

SAP PRESS E-Bites

Introducing Operational Planning with SAP® IBP for Response and Supply



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What You'll Learn

Start by learning the basics of operational planning and see how it works in SAP IBP for response and supply. Then walk through forecast consumption and demand in supply and product allocation planning. See how response planning keeps your business flexible and discover how to improve product delivery with deployment planning. You'll also preview best practices to follow for your own operational planning implementation.

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1 Operational Planning Basics

Operational planning is the process of developing short-term, execution-level plans, with an ability to sense, collaborate, optimize, and respond to supply chain disruptions. In simple terms, operational planning involves operationalizing the strategic vision and tactical objectives set by an organization. In this section, we cover the operational planning process, the technological shift from the supply chain model to the supply network model, the importance of operational planning, and operational planning using SAP Integrated Business Planning for Supply Chain (SAP IBP).

1.1 Synchronized Planning

Traditional supply chain objectives are becoming harder to achieve due to increased market volatility and complexity, digital disruption, and shifting customer expectations. The Digital Capabilities Model for Supply Networks (DCM) addresses the need for a process shift from sequential supply chains to an integrated supply network. The DCM has six key capabilities, which are outlined in Figure 1.1:

- **Digital development**

A next-generation methodology of developing and managing products and services that are responsive to the customer experience and are transformed by smart, real-time data, advanced technologies, and agile innovation

- **Synchronized planning**

Enables a business strategy via planning and operational levers across the entire value network. This capability integrates strategic goals, financial objectives, and tactical supply network plans to create a concurrent and synchronized business plan

- **Intelligent supply**

Impacts every component of the procurement process to source goods and services from leading suppliers at the best value while driving efficiency in procurement operations, improving supplier relationships, and mitigating risks

- **Smart operations**

A highly responsive, adaptive, digitized, and connected function that is integrated into digital supply networks and synchronizes all aspects of production and operations

- **Dynamic fulfillment**

Gives an enhanced customer experience by delivering the right product to the right place at the right time, ensuring the expected quality, quantity, and condition of products, and providing the necessary level of service, visibility, and responsiveness

- **Connected customer and aftermarket**

A new way to augment traditional transactional interactions to achieve effective and integrated customer engagement throughout the customer, product, and service lifecycles, from acquisition to service

Additional Reading

Please visit <https://dcm.ascm.org/> for more information on the DCM.

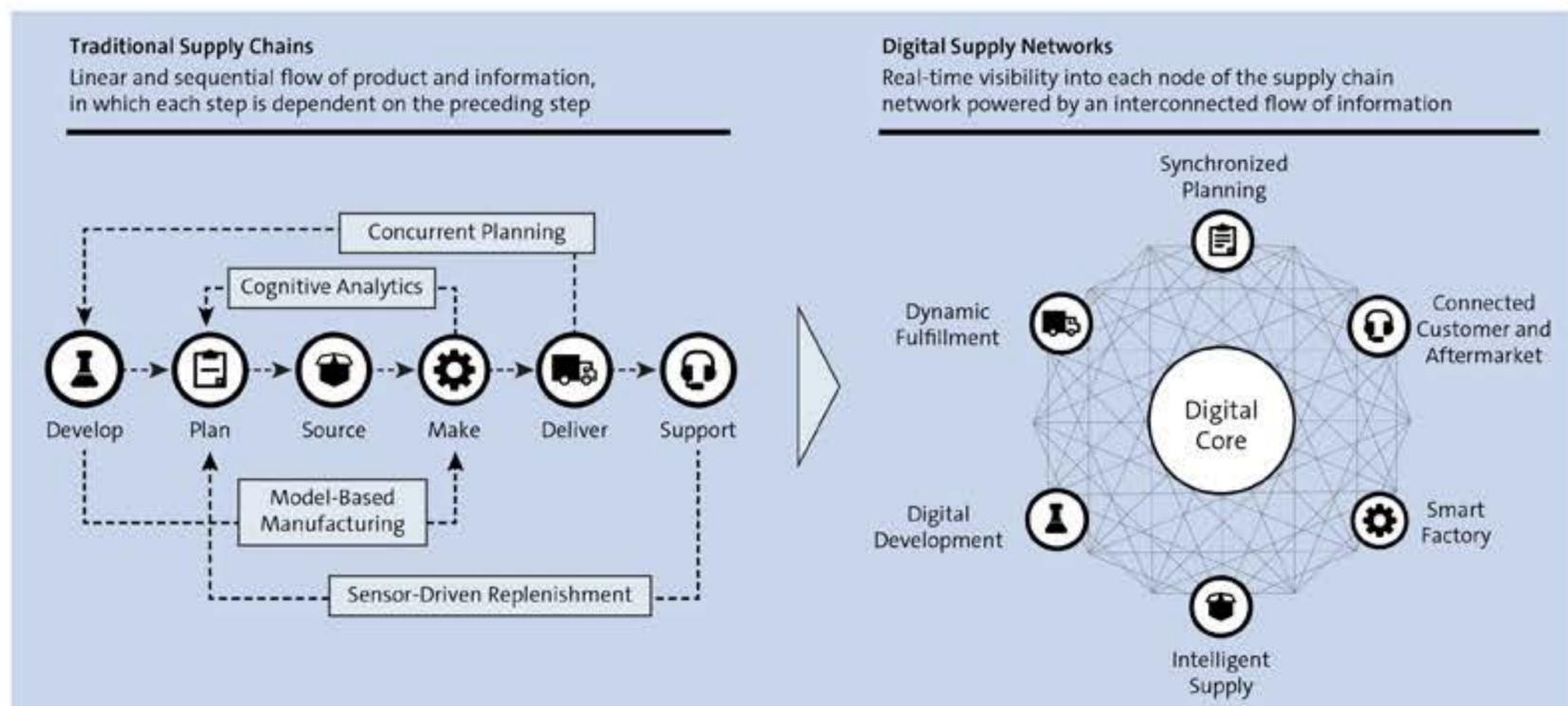


Figure 1.1 Shift from Supply Chains to a Supply Network in Industry 4.0

Synchronized planning enables a business to design and execute its strategy via planning and operational levers across the entire value network. This capability integrates strategic goals, financial objectives, and tactical supply network plans to create a connected and synchronized business plan. The result is faster cross-functional decision-making, better information visibility, enhanced customer service, an agile supply network, real-time collaboration with business partners, efficient resource

usage, and improved financial performance. Digital supply networks leverage synchronized planning to proactively predict and shape demand, position supply, source materials and services, respond to disruptions, plan finances, organize talent, allocate capacity, and schedule production for the overall network. The capability ensures cross-functional collaboration and strategic synchronization across the entire value network, culminating in one desired outcome, while adapting to changing market conditions and evolving customer needs.

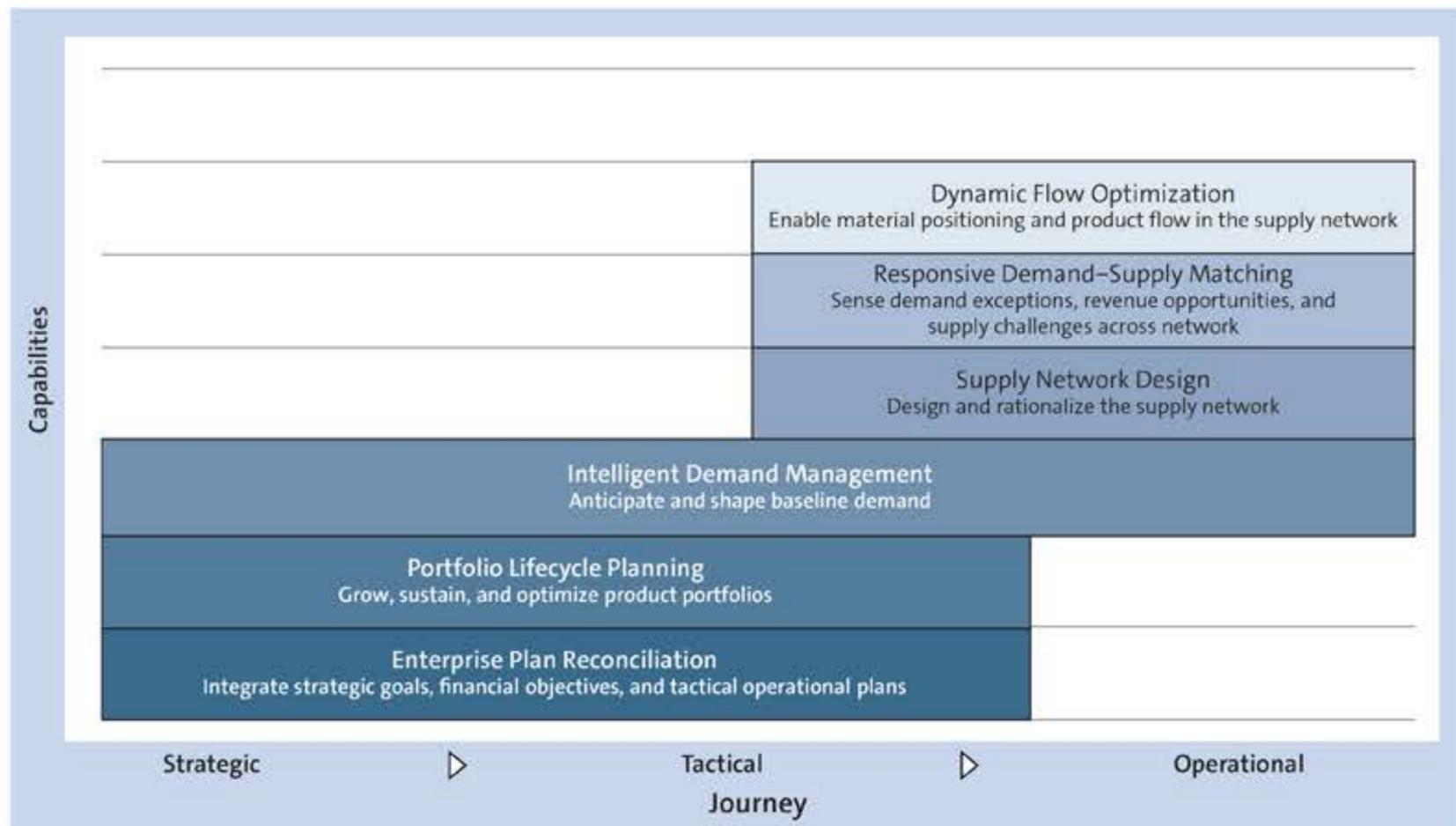


Figure 1.2 Key Capabilities of Synchronized Planning

Synchronized planning has six main sub-capabilities aligned to strategic, tactical, and operational planning horizons (Figure 1.2):

- **Intelligent demand management**

The ability to anticipate and shape baseline demand and promotional lift using data science methods that account for historical demand cycles; trade promotions, including channel incentives and pricing changes; customer preferences; and economic and environmental factors

- **Responsive demand–supply matching**

The ability to sense demand exceptions, revenue opportunities, and supply challenges through the orchestration of supply across the network and to prioritize the allocation of supply to best meet demand according to the business strategy

- **Dynamic flow optimization**
The ability to enable material positioning and product flow in the supply network to maximize profitability, margin, and service through routing, procurement, and inventory levers
- **Enterprise plan reconciliation**
The ability to integrate strategic goals, financial objectives, and tactical operational plans seamlessly through cross-functional alignment
- **Portfolio lifecycle planning**
The ability to grow, sustain, and optimize product portfolios, including packaging and service, through measures of portfolio health, such as product productivity; supporting launch and phase-out roadmaps; and alignment with commercialization plans, including brand and packaging plans
- **Supply network design**
The ability to design and rationalize the supply network, optimizing for the required service level at the lowest total landed cost, as well as the ability to manage long-term capacity decisions based on strategic decisions and investment plans

1.2 Sales and Operations Planning and Execution

Sales and operations planning (S&OP) is an integrated business management process aligning sales, marketing, development, manufacturing, sourcing, and financial plans to generate strategic operating plans. While this process lays a strong foundation for supply chain planning, shifts in supply chain trends are quickly making tactical plans obsolete; organizations are struggling to make tactical plans meaningful and to drive operational plans in the short-term horizon. This calls for a separate set of defined strategies for an operational execution planning process that is tightly coupled with S&OP. Enter sales and operations execution (S&OE).

S&OE is the process of generating short-term, dynamic, and responsive operational execution plans by breaking down the tactical plans generated from S&OP at least daily over a horizon of approximately 10 weeks. The purpose of S&OE is to eliminate the disconnect between S&OP and operational planning. The objective is to take input, including insights from S&OP, order demands and exceptions, and operational supply and constraints, to output a constraint production plan and responsive order confirmation.

As shown in Figure 1.3, S&OP and S&OE are closely integrated to generate order-level execution plans that can help businesses achieve their desired business value and

vision. Unconstrained demand from demand planning, with safety stock or target inventory positions from multi-echelon inventory optimization, is sent to time series supply planning to generate a network-optimized, constrained net requirements supply plan across the value stream nodes. S&OP takes all of this input to generate a consensus-constrained demand plan for use in the S&OE process. S&OE uses S&OP input with real-time visibility into the demand, inventory, and supply situation in the short term to generate output, such as a detailed scheduling production plan, a constrained procurement plan, buffer position recommendations, and an allocation and response plan.

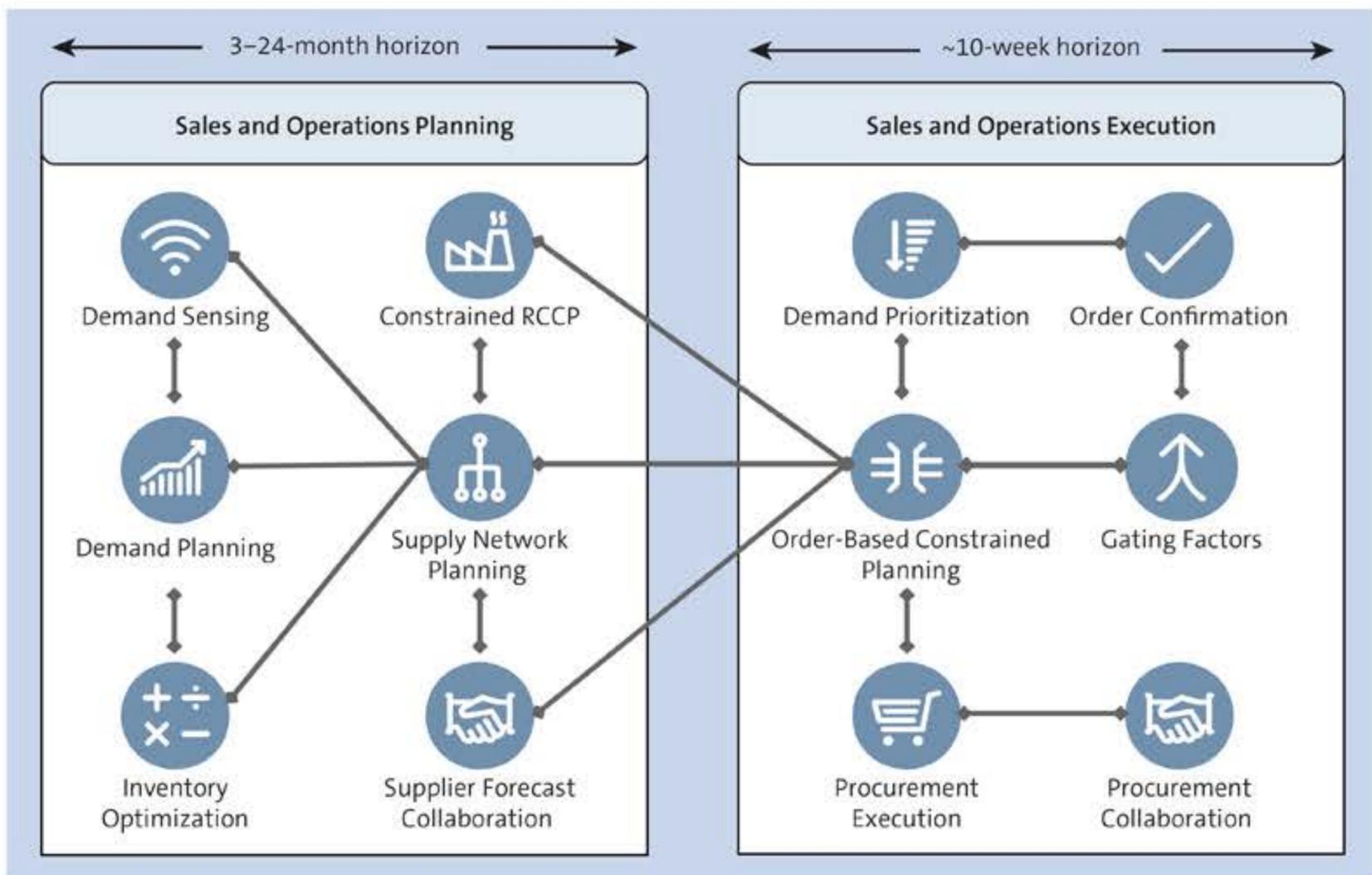


Figure 1.3 The Confluence of S&OP and S&OE

Table 1.1 outlines the differences between the S&OP and S&OE processes.

