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An approach to Effective
APO DP Design & Implementation

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White Paper

Key Concept

A robust design of APO Demand Planning should have the following key considerations – Scale and Scope Management of solution among DP planners, Statistical Forecast Intervention and Management through DP functionalities, and efficient Product Life-Cycle Management in APO Demand Planning.

Use these considerations to come up with a robust design of your APO DP solution.

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An efficient and effective APO DP design goes a long way in ensuring long-term sustainability of the solution. More importantly, it helps all key DP project stakeholders imbibe and embrace the solution.

SAP APO DP provides many key features and functionalities to help manage the solution in terms of effective solution scope management, forecast intervention and supporting the APO planning object such as a product at a location through its lifecycle. This document will help us understand some of these features that can be used very effectively in your design.

1. Scale and Scope Management – An APO design can be global in scale covering all geographies and business units of an organization. Users may be aligned in a Demand Planning process flow based on Business Unit, Region, Sub-Regions, Product Aggregates, or a combination of some of these.

    a. Planner ID as a Characteristic or Navigational Attribute: Unlike SNP, DP does not offer the Planner ID that appears in the Administrator tab of Product Master to be one of the options of selection criteria. The reason is that the internal technical architecture of SNP is much different from DP. Based on your business requirement it may make sense to have a dedicated characteristic in DP for Planner ID. Once we have a characteristic defined as Planner ID, it may be easier to define Selection IDs. Note that in a business situation where planners are aligned on very specific characteristic values, it may be useful to define Planner ID as a navigational attribute. There are relative advantages and disadvantages of defining navigational attribute vis a vis a characteristic.

Note: For more information about navigational attribute vs characteristic, refer to OSS Consulting Note 413526.

However, one of the challenges of maintaining Planner ID as a characteristic or a navigational attribute is to define a process of accurate updating and management of the characteristic info-object as well as the CVC creation. For the former, it is crucial to define BW update rules and if such a structure already exists in the BW solution, it may make sense to leverage the same. For the latter, it may make sense to define a Z table that contains relationships between the Planner ID and the combination of characteristic that it is unique to. Here is an example in Figure 1, where Product

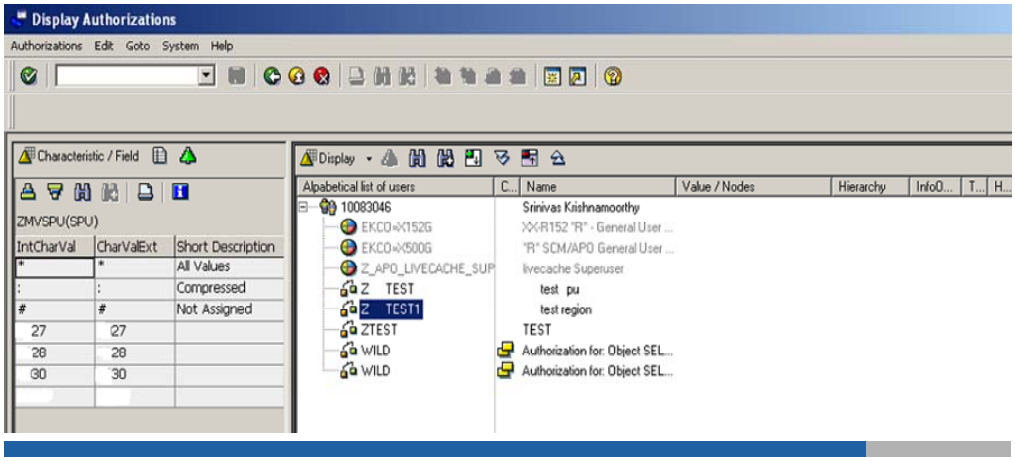
Figure 1 An example of Planner ID alignment

Product Aggregate	Region	Planner ID
Television	Americas	A
Camcorder	Americas	B
Television	Europe	C
Camera	Americas	A
Music System	Europe	C

Aggregate and Region are subset of characteristics that decide the Planner ID. At the time of CVC creation, we can use BADI to automatically populate the Planner ID characteristic based on the values of Product Aggregate and Region in the CVC.

b. RSSM Transaction: This BW transaction basically helps define authorization objects based on the scope of characteristic value combinations. These authorization objects can then be assigned to the users. See example in Figure 2.

