Improving the Usability of Demand Planning Solutions SAP APO

Mark Chockalingam
Valtitude

www.valuechainplanning.com
www.demandplanning.net

Outline

- About Demand Planning LLC
- Demand Planning LLC Client Base
- Usability – key questions
- Methodology to improving usability
- Statistical Modeling
- Building a demand planning process around SAP APO
- Statistical Model Diagnostics and Error Measurement
- Learnings from our SAP APO re-design Projects
- Questions and Answers

Valtitude

- Consultancy providing Process and Strategy Consulting and technology implementation
- Founded in 2019.
- Domain Expertise
  - business forecasting and demand planning
  - sales & operations planning (S&OP)
- Usability Consulting for Technology and Software Applications
  - Work with JDA i2 & Manu, SAP APO, Oracle Demantra and Logility
  - Build Custom Software for SMB Clients
- List of Clients on the next slide

Partial List of Clients

Valtitude

Abbott

au bon pain.

Coleman

Celanese

YASKAWA

Schlumberger

Hill's

NSTAR ELECTRIC

Labatt Blue

TEVA

NORDAM

IMP GROUP Aerospace

Saputo

Miller SINCE 1855 MILLER BREWING COMPANY

Wyeth

GHIRARDELLI CHOCOLATE

QUALITY SINCE 1922 Grace

Honeywell

Usability

Software for the People ➔ SFP

People to support the Software ➔ PSS, COE, AMS and ???

Software against People ➔ SAP

- Usability is being able to make your technology work for you to improve productivity and enable you to manage your planning process by exception!
- Ask the following questions:
  - Are you typing Forecasts into SAP?
  - Do Statistical Models provide forecasts other than the ubiquitous Straight line?
  - Does Day 1 in your monthly process arrive without an Earth Quake?
  - Have you been alerted by useful System alerts?

Problems in the Landscape

Our survey of constituents have indicated the following reality:

- Most APO implementations do not leverage the statistical modeling functionality of the tool
  - They all result in either flat Forecasts or very chaotic forecasts with no bearing on reality
  - Most integrators develop generic Master Forecast profiles without an understanding of the business or the underlying data
  - And quite a few do not even have STAT functionality enabled
- Many APO implementations are designed to serve their transaction counterpart rather than as true Planning systems
  - Inhibits Planning at the correct level of the Hierarchy
  - Too much detail that affects performance
  - Too much clutter in the User interface to be usable
- Alerts are typically turned off because there are a thousand too many
- Proportional Forecasting is generally not understood so dis-aggregation settings are generally sub-optimal
- Although Demand Planners understand the business, they lack training – both in Statistics as well as APO

Methodology to Improve Usability

Assessment

- Align the Business Process to Solution Requirements
- Configuration Audit
- Identify constraints – Systems and Business Process
- Develop Roadmap to Solutions Tuning

Solution Tuning

- Minor Configuration Changes from an Usability angle
- Tune Statistical Methodology – identify forecasting levels
- Develop user-friendly Planning Books and Views
- Enable Advanced functionality – Proportional Forecasting
- Re-design and create holistic Work flow in the monthly planning process

Training

- Navigation Training and Basic Concepts Training
- DP Advanced Concepts – Statistical Modeling, LCP, Causal Modeling, Proportional Forecasting
- Training on Demand Consensus and Monthly Workflow
- Forum to provide transparency to the users on the Background Jobs

