

# Collaborative Demand Planning

## For Profit-Driven Supply Chains

### Introduction

Demand Planning systems have traditionally been deployed in order to increase forecast accuracy, so that customer service and inventory levels can be improved. But a demand planning solution can play a much bigger role than that. In addition to the conventional measures, the right demand planning solution should *directly* support increases in revenue, decreases in costs, and reductions in working capital. These are the measures that impact higher profitability and better Return-on-Assets. Profit-Driven Supply Chains always focus on such metrics and their ultimate goal is sustainable *profitability* and higher returns—while increased forecast accuracy is only one objective in reaching that goal. In this paper we will discuss how to bring the right process and technology together in order to go beyond the traditional role of Demand Management and to make your supply chain more profit-driven.

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## Managing Demand in a Profit-Driven Supply Chain

If the real goal is to strategically use the supply chain to increase profits, and return-on-assets, then we should look for a system that has capabilities to directly guide the enterprise to that goal. This new goal changes the requirements of the system to something beyond the ability to determine an accurate consensus demand number. What is needed is a business process and supporting system to align the selling organizations (Marketing, Sales, Inventory Management, etc.) to determine a sales and inventory plan that will return the most profit to the company. Hence, the system will need to be able to do the following:

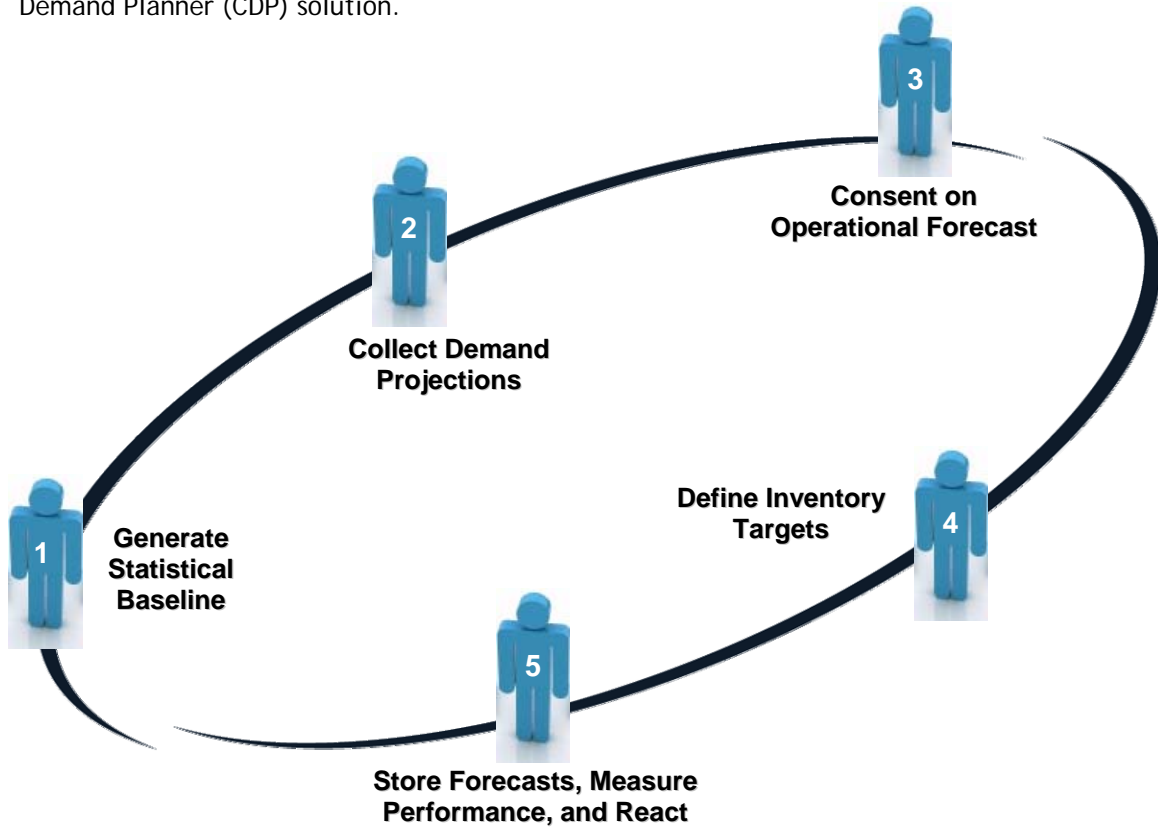
- Be able to recognize the potential of profitability a consensus-forecast may have based on the expected revenue and marginal cost for each unit sold
- Offer the traditional Demand Planning tools, in order to determine an accurate consensus demand
- Be able to translate the demand of various market segments based on their characteristics into a company sales and revenue plan through the use of *attributes*
- Recognize Average selling price for various mixes of product in order to determine expected revenue considering segmented product groups
- Be able to segment the market for sales and profit analysis based on many different characteristics and *attributes*
- Understand the cost of inventory and the trade-off between incremental revenue and additional dollars of inventory
- Be able to utilize the supply constraints feedback for closed loop analysis to determine the best product mix for maximum profitability
- Be able to communicate and collaborate with financial management about the sales and revenue plan
- Be able to monitor the plan with metrics that help understand when the company is not on track to achieve operational or financial goals