Figure 2 An example of Planning Authorization Object using RSSM with Characteristic Value



c. One of the advantages of defining authorization objects based on planner scope is that it creates virtual impermeable boundaries between the scopes of two planners. The Planner ID can also define his or her own sub-selections within the scope defined by RSSM transaction.

It is highly recommended to incorporate a design that allows defining RSSM scope for a group of planners, who need to have the visibility or responsibility to occasionally manage plans created by other users. However, one downside is the on-going management of RSSM scope for planners and hence it may make sense to define such a scope at a higher level example at a Business Unit Level or Region instead of Product or Location respectively.

d. Authorization Objects and BADIs on Forecast Profile: Based on the business process, it may be important to run forecasts on very specific levels of Product or Geography or a combination of these. In such situations there are two approaches that one can think of –

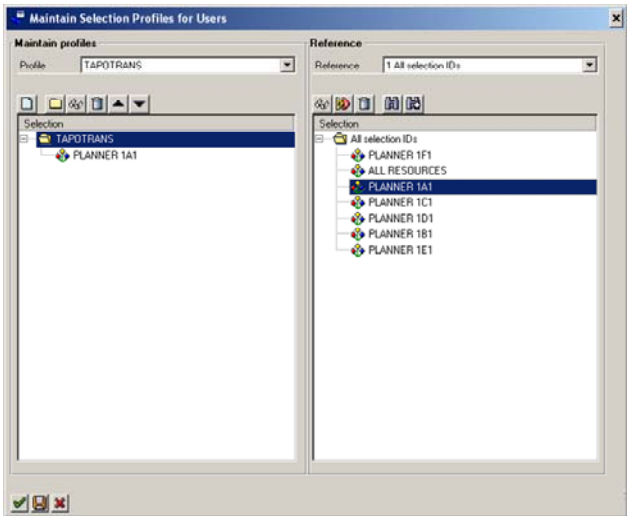
   i. Using BADIs such as /sapapo/SDP_interact, /SAPAPO/SDP_AUTH_CHK and /SAPAPO/SDP_FCSTAUTH to enable/disable the statistical forecast button or do a user ID check before allowing forecasting.

   ii. Enabling Authorization at Forecast Profile Level. Using Selection Profile assignment to Forecast Profile and maintaining authorizations can ensure

that planners do not intentionally or unintentionally run forecasts at an inappropriate level.

e. Selection ID Management: In a DP design, it may make sense to give authorization of transaction /sapapo/MC77 to the DP administrator. This transaction, as shown in Figure 3, allows assigning Selection IDs to different user IDs. It is also possible to directly maintain authorizations on Selection IDs, however, it can be a painful exercise to manage them on an on-going basis though it is easier to set up for the first time.

Figure 3 Transaction /sapapo/MC77 can be used to assign selection Ids to users



f. Multiple planning areas: It may occasionally make sense to have multiple planning areas if there are completely different kind of businesses independent of each other from a scalability and management perspective. As an example, there may be a business unit that predominantly uses a specific Unit of Measure that is not relevant for some other business unit. This will save many units of measure conversions that would otherwise have to be maintained as an example maintaining a specific planning area Unit of Measure that may not have a business interpretation.

