Using Multi-echelon Inventory Optimization (MEIO)
to achieve measurable operational improvements

# THE INVENTORY OPTIMIZATION HANDBOOK



# WHY INVENTORY OPTIMIZATION?

Nucleus Research found that companies applying IO tools can generally reduce inventory holdings in the range of 10 to 30 percent.

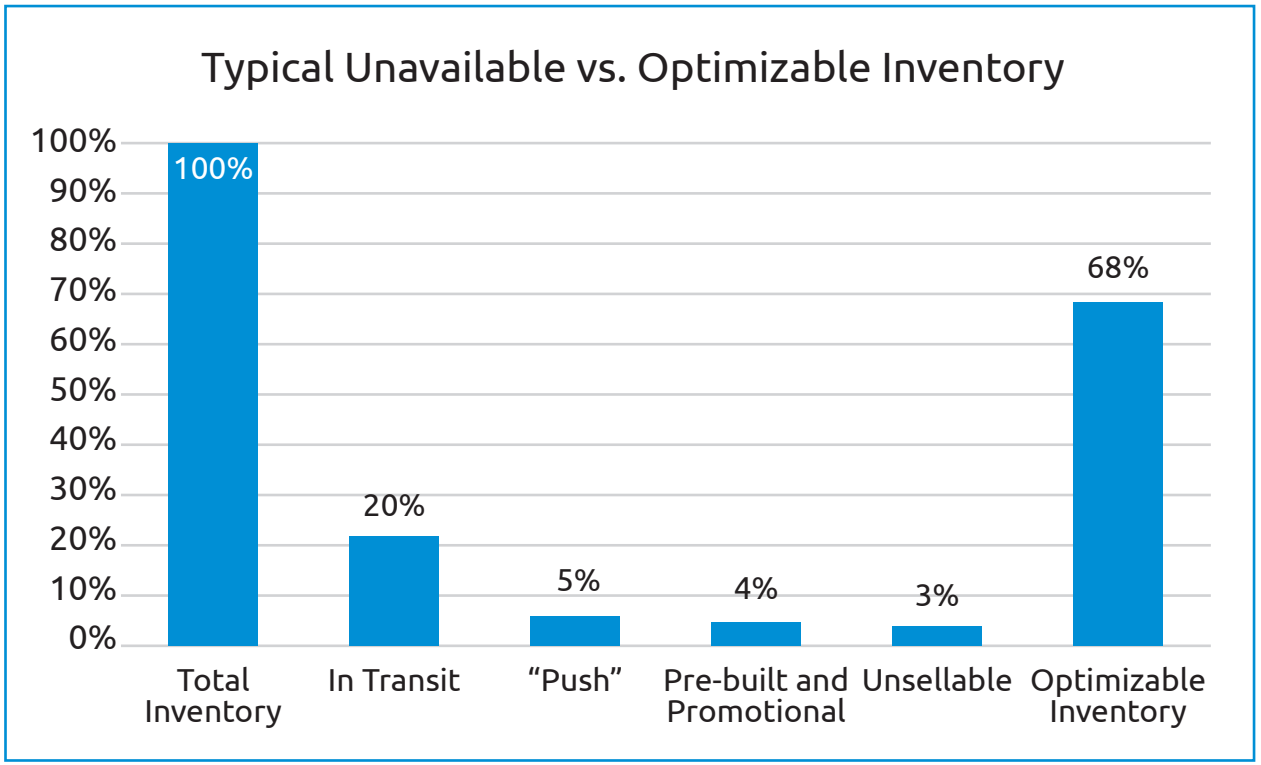
Every supply chain team must balance inventory investment with service level performance. Without proper balance, excess inventory accumulates throughout the supply chain and traps vital working capital. Often companies attempt to manage inventory through a “rules of thumb” philosophy or their Enterprise Resource Planning (ERP) system. This approach leaves companies vulnerable and unable to account for demand uncertainty, supply volatility and the interdependencies between nodes and tiers of the network.

Inventory Optimization (IO) can have a huge financial impact by minimizing inventory and freeing up working capital while guaranteeing the right stock is on hand, when and where it is needed. Nucleus Research found that companies applying IO tools can generally reduce inventory holdings in the range of 10 to 30 percent.

