SAP Integrated Business Planning (IBP) Introduction Series
3: Demand Planning with SAP IBP

Tod Stenger SAP Solution Management
October 29, 2018
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<tr>
<th>Date</th>
<th>Session Focus</th>
<th>Presenters (Solution Management + Product Management)</th>
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<tr>
<td>Sep. 27, 2018: 10-11:30 AM EST</td>
<td>SAP IBP Overview</td>
<td>Anna Linden</td>
</tr>
<tr>
<td>Oct. 29, 2018: 10-11:30 AM EST</td>
<td>Demand Planning using SAP IBP</td>
<td>Tod Stenger + Rainer Moritz</td>
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<tr>
<td>Dec. 5, 2018: 10-11:30 AM EST</td>
<td>Tactical and Operational Supply Planning using SAP IBP</td>
<td>Eric Simonson + Michael Mack + Pramod Mane</td>
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<tr>
<td>Dec. 11, 2018: 10-11:30 AM EST</td>
<td>Inventory Planning using SAP IBP</td>
<td>Beatrice Hulde + Alexis Lozada</td>
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<tr>
<td>Jan. 8, 2019: 11-12:30 AM EST</td>
<td>Business Network Collaboration and Alerts for SAP IBP</td>
<td>Volker Wilhelm + Kent Harman</td>
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Agenda

• Introduction and Processes: Demand in IBP
• Demand Planning
• Demand Sensing
• Additional Capabilities
• How does the solution work? (Demo)
• Q&A
Introduction and Processes: Demand in IBP
Digital Transformation Journey
Covering the End-to-End Demand Planning Spectrum

SAP Integrated Business Planning

Strategic
Sales and Operations Planning (S&OP) & Consensus Demand Planning

Tactical
S&OP & Consensus Demand Planning

Operational
Demand Sensing

SAP Demand Signal Management

Ultimate Sources of Demand

Years to Months
Months to Weeks
Weeks to Days

Time Granularity of Demand

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SAP Integrated Business Planning for demand

Overview

Demand Management
- Develop an accurate mid- and long term forecast on any aggregation level

Statistical Models
- Time-series, regression and machine learning based forecasting methods

Demand Sensing
- Create short-term forecast to drive better fulfillment and inventory reduction

Exception Management
- Focus planners on problems and identify opportunities for improving the forecast and the overall process

Embedded Analytics
- Create Dashboards and ad-hoc analytics for any key figure or KPI

What-if Analysis
- Fast and simple scenario simulation with complete view on overall supply chain impact
Demand Planning Process
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Segmentation
- Quarterly/Yearly

Time Series Analysis
- Quarterly

Consensus Demand Planning
- Statistical Forecasting
  - Weekly/Monthly
- Management by Exception*
  - Daily/Weekly
- Forecast Accuracy Calculation
  - Monthly

Monitoring & Controlling of the Planning Process*
- Process Step 1
- Process Step 2
- …
- Process Step n

*Additional licenses may apply
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process
Demand Segmentation
Configure & Calculate Your Segments

<table>
<thead>
<tr>
<th>PRODUCT IMPORTANCE / PROFITABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRODUCT VOLATILITY / FORECASTIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Z</td>
</tr>
</tbody>
</table>

Define ABC and/or XYZ calculation rules
Example: Based on Revenue or QTYs?

Run segmentation jobs regularly
e.g. monthly or quarterly

Define planning strategies based on segmentation results
Demand Segmentation
Staffing Done Right: Focus Manpower on the Right Products

ABC Segmentation: Importance | XYZ Segmentation: Volatility / Forecastability

A-X
High Importance, easy to Forecast

A-Y
High Importance, not that easy to Forecast

A-Z
High Importance, hard to forecast

B-X
Medium Importance, easy to forecast

B-Y
Medium Importance, not that easy to forecast

B-Z
Medium Importance, hard to forecast

C-X
Low Importance, easy to forecast

C-Y
Low Importance, not that easy to forecast

C-Z
Low Importance, hard to forecast
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Segmentation
Quarterly/Yearly

