

## > Solution Overview



With SAS® for Demand-Driven Planning and Optimization you can ...

- **Quickly and easily visualize market signals and data to predict outcomes.** Sense near-real-time market data to understand shifts in demand for your products. Simulate future demand by varying the values for price, sales promotions, marketing events and other related factors using what-if scenario analyses.
- **Support integrated business planning (IBP).** An integrated planning suite that delivers a more accurate demand forecast, structured process support, collaborative planning, visualization, advanced analytics and optimization.
- **Automate and optimize the inventory management process.** Create a business/product hierarchy on the fly to automatically assess every level of the hierarchy to determine the most appropriate distribution model based on statistics, business rules and forecasts.
- **Accurately forecast new product launches.** Relying on best-guess forecasting due to a lack of historical data for new products is a thing of the past. Using SAS' patented structured-judgment and data mining techniques, you can finally accurately predict new product demand.

# SAS for Demand-Driven Planning and Optimization

Listen to customers, focus on the market and respond to demand in near-real time

## Overview

It all starts with the demand forecast.

The demand forecast drives the integrated business planning (IBP) process and is its largest source of variation and uncertainty. Improving the demand forecast will affect everything throughout the supply chain. And, it can have a multiplier effect as it travels along the IBP process. Even slight forecasting improvements can have a larger proportional effect on revenue, costs, profit, customer satisfaction and working capital than any other factor, supply-oriented or otherwise. Get the demand forecast right, and good things will follow.

Another crucial element we can provide to the IBP process (beyond its technical and analytic forecasting capability) is structure. IBP can be one of the most unstructured processes found in an organization - often a jumble of disconnected data and spreadsheets. Structure makes the process more efficient, manifesting itself in lower costs, faster forecasts and better decisions that enable your supply chain management team to spend more time where it can add the most value.

## How SAS Can Help

We offer an integrated suite of forecasting, analysis, visualization, reporting and optimization modules built on a common base. SAS for Demand-Driven Planning and Optimization gives users of all types the information they need in a set of common dashboards and scorecards as well as dynamic performance reports. With the SAS Demand-Driven Planning and Optimization suite you get:

- **A user-oriented forecasting interface.** Designed around the forecasting analysts' everyday planning needs, it uses high-performance, batch forecasting to generate large-scale, high-volume forecasts. We also provide patented, scenario-based planning so you can better respond to changes in the marketplace and significantly reduce data administrative tasks.
- **Collaborative planning.** Our collaborative planning workbench gives all forecast users statistically derived baselines and then facilitates their business judgment and input by guiding them through a workflow and approval process that integrates with email. It also provides forecast value added monitoring and tracking to determine touchpoints that are adding value and those that are not.

- **Statistical analysis combined with business judgment.** Based on SAS' patent-pending structured judgment method, it combines business domain expertise with data mining and statistics in an interactive way to forecast the future demand of new products based on the behaviors of similar or surrogate products.
- **Multiechelon inventory optimization.** Optimize your replenishment planning and disaggregation abilities. You can develop a wide range of what-if scenarios (e.g., supply shaping) and interact directly with your ERP system.
- **A robust demand signal repository.** In-memory visual analytics enables you to easily explore and analyze demand data about sales, products, stores, territories, promotions, inventory, price, performance and operations.

## Demand-Driven Forecasting

In a scramble to match demand with supply, companies have sometimes ignored profitability, customer satisfaction, or both. Their focus is on operational excellence through reducing inventory costs and improving manufacturing efficiencies. As a result, many companies are lean and operationally efficient but unbalanced due to their supply-centric processes. This lean approach to the supply chain makes it more difficult to react to demand volatility.

Companies are quickly realizing that renewed attention is needed on customer excellence. Market leaders are becoming more demand-driven in selling their products (by "pulling" them through their distribution channels) and are taking a new look at sensing, shaping and translating demand. Here are some ways that SAS can help you better respond to demand signals.