Drivers	S&OP	S&OE
Horizon	3–24 months	0–12 weeks
Time Granularity	Weekly or monthly	Daily or weekly
Planning Level	Aggregated (e.g., product family)	Detailed (e.g., SKU)
Cadence Frequency	Monthly	Weekly

Table 1.1 Comparison of the S&OP and S&OE Processes

Drivers	S&OP	S&OE
Process Ownership	Strategy planning with global or regional S&OP organization	Sales and S&OP team
Planning Series	Time series based	Order based
Key Objectives	Short-term demand governance, supplier collaboration, detailed scheduling, deployment, allocation, and response planning	Demand forecasting, network optimization, aggregated capacity planning, supplier collaboration, and product portfolio analysis
Data Integration	Weekly or monthly	Real-time or daily
Data Volume and Level	Medium and aggregated	High and granular

Table 1.1 Comparison of the S&OP and S&OE Processes (Cont.)

The benefits of the S&OE process include the following:

- Responsive demand–supply matching to generate or simulate constraint-based plans in real time
- Lead time compression with the ability to respond to short-term demands quickly
- Excess inventory reduction and better schedule adherence
- Visibility into production capacity and material usage and the ability to perform concurrent planning
- The ability to respond to supply disruptions and dynamically choose alternate sources of supply

1.3 Why Is Operational Planning Critical?

Enterprises often use the terms tactical planning and operational planning interchangeably, or they simply use one common process. However, as mentioned in the previous section, it is important to have a dedicated process using S&OE and to generate a separate operational plan that is dynamically responsive to changing supply chain conditions in the short term. While strategic or tactical plans help a business outline its long-term goals and fulfill its overarching vision, operational plans define a business's approach for executing day-to-day operations.

Traditional material requirements planning (MRP), which began in the late 20th century, has served its purpose for simplifying domestic supply chains. However, a growing global supply network and dynamic supply chain disruptions (due to external

factors such as the global COVID-19 pandemic) require planning that is more adaptable and can quickly react to these variables. Enter operational planning. In our own experience, many of our customers have a sufficient tactical planning process and solution suite, but the majority of these customers do not have the capability and maturity to conduct operational planning and are not ready for the situations occurring in the current environment. The disruption caused by the COVID-19 pandemic has been a big eye-opener for many of these companies. Additionally, technology is shifting from a digital environment to an intelligent and automated environment, which is moving toward the end goal of autonomous solutions. Supply chain plans that are generated on a monthly or weekly basis do not have a competitive edge in this market. Operational plans that are generated on a daily or hourly basis will be the new normal.

1.4 Operational Planning in SAP Integrated Business Planning for Supply Chain

SAP IBP offers several functions that help drive an efficient and short-term operational plan integrated into SAP ERP systems for execution. Figure 1.4 illustrates the simplified synchronized planning process flow with all the SAP IBP solution offerings integrated across the strategic, tactical, and operational planning horizons.

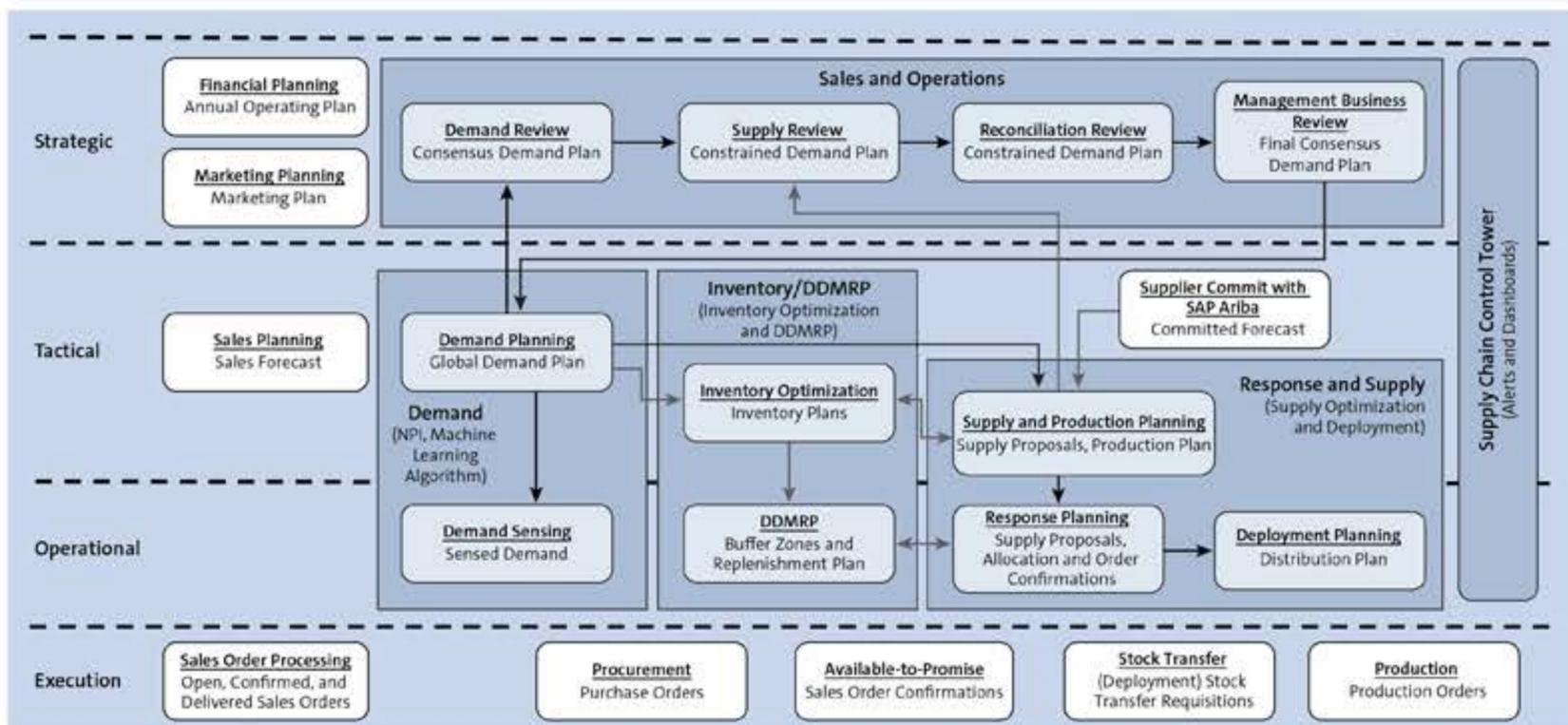


Figure 1.4 Integrated Planning Process across Strategic, Tactical, and Operational Horizons

The following list outlines the operational planning functions for demand, supply, and inventory planning:

- **SAP IBP for demand: Demand sensing**

SAP IBP for demand is a highly automated forecasting technique that leverages advanced algorithms, such as machine learning, near real-time data from sources like points of sale, and the latest supply chain snapshot data to create an accurate forecast of short-term demand.

Some of the benefits of SAP IBP for demand include the following:

- Leads to lower safety stock due to higher forecast accuracy (especially if run together with SAP IBP for inventory)
- Drives correct deployment and transportation decisions, which leads to reduced stock-outs and rush orders
- Leads to a lower cycle stock due to improved over or under forecasting behavior
- Improves the level of customer service and on-shelf availability
- Frees up the planner's capacity due to a fully automated process

- **SAP IBP for response and supply (the focus of this E-Bite)**

SAP IBP for response and supply is a fast and flexible supply planning solution catered to tactical planning, supporting the S&OP process and the material and capacity constrained operational supply and deployment plans for the S&OE process. Scenario modeling with an ability to sense and respond is one of the main features of this solution. It has two main capabilities:

- **Tactical planning: A time-series-based approach**

This function creates mid-to-long-term supply plans and simulations for S&OP based on demand (i.e., forecast) and supply (i.e., orders, inventory, or safety stock targets). The main objectives of this function are to generate rough cut capacity plans, determine multi-level sourcing for both distribution and the bill of materials, meet optimized inventory targets, gain visibility for projected stock or shortages at relevant levels of aggregation, and perform scenario modeling functions.

- **Operational and response: An order-series-based approach**

This function generates a finite capacity supply plan based on prioritized and categorized demand, such as orders and forecast, in the short-term horizon. The main objectives of this function are to generate fast, rules-based, priority-driven supply, allocation, order rescheduling, and deployment-planning functions.

Some of the benefits of SAP IBP for response and supply include the following:

- Generate feasible supply plans to meet demand with accurate inventory targets and efficient capacity utilization
 - Develop a material and capacity constrained plan with sourcing decisions that is ready to be executed
 - Gain upside revenue and competitive advantage by rapidly adjusting plans to seize demand opportunities and respond to supply disruptions
 - Determine a deployment plan to meet downstream requirements via a priority-based approach
- **Supply and allocations planning**
This function creates allocations and a supply plan based on prioritized forecast demands and supply chain constraints.
 - **Response planning**
This function creates order confirmations and an adopted supply plan based on prioritized demands, allocations, and supply chain constraints.
 - **Deployment planning**
This function creates a deployment plan and adjusts other supply proposals and order confirmations based on prioritized demands, allocations, supply chain constraints, and deployment settings.
 - **SAP IBP for demand-driven replenishment**
Demand-driven material requirements planning (DDMRP) is a multi-echelon planning and execution method to protect and promote the flow of relevant information through the establishment and management of strategically placed decoupling point stock buffers.

SAP's solution for DDMRP, called SAP IBP for demand-driven replenishment, includes the following five components:

- **Strategic decoupling**
This component involves strategically placed buffers throughout the supply chain to stop the transfer of variability in both directions, demand and supply.
- **Buffer profiles and levels**
This component involves color-coded three-zone levels at the decoupling points and how these levels are calculated.
- **Dynamic buffer adjustments**
This component involves the dynamic nature of the buffers, which can go up or down based on demand signals.

- **Demand-driven planning**

Sales orders within a short horizon are used as demand elements and, with buffer status drive supply order creation, form the net flow equation:

Buffer Daily Net Flow Position = Quantity On Hand + Open Supply – Qualified Sales Order Demand

If the day's net flow position is below the top of the yellow buffer level, then a supply order is issued to bring it back up to the top of the green level.

- **Visible and collaborative execution**

Pull execution is managed by open supply orders using easy-to-interpret signals to highlight priorities against the on-hand buffer position.

SAP IBP for demand-driven replenishment is a certified demand-driven S&OP solution to handle operational inventory and replenishment planning functions. It is closely integrated with other planning applications within SAP IBP and is bi-directionally integrated with SAP S/4HANA's digital core.

The benefits of SAP IBP for demand-driven replenishment include the following:

- Sufficient inventory with a supply and production network visualization tool to facilitate setting up decoupling points and buffer level calculations
- Easy and intuitive capabilities for simulation and versioning as well as impact analyses of decoupling alternatives
- Improved customer service and lead-time compression with the ability to generate order recommendations, including visualization of order spikes, inventory projections, and alert functionality with dashboards and custom alerts

We cover operational planning integrations with other SAP planning applications in Section 4.

Operational planning and S&OE offer many important components that are crucial for driving value in every organization. This topic is vast, so this E-Bite focuses on one critical area: order-based operational planning using SAP IBP for response and supply.

2 Supply Planning and Product Allocation Planning

The ability to plan for demand in the short-term horizon, given the various supply chain constraints, is essential for an organization's success. Planning is even more critical when we need to manage products with long lead times in a globally distributed and complex supply chain network with material and capacity constraints.

The planning tool should provide the capability to quickly view and analyze the gating factors, helping planners take necessary action. In addition, planners must be able to allocate constrained supply to priority customers and manually adjust the allocations as needed.

In this section, we cover the functionalities that SAP IBP for response and supply offers to generate a constrained supply plan based on demand prioritization, considering various supply chain constraints such as product lead times, capacity, and materials. We also cover the planning heuristics approach to determine a feasible supply plan and the parameters that affect the planning results. Finally, we cover how to set up product allocation quantities for online confirmation of incoming sales orders.

2.1 Forecast Consumption

Forecast consumption is a key step in the overall supply chain planning process. You need to ensure that the planning algorithm considers the most detailed requirements while generating supply and that the incoming sales orders are not treated as an additional demand.

Since sales orders are more specific than forecasted requirements, sales orders must consume the forecast. The forecast consumption for order-based planning in SAP IBP depends on how you set up the forecast consumption profiles. For example, you can define a planning level as period-product-location or period-product-location-customer in the profile, in which the period can be days or weeks.

Figure 2.1 shows the forecast consumption profile with the planning level **PERPRODLOC** and the period type of day.