2. Statistical Forecast Intervention – A business process may require multiple ways of intervening statistical forecast. One process may require an ability to incrementally add forecasts, or completely over-post the statistically derived figure. There may be a process to even archive such planner intervened numbers to keep track of Key Performance metrics. After all, forecasts derived through statistics are meant to capture tacit knowledge that is perhaps not captured well in historical sales or projected into the future. It may thus be crucial to track error measurements of planner intervened key figures and Statistical Forecasts vis a vis the actual sales. Some of the tools suggested for planners to be able to efficiently modify the forecasts are:

a. Custom Alerts as an Effective Exception Management tool: APO Demand Planner offers ability for the planners to define very unique kind of alerts. These alerts can be very useful in effectively drawing the planner's attention to problems identified in forecasting. As an example, alerts could be a certain percentage deviation from an average of 12 months sales. However, there are ways to define smarter alerts that can put the planner time on forecasts for best possible use. One can define Dynamic Alerts for small time buckets and Database Alerts for larger chunks of time. It may also make sense to define these alerts only on focus zone of the Forecast Horizon. Thus in a supply chain where supplies can react to forecast changes within a time frame of 3 months, it may not make sense for the planners to spend time on forecasts which are 12 months out unless there is a long term resource/ material requirement in the supply chain. Alerts should typically thus be defined in the Forecast Horizon. Database alerts can also thus be defined so that it looks at longer time horizons. One can use macro functions to cumulate the key figures on these chunks of time and then appropriately define alerts. Dynamic Alerts though can be defined on small chunks of time, which could be the equivalent of Data View time buckets. It may make sense for the planners to make changes to alleviate these Dynamic Alerts. Some of the alerts that have been found useful in my experience are alerts that do high-level calculations such as –

    i. Compares forecast of a month with the sales of the same month last year and checks for a certain percentage difference
    ii. Compares the annual forecast number with the annual historical number in the immediate past
    iii. Compares standard deviation of corrected history with that of forecast and alerts for a certain percentage deviation
    iv. User Exit macro alerts in situations where history has dropped to zero for certain number of months without a corresponding entry in the Phase-Out profile.

b. Strategy 56 to do regeneration of Forecasts: SAP APO Demand Planning offers auto-models that can be used to define unique Forecast Strategy for the Planning Object (also referred as the CVC at which Forecast is run). Strategy 56 is a very powerful auto-model which can help test seasonality, trend or intermittence of historical sales to finally decide which strategy can be used for the planning object. This information is captured in a generated Forecast Profile that planners can override with what they consider to be a better forecast model. Example auto-model 2 or Strategy 56 can propose a constant model based on the historical pattern. Planners may have additional information that may lead them to believe that a seasonal model is more relevant. Thus they can override the generated profile with this information so that the Forecast Model that runs next time can use the planner proposed model instead of the one proposed by auto-model 2. It may also make sense, once every six months, to check the list of planning objects that have not been used by the planner. Based on these criteria, the generated profiles from the auto-model 2 run can be cleared so

that it can regenerate a profile by detecting any new dynamics in the history. If not, the forecast run will get locked in with the generated profile of auto-model 2.

c. Analyze MC8K logs: The log gives very useful statistical information such as reasons why a forecast may not be saved or error metrics. It may make sense once every three months for someone to analyze the “Reds” in the log. Figure 4 shows an example of such a log.

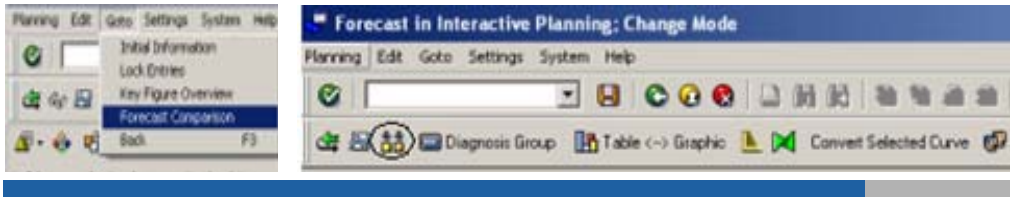
Figure 4 A sample above shows the Reds in MC8K log.