Given the importance of these goals, leading companies have recognized that planning for profit requires more than conventional demand planning and management systems. A collaborative approach is needed, which extends the ability to manage demand by the ability to understand profit. To get to this goal a holistic process needs to be put in place that includes the Customer, Marketing, Sales, Inventory Management, Finance, and Operations. This process needs to be supported by a system that provides decision-support intelligence, analytics, reporting, collaboration, workflow, and integration to enterprise systems and personal productivity tools (i.e. MS Excel®)—plus the flexibility to accommodate the needs of a cross-functional and distributed user base.

## “Best Practice” DP for Profit Driven Supply Chains

Figure 1 outlines the best-practice planning process supported by Adexa’s Collaborative Demand Planner (CDP) solution.



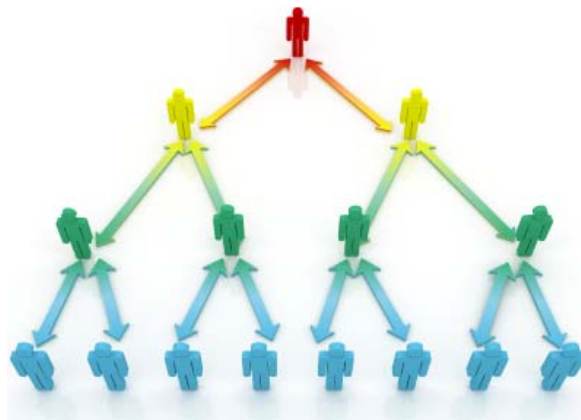
**Figure 1. Best-practice demand planning process**

All the organizations mentioned previously need to participate in this process. The system enables each stakeholder to perform their role in the process in an orderly and efficient way. The process is followed by leveraging internal data engines (statistical forecasting and inventory planning), analysis components (interactive data management and reporting), and workflow (alerting and messaging). Adexa’s Collaborative Demand Planning environment enables the creation of a profit-driven demand plan. The steps of this process and how the system enables the process is described in the following sections.

## Step 1: Generate statistical Baseline

Profit-driven supply chains need to rely on accurate forecasts to keep customer satisfaction high and inventory low. Statistical forecasts serve as the foundation for creating an objective view of expected demand. When humans feel the pressure to modify the forecast to meet the financial plan, statistical trend lines offer a neutral opinion as to whether or not the numbers are realistic. For industries such as retail and consumer packaged goods, historic sales are indicative of future demand, and therefore the statistical forecast directly drives the operational forecast. For some verticals, such as Semiconductor and High-Tech, short product lifecycles and rapidly changing trends preclude the use of the statistical forecast as a direct or turn-key input to the operational forecast. However, even in these dynamic industries the statistical forecast provides value as a:

- Control measure to identify exceptions in other forecast sources (e.g. generate alerts if the forecast from field sales is more than 50% greater than the average of shipments over the past 6 weeks)
- Mechanism to apportion and automate the propagation of family-level forecasts to the SKU level (e.g. proportionally disaggregate a category forecast to 5,000 SKUs based on shipments over the past month)
- Method to understand how external factors impact demand. Causal analysis enables an enterprise to understand how factors as diverse as weather to pricing can affect demand for various products.
- Vehicle for forecasting new products based on seasonal and lifecycle profiles



CDP's award-winning forecasting engine is on top of its class with a proven set of statistical methods. The best-fit algorithm, which negates the need for human intervention while optimizing forecast performance, automatically picks the optimal forecast across a breadth of statistical algorithms, including algorithms for intermittent demand (Croston's, discrete forecasting), low-volume demand (simple moving average, linear regression), and conventional algorithms that define trend and seasonal influences (Holt-Winters, Box-Jenkins, exponential smoothing). In addition, the Event/Promotion utility automates the identification of event-based sales and enables planners to intelligently adjust the forecast when events are anticipated to recur.

### Solution Highlights:

- Best-fit algorithm automates the selection of the optimal forecasting technique
- Pre-built interfaces to ERP/ legacy systems streamline the task extracting data required to support the demand planning process, such as product masters, shipments and price
- Causal forecasting techniques identify the relation between sales volume and extrinsic variable such as price and market conditions
- A library of model-fit statistics (such as MAD, standard deviation, and standard error) quantify the quality of statistical forecasts
- Event/Promotion utility automates the identification of event-based sales.

## Step 2: Collect Demand Projections

While statistical forecasting can help anticipate demand based on historic sales, planning for profit includes the insight from various planning stakeholders, including sales, marketing, finance, customers, and partner channels. There is no limit to the number of users or demand streams Adexa's CDP can accommodate, and as forecasts are managed at any level of aggregation, the impacts are immediately propagated up and down through a comprehensive hierarchy. The system can immediately calculate the expected revenue based on the demand input at any level of the product hierarchy. The security model enables the administration of read versus read/write privileges on a product-specific basis, level-specific basis, and user-specific basis so that each stakeholder

Each stakeholder needs to be able to understand the market demand in a way that is meaningful to them. *The characteristics of the market place are translated into cohesive market segments through the use of Attributes.* Attributes enable any stakeholder to segment the data in a way that is meaningful to them. An example of this is a market analysis by target industry, or product characteristic (e.g. color, speed, capacity, size, fabric, environmental green characteristics, etc.) The stakeholder can analyze and edit data based on views that are segmented by these attributes in order to be able to target revenue for any product, customer, or geographic segment, as well as any segment that is meaningful to the participants.

Demand numbers are the foundation for calculating the expected revenue. The Average selling price is dependent on product mix. The system calculates expected revenue for any product mix for any segment of market. Naturally, the user can change average selling price and understand the effect on expected revenue.



### Solution Highlights

- Any number of planning stakeholders (such as sales, marketing, finance, customers, and partner channels) can have designated forecast streams
- The system calculates Expected Revenue for any subset of products at any level of the hierarchy. If the subset of products changes the system will recalculate expected revenue and the average selling price.
- Any number of *Attributes* can be used to define product segments for both analysis and planning. Unlike other systems *Attributes* can be used to both view and edit cuts of data at any level of the hierarchy.
- Workflow controls coordinate the ownership and approval of data as it passed from one stakeholder to another (e.g. from field sales to sales management)
- Alerts identify exceptions based on user-defined rules (e.g. identify instances in which the forecast differs with corporate financial targets by more than 10%)
- Forecasts from participants outside of the enterprise (such as customers, suppliers, and partners) and industry forecasts can be brought into CDP through electronic transmissions, including the technology and format protocols of XML, EDI, RosettaNet, BizTalk, CPFR, and flat-file transfers
- Enables offline planning for remote users through seamless interoperability with Excel® (download and upload).