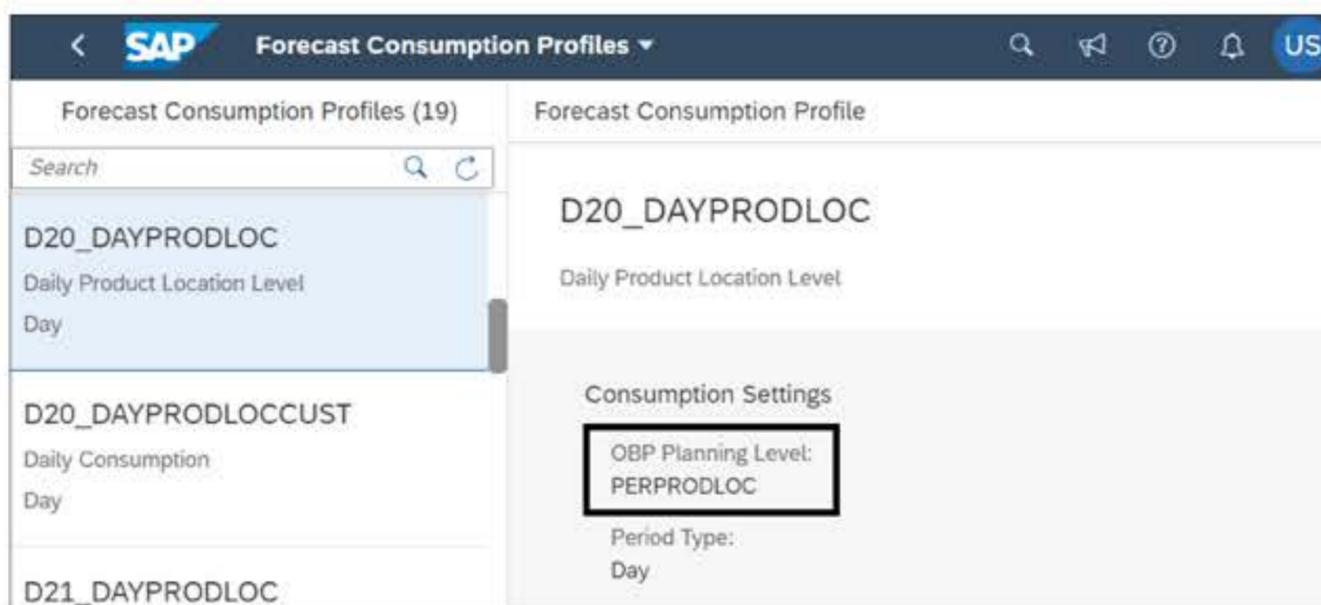


Figure 2.1 Forecast Consumption Profile

The example in Table 2.1 shows customer sales orders consuming the forecast at the location-material level. The forecast for the laptop is 100 units. The sales order for C1 and C2 customers are for 40 and 25 units, respectively. The system calculates the open forecast by deducting incoming sales orders from the future forecast.

Material	Location	Customer	Key Figure	Period
Laptop	L1		Forecast	100
Laptop	L1	C1	Sales Order	40
Laptop	L1	C2	Sales Order	25
Laptop	L1		Open Forecast	35

Table 2.1 Example of Forecast Consumption at the Location-Material level

The planning algorithm “order-based planning: constrained forecast run” reads the value of the forecast key figure based on the planning level selected in the forecast profile. Other planning algorithms, such as “order-based planning: confirmation run” and “order-based planning: deployment run,” plan the supply based on the open forecast.

$$\begin{aligned}
 \text{Open Forecast} &= \text{Forecast} - \text{Actual Sales Orders} \\
 &= 100 - 65 \\
 &= 35 \text{ Units}
 \end{aligned}$$

Note

The SAP7 planning area for order-based planning does not have the customer dimension. You need to enhance it to add the customer dimension and to adjust the planning level and operators accordingly.

To enable forecast consumption in SAP IBP for order-based planning, ensure that you set the following:

- **Planning level**
Create planning levels for forecast consumption. Make sure the planning area has all the attributes that are part of the planning level.
- **Forecast profile**
Define the forecast consumption profile.
- **Profile assignment**
Assign the forecast profile to the location-material master data.

- **Sales order field assignment**

Link the sales order field with the corresponding attribute of the planning area in the Settings for Order-Based Planning app.

2.2 Demand Prioritization

In the real world, you encounter multiple constraints in your supply chain that impact your ability to fulfill all orders. You need to align your production schedule to meet high-priority demands to help your organization achieve maximum profitability and customer service targets.

The demand prioritization feature within order-based planning in SAP IBP allows you to sequence your demands based on priority. The order-based planning algorithms then consider these demands based on your established sequence. You can update these prioritization settings at any time and execute planning to analyze the results. The tool also allows you to run simulations to visualize the sequence of your demands and to adjust the rules as needed.

In the following sections, we cover how to define the demand prioritization rules and how to analyze the demand priority sequence during planning runs.

Prioritization Rules

You can define the demand prioritization rules in the Planning Run Profile app. Within the rules, you can maintain multiple segments and their priorities. In each segment, you can define conditions for the demand selection for prioritization. Furthermore, you can select the sort attributes to order the selected demands in a specified direction.

Figure 2.2 shows how demands can be grouped under segments within a rule and then prioritized within the segments.

Segments

If you plan based on forecast and sales orders, you may want to prioritize sales orders over the forecast. To do so, you can select “demand type” for the sales orders segment above the forecast segment. Also, if there are rush orders or sales orders with a higher delivery priority, you can create a separate segment for these orders above the regular sales order segment. In Figure 2.3, you can see the **Demand Prioritization Rule** section in the Planning Run Profile app in SAP IBP.

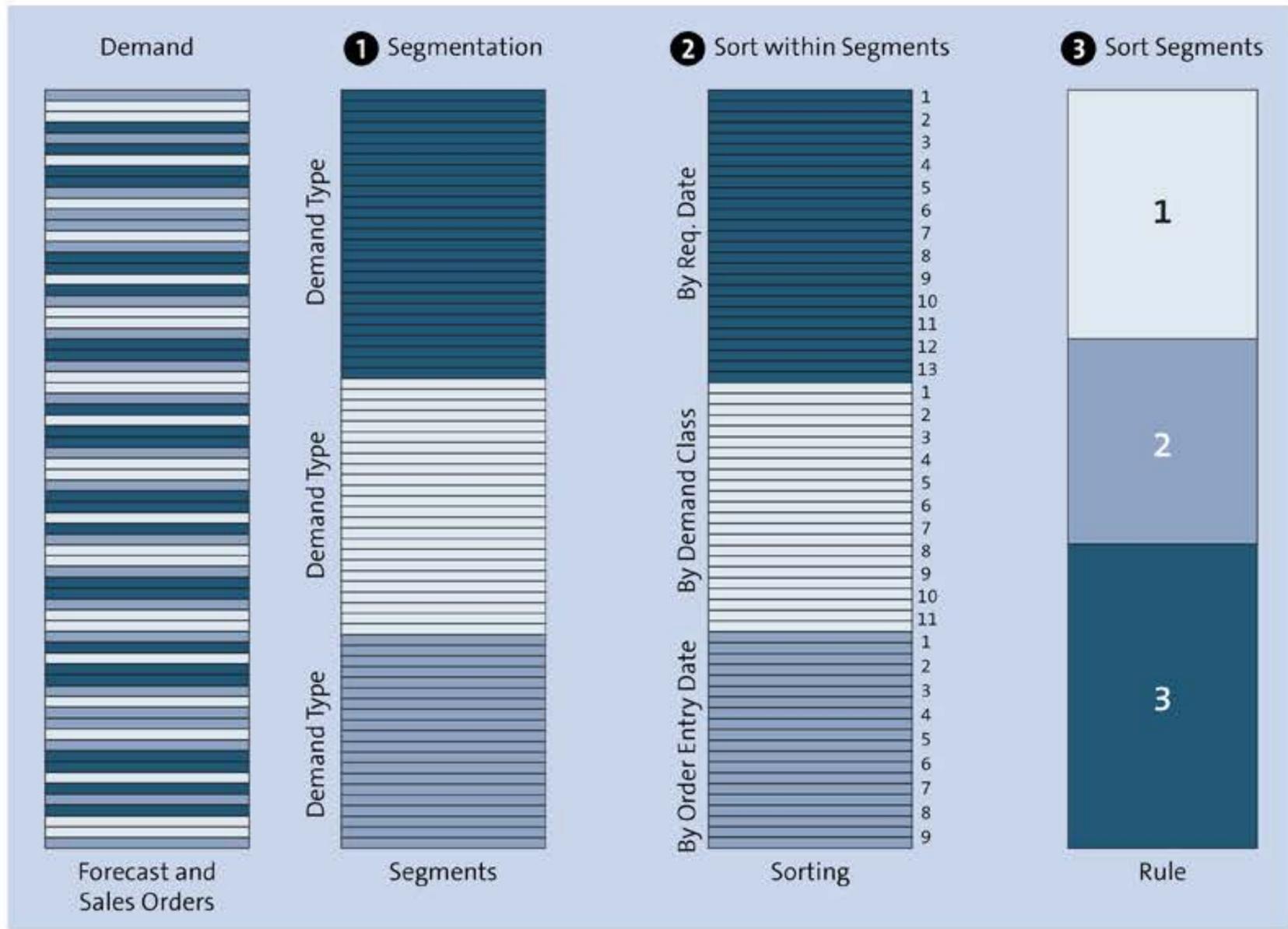


Figure 2.2 Demand Prioritization within Rules and Segments

Segment Priority	Segment Description	Condition Preview	Pegging Strategy
0	Pre-Allocation Segment		Prefer just-in-time supply
1	Sales Order Segment	<code>Demand.DemandType = 'S_...</code>	Prefer just-in-time supply >
2	Forecast Segment	<code>Demand.DemandType = 'FC...</code>	Prefer just-in-time supply >
9999	Catch-All Segment		Prefer just-in-time supply >

Figure 2.3 Demand Prioritization Rule in the Planning Run Profile App

Figure 2.4 shows a **Condition** to select all the sales orders with delivery priority as **01**. **1** shows a dropdown menu with multiple attributes available (e.g., demand type, distribution channel, material, and location). Choose the appropriate attribute based on your business scenario for demand prioritization. Then, select the corresponding attribute **2**.

Segment Description: Sales Order Segment
 Segment Priority: 1
 Pegging Strategy: Prefer just-in-time supply

Condition | Prioritization Settings

AND OR

DemandType Equal to Sales Order

Sub-Condition 1

DeliveryPriority Equal to 01

Figure 2.4 Example of a Condition within a Segment

You may use the Boolean operators (**AND** and **OR**) and add sub-conditions if you require any other advanced prioritization conditions.

Sort Attributes

Now, with the above conditions, the selected demands are grouped under the segment. However, as a next step, you should sequence these demands using sort attributes.

Depending on the condition selected, choose the relevant object and attribute to sort the demands. You can also add multiple sorting sequences based on your business requirements.

Figure 2.5 shows the **Prioritization Settings** within the segment to sort the demands in a specified sequence. Select the object (e.g., demand, material, or location) for prioritization **1**; based on the chosen object, select the attribute value to define the sort direction **2**.

Condition | Prioritization Settings

Prioritization Settings

Prioritization Type: * Demand Sequence Segment

Sort Attributes

Sequence Number	Object	Attribute	Sort Direction
1	Demand	RequestedDateTime	<input checked="" type="radio"/> Ascending <input type="radio"/> Descending

Figure 2.5 Prioritization Settings Using Sort Attributes

There may be business scenarios in which the standard sorting directions (ascending or descending) for demand sequencing do not meet your requirements. In such

cases, you can consider custom sequencing or a combination of custom and standard sorting criteria. Figure 2.6 illustrates an example of a business scenario requiring the demands to be sorted based on customer classification. If you have customers with classifications, such as A, B, and C, you can sort them in the desired **Custom Sequence** for demand prioritization. ❶ shows the sequence number in which you define the priority within a segment. As shown in ❷, you can select the custom sequence option based on the business requirement.

Condition **Prioritization Settings**

Prioritization Type: Demand Sequence Segment

Sort Attributes

Sequence Number	Object	Attribute	Sort Direction
1 ❶	ShipToCustomer	Classification	Custom Sequence ❷
2	Demand	RequestedDateTime	Ascending
3	Location	PlantType	Descending

Classification

ShipToCustomer

Sequencing of Attribute Values

Attribute Values (3) Add ↑ ↓ Remove

Sort Position	Attribute Value
<input checked="" type="radio"/> 1	B
<input type="radio"/> 2	A
<input type="radio"/> 3	C

Figure 2.6 Prioritization Settings with Custom Sequencing

Fair Share of Demand

In addition, there may be a business scenario in which you have multiple customers with equal priority. In this case, if the supply falls short of demand, you may want to set up the demand prioritization in a way that all your customers get their fair share.

You can achieve this outcome using the Fair Share Set Profiles app and grouping these demands into separate segments of the demand prioritization rule.

Note

The **Pre-Allocation Segment** and the **Catch-All Segment** are added by default in the demand prioritization profile.

- **Pre-Allocation Segment:** This is the highest priority segment for the demand types (e.g., deliveries, dependent demands of fixed supply elements, and dependent demands of supply elements within the frozen horizon).
- **Catch-All Segment:** This captures all the remaining demands that are not covered in the previous higher priority segments.

Pegging Strategy

The pegging strategy determines how demands are linked to supply. You can select the **Pegging Strategy** for each demand prioritization segment, as shown in Figure 2.7.

Segment Priority	Segment Description	Condition Preview	Pegging Strategy
0	Pre-Allocation Segment		Prefer just-in-time supply
1	Prioritized Sales Order Segment	Demand.DemandType = 'S_ORD' ...	Prefer just-in-time supply
2	Normal Sales Order	Demand.DemandType = 'S_ORD'	Prefer just-in-time supply
9999	Catch-All Segment		Prefer just-in-time supply

Figure 2.7 Pegging Strategy in Demand Prioritization

There are two strategies available for pegging demands to supply:

- **Prefer just-in-time supply**
- **Prefer stable supply**

The prefer just-in-time supply pegging strategy is the standard pegging approach for the planning algorithm. In this strategy, if the fixed-supply elements are available, they are pegged to the demand with the closest requested date. If no fixed receipts are available, the algorithm creates new planned supplies as late as possible to fulfill the demand on time.

The supply pegged to an existing higher priority demand can also be released and pegged to a lower priority demand if the algorithm can fulfill both the demands on time.

In the prefer stable supply strategy, the algorithm pegs the earliest fixed receipt elements to meet the demand on time based on its requested date. Similar to the prefer

just-in-time supply strategy, the planning engine generates new planned receipt elements as late as possible if there are no fixed supplies available to fulfill the demand on time.

In this approach, the fixed supply elements linked to a higher priority demand are not freed for the lower priority demand.

Note

- The optimizer algorithm supports only the prefer just-in-time supply pegging strategy.
- If you use the prefer just-in-time supply pegging strategy in one segment, all the following segments should use the same strategy.
- We recommend using the prefer stable supply strategy in the short-term horizon.

Demand Prioritization Attributes

Many attributes can be used in demand prioritization rules based on business requirements, including the flexibility to use custom attributes. Some of the key attributes are detailed in Table 2.2:

Demand Attributes	Location Attributes	Material Attributes	Ship-to-Customer Attributes
<ul style="list-style-type: none"> ■ Demand Type ■ Requested Date/Time ■ Delivery Priority ■ Document Type ■ Material Number ■ Location Number ■ Custom Attributes 	<ul style="list-style-type: none"> ■ Custom Attributes 1–10 	<ul style="list-style-type: none"> ■ Custom Attributes 1–10 	<ul style="list-style-type: none"> ■ Classification ■ Country ■ Region ■ Custom Attributes 1–10

Table 2.2 Attributes for Demand Prioritization

Prioritize Demand During Planning Runs

You can view and analyze the demand prioritization sequence using the View Demands by Priority app. You can use this app for two primary purposes:

- To analyze the demand sequence based on which planning algorithm generated the supply. For this, select the **Planning Run Profile** used by your supply planning run.

- To review the demand sequence for simulation. For this, you have maintained or adjusted your **Planning Run Profile**, and you want to see how the demands are sequenced based on the profile before using it in the supply planning run.

Figure 2.8 illustrates how to apply filters in the View Demands by Priority app and analyze the demand prioritization. Select your planning area and the version of your **Planning Run Profile** (baseline or simulation), user **Time Zone**, and **Planning Start Date** in the app. Additionally, you can filter by the material and location for which you want the system to simulate and display the demand priority.