Consensus Demand Planning

Time Series Analysis
Quarterly

Statistical Forecasting
Weekly/Monthly

Management by Exception
Daily/Weekly

Forecast Accuracy Calculation
Monthly
Time Series Analysis
Example

Automated analysis of historical sales data via statistical tests

Demand pattern identified by the analysis

Resulting Demand properties to be stored as attribute values

- Constant
- Seasonal
- Sporadic
- Trend
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Consensus Demand Planning

- Statistical Forecasting
  - Weekly/Monthly
- Management by Exception
- Manual Input by Planners
  - Daily/Weekly
- Forecast Accuracy Calculation
  - Monthly

Segmentation
Quarterly/Yearly

Time Series Analysis
Quarterly
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Consensus Demand Planning

Segmentation
Segmentation

Time Series Analysis

Statistical Forecasting
Weekly/Monthly

Management by Exception

Manual Input by Planners
Daily/Weekly

Forecast Accuracy Calculation
Monthly

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Statistical Forecasting
Preparation and Execution

Data Cleansing

Data Integration

Statistical Forecasting
Data Cleansing
Create Baseline Sales History as Foundation for a Good Forecast

Cleansed Data → Reliable Data → Better Forecasting Results

Substitute Missing Values
Outlier Correction
Promotion Sales Lift Elimination

Automated Data Cleansing
Define “pre-processing algorithms“ that automatically cleanse the data before the actual forecasting run

Manual Data Cleansing
Via Microsoft Excel, e.g. by calculating standard variations. The data can then be changed directly in the planning view
Statistical Forecasting Models

Data Cleansing
• Outlier Correction
• Substitute Missing Values
• Promotion Sales Lift Elimination

Constant Models
• Automated Exponential Smoothing
• Single Exponential Smoothing
• Adaptive-Response-Rate Single Exponential Smoothing
• Simple Moving Average
• Simple Average
• Weighted Moving Average
• Weighted Average

Trend Models
• Automated Exponential Smoothing
• Double Exponential Smoothing
• Brown's Linear Exponential Smoothing
• Auto-ARIMA

Seasonal Models
• Automated Exponential Smoothing
• Triple Exponential Smoothing
• Auto-SARIMA

Sporadic Demand Models
• Croston Method

Regression Models
• Multiple Linear Regression
Statistical Forecasting Best Fit Models
Statistical Forecasting Best Fit Models
Sample Planning View with Interim Results from Different Algorithms
Statistical Forecasting Best Fit Models
Sample Planning View with Statistical Details

e.g. MAPE, Seasonality Patterns, Expost Forecast
### Statistical Forecasting Best Fit Models

#### Business Logging

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tr>
<td>1</td>
<td>Planning Area</td>
<td>Customer ID</td>
<td>Product ID</td>
<td>Forecast Model / Reference</td>
<td>Step</td>
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<td>Best Forecast</td>
<td>Information</td>
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A **robust predictive model** is the one that has low training error and low test error.
Time Series Analysis and Forecasting Algorithms

<table>
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<tr>
<th>Product</th>
<th>Common Demand Patterns</th>
<th>Demand Proprieties</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Constant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seasonal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sporadic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trend</td>
</tr>
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</table>

**Algorithms Used**

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Forecast Accuracy</th>
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<tr>
<td>Adaptive Response Rate Single Exponential Smoothing</td>
<td>78%</td>
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<tr>
<td>Automated Exponential Smoothing</td>
<td>80%</td>
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<tr>
<td>Auto-ARIMA/SARIMA</td>
<td>78%</td>
</tr>
<tr>
<td>Brown Exponential Smoothing</td>
<td>75%</td>
</tr>
<tr>
<td>Croston Method</td>
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<tr>
<td>Double Exponential Smoothing</td>
<td>70%</td>
</tr>
<tr>
<td>Multiple Linear Regression</td>
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</tr>
<tr>
<td>Simple Average</td>
<td>70%</td>
</tr>
<tr>
<td>Simple Moving Average</td>
<td>65%</td>
</tr>
<tr>
<td>Single Exponential Smoothing</td>
<td>85%</td>
</tr>
<tr>
<td>Triple Exponential Smoothing</td>
<td></td>
</tr>
<tr>
<td>Weighted Average</td>
<td>75%</td>
</tr>
<tr>
<td>Weighted Moving Average</td>
<td>75%</td>
</tr>
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</table>

Time Series Analysis identifies which demand pattern fits for which product.