### Patented, large-scale automated forecasting

Our statistical forecasting engine automatically creates a business/product hierarchy on the fly and assesses every level of the hierarchy to determine the best statistical model based on analysis, business rules and forecasts. By employing an exception-based modeling methodology, you can greatly speed up the forecasting process and cut costs by refocusing the analyst's attention on the small number of items that truly require expertise and further analysis, while automatically providing the best available forecast for the bulk of the forecast.

### Forecast calendar/event definitions and modeling

Treating demand spikes and anomalies as outliers skews the forecast and does not accurately explain operational or calendar events. SAS gives users the ability to explain and model events such as weather, out-of-stocks, plant shutdowns, holidays, etc., to create more accurate predictions for future events.

### Forecasting model repository

The model repository has more than 200 different methods to choose from, and can accommodate custom algorithms. It is scalable and offers the choice of running your data in batch or through the GUI. Exception reports allow you to quickly identify inaccurately forecasted items, minimizing the number of forecasts that need to be actively managed because users are only focusing on the exceptions.

All model families (e.g., time series, ARIMA, dynamic regression, ARIMAX, intermittent demand function, unobserved components models, or UCMs, and weighted combined models) are provided along with an unlimited number of methods (including customized algorithms). All methods are evaluated using a combination of statistics and business rules and allow you to assign separate methods to every level and node in the hierarchy. This provides flexibility and greater accuracy because the historical data being evaluated for each level and node may need its own unique method in order to create an accurate forecast.

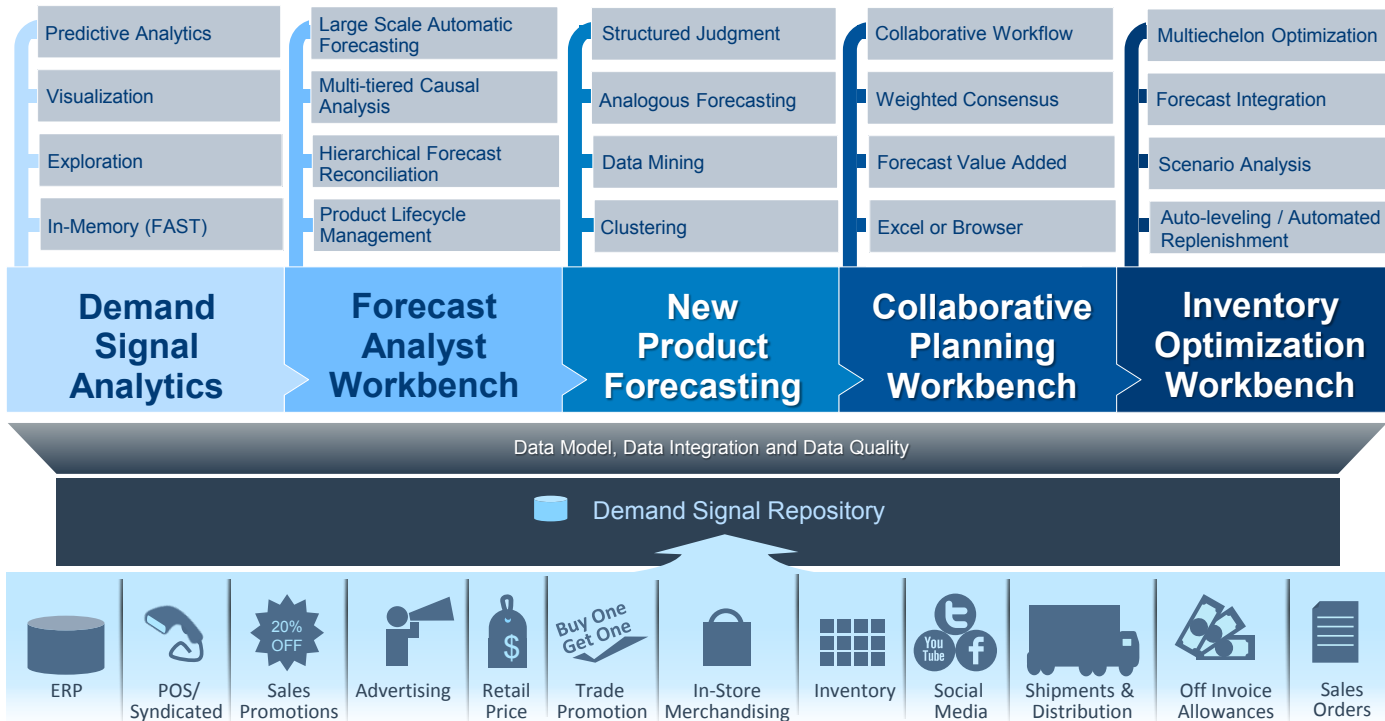
### Demand shaping using what-if analysis and scenario planning

