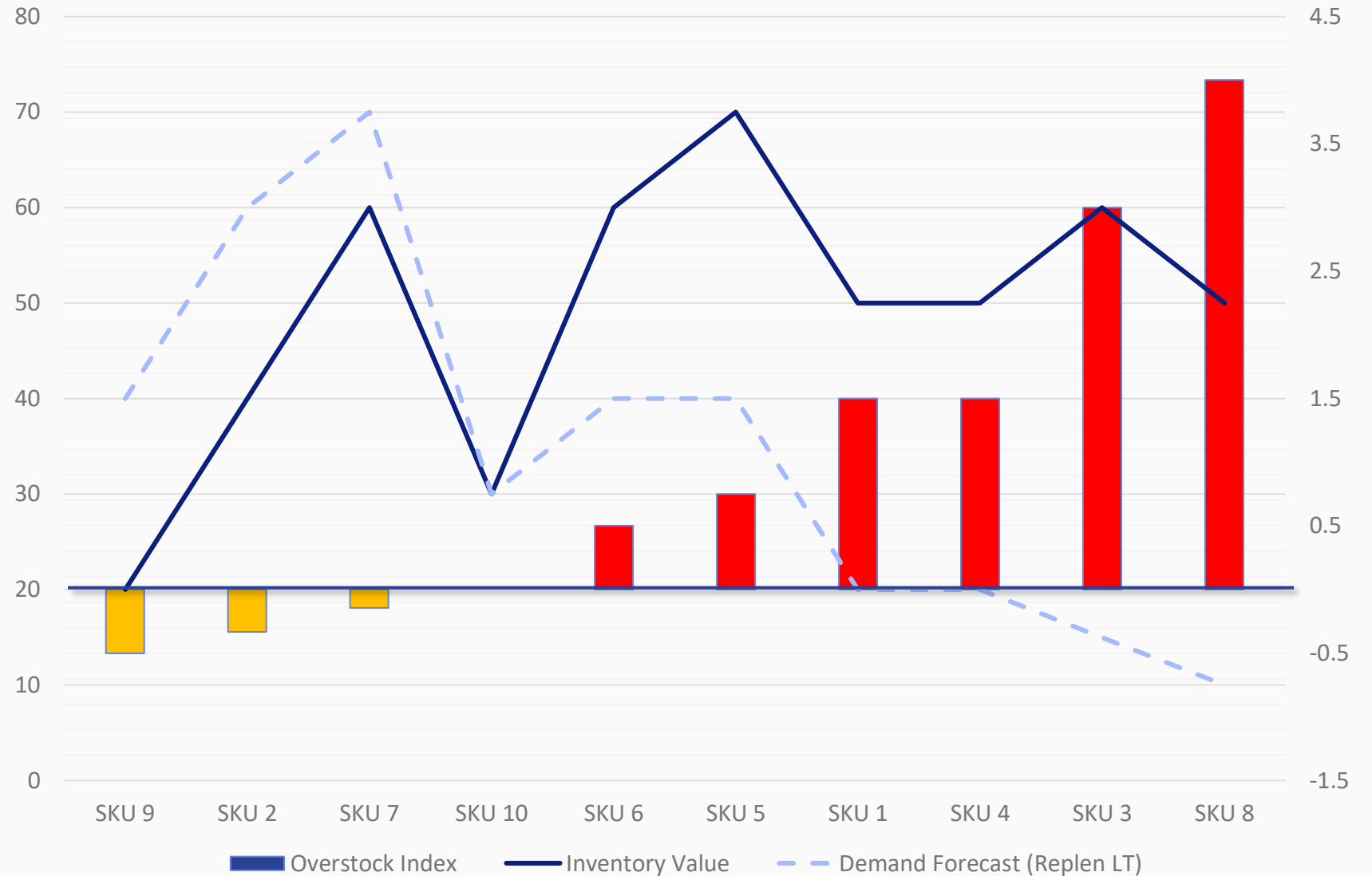
Select Segmentation Cases

factorsgroup
of nutritional companies inc.

Factors Group of Nutritional Companies

- Under $1 billion CAD annual revenues
- Privately held company
- 4000+ SKUs, 1000+ customers in 50+ countries
- Sitting on > $140 million in inventory at outset
- Introduced Part Segmentation methodology to improve Turns and ROIC
- Reduced inventory by $25+ million and improved service levels by 300 bps over 18 months

SLOB (Slow-Moving and Obsolete)

Portfolio Rationalization

HID Segmentation Summary - No Data Prep*

Zone	1	2	3	4	
n	8	15	2,137	17,092	
$ Average	$ ⬭	$ ⬭93	$ ⬭	$ ⬭	Zones 3 and 4 include parts with negative contribution
CV Average	1.502	0.483	0.473	5.326	

8108 of the parts in Zone 4 have no history

Parameters

CV Breakpoint = 1 — Roughly 20% of parts with history are < 1. Good calibration until Comet Chart analysis is undertaken to determine FA.