A form of prescriptive analytics, IO determines where and how much stock to hold to meet a designated service level while complying with specific inventory policies. Through sophisticated algorithms, IO makes stocking recommendations to satisfy these needs.

# THE LARGE OPPORTUNITY FOR INVENTORY OPTIMIZATION

Multi-echelon Inventory Optimization (MEIO) goes a step further to optimize stock locations and amounts across all sites and nodes in a supply chain network. The right MEIO approach automates the stocking and replenishment process as well as enables rich "what-if" scenario analysis to analyze tradeoffs between costs and service levels. It also uses machine learning to identify stocking patterns for seasonal products or new product introductions. Through robust visualizations, MEIO dashboards and event driven notifications help improve usability, user adoption and user efficiency.




Source: Logility

This e-book explains the importance of IO and MEIO strategies to help minimize costs while meeting customer service requirements, and provides examples of how to build these capabilities at your company.



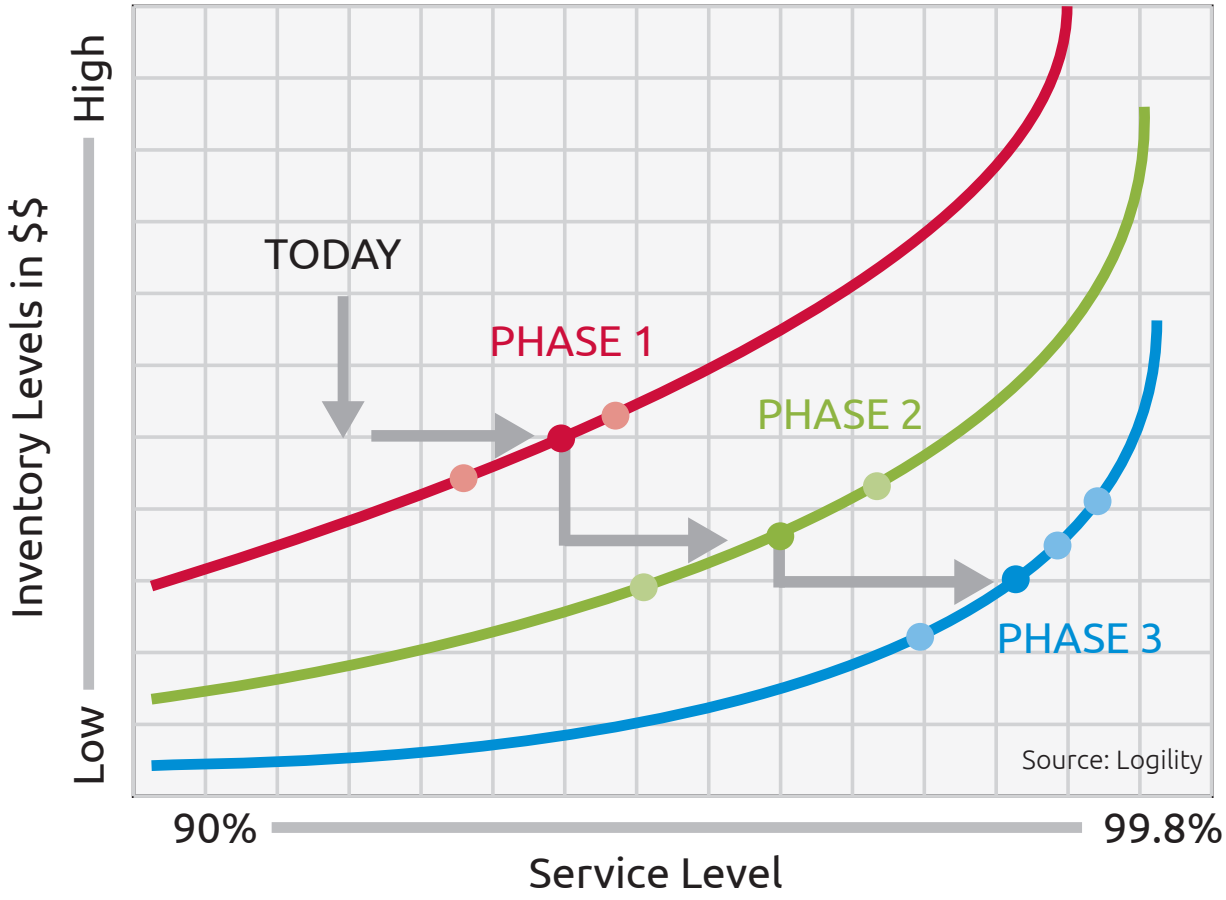
# THE TWO LEVERS OF INVENTORY OPTIMIZATION

Inventory Optimization uses two powerful performance levers: working capital and service levels. Through the effective use of each lever, you can free trapped working capital while improving service levels (which can result in increased market share).