Only algorithms which fit the identified demand pattern are considered by system.

Best Fit selects the algorithm with the best accuracy based on Model Fit Error.
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process
Manual Input & Refinement by Planners, Example

Refine an Automated Process

Example:

- **Statistical Forecast**
- **Manual Sales Input**
- **Manual Marketing Input**
- **Manual Demand Planner Input**
- **Final Consensus Demand Plan**
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Segmentation
Quarterly/Yearly

Time Series Analysis
Quarterly

Consensus Demand Planning
- Statistical Forecasting
  Weekly/Monthly
- Management by Exception
- Manual Input by Planners
  Daily/Weekly

Monitoring & Controlling of the Planning Process
- Process Step 1
- Process Step 2
- …
- Process Step n

Forecast Accuracy Calculation
Monthly
Forecast Accuracy Calculation
Measure the Quality of the Forecasting Process

What it Does:

**Accuracy Analysis**
- Compares the different forecasts to the actual historical sales data

**Bias Analysis**
- Compares forecast tendencies to historic sales trend

**Value Add Analysis**
- Measures quality of different forecasting steps

What it Means:

- **Identify areas with planning issues**
- **Identify trends over time**
- **Identify areas suitable for automation**

Short Term Improvements

Long Term Improvements
Forecast Accuracy & Bias: Example Analytics

Statistical vs. Demand Plan Forecast Accuracy & Bias (Lag 3)

Demand Planning Accuracy (%) Plan vs. Target
Forecast Accuracy Value Add: Example Analytics

Forecast Accuracy (%) Value Add: Lag = 3, last 3 Months

A Segment: Forecast Value Add by XYZ (last 3 Months, Lag 1)

Forecast Value Add by Demand Pattern (last 3 Months, Lag 1)
Forecast Accuracy Calculation: Bias Analysis

Example of Same Accuracy, Different Bias

Accuracy: 70%

Negative Bias = Under-forecasting

Unbiased

Accuracy: 70%
Forecast Accuracy Calculation: Value Add

Example

**Statistical Forecast**

<table>
<thead>
<tr>
<th>Sales Input</th>
<th>Accuracy Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ +5%</td>
<td></td>
</tr>
<tr>
<td>Sales Input</td>
<td>Accuracy Change</td>
</tr>
<tr>
<td>Δ -5%</td>
<td></td>
</tr>
<tr>
<td>Sales Input</td>
<td>Accuracy Change</td>
</tr>
<tr>
<td>Δ +0%</td>
<td></td>
</tr>
<tr>
<td>Marketing Input</td>
<td>Accuracy Change</td>
</tr>
<tr>
<td>Δ -6%</td>
<td></td>
</tr>
<tr>
<td>Demand Planner Input</td>
<td>Accuracy Change</td>
</tr>
<tr>
<td>Δ +0%</td>
<td></td>
</tr>
</tbody>
</table>

**FINAL CONSENSUS DEMAND PLAN**
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Segmentation
- Quarterly/Yearly

Time Series Analysis
- Quarterly

Monitoring & Controlling of the Planning Process
- Process Step 1
- Process Step 2
- …
- Process Step n

Consensus Demand Planning
- Statistical Forecasting
  - Weekly/Monthly
- Management by Exception
- Manual Input by Planners
  - Daily/Weekly
- Forecast Accuracy Calculation
  - Monthly
Consensus Demand Planning Process

Recap

Input
- Derived from ERP Backend System
- Sales Orders
- Shipments

Sales History

Data Cleansing of Sales History
- Substitution of missing values
- Correction of Outliers
- Elimination of Promotion Sales

Automated Cleansing based on algorithms
Manual Cleansing in MS Excel Planning View