Priority	Segment Description	Demand ID	Material Number	Location Number	Customer Number	Requested Date	Customer Classification
1-1	Prioritized Sales Order Segment	1006 / 10	IBP-FG-300	DC01	IBP-CUST-01	08/10/2021	A
1-2	Prioritized Sales Order Segment	1003 / 10	IBP-FG-200	DC01	IBP-CUST-01	08/10/2021	A
1-3	Prioritized Sales Order Segment	1000 / 10	IBP-FG-100	DC01	IBP-CUST-01	08/10/2021	A
1-4	Prioritized Sales Order Segment	1015 / 10	IBP-FG-300	DC02	IBP-CUST-01	08/12/2021	A
1-5	Prioritized Sales Order Segment	1012 / 10	IBP-FG-200	DC02	IBP-CUST-01	08/12/2021	A
1-6	Prioritized Sales Order Segment	1009 / 10	IBP-FG-100	DC02	IBP-CUST-01	08/12/2021	A

Figure 2.8 View Demands by Priority

The first column represents the **Priority** of the demand based on the prioritization run. The priority of 1-1 signifies the first demand of the first segment; similarly, 1-2 signifies the second demand of first segment. In this example, the first segment selects the orders based on **Customer Classification A**. Then, these orders are further sorted based on the customer's **Requested Date** in ascending order.

You will also notice that only the prioritized sales orders have been selected in the first segment since we have maintained demand type as sales order and delivery priority as 01 in the selection condition of the demand prioritization profile. To view the order segment details, click on the hyperlink **Prioritized Sales Order Segment**, as shown in Figure 2.9. The pop-up appears with the **Segment Priority**, **Pegging Strategy**, **Condition**, and **Sort Attributes** details. You can re-execute the demand simulation

here by changing your existing demand prioritization profile, selecting a new profile, or updating the filter criteria.

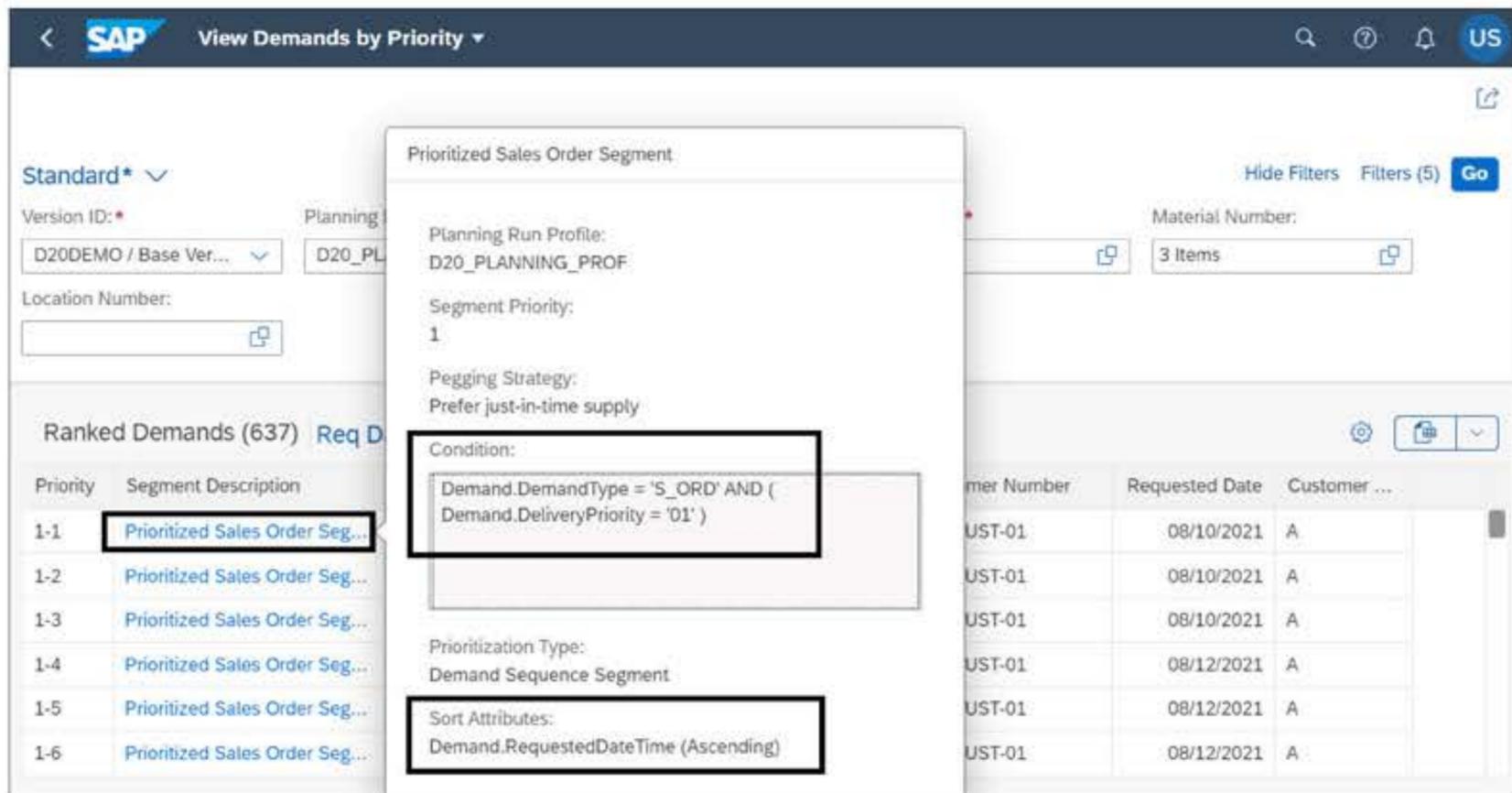


Figure 2.9 Prioritized Sales Order Segment

2.3 Supply Planning

After you set up the demand prioritization rules and forecast consumption profile based on forecast and incoming sales orders, the next step is to plan for the supply. SAP IBP operational supply planning provides order-based planning algorithms that plan across multiple levels and take into account the capacity, material, lead time, and cost-based constraints to generate feasible and constrained supply plans.

In the following sections, we use the terms operational supply planning and order-based planning synonymously.

Depending on the business requirements and constraints in your supply chain network, you may choose to leverage planning algorithms. In the next sections, we discuss the following key topics related to planning algorithms:

- Essential initial settings before performing order-based planning
- Key planning parameters that impact the planning run and its output
- A priority-based finite heuristic planning approach and its key features
- An optimizer-based planning approach and its key features

Settings for Order-Based Planning

To perform order-based planning in SAP IBP, the first step is to set up your planning area. SAP delivers sample planning areas for order-based planning. We recommend creating your own order-based planning area by copying from the sample planning area and modifying it based on your business requirements. You specify this planning area in all the profiles and applications used in the order-based planning processes.

You can set up your own planning area for order-based planning using the following sample planning areas:

- SAP7 (if you use only order-based planning)
- SAPIBP1 (if you use both time-series-based supply planning and order-based planning, based on operational master data)

Warning!

We recommend creating your planning area based on SAP7 for your order-based planning requirements. Leveraging SAPIBP1 for both time-series and order-series planning has certain limitations while using master data types, attributes, and key figures. For more details, please refer to SAP Best Practices for SAP Integrated Business Planning for Supply Chain.

Figure 2.10 shows the **SAP7** sample planning area. You can **Copy** this planning area to create your own planning area and enhance it based on your business needs by creating additional attributes and planning levels. The planning area supports day-level planning.

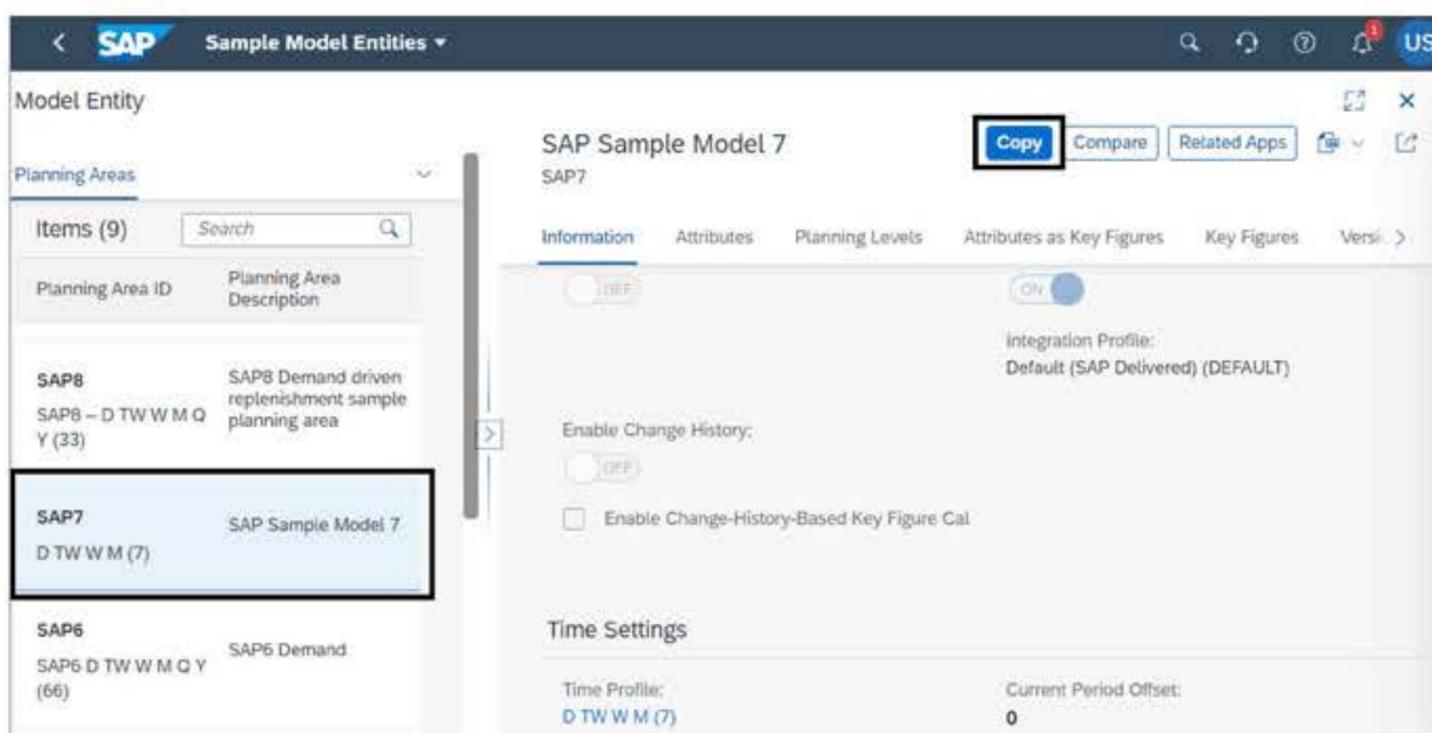


Figure 2.10 SAP7 Sample Planning Area for Order-Based Planning

Note

The lowest time granularity for planning in the SAP7 planning area is in days. Sub-daily time periods are not supported.

After creating your planning area, use the Settings for Order-Based Planning app to define all prerequisite settings before executing the order-based planning process. As a starting point, select the planning area in which you want to perform the order-based planning. Then, maintain the various attributes, planning levels, and key figures relevant for planning.

Figure 2.11 shows the **D20DEMO** planning area, which is based on the sample SAP7 planning area, and the master data **Attributes** that have been specified.

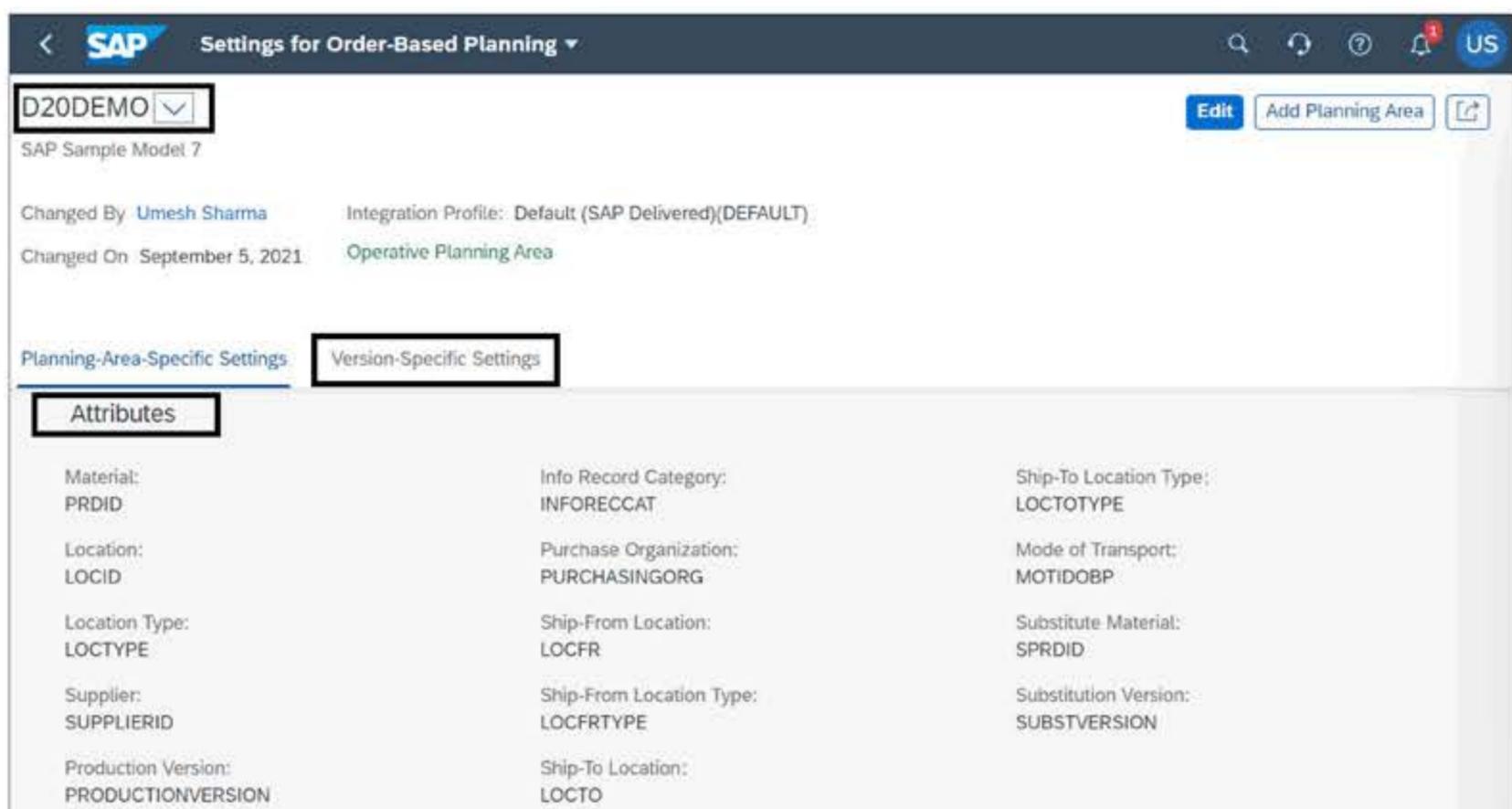


Figure 2.11 Settings for Order-Based Planning

Similarly, in the **Version-Specific Settings**, you can define various key figures and corresponding period types. These settings are version specific. Therefore, you can choose to maintain different assignments across your baseline and simulation versions.

Planning Run Profiles

In the Planning Run Profile app, shown in Figure 2.12, you define various settings and planning parameters that are used by the planning algorithms in order-based planning. Some of the key parameters include the following:

- **Switchable constraints**

Supplier, capacity, allocation, lot sizes, freeze horizons, and other constraints are available. You can choose to include or exclude these constraints in the planning run. You can also apply rule-based constraints (e.g., you can activate a supply constraint only for selected suppliers or set up rules for capacity constraints based on resources).