$ Breakpoint >= 80% — Recommend resetting at >=70%

Initial recommendations:
1. Need to take a closer look at half of the Zone 4 parts. There appears to be no history. Should they be active?
2. Rationalise stocking status (i.e. MTO) for remaining Zone 4 parts where appropriate. Potential EOL.
3. Rerun model using top 70% contribution to migrate more parts to top two segments.
4. Initial analysis of aggregate CVs indicate group forecasting has good potential.
5. Immediate need for historic outlier analysis and correction.
6. Discuss stratgy for Sales and Marketing input, CPFR on Zone 1 parts.

- $1+ Billion USD manufacturer of security electronics
- Subsidiary of ASSA Abloy
- 100,000+ SKUs, 1000+ customers, distributed globally
- Part proliferation was driving inventory and reducing profit per unit
- Identified thousands of parts which were candidates for amalgamation or obsolescence
- Calculated cost of creation/SKU for entire business across every touchpoint
- Over two years, reduced SKU count by 10,000+, improved GP$/u and reduced inventory by more than $15 million USD

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Inventory Management Maturity Model

Best in Class (MEIO + AI)
Dynamic Safety Stocks between each node of manufacturing are established based on demonstrated replenishment rates and variability, and are optimized in real-time with minimal human intervention.

Dynamic Safety Stocks
FG Safety stocks that are allowed to flex based on forward-looking demand changes are established, and a closed feedback loop with Demand Planning ensures optimum levels.
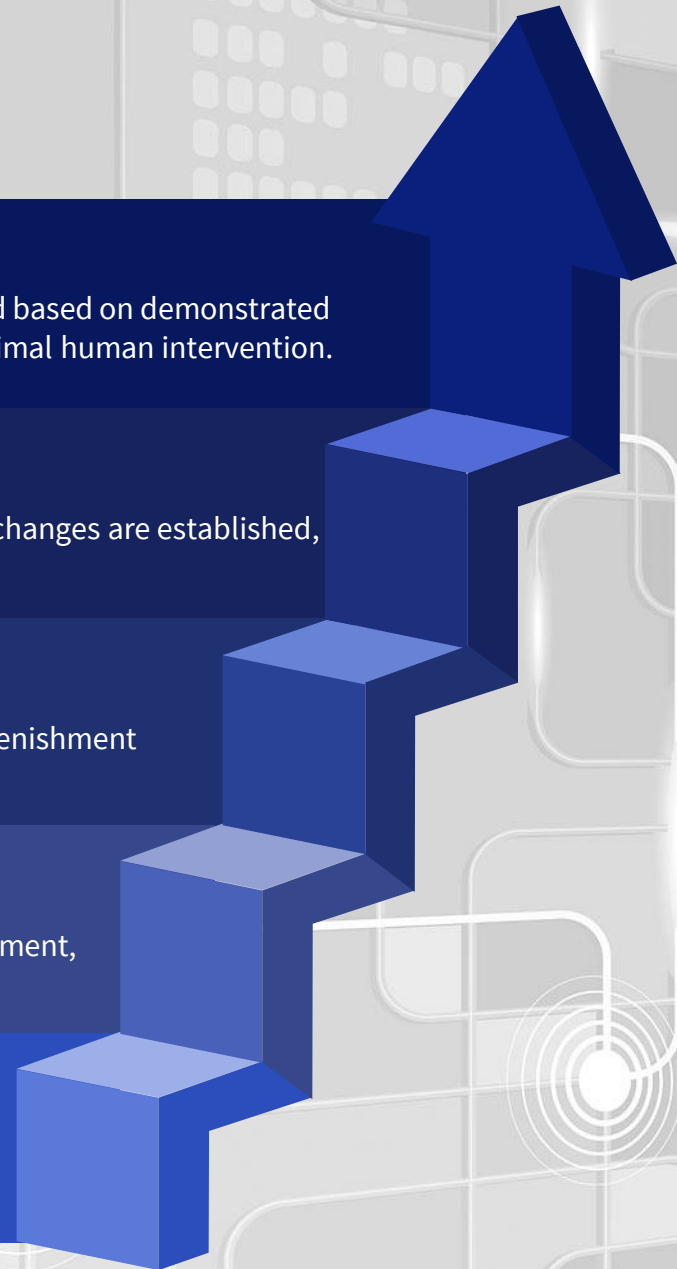
Safety Stocks
FG Safety Stocks based on calculated and validated demand variability, replenishment variability are established and proactively managed.
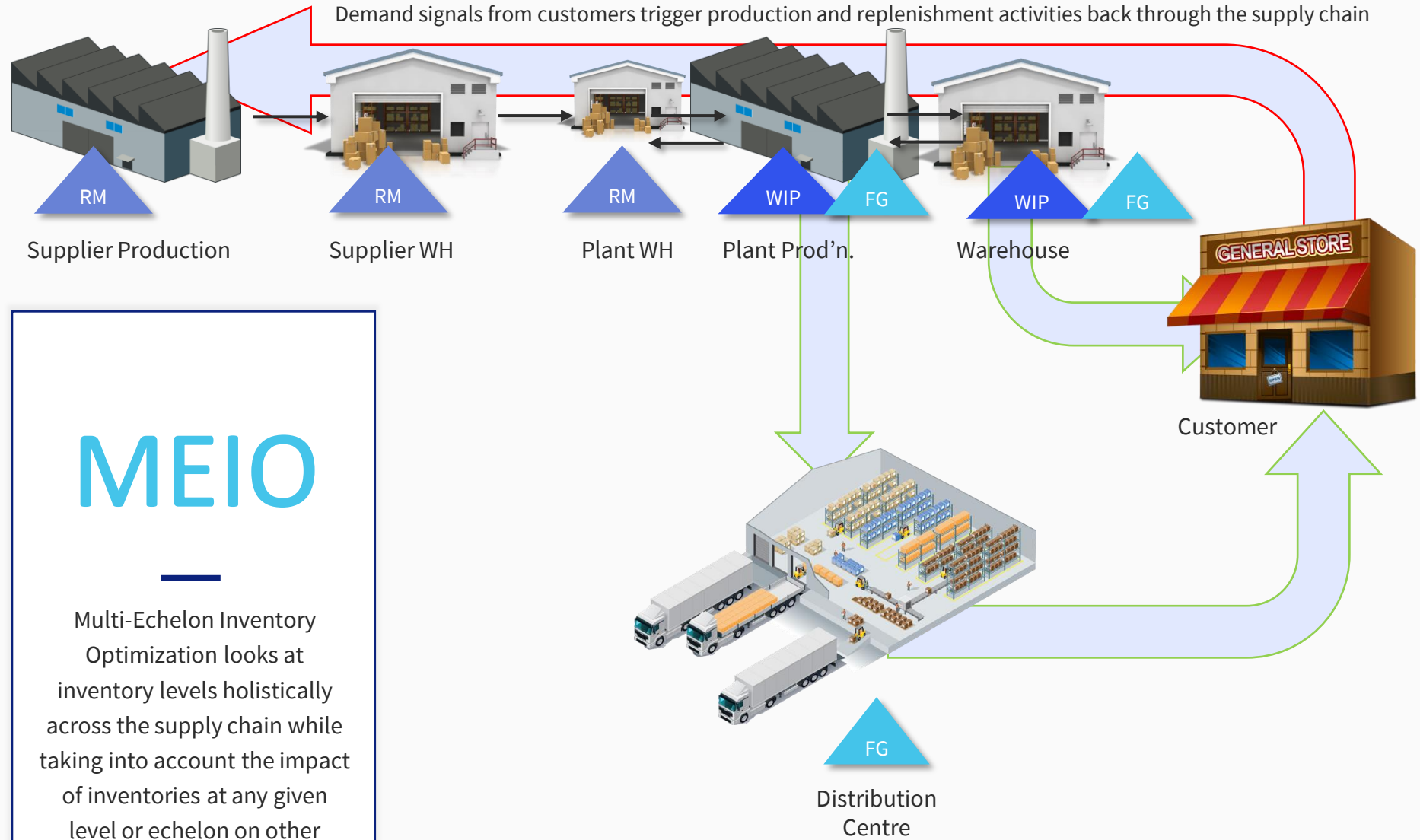
Targets and Ownership
Inventory targets and ownership is established, with some plans for management, but the organization remains reactive.

