Advanced Planning in Supply Chains - I
Illustrating the Concepts Using an SAP APO Case Study

3 SAP APO Module Matrix and General Principles
3 SAP APO – Module Matrix and General Principles

3.1 Module Matrix and Related Systems

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3.4 The SAP APO Solution for the Frutado Case
3.1 Module Matrix and Related Systems

- The SAP Business Suite

Figure 3.1
3.1 Module Matrix and Related Systems

Modules of SAP® APO

- **Demand Planning (DP)**
  - Forecast future demand
  - Statistical and causal forecasting methods
  - Monitoring of forecast accuracy
  - Product lifecycle recognition
  - Aggregation / disaggregation logic
  - Collaborative planning
- **Supply Network Planning (SNP)**
  - Supports master planning
  - Integrates purchasing, production, distribution and transportation decisions
  - Controls complete supply chain
  - Three planning algorithms: heuristic, rule-based, optimization-based
  - Deployment functionality
- **Production Planning / Detailed Scheduling (PP/DS)**
- **Transportation Planning / Vehicle Scheduling (TP/VS)**
- **Global Available-To-Promise (GATP)**
3.1 Module Matrix and Related Systems

Modules of SAP® APO

• Demand Planning (DP)
• Supply Network Planning (SNP)
• Production Planning / Detailed Scheduling (PP/DS)
  • Creation of planned production orders and purchase requisitions
  • Determination of lot-sizes
  • Concept of pegging
  • Manual planning, heuristics and optimization
• Transportation Planning / Vehicle Scheduling (TP/VS)
  • Transportation planning for inbound, intra-company and outbound scenarios
  • Vehicle scheduling and routing
  • Transportation service provider selection
  • Collaboration (web-based, EDI-based)
• Global Available-To-Promise (GATP)
  • Rule-based ATP
  • Multi-level ATP
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3.2 Data Flows (Technical and Process-Related)

Technical Data Flows

- SAP SCM Server Architecture

![Diagram showing technical data flows in SAP SCM Server](image-url)

Advanced Planning in Supply Chains
3.2 Data Flows (Technical and Process-Related)

Technical Data Flows
- Core Interface (CIF)

Figure 3.3
3.2 Data Flows (Technical and Process-Related)

Technical Data Flows using the Core Interface (selected items only)

- **Master Data (ERP to APO)**
  - Locations
  - Products
  - Resources
  - Bill-of-Materials and routings

- **Transactional Data (ERP to APO)**
  - Sales orders
  - Production orders
  - Confirmations
  - Stock information

- **Transactional Data (APO to ERP)**
  - Planned orders
  - Stock transfer requisitions (or orders)
  - Planned shipments
3.2 Data Flows (Technical and Process-Related)

Process-Related Data Flows (example)
- Transportation Planning – outbound process

Figure 3.4
3 SAP APO – Module Matrix and General Principles

3.1 Module Matrix and Related Systems

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3.4 The SAP APO Solution for the Frutado Case
3.3.1 Models and Planning Versions

- **Model**
  - Determines relevant master data
  - Can have several planning versions assigned
  - Analysis of supply chain configuration

- **Planning version**
  - Determines relevant transactional data
  - Analysis of different demand situations (example)
3 SAP APO – Module Matrix and General Principles

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3.4 The SAP APO Solution for the Frutado Case
3.3.2 Master Data

For all planning tasks master data quality is crucial!

- **Location**
  - address, to represent geography
- **Resource**
  - to represent (finite) capacity and availability
- **Product**
  - to represent physical (e.g. dimensions) and logical (e.g. attributes) properties
- **Transportation Lane**
  - to represent geographical reachability
- **Quota Arrangement**
- **Production Process Model (PPM) / Production Data Structure (PDS)**
- **Product Storage Definition**
- **Setup Matrix**
- **Characteristic Value Combination (CVC)**
3.3.2 Master Data

- Location
- Resource
- Product
- Transportation Lane
- Quota Arrangement
  - split percentage for sourcing (inbound) or distribution (outbound)
- Production Process Model (PPM) / Production Data Structure (PDS)
  - to represent bill-of-material and routing information
  - Detailed example in subsequent slides
- Product Storage Definition
  - defines how products are drained from or filled into tanks
- Setup Matrix
  - to represent setup times and costs for different production sequences
- Characteristic Value Combination (CVC)
  - (allowed) combination of characteristic values used in demand planning
3.3.2 Master Data