Scenario analysis allows you to evaluate exceptions to your sales history and plan for future events, including new products, locations and channel introduction. You can conduct what-if analysis using statistical models to find the optimal forecasting scenario based on your marketing investment strategies. Relevant causal event variables can be modified in a what-if sandbox to examine predicted outcomes. These scenarios can be compared and used in downstream inventory and planning systems.

Scenario building is important to the development of variations in unconstrained demand as an input to the S&OP and IBP processes. Scenarios enable simulation and testing of demand and supply capacity on marketing or promotional efforts and provide feedback for developing an optimal production plan.

## Challenges

- **Antiquated approaches.** Believe it or not, many organizations still manage their most important supply chain processes using spreadsheets.
- **Basing demand on sales, not just supply.** A lack of visibility into channel sales and inventory makes it difficult to identify demand patterns and then prepare a demand response model.
- **Lack of technology.** Most companies (46 percent of companies according to recent research) who have implemented S&OP processes have limited technology capabilities that focus primarily on the supply side.
- **Uncertainty in demand and supply.** Without a strong S&OP process and the ability to combine sales data and market-driven data it's difficult, if not impossible, to synchronize demand and supply.



### Multitiered causal analysis (MTCA)

MTCA is an approach that links a series of quantitative methods to measure the impact of sales and marketing strategies on consumer demand (demand sensing). MTCA then creates various what-if scenarios to shape and predict future demand (demand shaping). This means you can link demand and supply (POS and syndicated scanner data to shipments and sales orders) using analytics rather than judgment. Manufacturers can have several tiers and a series of causal models to measure the impact of demand on each level of the supply chain (e.g., wholesalers, distributors or retailers).

### Advanced Collaborative Forecasting and Planning

Our fully automated, statistically driven, consensus forecasting and planning provides for collection, development and review capabilities for monitoring, tracking and reporting different departmental inputs to the consensus forecast. Access to the consensus forecasts and reports is available via the web or an Excel interface. It's an interactive application and a set of collaborative planning views and reports that collect and consolidate internal and external forecasts for the purpose of creating a consensus forecast to drive your S&OP and IBP processes.

### Structured Judgment Methodology

A structured analogy approach to new product forecasting requires two types of data - product attributes (new and existing) and historical sales. Using our patent-pending process, you'll build a forecast using the historical data of groups of existing products with similar attributes. The process facilitates user judgment and eliminates outliers to produce a better historical set of data for a new product forecast.

### Demand Signal Analytics Using SAS® Visual Statistics

SAS Visual Statistics is a business intelligence solution that uses in-memory analytics to empower organizations to visually explore data to reveal patterns and trends and identify opportunities for further analysis. We call this demand signal analytics. With it, you'll get a robust set of BI capabilities and analytics that are user-friendly, not intimidating. This easy-to-use approach encourages different types of users to discover insights from any size of data through data visualization and exploratory analysis. You can quickly and easily explore all of your data using a drag-and-drop interface, analyze data and share results easily via web reports and mobile apps.