Statistical Modeling

Modeling and System functionality

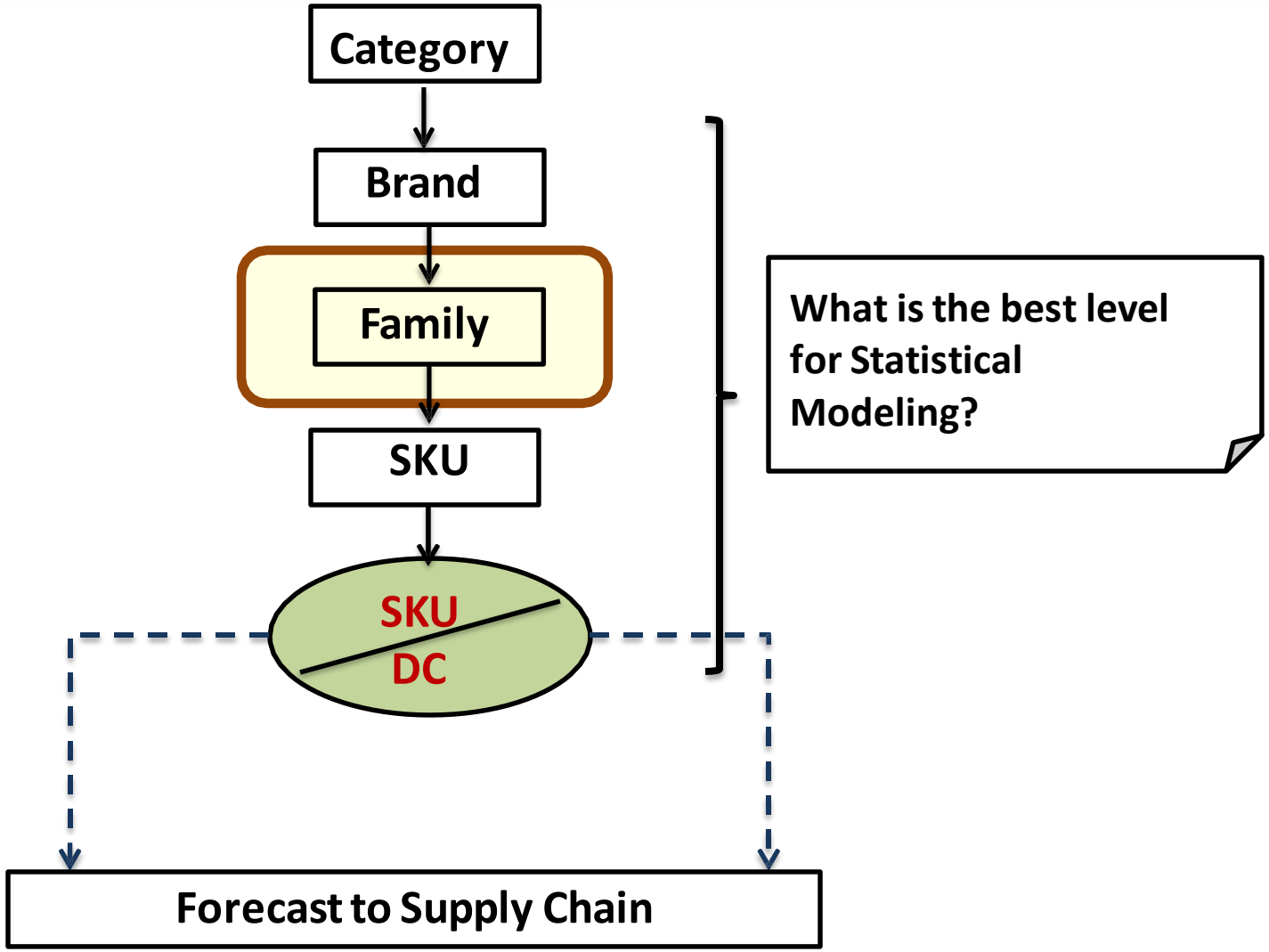
One unique Model per SKU

rather than

One Size Fits All!