Ty...	Char.c...	Message Text	LTxt
	NA US NA	Following forecast profile selected: 2-FCST	
		Outlier correction performed; no outliers exist	
		Forecast profile Hiva45O66TVX0000blV4A0 was generated and assigned using strategy 11	
		Too few historical values for parameter optimization	
		Insufficient historical values available for model choice	

The logs can be summarized and become an effective tool for the planners to get indicators on where things may be going wrong from both, the Forecast and the Data Management perspective.

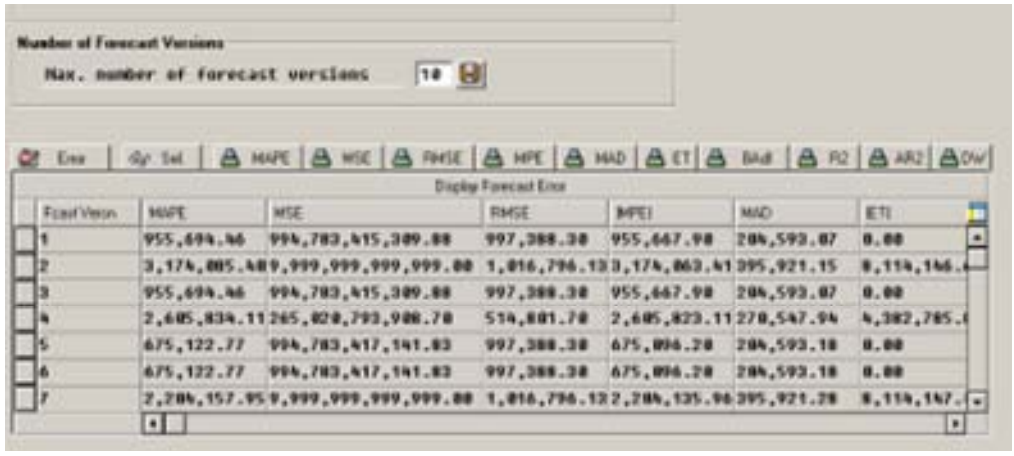
d. Define error measurements appropriate to the business: APO Demand Planner provides ability to define custom error measurements. As an example MAD (Mean Average Deviation) can be an effective error measurement to capture errors for a planning object that may be of high value in nature. However MAPE (Mean Average Percentage Error) can be an equally effective error measure to capture errors for a planning object that is high volume in nature. An effective custom error measure for a high value high volume planning object can be a multiplication of MAPE and MAD. Planning Strategies can be decided by an auto-model based on minimum custom error. APO Demand Planning also offers a Forecast Comparison tool that can be accessed through Interactive DP or Forecasting View. The Figure 5 shows an example of how this comparison tool can be accessed.

Figure 5 Accessing Forecast Comparison tool through Interactive planning and Forecast view.



The tool gives a great view to look at various error metrics. Planners can review the existing error metric and revise the same, if required. Figure 6 shows different error metrics with different forecast simulation parameters.

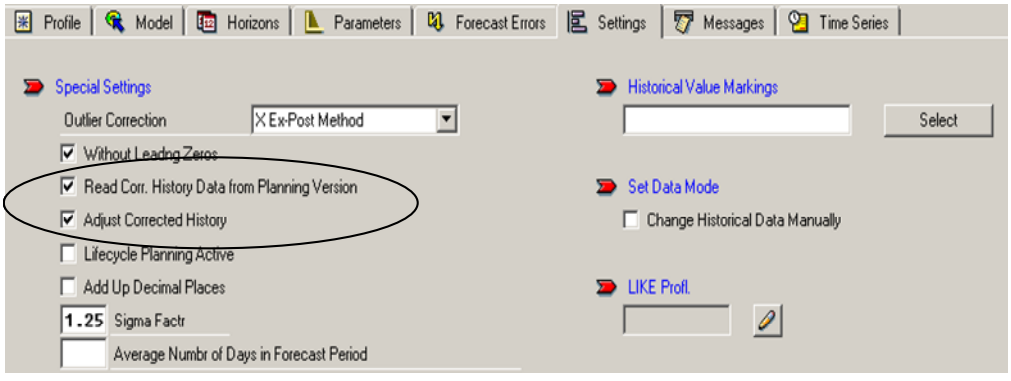
Figure 6	Forecast Comparison tool gives view of errors based on different forecast strategies executed in interactive and background simulation