Different forecasting algorithms are used to accurately predict future demand based on historic data

Manual Input from:
- Sales Department
- Marketing Department
- Demand Planners

Statistical Forecasting
- Combine algorithms in one forecast model
- System computes the "best fit" per planning object based on the best forecast error

E.g. additional Sales Opportunities, Realization Probabilities, Price Discounts, Predicted Sales Spikes

Output

Consensus Unconstrained Demand Plan

Measure Forecast Accuracy & Bias at end of Forecasted Period

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Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

- Process Step 1
- Process Step 2
- …
- Process Step n

Consensus Demand Planning

- Statistical Forecasting
  - Weekly/Monthly
- Management by Exception
- Manual Input by Planners
  - Daily/Weekly
- Forecast Accuracy Calculation
  - Monthly

... What is the next step to tackle growing market volatility
Demand Sensing
Bridge the Gap between Tactical and Operational Processes
Accurate and granular short term forecast

Focus of classical forecasting:
- Aggregated (e.g. Customer Group)
- Mid to long term
- Weekly or even monthly buckets and planning cycles

Question:
How to come to a detailed daily forecast as input to operational supply planning processes like Deployment?

The Answer:
Demand Sensing as an extension to the classical forecasting
Demand Sensing – Next Level of Forecasting
Enhance and disaggregate Forecast based on short term Demand Signals

“Internal” Demand Signals like Deliveries, Sales Orders, Promotions and Open Orders

Consensus Demand Plan

Demand Sensing
Time Horizon: 4-8 Weeks
Granularity: Days

Short Term Forecast

“External” Demand Signals like Point-of-Sale (POS) or Weather* data

Drive operational supply planning processes:
- Deployment
- Transportation planning
- Production and packaging sequences
- Purchasing Decision
- Inventory Optimization

* Future Direction
Demand Sensing: Example
Replenishment without Demand Sensing

National Company Plant

Annual forecast of 2,650 units

National DC

Weekly forecast of 40 units

East DC

Daily Replenishment Schedule w/ updated forecast

East Daily Demand Trend

West DC

West Daily Demand Trend
Demand Sensing: Example

Replenishment driven by Demand Sensing

National Company Plant

Annual forecast of 2,650 units

National DC

Weekly forecast of 43 units

East Daily Demand Trend

East DC

Daily Replenishment Schedule w/ updated forecast

West Daily Demand Trend

West DC

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Integration of Point of Sale (POS) Data from SAP Demand Signal Management (DSiM 2.0 FP04)

Reuse the cleansed and harmonized Point of Sale (POS) Data from your retailers in SAP Integrated Business Planning

- Use the POS data in your Analytics and Dashboards for detailed analysis
- Use the POS data as additional input factor for your Demand Sensing and Planning Processes.
- Integration concept takes care of data aggregation from DSiMs Retailer Store Level in Daily Buckets to IBPs Manufacturer DC level in Weekly Buckets.
Demand Sensing: Key Capabilities & Benefits

Demand Sensing creates short term forecast:
• 4-8 weeks forecast in daily granularity
• Fully automated
• Using pattern recognition
• Leveraging multiple demand signals

Improved short term forecast:
• Drives right deployment and transportation decisions, which leads to reduced stock outs and less rush orders
• Leads to lower safety stock due to higher forecast accuracy (if run together with IBP for inventory)
• Leads to lower cycle stock due to improved forecast bias
• Improves the service level
• Frees up planner’s capacity due to fully automated process
• Depending on lead times and reaction time: improved production, packaging and material purchasing
Additional Capabilities
Managing Product Lifecycle
Improve Forecasting Accuracy Both for New and Obsolete Products

- Forecasting during product replacements and introduction of new products
- Generate a reliable forecast for new products without sales history
- Generate a reliable forecast for products during phase-out period
Manage Global Product Launch - Example