- **Cost rules**

You can define various cost parameters, such as inventory costs, transportation costs, and production and procurement costs based on the constraints in your network. These rules are used by the optimizer algorithm.

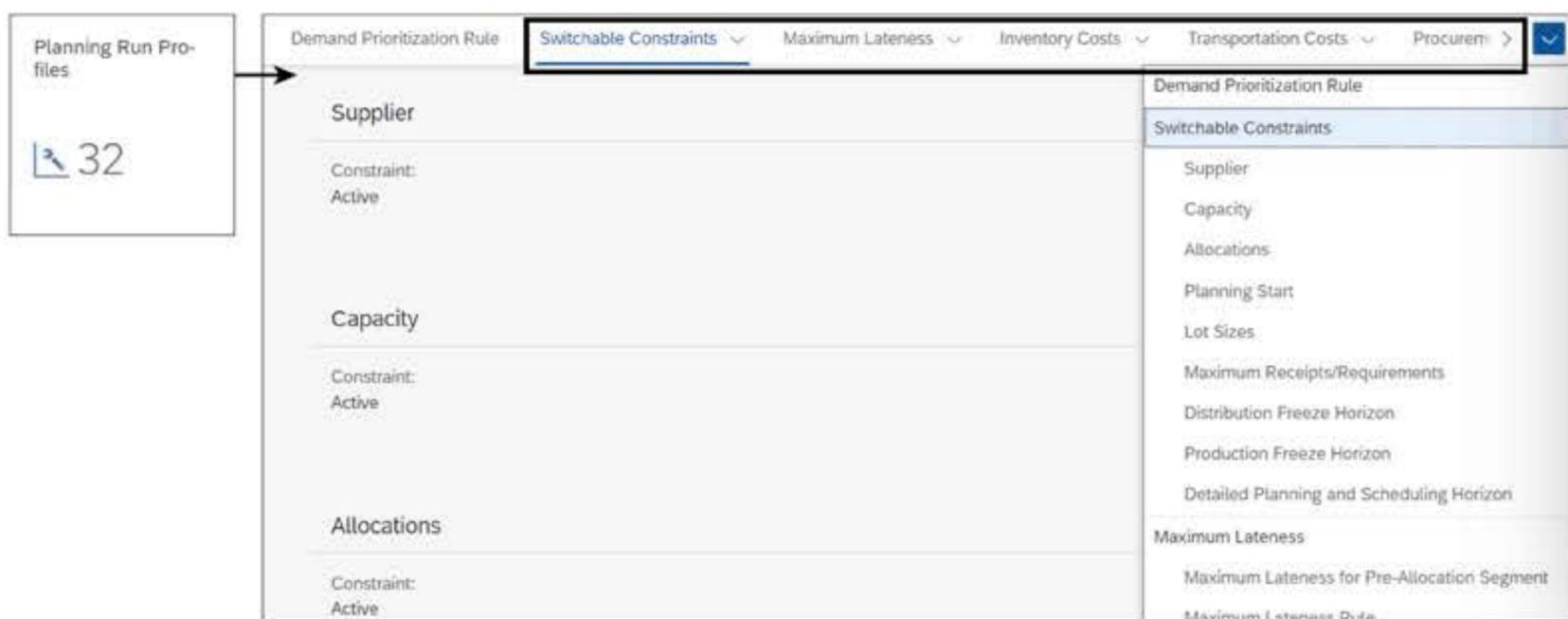


Figure 2.12 Planning Run Profile

Constrained Forecast Execution (Finite Heuristic)

The purpose of the constrained forecast execution in order-based planning in SAP IBP is to generate a feasible supply plan, taking into consideration capacity, supplier, lead time, and other constraints. Constrained planning can be performed leveraging the priority-based finite heuristic or the optimizer algorithm in SAP IBP. The selection of the planning algorithm is based on your business requirements.

Figure 2.13 shows the input master and transaction data and the related planning profiles and parameters needed for the algorithms. Supply proposals (planned orders, purchase requisitions, etc.) and product allocations are generated as the output of the planning run. Pegging relationships are created as part of the planning run and can be analyzed by selecting a demand or supply element. You can review planning results and associated constraints in the View Gating Factors, Analyze Supply Usage, and Projected Stock apps.

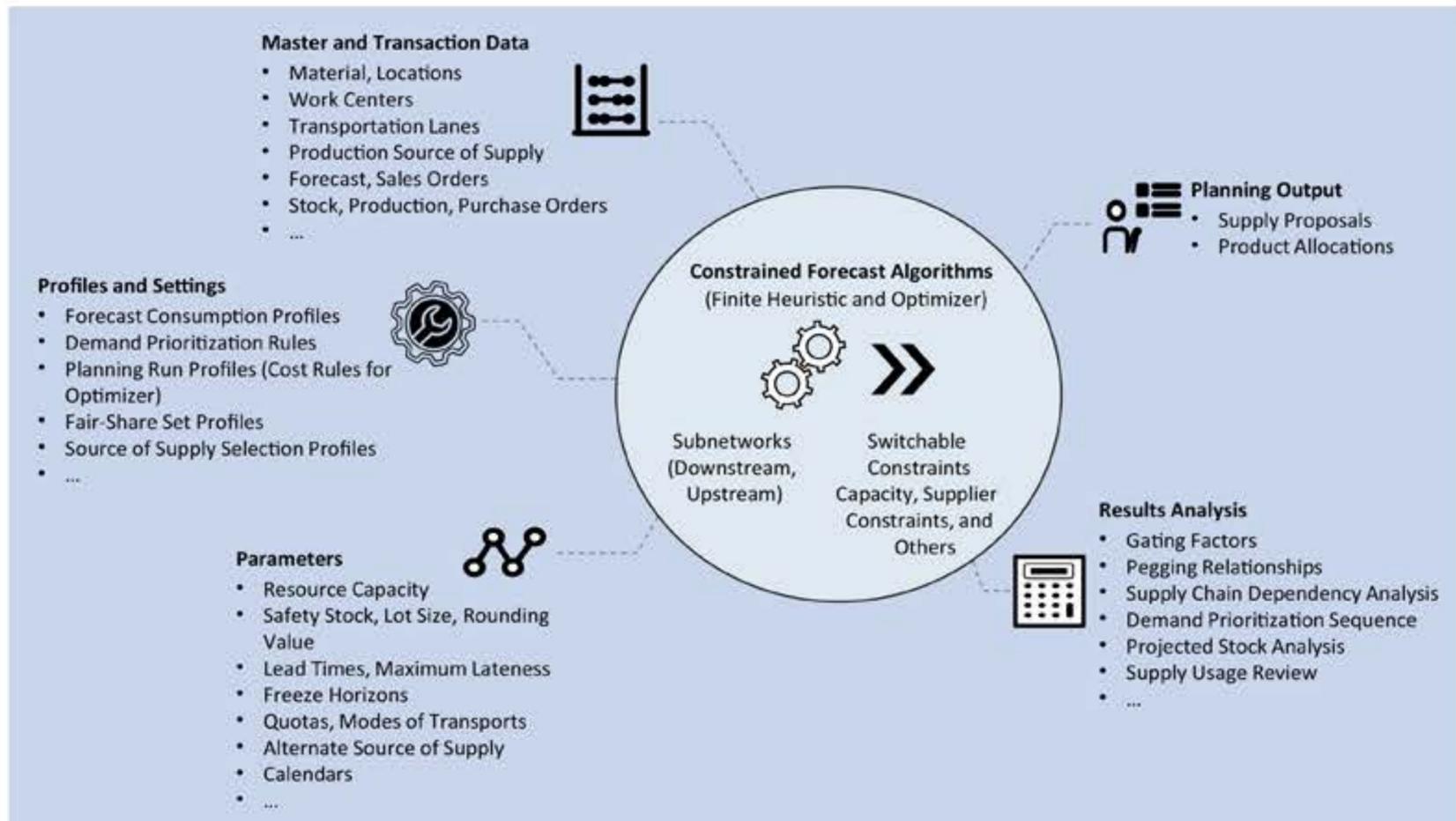


Figure 2.13 Constrained Forecast Algorithms: Finite Heuristic and Optimizer

Before executing constrained planning, ensure that you meet the following prerequisites:

- The planning area for order-based planning is set up.
- Settings for order-based planning are maintained.
- The planning run profile, including demand prioritization rules, is maintained.
- The forecast consumption profile is defined.

Note

You can define the planning scope by executing planning for the entire network or for a subnetwork. The subnetworks can be decided by logically grouping the location-materials of your supply chain network.

The finite heuristic goes through the following steps to determine the constrained supply plan:

1. It selects all demands from the planning scope and prioritizes them based on the demand prioritization rules.
2. It tries to meet the demand from the available stock at the demand location. If sufficient supply is not available, it looks at the source of supply (production data structures, transportation lanes) to satisfy the demand.

3. Based on the source of the supply, it generates production receipts, component-dependent demand, stock transfer requisitions, and purchase requisitions.
4. Similarly, for all dependent demands, the algorithm creates supply proposals based on the corresponding source of supply if the stock is not sufficient to satisfy the demand. If the supply still cannot meet the demand, the algorithm tries to fulfill the demand late.
5. Once the supply is planned for all the demands, the algorithm builds the safety stock levels.

During this planning approach, the finite heuristic algorithm reads the various parameters and constraints, such as available resource capacities, lead times, lot sizes, modes of transport, safety stock, supplier constraints, freeze horizons, and planning calendars, to determine the supply proposals.

Constrained Forecast Execution (Optimizer)

The optimizer algorithm for constrained planning works on the mathematical model of mixed-integer linear programming (MILP). The planning run takes into account the capacity and material constraints along with the cost rules maintained in the Planning Run Profile app or as maintained in the key figures as time-series values.

In some cases, to find a feasible and most cost-effective solution, the algorithm may also suggest partial fulfillment of demands and non-deliveries. It may also violate the safety stock targets or other soft constraints such as quota arrangements if it finds that doing so would be the least expensive option. The supply proposals generated by the optimizer algorithm are pegged to the corresponding demands.

The major cost input for the optimizer algorithm include the production, inventory, transportation, procurement, and non-delivery costs. You can maintain these costs as both fixed and variable costs, which are dependent on the material quantity.

The following are the prerequisites for the optimizer algorithm:

- The planning area for order-based planning is set up.
- Settings for order-based planning are maintained.
- The planning run profile, including demand prioritization rules, is maintained.
- Cost rules and parameters are maintained in the planning profiles or in the time-series key figures.
- The forecast consumption profile is defined.

Figure 2.14 shows the cost rules and parameters that you maintain in the Planning Run Profile app. The various cost input is categorized as hard, soft, and pseudo-hard constraints by the optimizer engine.

D20_OPTIMIZER_PROF Edit Edit Header Copy ...

Description: D20_Optimizer_Prof Changed By: Umesh Sharma
 Created By: Umesh Sharma Changed On: 10/02/2021
 Created On: 10/02/2021

< Inventory Costs ▾ Transportation Costs ▾ Procurement Costs ▾ Production Costs ▾ Substitution Costs > ▾

Production Cost Rate Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
1	Fcst	Location.PlantType = 'P'	10.000000 >
9999	Catch-All Segment		10.000000

Fixed Production Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
No data			

Figure 2.14 Cost Rule Maintenance for Optimizer

Note

You can define the maximum runtime for the optimization run based on the complexity of your supply chain network. The optimization process stops with a feasible solution when this maximum time is reached. However, this may not be the most cost-effective solution.

2.4 Product Allocation

In situations of limited supply, it is critical to have the ability to efficiently allocate the inventory among your customers. In order-based planning, you determine the constrained supply after performing the planning run based on either the finite heuristic approach or the optimizer approach. You can then copy this constrained supply to the product allocation key figure and manually adjust the allocations, if needed.

During the order confirmation run, the incoming sales orders are confirmed based on these allocations, and the remaining allocation quantities are determined.

To set up product allocations and confirm sales orders based on them, you should take the following steps:

- Set up the product allocation profile.
 - Define the planning level at which you want the incoming orders to consume allocations.
 - Specify the period type (e.g., day, week, etc.).
- Assign the product allocation profile to each location-material.

Note
The planning level in the product allocation profile should at have at least material and location attributes selected.

In Figure 2.15, ❶ shows the product allocation profile, in which the planning level and period type have been selected.

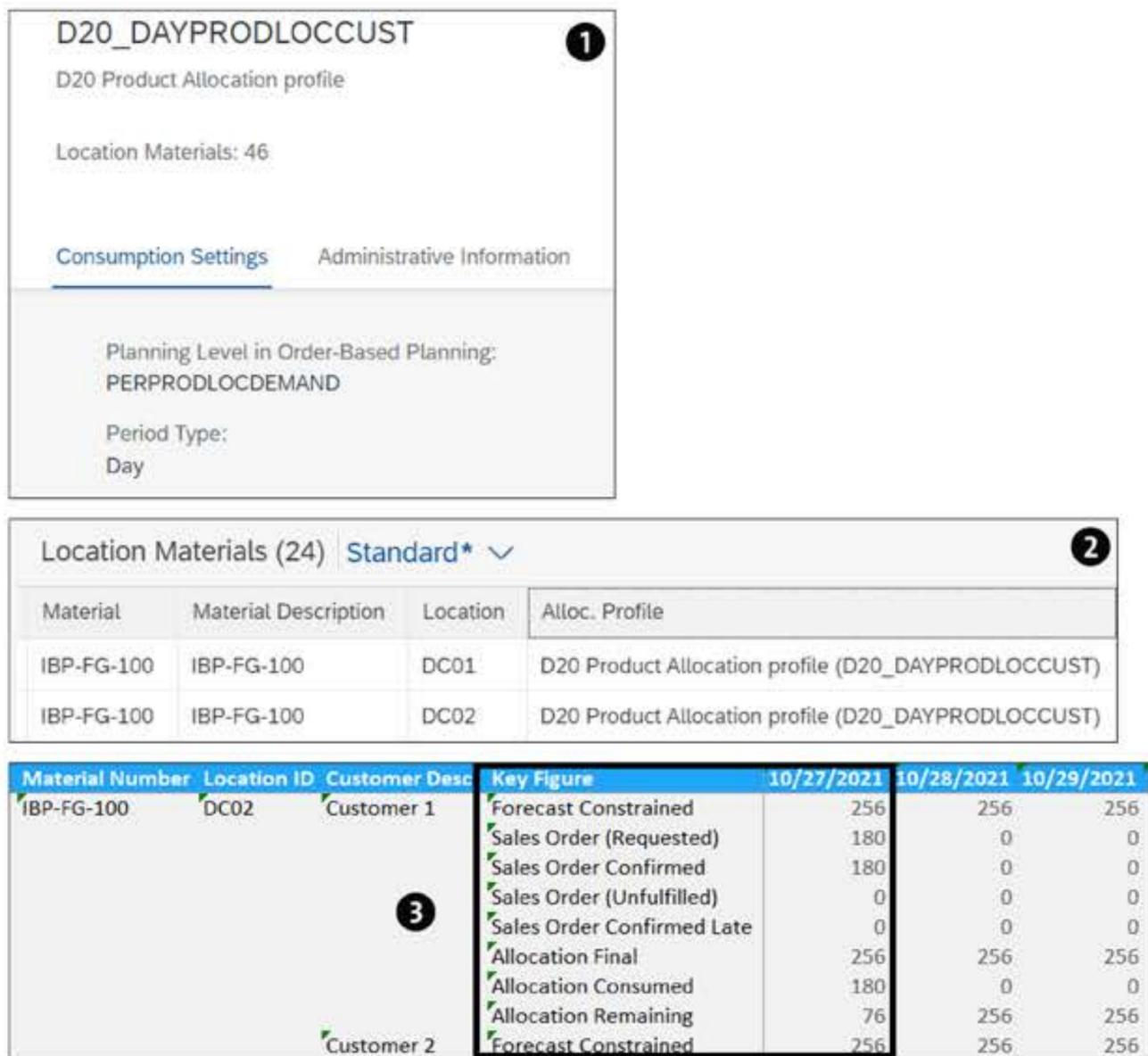


Figure 2.15 Product Allocation in Order-Based Planning

② displays the location-material master data in which the product allocation profile is assigned to each location-material combination. ③ shows an order confirmation in the SAP Integrated Business Planning, add-in for Microsoft Excel planning view; here, in the highlighted box, the **Forecast Constrained** quantity of **256** is the output of the constrained planning run, which is copied to the **Allocation Final** key figure after incorporating manual adjustments, if any. The **Sales Order (Requested)** of quantity **180** is confirmed from the total allocation of **256**; hence, the **Allocation Remaining** key figure is determined as **76**.