Multi-echelon Inventory Optimization (MEIO) uses time-tested advanced mathematical algorithms to accurately model inventory flows through the interdependent stages and locations of a supply chain, and analyzes historical behavior under all conditions. The model helps create an optimal configuration of inventory buffers and locations adequate to handle any degree of demand and supply uncertainty, seasonality, etc., while achieving desired service levels for minimum cost.

In addition to identifying the causes and types of excess stock held at various locations, MEIO typically recommends specific strategies for postponing inventory at earlier stages of manufacturing and distribution processes. Postponement can take two forms:

- Pooling finished goods inventory to meet aggregated customer demand streams with less waste (lower obsolescence rate).
- Buffering work-in-progress at crucial points before costly value-add manufacturing steps. This reduces costs and increases flexibility.




## EFFICIENT FRONTIER

Overall, by modifying stock buffers (lowering some, raising others) and revamping policies and targets around the supply chain—all driven by actual supply and demand history—a solid MEIO program can create reductions of 10%-30% in total inventory, freeing millions in working capital that has been trapped in excess stock and carrying costs. That's one side of the equation.

The other side involves the natural trade-off between service level and inventory cost. The trade-off relationship forms a curve called the "efficient frontier." The curve shows that, for any status quo, it will always cost more to achieve higher service levels. But phased MEIO initiatives can change the status quo, creating a series of new curves that deliver any desired service level at less cost than the former state allowed.

“Logility Voyager Inventory Optimization™ helped us improve fill rates and improve customer service with less cash tied up in inventory.”

**Michael Martin**
Manager, Global Supply Chain Strategy—Stanley Black & Decker




SUCCESS STORY:

# Stanley Black & Decker Gets Higher Fill Rates While Reducing Inventory Investments

Stanley Black & Decker, an S&P 500 company, is a diversified global provider of hand tools, power tools and related accessories, mechanical access solutions and electronic security solutions, engineered fastening systems, and more.

## Challenge

Stanley Black & Decker needed to gain control of safety stock, the most important part of its inventory, in order to deliver higher fill rates to its customers and reduce costs.

## Solution

Stanley Black & Decker deployed Logility Voyager Solutions™ and saw an immediate fill rate improvement to help reduce its finished goods days of supply as well as its investment in raw materials and components.

### The Bottom Line

- Reduced finished goods inventory by 27%
- Maintained target service levels and improved inventory visibility
- Improved its inventory management process
- Decreased projected on-hand inventory of raw materials and components by 17%

# REMOVING BARRIERS TO INVENTORY OPTIMIZATION

Supply chain executives worldwide face an ongoing dilemma: improve customer service levels but don't create excess or obsolete inventory at the same time.

It's a double-edged sword for supply chain performance. Because of variability in demand and supply, increasing customer service levels can lead to higher levels of safety stock. Improving cash flow by indiscriminately reducing working capital dollars can result in slashing the wrong inventory, resulting in lower customer service levels.

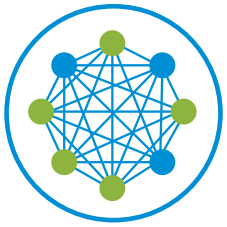
While many supply chain teams have conducted IO initiatives to raise service levels while lowering inventory cost, others worry that they won't be successful in the effort.

## TWO COMMON BARRIERS

Two common barriers often prevent an organization from reaping IO benefits:



■ TECHNOLOGY: Success is often undermined by reliance on limited tools (such as modules built into, or bolted onto, existing ERP systems) or inadequate ones (e.g. error-prone, hard-to maintain spreadsheets). These tools are unable to effectively analyze and model the required amount of inventory.