It is also possible to use macro functions to do online error calculations. These macro functions can do many calculations that can be either calculated on planning book temporary key figures or database key figures that can be backed up in an info-cube for further reporting. It may be noted that BW offers much richer reporting capability, however, based on experience 80% of reporting needs can be carried out in APO itself.

e. Strategy to override Raw History to help do more effective Forecasting: APO Demand Planning does offer Forecast Profiles that can do Outlier corrections on Raw History based on Ex-Post Forecasts or some other custom-logic.

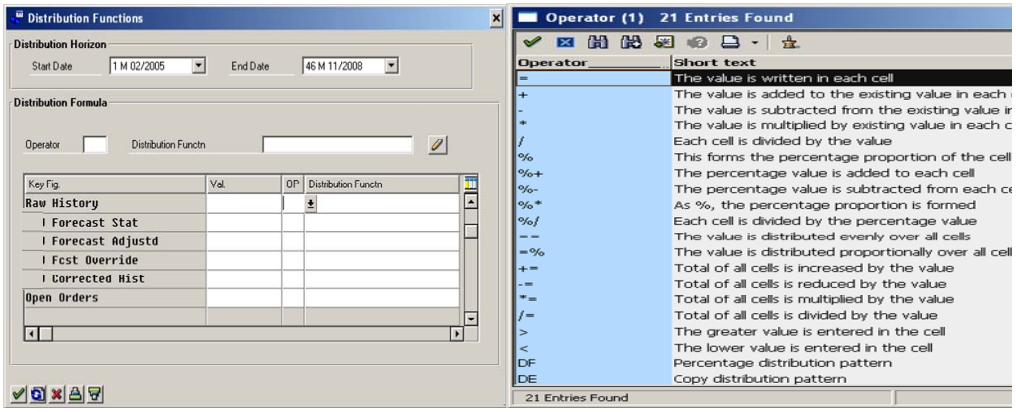
Figure 7	The checkbox shown above helps planner to override History with the Override History Key Figure



However, it may also make sense to give the control to override the history on which forecasting is done in the hands of planners. By ticking the checkboxes in the Forecast Profile shown in Figure 7, it is possible for planners to not only override the Corrected History but also use the Outlier function.

f. The Distribution Function feature in interactive Demand Planning: The distribution function has the ability to make mass changes to the forecasts very effectively.

Figure 8 The checkbox shown above helps planner to override History with the Override History Key Figure



As an example in Figure 8, increasing/ decreasing the values of key figures in percentage or by value. It can also be used to zero out or set a specific value to all the time buckets of the key figure.

3. Product Life-Cycle Management – APO Demand Planning product offers many features and functionalities to effectively manage a product through its lifecycle. Life-Cycle management and Realignment are very important tools to manage how the planning object transitions from one phase to another.

   a. Have Product Transition strategy (plan in advance): Products move from one aggregate group to another or they may be superseded by another planning object. It may not always be important to retain the historical information about a superseded product in APO DP, if there are effective BW-powered archiving strategies already in place. In such a situation, realignment makes sense since the number of CVCs in the system reduces, and consequently, the overheads in the system also reduce. However realignment per se is a memory intensive process and hence must be done at a time when users are not logged into the system.