3 Response Planning

Demand volatility, especially in the short-term horizon, is very common in today's business environment. Reacting quickly and efficiently to these demand fluctuations is essential to meet your customer service levels. Additionally, there could be disruptions on the supply side, which further adds to the complexity of the process. Therefore, an organization's ability to quickly simulate these impacts, considering material, capacity, and other constraints across the supply chain, is of utmost importance to fulfill customer orders and meet service level targets.

In this section, we cover the following topics:

- The order confirmation process, including the planning algorithm and the integration with the available-to-promise (ATP) process
- Constraints and planning parameters
- The order confirmation view, pegging relationships, and gating factors
- Sales order simulations

3.1 Order Confirmation

You learned in Section 2 that supply proposals are generated based on the constrained planning execution, taking into account constraints across your supply chain network. This feasible supply plan is then used as input for product allocations for confirming incoming sales orders.

Product allocations from order-based planning can be integrated with the ATP process in SAP ERP and SAP S/4HANA to participate in the order confirmation process in the execution system. Also, sales order confirmations from response planning can be

directly sent to SAP ERP and SAP S/4HANA. Figure 3.1 shows the overall planning processes in SAP IBP across strategic, tactical, and operational horizons and how these processes integrate with the execution processes. Order confirmation is part of the **Response Planning** process in the figure.

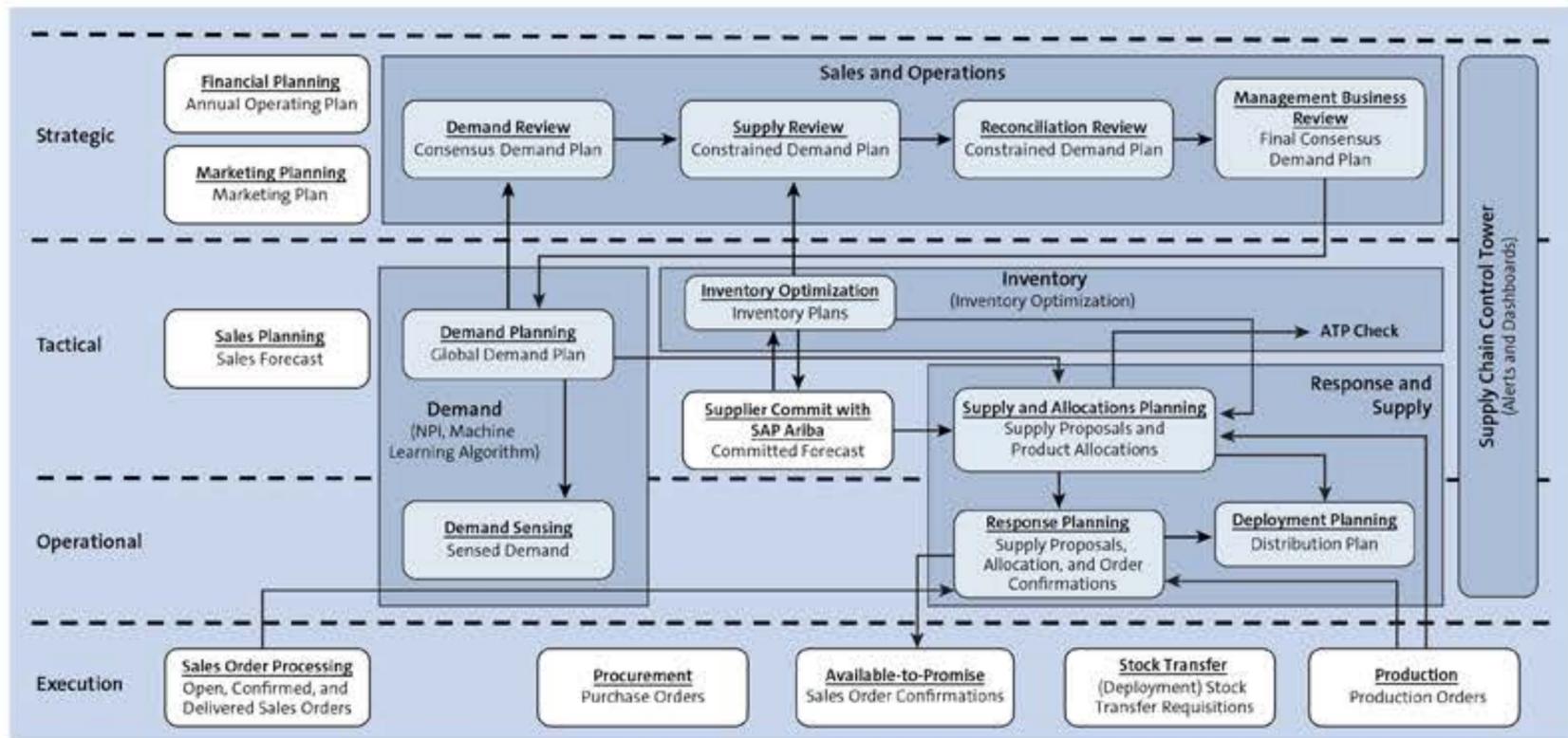


Figure 3.1 Response Planning in the Overall Planning and Execution Process

Like the constrained plan execution, you need to ensure the following to execute order confirmations in SAP IBP:

- Your order-based planning area is set up and the settings for order-based planning are maintained.
- The planning run profile, including demand prioritization rules, is maintained.
- The forecast consumption profile is defined.
- The product allocation profile is maintained, if you want to leverage product allocation functionality.

Planning Scope

Depending on your overall supply chain network, you may choose to execute the order confirmation for your entire network or break it down into smaller subnetworks. You can choose various attributes of your location-material master data to define your planning scope.

Note

If you choose one or more subnetworks, the planning run creates, changes, or deletes supply proposals only for those location-material combinations.

When planning with subnetworks, it is important to understand the concept of planning directions. Both upstream and downstream planning are supported in order-based planning.

In upstream planning, you plan from your distribution centers to your manufacturing plants and to your suppliers. The customer requirements at your customer-facing distribution centers are propagated across your network, and net requirements are calculated at each node. The distribution, production, and procurement plans are thus determined. In upstream planning, the supply from the upstream network is considered as infinite. If you have defined subnetworks within your network, the supply from the upstream network is considered as infinite. In downstream planning, you plan from supplier nodes to manufacturing, distribution plants, and then to your customers. In this case, the supply from the upstream network is considered finite.

Figure 3.2 shows the planning directions in the supply chain network. Here, subnetwork 2 in upstream planning takes the dependent demands as input generated from subnetwork 1. The supplies from subnetwork 3 are considered infinite in upstream planning.

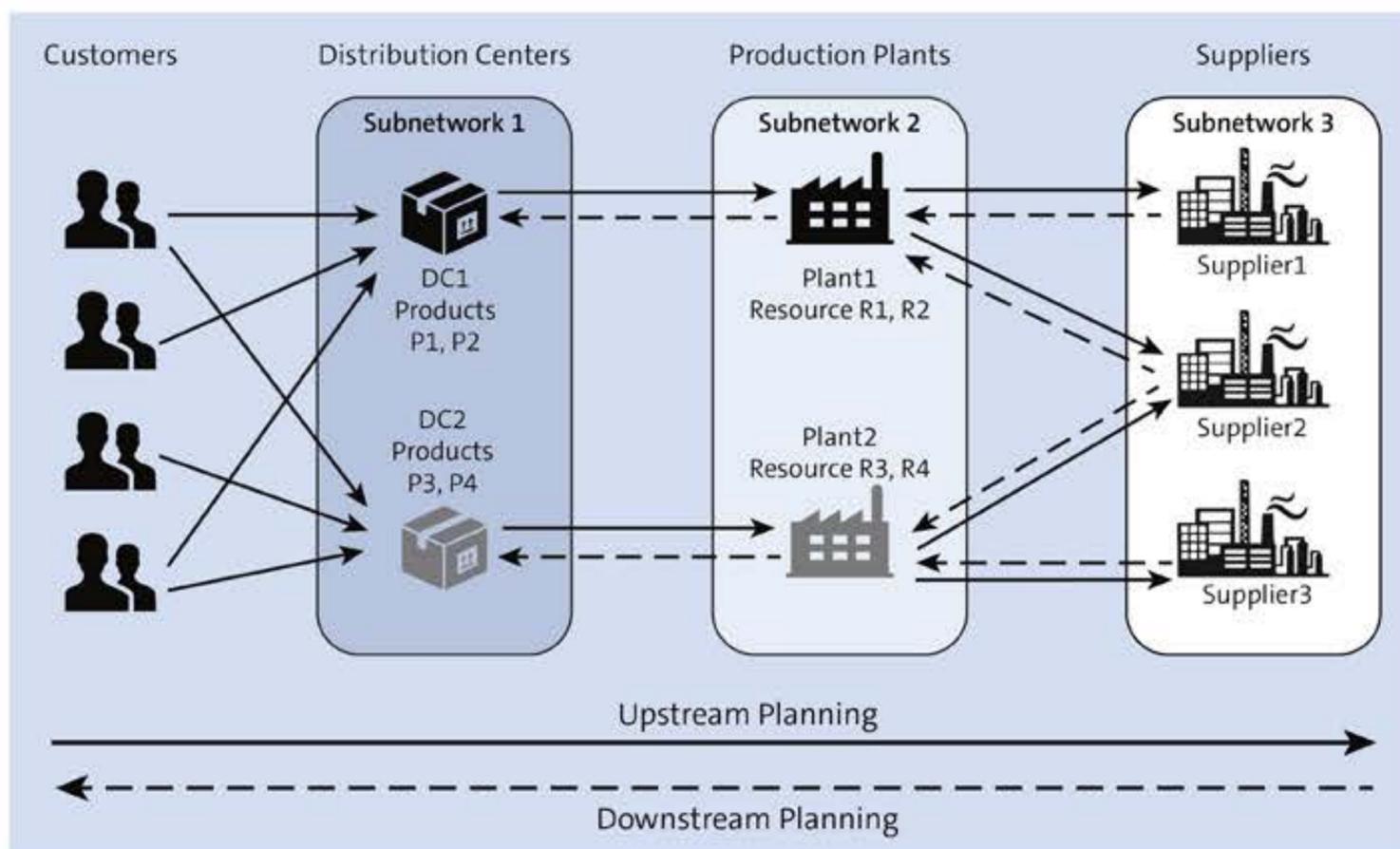


Figure 3.2 Upstream and Downstream Planning Using Subnetworks

On the other hand, in downstream planning, subnetwork 2 considers dependent demands from subnetwork 1; however, supplies from subnetwork 3 are considered finite.

For example, the planning run follows the downstream planning approach when constraining the finished goods plan based on the material constraints arising from the supplier commits against the supplier forecast.

Planning Approach

Execute the order confirmation run to determine which sales orders can be confirmed by which dates.

The order confirmation planning algorithm considers the following:

- Sales orders (open, unfulfilled, fulfilled, and orders fulfilled late)
- Fixed demand and receipts
- Forecast (based on the forecast consumption by incoming sales orders)
- Safety and target stock levels
- Product allocations

The planning run determines the order confirmation quantities by date and updates other key figure values, such as orders unfulfilled and orders fulfilled on time or late. Corresponding to the order confirmations, allocations are consumed, and the algorithm calculates the consumed and remaining allocations.

Note

You can also enable an option in the Planning Run Profile app for the algorithm to update the forecast quantities fulfilled on time or late.

Figure 3.3 shows an SAP IBP, add-in for Microsoft Excel planning view in which you can visualize the constrained forecast; requested, fulfilled, and unfulfilled sales order quantities; and the allocation consumption details.

The planning run also generates the pegging relationships between the demand and supply elements at various nodes of your supply chain network. The gating factors can be analyzed to view the limiting constraints identified by the planning run. You will learn more about pegging and gating factors in Section 3.2 and Section 3.3.

Material Number	Location ID	Customer Desc.	Key Figure	10/23/2021	10/24/2021	10/25/2021	10/26/2021	10/27/2021	10/28/2021	10/29/2021	10/30/2021		
IBP-FG-100	DC01	Customer 1	Forecast Constrained	257	260	217	237	207	277	260	253		
			Sales Order (Requested)	0	0	180	0	0	0	0	0		
			Sales Order Confirmed	0	0	180	0	0	0	0	0		
			Sales Order (Unfulfilled)	0	0	0	0	0	0	0	0		
			Sales Order Confirmed Late	0	0	0	0	0	0	0	0		
			Allocation Final	257	260	217	237	207	277	260	253		
			Allocation Consumed	0	0	180	0	0	0	0	0		
			Allocation Remaining	257	260	37	237	207	277	260	253		
			DC02	Customer 1	Forecast Constrained	257	233	221	256	256	256	256	237
					Sales Order (Requested)	0	0	0	0	180	0	0	0
Sales Order Confirmed	0	0			0	0	180	0	0	0			
Sales Order (Unfulfilled)	0	0			0	0	0	0	0	0			
Sales Order Confirmed Late	0	0			0	0	0	0	0	0			
Allocation Final	257	233			221	256	256	256	256	237			
Allocation Consumed	0	0			0	0	180	0	0	0			
Allocation Remaining	257	233			221	256	76	256	256	237			

Figure 3.3 SAP IBP, Add-In for Microsoft Excel Planning View for Sales Order Confirmation

3.2 Constraints and Planning Parameters

To confirm the orders, you need to have enough stock and receipts available. There could be numerous sales orders from multiple customers with varying delivery priorities and requirement dates. The algorithm searches across your supply chain network considering all these competing orders and tries to confirm the orders based on the rules set up in the planning profiles.

In addition to respecting the planning parameters, the algorithm goes through multiple constraints in your network and proposes solutions accordingly. In order-based planning, you have the flexibility to define switchable constraints. You can also activate and deactivate these constraints based on your business requirements or for simulation purposes. Other potential business use cases to work with switchable constraints could be to analyze the impact of the individual constraints on the algorithm output.

There could be scenarios in which a business wants to apply constraints in the short-term horizon while not planning with these constraints for mid-term planning. The switchable constraints function can support these requirements as well. Figure 3.4 shows the section in the Planning Run Profile app in which you can activate or deactivate constraints.

Note

You can also define rule-based switchable constraints. For example, you may want to use supplier constraints for a bottleneck supplier. However, for other suppliers, you may want to deactivate the constraints, as the required supplier forecast quantities are fully committed by some suppliers.