## Step 3: Derive Consensus Forecast

While collecting insight from an expansive base of stakeholders is at the heart of a profit driven demand planning program, only one demand plan and revenue plan can drive operations. Therefore demand planning programs need an effective process for blending the input from numerous sources into a single stream.

CDP includes a powerful utility for blending multiple streams into the *consensus forecast*, the one number used to drive operations. Both the alerting/exception-based aspect of CDP and the analytical capabilities are heavily utilized in this activity. The alerts enable planners to manage the forecast streams on an exception basis. For example, let me know if a customer has provided a forecast that is more than 25 percent greater than a statistical forecast. Or draw my attention only to those forecast that have changed by more than 15 percent since last month. The analytics can also show if the enterprise is on target to meet the revenue plan. Alerts can be generated for any product/market segment or division which is not meeting their share of the financial plan. It is up to management to take proactive corrective action to meet the revenue goals (not just back the numbers into the target).



The analytic capabilities of CDP empower the planner to intelligently blend the forecasts into a single stream. Using the forecast accuracy manager, planners identify the accuracy of the various forecast sources across any number of *lags*. For example, the lag 2 forecast analysis of the customer forecast indicates how accurate the customer has been when they are two months away from the given period. Within CDP users can create profiles used to blend multiple forecast streams into the consensus forecast, and this profile can be phased by time. For example, the customer forecast is accurate in the immediate periods of the forecast horizon (lags 1 through 3), so the first three months of the consensus forecast are based on the customer forecast. In the mid-term (lags 4 through 8), the statistical forecast is most accurate, and therefore the statistical forecast will drive the consensus forecast. In the long-term, (lags 9 through 18), the finance group is most accurate, and therefore the finance forecast populates these periods within the consensus forecast.

### Highlights

- Time-phased profiles blend forecast inputs into a single consensus forecast
- Alert if the revenue projections do not meet the financial targets
- Forecast accuracy analysis enables planners to monitor performance for all forecast sources over any number of lags
- Alerts automatically flag products for which forecasting are continually inaccurate or biased.

## Step 4: Generate Inventory Targets

In order to be successful, a profit-driven enterprise needs to formulate an inventory policy that is consistent with its financial goals. Inventory is used to help operations run efficiently and to protect an enterprise against uncertainty. The more inventories that a company has on hand, the less risk there is to the revenue plan and the more efficient a company can be in operations (i.e. saving set up time, and order costs). On the other hand, higher inventories cost more money to build and is a drag on Return-on-Assets. A company can use expected demand uncertainty, supply uncertainty, and lead-time to understand the trade-off between the amount of inventories and the amount of risk incurred (stock to service trade off curves for calculating safety-stock). Profit-driven companies understand the nature of their various business segments and make educated decisions on their inventory policies to avoid risk. This is accomplished by measuring forecast accuracy and continuously working to eliminate sources of error and non-value added lead-times. A profit-driven company will intelligently use inventory pooling and late stage postponement techniques to save on inventory dollars. The inventory plan is combined with the revenue plan to get a complete financial view of sales and inventory costs.



### Solution Highlights

- Inventory targets are calculated based on customer service level targets, demand variance, lead times, lead time variance, and order quantity
- Planners can conduct dynamic 'what-if' analyses by modifying any of the inputs to the inventory target calculation and reviewing the impact on projected inventory levels (for example, "If I increase customer service levels by 10 percent, how much extra inventory will I need to maintain?")
- Generate multiple inventory policies and review in units and/or dollars
- Measure demand uncertainty as part of the demand planning metrics, keeping track of Mean Absolute Percent Error to alert as to which products cause the most risk. Alert if a product deviates from its usual error.