■ COMPLEXITY: An internal perception that understanding and implementing proven mathematical tools and business processes in order to streamline the creation of optimal inventory policies and targets is too difficult for the team to take on.

Overcoming these barriers is easier than you think. Companies that embrace IO, either at a single stage or across their full, multi-echelon network, achieve on average a 28% increase in inventory turns.

# A THREE-STEP APPROACH

A simple three-step approach can remove barriers to achieving a successful IO initiative.

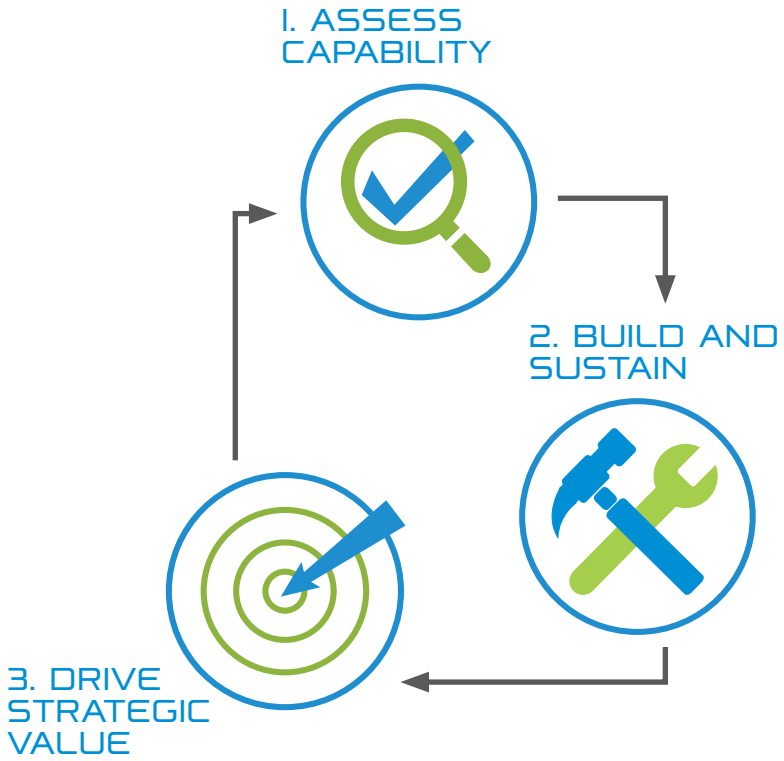
First, assess your organization's capabilities from these perspectives:

- Inventory performance
- Business process and inventory management expertise
- Technology and organizational readiness

Understanding your current state on these critical dimensions lays the foundation for a solid business case that can deliver real-world benefits.

Second, create a future state, IO capability—process, technology, organization—that provides your supply chain team with a roadmap to success.

Finally, continue to drive fundamental strategic changes that create greater resiliency and agility throughout the supply chain and establish a cycle of continuous improvement for years.



> “Logility gave us a solution that allowed us to attack our multi-echelon supply chain back to that push-pull boundary while holding our service levels at the constraints we choose.”

**Bryan Weiland**
Operations Research Engineer—Intel




# SUCCESS STORY:
# Intel’s MEIO Continuous Improvement Journey

Intel is the world’s largest semiconductor company, and in 2016 was ranked the 12th Most Valuable Brand in the World by Interbrand.

## Challenge

Intel needed to stage and monitor MEIO inputs, characterize CPU demand, and execute MEIO continuous improvement experiments without affecting the customer experience.

## Solution

Intel deployed Logility Voyager Solutions to optimize its inventory strategy for all forward-staged inventory points in its global distribution network. It now runs an MEIO model once per week, feeding it the latest demand, lead time and variability inputs. New safety stock targets are loaded into the company’s replenishment solver each week.

## The Bottom Line

### Initial IO Results for Intel’s VMI Hubs:

- Identified new, real measure of service level against actual customer demand
- Minimized inventory to suit service level expectations

# THE TOP THREE AREAS OF IMPACT

## 1) TACTICAL & STRATEGIC INVENTORY MODELING

Tactical modeling compares actual demand to forecast, and actual receipt of goods to the plan for each SKU. Tactical modeling identifies forecast accuracy and safety stock issues. Adding historical forecast accuracy into the equation enables predictive service level calculations. This fact-based approach to inventory targets allows you to right-size inventory by SKU.