Production Process Model (detail)

- In the Frutado case, a simple PPM is used (only one resource and no input material needs to be considered)
- Concept of PPM is explained based on the following example:

```
Input Product
Chassis I_C00
```

```
Input Product
Wheels I_W00
```

```
PPM I100
```

```
Op. 10 – Assembly
Resource: I_ASSY1
```

```
Op. 20 – Painting
Resource: I_PAINTSHOP
(setup and production)
```

```
Op. 30 – Packaging
alternative resources: I_PACK1 or I_PACK2
```

```
Finished Product I_100
```

2 Pieces

8 Pieces

1 Piece
3.3.2 Master Data

Production Process Model (detail)

Figure 3.5: SAP-Screenshot Production Process Model (PPM)
### 3 SAP APO – Module Matrix and General Principles

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- **3.3.1 Models and Planning Versions**
- **3.3.2 Master Data**
- **3.3.3 Transactional Data**
- **3.3.4 User Interface**

#### 3.4 The SAP APO Solution for the Frutado Case
3.3.3 Transactional Data

- Representation as
  - Key figure
  - Order
  - Quantity (ATP time series)

- Different usage of data in different planning modules
3.3.3 Transactional Data

- Data Structure for Demand Planning

![Diagram of Data Structure for Demand Planning]

*Figure 3.6*
3.3.3 Transactional Data

Order-based representation

- Used in PP/DS and TP/VS
- Order categories (order type)
  - Purchase orders (receipt)
  - Purchase requisition (receipt)
  - Production order (receipt)
  - Planned (production) order (receipt)
  - Sales order (requirement)
  - Scheduling agreement (requirement)
  - Dependent demand (requirement)
  - (Unrestricted) stock (stock)
  - Safety stock (stock)
  - Forecast (forecast)
3.3.3 Transactional Data

- **Pegging**
  - Order-based transactional data
  - Assignment of receipt elements to requirement elements

![Figure 3.7](image-url)
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3.3.4 User Interface

- SAP APO Navigation

![SAP-Screenshot](image.png)

**Figure 3.8: SAP-Screenshot** SAP APO Navigation
3.3.4 User Interface

- Planning Book

Figure 3.9: SAP-Screenshot SNP – Planning Book
3.3.4 User Interface

- Production Planning Table

Figure 3.10: SAP-Screenshot  Product planning table (PP/DS)
3.3.4 User Interface

- Detailed Scheduling Planning Board

Figure 3.11: SAP-Screenshot Detailed scheduling planning board (PP/DS)
3.3.4 User Interface

- Interactive Vehicle Scheduling

Figure 3.12: SAP-Screenshot Interactive vehicle scheduling (TP/VS)
3.3.4 User Interface

- **Alert Monitor**

![SAP-Screenshot Alert monitor](image-url)

- **Figure 3.13: SAP-Screenshot Alert monitor**

- First task of the day for a planner: Check the existing alerts
- Drill-down from the alert monitor to the application to solve the issue.
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3.4 The SAP APO Solution for the Frutado Case

Assignment of planning tasks to APO modules

- Demand Planning (short-term and medium-term) ➔ DP
- Master Planning (cross-location) ➔ SNP
- Short-term Production Planning and Scheduling ➔ PP/DS
- Distribution Planning / Deployment ➔ SNP
- Transportation Planning ➔ TP/VS
- Available-to-Promise / Capable-to-Promise ➔ Global ATP
3.4 The SAP APO Solution for the Frutado Case

- Planning Tasks and Data Flows in the Frutado Case

Figure 3.14
3.4 The SAP APO Solution for the Frutado Case

- Rolling Schedules

![Rolling Schedules Diagram]

Figure 3.15
3.4 The SAP APO Solution for the Frutado Case

- **Frutado Implementation of Rolling Schedules**

Figure 3.16

- 2 Years in the past
- 51 Weeks Demand Plan
- 52 Weeks SNP Plan
- 28 Days PP/DS Plan
- 1 Week Customer Orders
- 14 Days Deployment Plan
- 6 Days TP/VS Plan