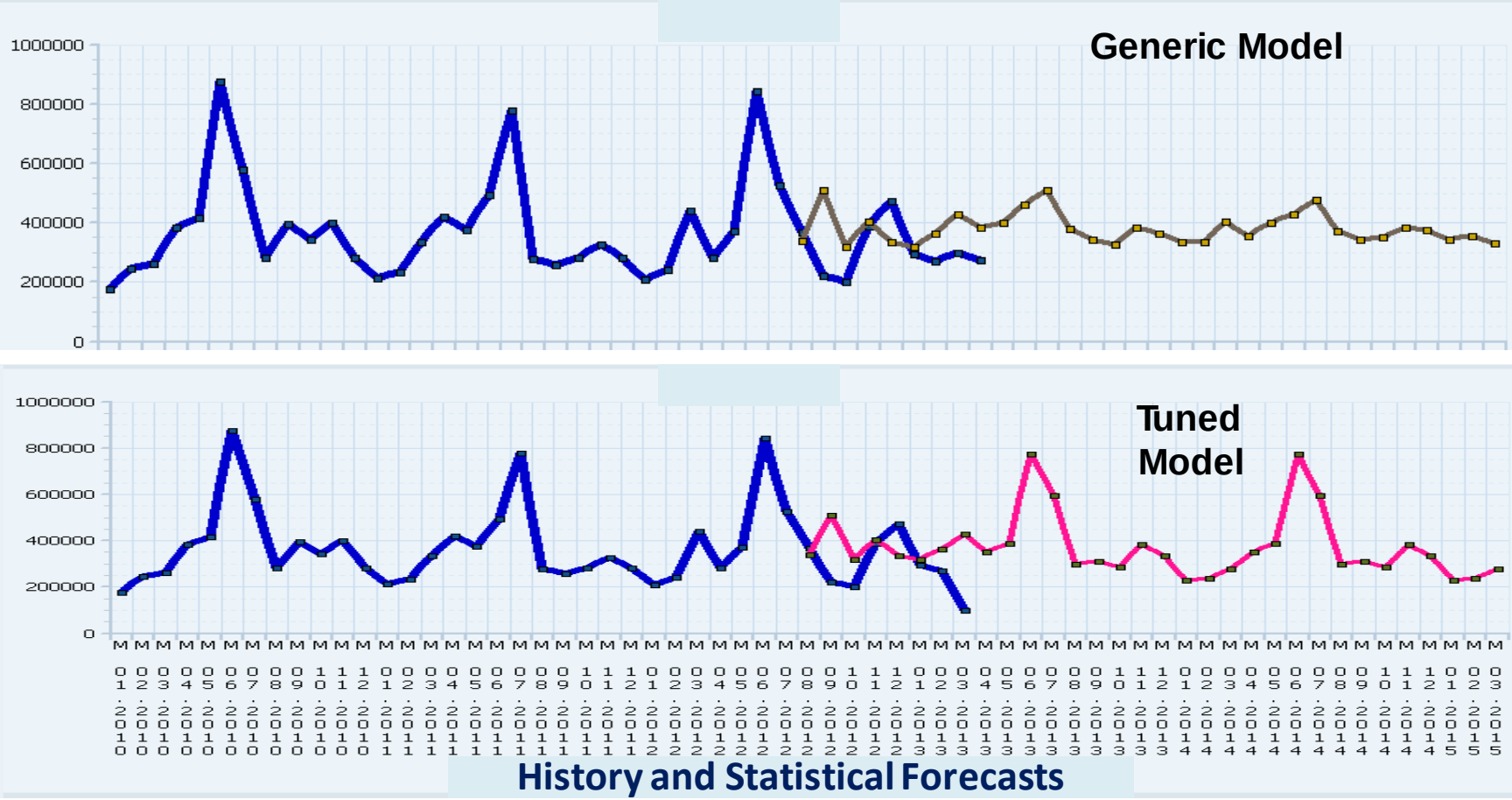
- **Thy shall** Optimize the Statistical modeling capabilities
  - Tune the Modeling Engine
  - Enable the best expert selection models
  - Empower the planners to create Custom Model Settings
- **Thy shall** Identify the suitable level to create demand models based on demand profiles and patterns
- **Thy shall** Create good model diagnostics
- **Thy shall** Enable exception management features so planners have a monthly workflow
  - Focus on important products
  - Focus on products with high error and high volume