To answer more difficult questions, such as where to make or stock products or the impact of distribution or manufacturing facility closures or openings, use strategic inventory modeling. It can provide quick, side-by-side scenario analysis to help make the right decisions.

## 2) DEMAND FORECASTING ACCURACY

MEIO enables timely answers to complex "what-if" questions including impacts of channel changes and stocking policies across a complex and volatile omni-channel distribution network.

MEIO users are more likely to launch an initiative to improve forecast accuracy due to seeing greater improvement in inventory modeling from better forecast accuracy.

## 3) INVENTORY REPLENISHMENT STRATEGIES

Improving inventory replenishment strategies include postponement strategies, cycle time and supplier improvements, and changes to replenishment parameters. The addition of a formal MEIO platform can help pinpoint which products are susceptible to supply issues so that root cause and corrective action can be applied.

REAL-WORLD BENEFITS FROM

# INVENTORY OPTIMIZATION

**28%**

Increase in inventory turns with Multi-Echelon Inventory Optimization

MEIO Users are **2X** more able to cost effectively balance Inventory and Service

Source: ABERDEEN GROUP

# CHECKLIST

If your organization is considering an inventory optimization initiative, ponder these points:

- **USABILITY**—From effective use of exception workflows, to visibility into the drivers of inventory, to exposure of underlying computations, to end-to-end models for sandbox-style evaluations, choose a solution that will empower users across different areas of your business to perform their jobs more efficiently and deliver more value to the bottom line.
- **TACTICAL TARGET SETTING**—When setting tactical targets on an ongoing basis, make sure you can automatically characterize demand and uncertainty, both in lead time and in the demand signal.
- **CONFIGURABILITY**—Not all supply chains are alike, even in the same organization. Choose a solution that can be adapted to your supply chain's specific inventory optimization needs.
- **FLEXIBILITY**—Some inventory cannot be statistically modeled. Make sure the solution you select can set smart inventory parameters for your most problematic SKUs.
- **DATA COMPLEXITY**—Getting data into and out of a powerful MEIO tool is a major consideration. Select a software provider who can diffuse this concern by providing powerful integration tools with little or no customization required.
- **RISK AVERSION**—The right IO/MEIO approach can do more than deliver better service levels. It can also make your C-Level team happy by identifying and mitigating risk.
- **STRATEGIC MODELLING**—Once tactical processes are in place, turn your efforts to year-over-year improvements. The right solution will give your team powerful tactical and strategic planning capabilities to perform comprehensive analytics across your supply chain for valuable business insight.

# CONCLUSION

The benefits of both Inventory Optimization (IO) and Multi-echelon Inventory Optimization (MEIO) are well established by hundreds of companies of all sizes in industries ranging from consumer products to life sciences, high technology to process and discrete manufacturing.

Leading organizations have shown that right-sizing inventory buffers and restructuring where and how inventory is held can drive powerful financial benefits and adds tremendous value to the Sales & Operations Planning (S&OP) process. Inventory Optimization provides a knowledge platform for better decision-making and enables organizations to use inventory as a lever for balancing supply and demand.

This platform also recommends where and how to hold inventory across all tiers of the value chain. IO and MEIO initiatives typically reduce inventory by 10-30% while improving service levels, resulting in dramatically improved profitability and happier customers.

## Significant recurring benefits can include:



Lower working capital



Reduction in logistics cost burden



Savings from decreased obsolescence



Revenue uplift from fewer permanently lost sales orders

# ABOUT LOGILITY

With more than 1,250 customers worldwide, Logility is a leading provider of collaborative supply chain optimization and advanced retail planning solutions that help small, medium, large, and Fortune 500 companies realize substantial bottom-line results in record time.

Logility Voyager Solutions is a complete supply chain management and retail optimization solution that features a performance monitoring architecture and provides supply chain visibility; demand, inventory and replenishment planning; sales and operations planning (S&OP); integrated business planning (IBP); supply and inventory optimization; manufacturing planning and scheduling; retail merchandise planning, assortment and allocation; and transportation planning and management.

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