Typical marketing research provides answers to predefined questions - visual analytics provides insight into questions you didn't initially know to ask and correlated effects that you didn't know existed.

### Demand Sensing

Integrating consumer demand to improve shipment (supply) forecasts has become a high priority in consumer packaged goods, automotive manufacturing, appliances, electronics, pharmaceuticals and many other industries. These industries use marketing tactics to pull consumer demand through their distribution channels. With improvements in technology, data collection and storage, and the analytical know-how, companies are now integrating consumer demand with shipment forecasts to capture the impact of marketing activities on the entire supply chain.

## Inventory optimization

Because the input is a rich, accurate statistical forecast from SAS, you can calculate optimal inventory levels and replenishment policies based on user-specified constraints such as required lead times, costs and targeted service levels. It identifies items that have reached reorder thresholds and then generates recommended order quantities for each item based on cost and service-level targets.

### Single, dual and multiechelon inventory optimization

SAS enables single, dual or multiechelon inventory optimization to help you stock the right products at the right locations in the right quantities, without building excesses throughout the network. Planners can customize key replenishment policies such as review-period lengths, customer-service measures, ordering rules and cost figures to streamline replenishment for specific items. Reduce over-/under-stock by autoleveling and balancing products between locations when costs dictate a shift is economical.

## The SAS® Difference

- **Integrated approach.** Starting with a common data model and powerful data management and data integration tools that allow for a “data first” approach to S&OP and IBP, our solution includes best-practice KPIs and metrics to surface product performance information.
- **Large model repository.** SAS has a complete array of advanced forecasting methods to model and forecast all products across a company’s portfolio. SAS can integrate consumer demand (pull), model it and forecast it automatically using award-winning data access tools and analytics.
- **Depth and breadth of statistical capabilities.** You can model and predict incremental lifts in sales volume associated with sales promotions, marketing events and activities, and other irregular events that affect demand.
- **Faster scenario planning.** No other software vendor has a fully functional, integrated simulation and scenario planning capability that allows forecasters and business analysts to test various scenarios using model parameters to determine the impact on the forecast due to business hierarchies for hundreds of thousands of products.
- **Consensus forecasting and planning.** For reconciliation, forecasts can be averaged or weighted based on past performance. Assessment routines can be performed against financial KPIs to determine the impact on revenue management. This is the only automated, statistically driven, consensus forecasting application on the market using proven, combined weighted forecasting methodologies.
- **Structured judgment.** This approach to new product forecasting combines analogies with sound judgment and provides an objective basis for predicting new product demand using “as-like” or surrogate products based on a product profile. The patent-pending process helps validate user judgment and allows for the elimination of outliers to produce a better historical set of data for the new product.
- **Multiechelon inventory optimization.** Calculate optimal inventory levels using inventory policy parameters throughout the entire supply chain. Automate and optimize inventory distribution by providing the ability to take a forecast and from that calculate optimized inventory levels and order quantities for every SKU at every level and every location. Trust in the automated process starts with SAS’ trusted analytics expertise.
- **Visualization.** Only SAS delivers a user-friendly and yet powerful in-memory, visual and analytic approach to analyzing demand data for patterns and insights regarding sales, shipments, pricing, promotions, and operational, category or regional performance. Visibility into your supply chain, sales channels and inventory lets you identify demand patterns and prepare a demand response model.

## A path to automation

Simplistic optimization methods require continual monitoring to overcome skepticism that can lead to buyers and planners gaming the system by overriding outputs. This confidence dilemma is difficult to overcome unless buyers and planners see that the system-generated replenishment orders can be trusted.

SAS has developed a robust order suggestion system that is not designed to replace a replenishment system, but to assist buyers and planners in reviewing optimized orders. SAS has found this optimized inventory and replenishment model builds trust to the point of allowing SAS to handle most of the regular ordering and allowing buyers and planners to concentrate on the incomplete orders. The end result is true optimization, time and resource savings, and better order fulfillment and SLA performance.

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