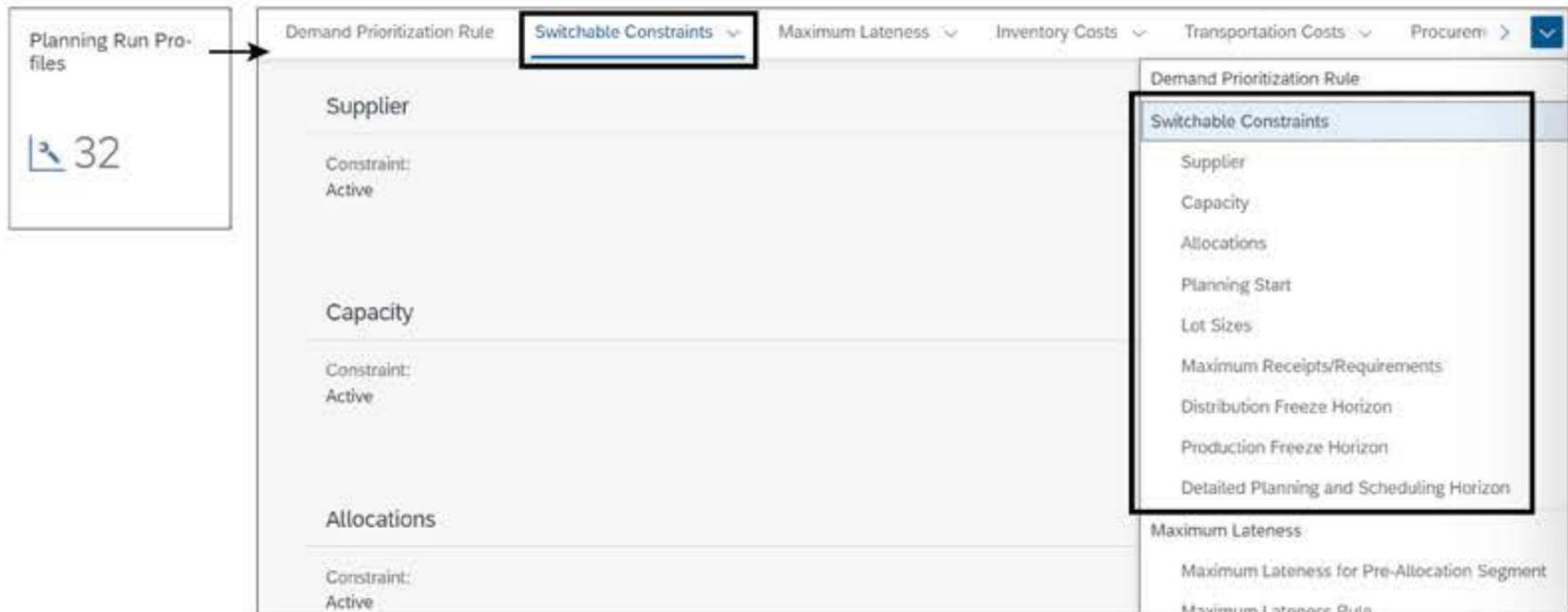


Figure 3.4 Switchable Constraints in the Planning Run Profile App

The switchable constraints function allows you to activate or deactivate the following constraints in the Planning Run Profile app:

- Supplier constraints
- Resource capacity constraints
- Product allocations
- Planning start
- Lot sizes (procurement, stock transfer, and production)
- Maximum receipts and requirements
- Freeze horizons (distribution, production, and detailed scheduling)

Table 3.1 describes these constraints in more detail:

Constraint/ Planning Parameter	Details
Supplier constraint	This constraint specifies how many units of raw materials can be committed by a supplier during a given period. The algorithm uses this as a material constraint and adjusts the finished goods plan accordingly.
Capacity constraint	This constraint is the available capacity for your production and transportation resources based on the amount of material that can be produced or transported. The planning run respects both production and transportation resource capacities.

Table 3.1 Key Constraints and Planning Parameters

Constraint/ Planning Parameter	Details
Allocation constraint	Based on the available constrained supply, the product allocations are maintained. The order confirmation run confirms the order based on these allocation quantities and calculates the consumed and remaining allocations.
Planning calendars	Production, transportation, shipping, and receiving calendars are considered by the planning run when scheduling orders.
Lot sizes	The planning run considers the lot sizes and rounding values in determining the order quantities to be produced or transported.
Planning start	This constraint defines the point in time that the planning run considers “now.” This parameter affects how the algorithm reads the key figure data, performs lead time calculations, and considers planning horizons. You can define the planning start in a different profile from the actual planning job execution time.
Maximum receipts and maximum requirements	You can define maximum limits for receipts and requirements. These are respected as constraints by the planning run.
Freeze horizons	The planning run considers the production and distribution freeze horizons. It does not create, change, or delete any orders within the freeze horizons.

Table 3.1 Key Constraints and Planning Parameters (Cont.)

The following are other important planning parameters and settings that help the planning engine make supply proposal decisions:

- **Pegging strategies**

This can be one of two strategies:

- **Prefer just-in-time supply:** In this strategy, if the fixed supply elements are available, they are pegged to the demand with the closest requested date. If no fixed receipts are available, the algorithm creates new planned supplies as late as possible to fulfill the demand on time.
- **Prefer stable supply:** In this strategy, the algorithm pegs the earliest fixed receipt elements to meet the demand on time based on the demand’s requested date. Like the prefer just-in-time supply strategy, the planning engine generates new planned receipt elements as late as possible if there are no fixed supplies available to fulfill the demand on time.

- **Production, transportation, and goods receipt (GR) processing times**
The planning run schedules the planned orders, stock transfers, and purchase requisitions based on the lead times and the maintained planning calendars.
- **Source of supply (priority, validity, duration, and lot sizes)**
These are maintained in production data structures and transportation lanes.

Confirmation Mode

Due to various constraints in your supply chain network, there may be instances in which the sales orders can be confirmed only partially or at a later date. This is governed by the specified confirmation mode. The planning algorithm based on the confirmation mode confirms the orders accordingly.

Table 3.2 details the supported sales order confirmation modes:

Confirmation Mode	Detail
Blank (no value)	Full or partial delivery on requested date
B	Full delivery on any date
C	Full delivery on requested date
X	Full or partial delivery on any date

Table 3.2 Confirmation Modes

Note

The specified confirmation mode works with the product allocation constraints. If the sales order quantity exceeds the product allocation quantity in a specific period, allocations across multiple periods are used by the planning algorithm to confirm the order.

The algorithm always plans for forecasts based on confirmation mode X (i.e., full or partial delivery on any date).

3.3 View Confirmations

Once the constrained planning and order confirmation planning processes have been executed, the next step is to review and refine the planning output. In this section, we cover the various ways to analyze the planning results after the constrained planning and order confirmation processes. We also cover the key features of other related SAP IBP applications to review planning output, pegging relationships, and gating factors.

The following solutions allow you to view planning results and confirmations:

- **SAP IBP, add-in for Microsoft Excel**

You can view the planning output in Microsoft Excel planning templates. The data can be analyzed in daily, weekly, or monthly time buckets. For example, if you want to understand the constrained planning output and order confirmation details, you can review the corresponding key figures—forecast constrained, sales orders requested, sales orders fulfilled or un-fulfilled, and the allocation details—in the SAP IBP, add-in for Microsoft Excel view.

- **Web-based planning views**

You can view the planning data in the web-based planning views. The main advantage of using these views is that you can view the individual order details by displaying the details of the aggregated order quantities and navigating to apps like Analyze Supply Usage and View Confirmations for further analysis.

In Figure 3.5, ❶ shows the order confirmation details in the web-based planning view. To review order details, right-click on the order quantity and then click on **Show Order Information**. ❷ displays the order details; here, you can see the individual order information. As shown in ❸, you can then select an order and click on the **Navigate To** option to view this order in other apps like View Confirmations.

The screenshot displays the SAP IBP Web-Based Planning interface. The top navigation bar includes the SAP logo, 'Web-Based Planning', and user information 'US'. The main area is titled 'Order Confirmation View' and includes options for 'Edit Planning View' and 'Change Planning Filter'. A refresh button labeled '1 minute ago' and a 'Simulate' button are also present. Below this is a table with columns for Material Number, Location ID, Customer Desc., Key Figures, and dates from 10/29/2021 to 11/03/2021. A right-click context menu is open over the '390' value in the 10/29/2021 column, with 'Show Order Information' selected. Below the main table, a detailed view titled 'Orders for Sales Order Confirmed (2) 10/29/2021' is shown, with a 'Navigate To' button highlighted. The detailed view table has columns for Order / Item, Confirmed Date, Confirmed Quantity, Material, Material Name, Location Number, Location Name, Ship-to Customer, and Ship-to Customer.

Material Number	Location ID	Customer Desc.	Key Figures	10/29/2021	10/30/2021	10/31/2021	11/01/2021	11/02/2021	11/03/2021
31	IBP-FG-300	DC02	Customer 1	Sales Order (Reque...	670	0	0	0	0
32	IBP-FG-300	DC02	Customer 1	Sales Order Confir...	390	0	0	0	0
33	IBP-FG-300	DC02	Customer 2	Sales Order (Reque...	150	0	0	0	0
34	IBP-FG-300	DC02	Customer 2	Sales Order Confir...	0	0	0	0	0
35	IBP-FG-300	DC02	Customer 3	Sales Order (Reque...	160	0	0	0	0
36	IBP-FG-300	DC02	Customer 3	Sales Order Confir...	0	0	0	0	0

Order / Item	Confirmed Da...	Confirmed O...	Material	Material Name	Location Num...	Location Name	Ship-to Custo...	Ship-to Custo...
1177 / 10	10/29/2021	80 EA	IBP-FG-300	IBP-FG-300	DC02		IBP-CUST-01	Customer 1
1195 / 10	10/29/2021	310 EA	IBP-FG-300	IBP-FG-300	DC02		IBP-CUST-01	Customer 1

Figure 3.5 SAP IBP Web-Based Planning View

Note

You can also view the order level details in the Planner Workspace app. Additionally, in this app, you can review or create custom alerts.

To analyze further detailed information about planning results, navigate to pegging relationships and see the root cause of a constrained situation; here, you can use the following apps:

■ View Confirmations

In this app, you can see the sales order confirmation status. Figure 3.6 shows the View Confirmations app displaying the sales order details with the visual representation of order confirmation status. You can sort the orders by confirmation status, change the column sequences for viewing, or hide any columns. Important details like confirmed percentage, confirmed quantity, and confirmation date can also be reviewed. By clicking on the **Period Settings**, you can visualize these details in other time periods: days, weeks, or months.

Requirement	Order	Item	Customer N...	Material Nu...	Requested Date	Requested ...	Confirmed Q...	Confirmed (%) ...	Confirmation Status	Location Num
Sales Order	1204	10	IBP-CUST-01	IBP-FG-300	10/27/2021	340 EA	340 EA	100%	☑	DC01
Sales Order	1205	10	IBP-CUST-02	IBP-FG-300	10/27/2021	240 EA	100 EA	58.3% 41.7%	⚠	DC01
Sales Order	1213	10	IBP-CUST-01	IBP-FG-300	10/29/2021	670 EA	390 EA	41.8% 58.2%	⚠	DC02
Sales Order	1168	10	IBP-CUST-01	IBP-FG-300	09/28/2021	590 EA	0 EA	100%	❌	DC01

Figure 3.6 View Confirmations Application

You can visualize the following order confirmation statuses:

- Confirmed
- Confirmed with delay
- Partially confirmed
- Partially confirmed with delay
- Unconfirmed

You can apply various filters to review the relevant orders (e.g., by material, location, customer, or order status). You can also use additional filter criteria based on

the material, location, customer, and sales order attributes. Click on **Adapt Filter** in the upper section of the app to leverage these additional filters.

Using the **Version/Scenario** field, you can choose to view the confirmation status either in the baseline or simulation versions. Also, you can select any future horizon or future interval using the **Date Horizon** field in which you would like to analyze the orders.

From the order list, you can click on individual orders that are not confirmed and need to be reviewed further. After clicking on the order number, you can see the list of competing sales orders, as shown in Figure 3.7. The **Priority** column represents the sequence of the orders in a segment. The **2-12** value means that the order is ranked 12th in the second priority segment. By clicking on the field marked by **1**, you can see the competing sales order list by **Same Location Material**, by **Same Segment**, or by **All Sales Orders**. In the lower section of this screen, you can review the confirmed quantity and date of the sales order.

If the order is not confirmed, you may like to review the pegging relationships to understand how the demands and supplies are linked to this order across the network. To view pegging, click on **2**, **Order Network**.

Analyzed Demand	Priority	Segment Description	Order Number	Item N...	Customer Number	Customer Name	Requested Date	Requested Quantity
	2-7	Prioritized Sales Or...	1187	10	IBP-CUST-02	Customer 2	10/13/2021	320 EA
Yes	2-12	Prioritized Sales Or...	1205	10	IBP-CUST-02	Customer 2	10/27/2021	240 EA
	3-1	Prioritized Sales Or...	1170	10	IBP-CUST-03	Customer 3	09/28/2021	430 EA
	3-7	Prioritized Sales Or...	1188	10	IBP-CUST-03	Customer 3	10/13/2021	290 EA

Confirmed or Requested Date	Requested Quantity	Confirmed Quantity
10/27/2021	240	100

Figure 3.7 Visualize Competing Sales Orders

The order network within the View Confirmations app, shown in Figure 3.8, displays the end-to-end demand-to-supply pegging relationships.

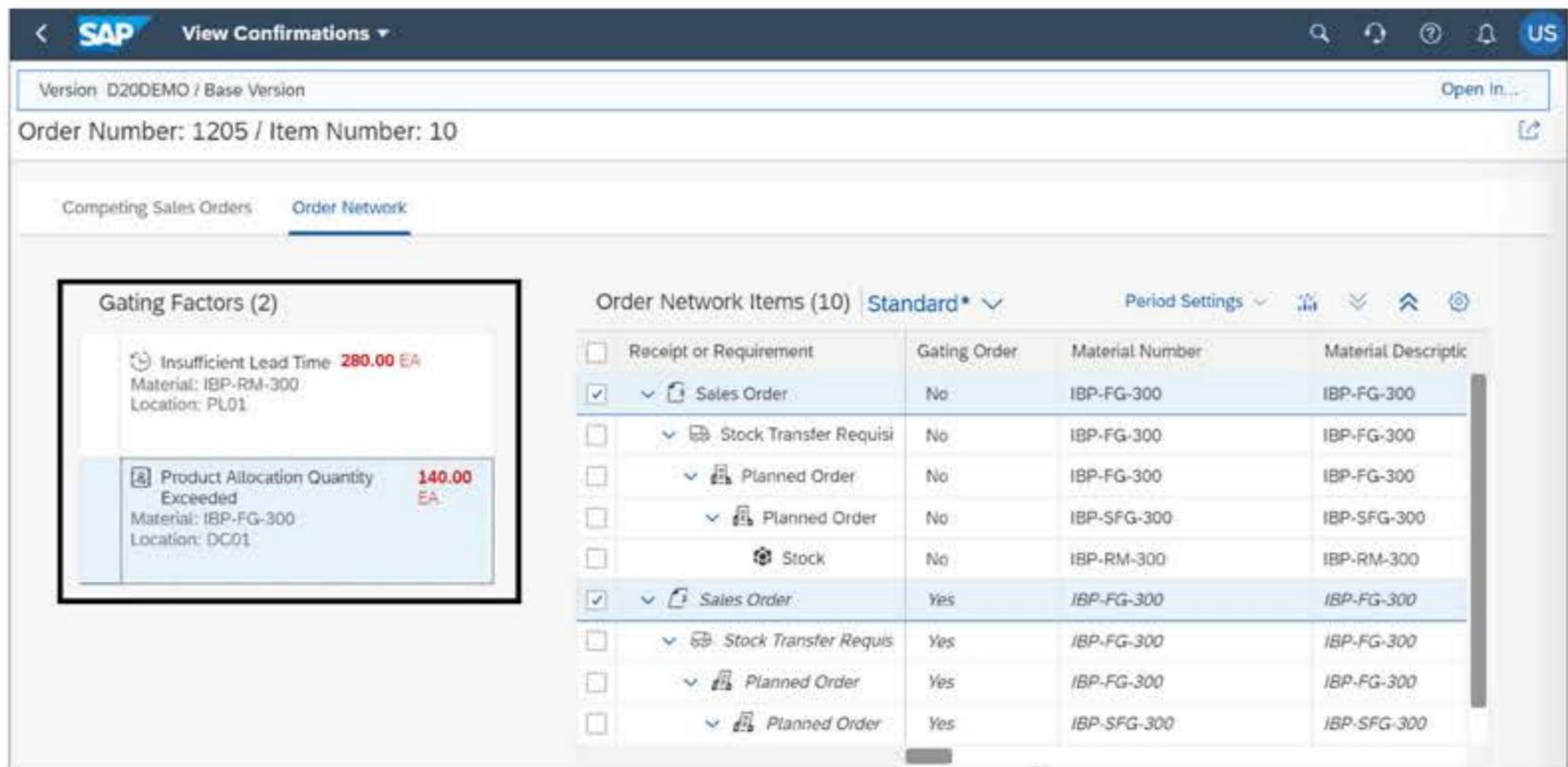


Figure 3.8 Order Network Display

Here, the app also shows you the **Gating Factors**. Gating factors are the constraints that prevent the planning run from fulfilling a demand.