## Step 5: Store Plans, Measure Performance, and React

A profit-driven enterprise must be able to record the financial plan, demand plan, revenue plan, and inventory plan in order to be able to create metrics to identify when the company is off target. Some of the metrics are standard, such as expected revenue, targeted revenue, and actual sales for the financial plan. Other metrics such as mean absolute percent error (MAPE), and quantity sold, monitor forecast accuracy in order to alert user as soon as possible if the sales plan is off track. A best practice of highly profitable companies is to measure the multiple sources of demand (customer, sales, marketing, industry), in order to determine which provide the most accurate predictions. In order to increase profitability a company may want to reward those customers that can provide the most accurate forecasts with preferred pricing or preferred availability priority. Since each company is different in their behavior and goals in the market place, they will put in place unique measures and metrics into their process. The key is to have the metrics in place to provide alerts if they are off track, and pinpoint possible areas of improvement. Adexa's CDP provides great flexibility for easily including unique metrics and analytics specific to your process, as explained in the Solution Highlights section.



### Solution Highlights

- The ability to add any time series of data and include it in the metrics and analytics
- The ability to create analytic cubes that have custom dimensions
- The ability to define any calculated measures from the input time series of data including financial functions, numeric functions, and logical functions.
- The ability to use customer attributes to analyze slices of data. *Attributes* should be able to be viewed at any level of the hierarchy. Members can be part of many *attribute* family
- The user should be able to create custom alerts based on comparisons of data
- The system must enable collaboration with notes and workflow to manage a process of monitoring the metrics and taking corrective action
- The system must be secure and role-based to enable each participant to only access the functions that they are authorized to perform and the data that they are allowed to see and change.

## Conclusion

A company's supply chain needs to be a key part of a company's strategy for increasing profit. Unless the supply chain planning systems are designed to consider profit, the company will not be able to align their operations with financial goals. The following table summarizes the key capabilities that make the Adexa Collaborative Demand Planner (CDP) the right system for a Profit-Driven supply chain.

Challenge	Adexa Enablers
Enabling a planning process that fosters collaboration across divisional (e.g. sales, marketing, finance, manufacturing) and geographic boundaries	<ul style="list-style-type: none"> <li>■ User-defined planning 'views' ensure each stakeholder works with data in formats that best facilitate his or her planning activities</li> <li>■ User-defined measures/alerts empower stakeholders to follow the business according to custom metrics (e.g. projected revenue, forecast accuracy, anticipated demand on bottleneck manufacturing resources)</li> <li>■ Attribute-based hierarchy ensures limitless flexibility in how data is aggregated and monitored (e.g. ABC classification, grade, customer tiers)</li> <li>■ Multi-lingual interface and the ability to accommodate any number of foreign currencies</li> </ul>
Understanding the impact of end-item forecasts on upstream operations	<ul style="list-style-type: none"> <li>■ Planning bill-of-materials immediately converts end-item forecasts into material/part requirements</li> <li>■ Attribute-based hierarchy enables the real-time determination of the impact of end-item forecasts on bottleneck manufacturing resources</li> </ul>
Leveraging advanced statistical forecasting without a staff that is well versed in statistical algorithms	<ul style="list-style-type: none"> <li>■ Best-fit algorithm automates the selection of the optimal forecasting technique</li> <li>■ Causal forecasting algorithms automatically identify the correlation between sales volume and extrinsic variables such as price and market conditions</li> </ul>
Implementing a demand planning solution within a reasonable timeline and budget	<ul style="list-style-type: none"> <li>■ Pre-built interfaces to ERP/ legacy systems streamline the task extracting data required to support the demand planning process, such as product masters, shipments and pricing</li> <li>■ Best-practice templates for forecasting, forecast accuracy analysis, and inventory planning enable 'out-of-the-box' benefits</li> <li>■ Point-and-click interfaces for all administrative activities</li> </ul>
Getting adoption from field sales	<ul style="list-style-type: none"> <li>■ Seamless upload/download interoperability with Excel® ensures field sales can continue with existing practices, precluding the need to adopt a new platform</li> <li>■ Intelligent support for hierarchical revenue planning, with units, average sales price, and revenue both reviewable and editable at any level</li> </ul>

## How to Contact Adexa

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