Identifying the Levels to create Plans – important config feature

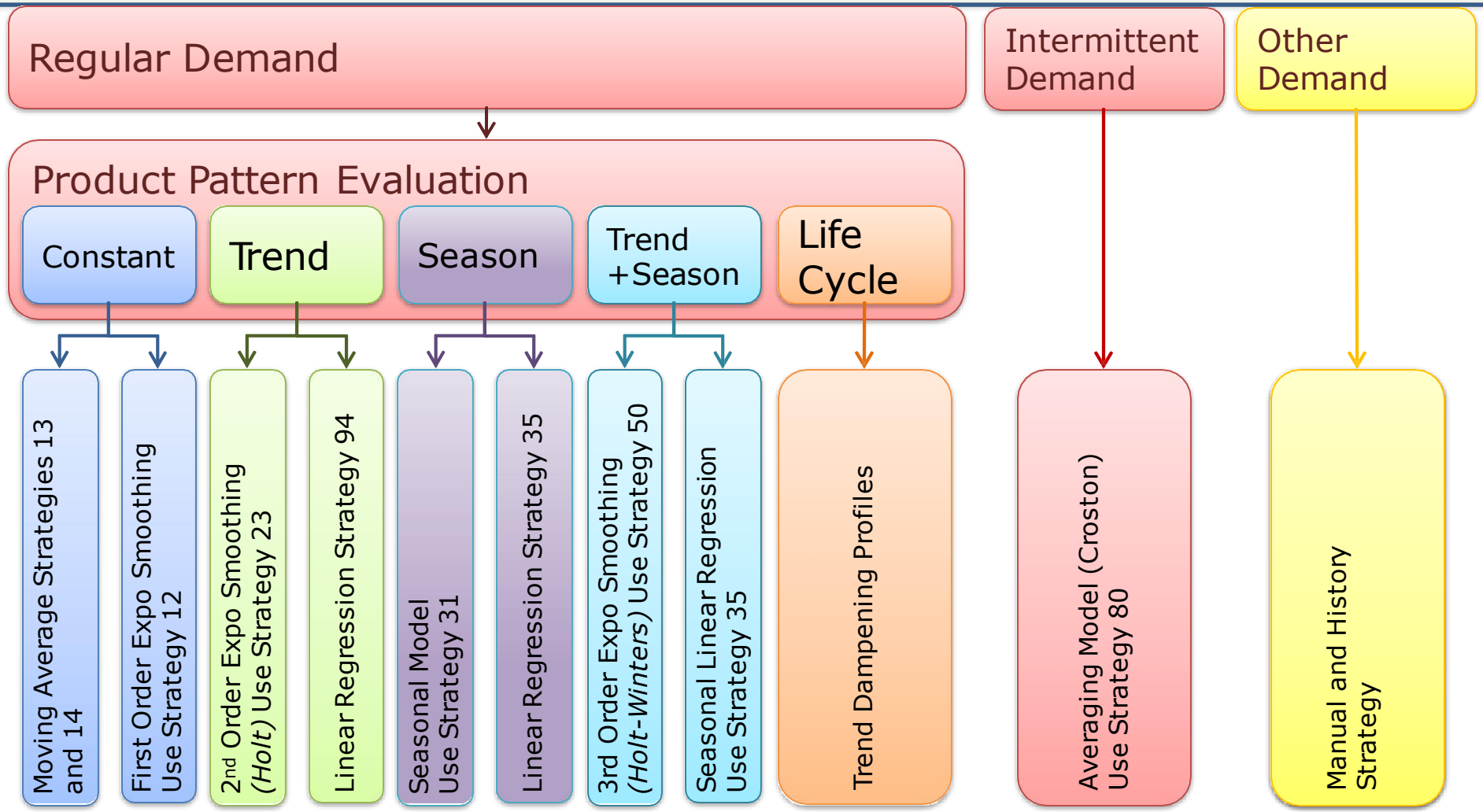


Making the Modeling Engine work for you!

Improvement through Model Tuning



Match the APO DP Models to the Business Need



Building a Demand Planning Process Around SAP APO

Re-design process to conform to S&OP

- Revise the APO Planning Book to conform to the Corporate DP Consensus process
  - More clarity and less Clutter
  - Planning Book should establish ownership of Forecasts
  - Facilitate Consensus and Reconciliation
- Drive meetings to focus more on business issues rather than building a forecast from scratch
  - Better Stat models should obviate the need for manually building profiles
  - Focus on promotions and marketing events

Planning Book Building Blocks

Keyfigure	Description	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14
Year Ago Demand	Show the YAG demand to benchmark the forecast												
User Corrected History	Allow the Flexibility for the Planners to correct history so data imperfections can be resolved before modeling												
Stat Forecast	System Generated Stat Forecast												
Last Cycle Stat Forecast	The STAT forecast from the previous model run												
Accounts Forecast	Business Intelligence												
Demand Planner Forecast	Manual adjustments to the forecast from the Consensus process will over-ride the STAT forecasts												
Consensus Forecast	Consensus Numbers												
Last Cycle Consensus Forecast													

Statistical Model Diagnostics and Error Measurement

Model Diagnostics

- APO Model error metrics are the diagnostics for each forecast model tested by the planner.
  - These diagnostic measures help the planner review the quality of the models and improve them.
  - The Model Errors can be used to set Forecasting Alerts to be triggered.
  - Also, useful to evaluate alternate forecasting models based on the Diagnostic Error measure.
- The standard APO Error measurements are NOT the same as the Forecast Errors calculated from Archived Forecasts with a lag.