Rudimentary
The organization recognizes inventory impacts on cashflow, but does not have visibility to its causes, its optimum levels, nor ownership.

Multi-Echelon Inventory Optimization

Demand signals from customers trigger production and replenishment activities back through the supply chain

RM — Supplier Production
RM — Supplier WH
RM — Plant WH
WIP · FG — Plant Prod'n.
WIP · FG — Warehouse
GENERAL STORE — Customer
FG — Distribution Centre

MEIO

Multi-Echelon Inventory Optimization looks at inventory levels holistically across the supply chain while taking into account the impact of inventories at any given level or echelon on other echelons.
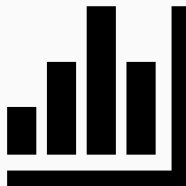
MEIO Considerations

MultiEchelon Inventory Optimization

... is counterintuitive

... requires trust and alignment across the organization

... needs better data and tools

Select Inventory Optimization Cases

Steelcase

- $3+ Billion manufacturer of office furniture
- Inventory optimization analysis identified $40+ million in savings, and service level improvement of 9%

Franklin Electric

- $2.3 Billion manufacturer of pumps
- Multi-echelon inventory analysis identified more than $80 million in opportunity
- Additional reduction of air freight by $4 million

SunPower

- $1.5 Billion manufacturer of solar panels and photovoltaic cells
- Through inventory optimization study and S&OP deployment, identified $70.2 million in inventory reduction opportunity
- Improved forecast accuracy 23%