Phase-In: July 2018
Phase-Out: April 2022

Phase-In: September 2018
Phase-Out: July 2022

Phase-In: September 2018
Phase-Out: July 2023

Phase-In: July 2018
Phase-Out: April 2025

Phase-In: December 2018
Phase-Out: May 2026
Trade Promotions
How to Integrate Promotions in the Planning Process

Option 1: Load Promotions from external system into SAP IBP

Trade Promotion Management in SAP CRM, Microsoft Excel, Other

Promotions Plan

Upload via…

HANA CPI-DS

.csv File

SAP IBP

Option 2: Create Promotions in SAP IBP

SAP IBP

Demand Planner

Analyze Promotions

Create

Promotions Plan
Trade Promotions in SAP IBP
Capabilities and Benefits

Capabilities:

- Provide Overview as well as Details of Trade Promotions
- Bridge the gap of having different planning levels in Sales and Supply Chain
- Create and adjust promotions on level of location, product, customer or period

Benefits:

- Improved forecast accuracy by incorporating trade promotions in the planning process
- More efficient trade promotions handling by fully automated integration into IBP
- Improved collaboration between Sales and Demand Planners
Realignment in SAP IBP

Introduction

In modern business, change is the only constant thing:

• New & discontinued products and customers
• Change of organizational structures
• Change of Product or Sales Hierarchy
• Products are manufactured in new plants
• Opening/closing of distribution centers
• …

With that, changes and “realignment” of existing data is required over time.

Realignment in SAP IBP is supporting this process by adjusting master data, planning objects and key figure values.
Realignment in SAP IBP

Example: Central Distribution Center serving all Customers
Realignment in SAP IBP
Example: New Distribution Center introduced
Realignment in SAP IBP
Setup & Execution

Realignment is organized in “Realignment Projects” consisting of several realignment steps.

The realization of a realignment projects is done via a dedicated realignment job.

A simulation mode with detailed information allows to see the impact of realignment upfront.

Dedicated User Authorization is required to setup and execute realignment
Open tasks that were assigned to your user, e.g. as part of an S&OP Process Step can now be visualized in the IBP Microsoft Excel Add-In.

- Process & Process Step Details and Progress can be seen as well.
- Task can be closed in Microsoft Excel.
- Tasks can be grouped and sorted by
  - Process
  - Priority
  - Due Date
Fixing of Cell Values

.value change

Fixing in IBP

<table>
<thead>
<tr>
<th>Customer Country</th>
<th>Customer Region</th>
<th>Key Figure</th>
<th>Scenario</th>
<th>W01 2018</th>
<th>W02 2018</th>
<th>W03 2018</th>
<th>W04 2018</th>
<th>W05 2018</th>
<th>W06 2018</th>
<th>W07 2018</th>
<th>W08 2018</th>
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<th>W10 2018</th>
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<tbody>
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</tbody>
</table>

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Planning Notes

• User can add planning notes to cells to explain certain values or their data changes
• Notes are aggregated and disaggregated and can be reviewed by other users
Solution Demo
Demand Planning
From Classic Planning Capabilities, to Smart Planning, to Full Automation

Time Series Analysis
Automatically analyze sales patterns in your data e.g. for trends and seasonality to streamline the forecasting process

- New Algorithms: Auto-ARIMA, Automated Exponential Smoothing & Brown's
- ABC & XYZ Segmentation
- Forecast Accuracy Calculations
- Product Lifecycle Management
- Statistical Forecasting Algorithms
- Demand Sensing
- Best Fit
- Manual Planning Capabilities

Forecast Automation
Fully automized forecasting process incl forecast level optimization

- Forecast Automation (Future Direction)
- Time Series Analysis (1808)
- Machine Learning Algorithm: Gradient Boosting (Planned 1811)
SAP Integrated Business Planning for Demand

- Develop more accurate mid-term statistical forecasts
- React faster to short term demand changes with pattern recognition based algorithms
- Drive more accurate deployment of product based on short term demand
- Enable planning flexibility and accuracy through segmentation
- Collaborate to ensure the most accurate forecast
Where to get more information

IBP Documentation

Direct link to IBP for demand documentation

IBP Product Page on sap.com

SAP Education for IBP
Thank you.

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