Errors Across SKU'S vs. Errors Across Time

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Cross-section

For one period across many SKUs

- Measures forecast performance of the planner, the demand chain and the division as a whole
- Summary measure for a single period
- Example: MAPE across SKUs

Calendar

For one SKU across many periods

- Also called as the Model Error or Error Diagnostic
- Used to measure the performance of a model and revise the model or process to forecast the SKU
- Example: RMSE over time for the same SKU

APO Modeling Error Metrics

- APO reports six error metrics with its own
- custom definition of each
  - Error = Actual Demand – Ex Post Forecast
  - Can be used in forecast system alerts
  - Although APO uses common terminology, the calculation method is unique to SAP.
  - Of the Six, WE will review the three most useful namely
    - **MAPE** – Mean Absolute Percent Error
    - **MPE** – Mean Percent Error
    - **RMSE** – Root Mean Squared Error

MAPE vs. MPE

MAPE

MAPE= Average of the Absolute% Error for each period

Always Positive

$$\text{Average of } \frac{\text{Absolute value of (Actual demand - ExPost Forecasts)}}{\text{(Actual demand)}}$$

MPE

$$\text{MPE= Average of } \frac{\text{Signed (Actual demand - ExPost Forecasts)}}{\text{Actual demand}}$$

Can be positive or negative

Negative means over-forecasted (different from CBP definition)

Root Mean Squared Error

- Mean Squared Error is the Average of the squared errors (hence positive).
- Root Mean Squared Error (RMSE) is the classic Statistical Error – very similar to Standard Deviation.

$$MSE = \frac{\sum (Actual - ExPost\ Fcst)^2}{N}$$

$$RMSE = \sqrt{MSE}$$

General Illustration
MPE, MAPE and RMSE

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	Forecast	Actuals	Error	Absolute Deviation	Squared Error	Percent Error	Absolute Percent Error
Jan-10	100	75	-25	25	625	-33.33%	33.33%
Feb-10	90	72	-18	18	324	-25.00%	25.00%
Mar-10	80	125	45	45	2025	36.00%	36.00%
Apr-10	75	69	-6	6	36	-8.70%	1.35%
May-10	75	100	25	25	625	25.00%	25.00%
Total	420	441	21	119	3635	MPE	MAPE
Average	84	88.2	4.2	23.8	727	-1.21%	24.14%
		Mean Squared Error			727		
		Root Mean Squared Error			26.96		
		RMSE relative to Actual			31%		
		WAPE			27%		

Key Learnings

1. Involve the Users

- Try to involve the users from the early beginnings of the process
  - Let them help define the design and the requirements
  - Get them to write Use cases and business scenarios that they will test
  - Ask them how they will use Statistical Forecasts
- Conduct series of Training sessions that include the Blueprint, Navigation and finally Advanced Modeling and Tool based training

2. Develop Prototype and Test

- Develop a Prototype of the proposed system
  - Get the users involved in testing the prototype
  - Refine requirements and modifications for final development
- Development and implementation is relatively easier if the users sign-off on the detailed prototype

3. Live Modeling Sessions

Develop pilot models in the Live Production environment.

- Develop Training Materials with actual case studies and examples
- Have Users model their real products in the Production system

4. Bottom-up and Top-Down Forecasting

Smart Design involves leveraging the system functionality to dis-aggregate higher level forecasts properly to SKU-DC and SKU-Customer-DC

- Leverage and optimize the APO dis-aggregation algorithms
- So that forecasts can be done using a middle-out approach, macros should recognize and adapt to the dis-aggregation algorithms
- APO allows a variety of techniques
  - Constant Proportions
  - Equal Proportions
  - Time Varying Dynamic Proportions

DPLLC Offerings

SAP APO Expert Consulting

Demand Planning LLC has worked with clients to make the Planning Solution more effective and empower the Planners.

1. Rapid Implementation Service
    1. Provide an usability optimized Implementation
    2. Fast track to roll out in 60 days or less!

2. SAP APO Re-configuration Service and Model Tuning
    1. We do the Repair work to rebuild your configuration
    2. Provide Model tuning and trainig

3. Configuration Audit
    1. Provide Detailed System audit of the Current configuration
    2. Contrast with Business requirements
    3. Provide recommendations to improve the usability

Contact Us

Demand Planning, LLC
26 Henshaw Street, 2nd Floor
Woburn, MA 01801

Web: www.valuechainplanning.com

Phone: +1(781)995-0685

Connect with us on LinkedIn at

https://www.linkedin.com/groups/1808515/

Discussion