   b. Lifecycle related profiles: Phase-In and Phase-Out profiles can have ramp up or down profiles that can gradually transition the products. These can be used to represent the actual business ramp-ups and downs. Based on experience, it has been found that the overhead times using Phase-Out profiles are much higher than using strategy of No Forecast. Thus in situations where Phase-Out is in current month or was in the past, it makes sense to use a “No Forecast” strategy. Like Profiles can also be used for the following situations

      i. Forecast of Product A is based on Product B and C

      ii. Forecast of Product A is based on 50% of B and 100% of Product A

While executing lifecycle features at an aggregate level, it may make sense to make a quick check on OSS notes. Another important aspect to take care while implementing Like Models is to ensure that the source and the target planning objects are similar in terms of their CVC definitions. For example, if Product B is being superseded by Product A, then Forecast of A would be dependent on History of A and B. In such a situation it has been found crucial to define Product B for those CVCs where Product A has been defined from a consistency standpoint.

c. Realignment as a permanent transition: After a product spends a certain amount of time in lifecycle-related models, it may make sense to do realignment to permanently adjust the CVCs. BW archiving can contain information on obsolete CVCs. Thus a Product Transition strategy defined into APO goes a great way in managing the solution on an on-going basis. It is also important to delete CVCs that have become obsolete from a Data Management perspective. It is very important to run LiveCache consistency checks and planning object structure consistency checks on running realignment. Since realignment is a very performance intensive process, it may make sense to do realignment in small installments — 100 planning objects at a time, as an example.

The above-mentioned suggestions would need to be thoroughly weighed against the business requirements to arrive at an implementation procedure.

Recommended Tips and Tricks in APO DP Implementation

There are many features that can be enabled through light development and configuration. These can meet many nice-to-haves and may be useful helping planners buy in to the tool.

1. Using BADI /SAPAPO/SDP_INTERACT to do authorization checks before displaying data to planners. This ensures planners only see what is intended for them.
2. DP Users should be encouraged to use Drill-down feature in the shuffler instead of Headers. When the planning area is set with detailed level lock at characteristic value level, Drill-down does not lock up all characteristic values unlike how Header uses one of the many loaded and locked values. This reduces the probability of lock-outs.
3. Use system messages function with SM02 to ensure that planners are not in edit mode in DP Planning Books at the time of forecast run.
4. Using Parameter IDs can be very effective in providing a pleasant navigation experience for users. Some such parameter IDs are / SAPAPO / FCST_GREEN and / SAPAPO / SDP94_D_MODE. The latter parameter ID can be used to make interactive planning in display mode for users. This can be used in a batch forecast run as well to avoid lock-outs. OSS note 350065 provides a longer list of such parameter IDs.
5. Returns Forecasting needs to be managed separately from regular forecasting. The returns number needs to be treated as a positive number for forecasting. Note that negative trends are zeroed out in APO when the value reaches zero and below.
6. Using User Exit macros makes sense when the logic of macros becomes very complex. As an example, when the planning area is defined at a monthly level and reporting calculations need to happen at daily level, then User Exit macros may be very useful.
7. Macros with complex calculations can slow down an interactive experience, and hence they should be run in the background if possible. Use Planning Book Key Figures, wherever possible.
8. Spare Planning Area key figures should be planned to be included for any changes to design in future or doing temporary calculations that need to be backed up. A warning is prompted when the number of planning area key figures goes beyond 40.
9. The backup of planning area should only happen on key figures that are planner intervened and not on macro determined or static key figures. This saves lot of overheads during the backup process.

About the Author

Srinivas Krishnamoorthy is a certified SAP APO application consultant and is presently working with Infosys Technologies as a Senior Supply Chain Consultant in Enterprise Solutions. He has also worked with i2 Technologies, which is one of the leading best-of-the-breed Supply Chain solution providers, as a Product Design consultant. He has a total of 9 years of experience in Supply Chain. He serves Hi-tech clients with complex global implementations of SAP APO, particularly in the areas of Demand Planning, Supply Network Planning and Global Available-To-Promise. He is a leading contributor to SAP Developer Network for APO. He is a Mechanical Engineer from IIT Delhi and a Management Post-Graduate from IIM. You can reach him via email at srinivas_k@infosys.com.