In the example order, you can see two constraints: **Insufficient Lead Time** and **Product Allocation Quantity**. When you click a particular gating factor, the app highlights the corresponding order, and you can review this order and perform adjustments and simulations as needed to fix the problem. We cover simulation capabilities in more detail in Section 3.4.

You can also review the constraints in a graphic, as shown in Figure 3.9. ❶ and ❷ show the constrained supply chain network nodes. The constraint details in terms of quantity and date are available after clicking on these nodes.

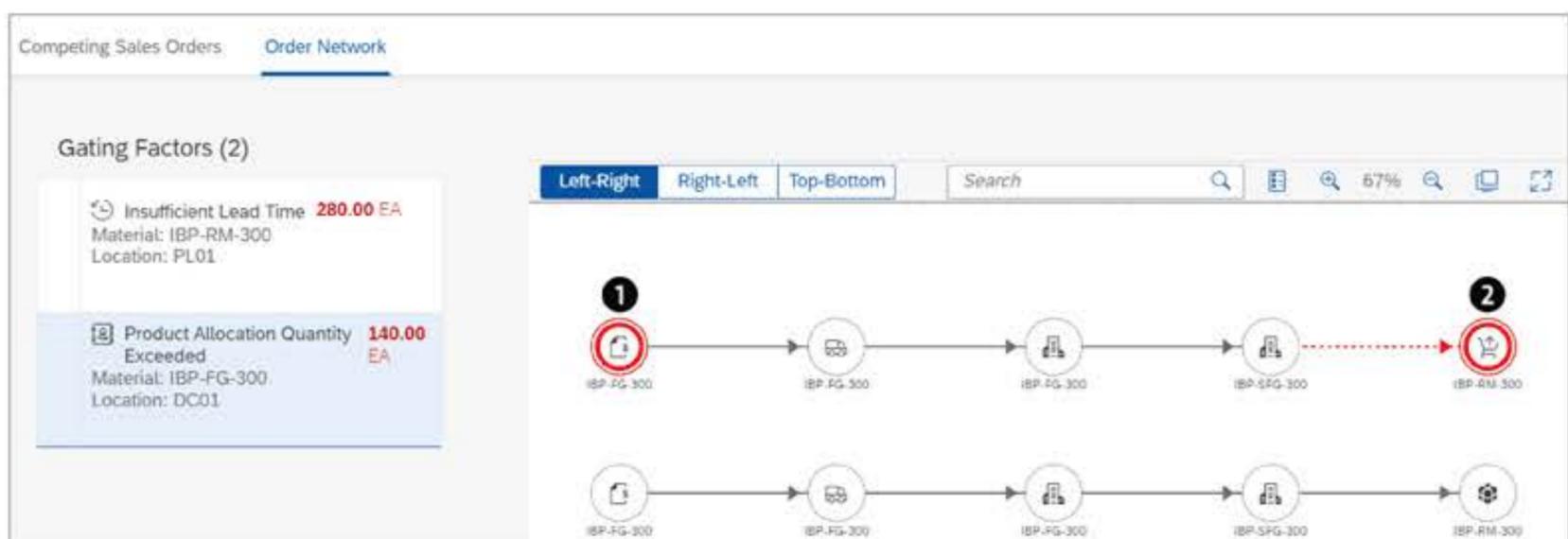


Figure 3.9 Order Network Display Graphic View

■ View Gating Factors

As explained in the previous section, gating factors are the constraints that do not allow the demands to be fulfilled on time. One way to visualize these is to navigate to the **Order Network** from the View Confirmations app against the individual sales order. The other way to review all the gating factors in your system is to analyze them in the View Gating Factors app, as shown in Figure 3.10. You can restrict the results based on material, location, customer, and order attributes, just like you can in the other apps. Additionally, you can view the constraints for a particular **Gating Factor Type**. From the list of gating factors, you can select an order line and navigate to order network by clicking on **Analyze Demands**.

Figure 3.10 View Gating Factors

Table 3.3 details the gating factor types that are supported in order-based planning:

Gating Factor Type	Details
Adjusted quantity	The planning run adjusts values to production, distribution, or procurement receipts, which work as limits to the corresponding planned quantities.
Freeze horizon	Freeze horizon is considered a gating factor, as the planning run does not create, change, or delete any orders within this period.

Table 3.3 Gating Factor Types

Gating Factor Type	Details
Lead time	The planning run identifies the lead time constraint when the order cannot be fulfilled on time, as the start date of the corresponding receipts are determined to be in the past during order scheduling.
Product allocation	The product allocation quantity is less than the order quantity to be confirmed.
Projected stock	The planning run shows this as a gating factor when the fixed supply receipts are not able to fulfill the demands on time.
Resources	Capacity utilization of production and transportation resources exceeds the available capacity.
Supplier constraint	Supplier commits are less than the supplier forecast.
Supply chain model	The master data objects to fulfill the order are missing.

Table 3.3 Gating Factor Types (Cont.)

■ Analyze Supply Usage

You can leverage the Analyze Supply Usage app to have a view of the supplies linked to the demands and to review the associated resource usage, as shown in Figure 3.11.

The screenshot displays the SAP Analyze Supply Usage app interface. It features a top navigation bar with the SAP logo and the app title. Below the navigation bar, there are filters for 'Standard*' and 'Filtered By (3): Version/Scenario, Date Horizon - Receipt, Supply Usage'. The main content area is divided into two sections: 'Supply Usage' and 'Resource Usage'. The 'Supply Usage' section shows a table with 69 items, and the 'Resource Usage' section shows a table with 30 items. Both tables have columns for Material Number, Material Description, Location Number, Supply Type, Order Number, Requested Start Date, and Quantity.

Material Num...	Material Descriptio...	Location Num...	Supply Type	Order Number - Rec...	Requested Start Dat...	Pegged Quantity...	Demand Type Descri...	Confirmed or Planne...
IBP-FG-300	IBP-FG-300	DC01	Stock Transfer Requi...	T41026677	10/22/2021	60 EA	Forecast	10/22/2021
IBP-FG-300	IBP-FG-300	DC01	Stock Transfer Requi...	T41026686	10/25/2021	340 EA	Sales Order	10/25/2021
IBP-FG-300	IBP-FG-300	DC01	Stock Transfer Requi...	T41026686	10/25/2021	100 EA	Sales Order	10/25/2021
IBP-FG-300	IBP-FG-300	DC02	Stock Transfer Requi...	T41026680	10/22/2021	110 EA	Forecast	10/22/2021
IBP-FG-300	IBP-FG-300	DC02	Stock Transfer Requi...	T41026683	10/28/2021	390 EA	Sales Order	10/28/2021
IBP-FG-300	IBP-FG-300	PL01	Planned Order	T41026676	10/19/2021	60 EA	Forecast	10/19/2021
IBP-FG-300	IBP-FG-300	PL01	Planned Order	T41026685	10/20/2021	340 EA	Sales Order	10/20/2021

Work Center	Capacity Cat...	Material Number...	Location Num...	Supply Type	Order Number -...	Resource Consumption...	Requested Start Dat...	Supply Quantity	Pegged Quantity...
RES_F1	1	IBP-FG-100	PL01	Planned Order	T41026654	760.000 H	10/26/2021	760 EA	760 EA
RES_F1	1	IBP-FG-100	PL01	Planned Order	T41026666	710.000 H	10/26/2021	710 EA	710 EA
RES_F1	1	IBP-FG-100	PL01	Planned Order	T41026673	760.000 H	10/25/2021	760 EA	760 EA
RES_F1	1	IBP-FG-200	PL01	Planned Order	T41026650	820.000 H	10/26/2021	820 EA	820 EA
RES_F1	1	IBP-FG-200	PL01	Planned Order	T41026659	840.000 H	10/26/2021	840 EA	840 EA

Figure 3.11 Analyze Supply Usage

For example, in this app, you can create a planned order, stock transfer requisition, or purchase requisition and execute the planning run interactively. You can also fix an order here by checking the fix indicator checkbox. Upon making changes to the plan, a **Save As** option appears in the top section of the app to save the plan in a simulation scenario. You can share your simulation scenario with other colleagues too.

Once you are satisfied with the simulation scenario results, you can save your interactive changes to the baseline version. Orders that are created or changed interactively in SAP IBP are transferred back to SAP ERP and SAP S/4HANA during the next outbound integration run.

Simulate Sales Order

If an existing sales order is not fulfilled on time, you may want to perform simulations by changing its order quantity, priority, or requested date and review the confirmation impact on other competing orders.

Also, you may have an unforeseen order that you want to fulfill based on its high priority. You can perform simulations in this scenario as well.

You can execute sales order simulations from the View Confirmations app, as shown in Figure 3.13. For this, change the requested date or order quantity and click **Start Simulation Run**. Using the save option, you can save the results in the simulation version or save them to the baseline version.

The screenshot displays the SAP View Confirmations app interface. At the top, the title bar shows 'SAP View Confirmations' with navigation icons and the user 'US'. Below the title bar, a status bar indicates 'Simulation in Version: D20DEMO / Base Version' and provides actions: 'Change Summary', 'Save', 'Save As', 'Send To', 'Discard', and 'Open In...'. The main content area shows 'Order Number: 1205 / Item Number: 10'. Below this, there are tabs for 'Competing Sales Orders' and 'Order Network'. The 'Competing Sales Orders' tab is active, showing a table of 9 orders. The table has columns for Analyzed Demand, Priority, Segment Description, Order Number, Item N..., Customer Number, Customer Name, Requested Date, and Requested Quantity. Below the table, there is a section for 'Schedule Line Details for Order Number 1205, Item Number 10'. This section contains a table with columns for 'Confirmed or Requested Date', 'Requested Quantity', and 'Confirmed Quantity'. The 'Confirmed or Requested Date' field is set to '10/26/2021' and the 'Requested Quantity' field is set to '240'. At the bottom of the interface, there are buttons for 'Display Product Allocation Details', 'Start Simulation Run', and 'Simulate Sales Order'.

Analyzed Demand	Priority	Segment Description	Order Number	Item N...	Customer Number	Customer Name	Requested Date	Requested Quantity
	1-1	Prioritized Sales Or...	1168	10	IBP-CUST-01	Customer 1	09/28/2021	590 EA
	1-7	Prioritized Sales Or...	1186	10	IBP-CUST-01	Customer 1	10/13/2021	150 EA
	1-13	Prioritized Sales Or...	1204	10	IBP-CUST-01	Customer 1	10/27/2021	340 EA
	2-1	Prioritized Sales Or...	1169	10	IBP-CUST-02	Customer 2	09/28/2021	150 EA

Confirmed or Requested Date	Requested Quantity	Confirmed Quantity
10/26/2021	240	100

Figure 3.13 Simulate an Existing Sales Order

To simulate a new sales order, click on the **Simulate Sales Order** option. This opens a screen to enter your sales order information to execute a simulation for this new order, as shown in Figure 3.14.

The screenshot shows a web-based form titled "Simulate Sales Order". At the top left, there is a dropdown menu set to "Standard". The form contains several input fields, each with a red asterisk indicating a required field. The fields are: "Material Number" with the value "IBP-FG-100", "Location Number" with "DC01", "Customer Number" with "CUST01", "Requested Quantity" with "10" and a unit selector set to "EA", and "Requested Date" with "10/22/2021". Below these are three more fields: "Net Value and Currency", "Order Type", and "Delivery Priority" (set to "01 (High)"). At the bottom right of the form, there are two buttons: "Start Simulation Run" (highlighted with a black box) and "Cancel".

Figure 3.14 Simulate a New Sales Order

Note

Depending on your order confirmation problem, you can also execute sales order simulations by adjusting your demand prioritization profile in such a way that the unfulfilled order is ranked higher in the demand sequence and is fulfilled on priority in the next planning run.

4 Deployment Planning

The supply planning run, as discussed in previous sections, generates the planned distribution demand and planned supplies across your supply chain network. The next step in the process is to determine the quantities that can be allocated to meet the distribution demands originating from various stocking locations. This short-term execution process of fulfilling the downstream location demands with the available supply is called deployment.

Primary use cases of deployment include the ability to respond to short-term demand or supply variations. For example, sales peak in one market, whereas in another market, forecast is not consumed or a production delay requires replanning

of replenishment to distribution centers and customers. Deployment replans the distribution considering the current demand and supply situation. Depending on the industry and specific business needs, deployment could be executed on daily or weekly basis. The output of the deployment planning run is deployment stock transfer requisitions. Table 4.1 shows the use cases for all these planning runs and how they fit within operational planning.

Operational Planning Runs	Process	Heuristic/ Optimizer	Demand Elements Used	Supply Elements Created	Allocations?	SO Confirmations Created?
Constrained Forecast Run	Supply and Allocations Planning	Heuristics/ Optimizer	Forecast, Fixed Demands, Receipts, and Safety Stock	Planned Orders, STR's, and Purchase Requisitions	No	No
Order Confirmation Run	Response Planning	Heuristics	Sales Orders, Forecast, Fixed Demands, Receipts, and Safety Stock	Planned Orders, STR's, and Purchase Requisitions	Yes	Yes
Deployment Run	Deployment Planning	Heuristics/ Optimizer	Forecast, Fixed Demands, Receipts, and Safety Stock	STR's and Deployment STR's	Yes (Heuristic) No (Optimizer)	Yes

Table 4.1 Comparison of Planning Runs

Deployment planning in SAP IBP can be executed using the following two planning algorithms, which we discuss in the following sections:

- Deployment run with finite heuristic, considering demand priority for pull scenarios
- Deployment run with optimizer, considering the network cost model for push and pull scenarios

4.1 Execution with Finite Heuristic

In real-world scenarios, the available supplies may not be sufficient to meet the demand, or, conversely, the available supplies may exceed the demand. In both situations, choosing the appropriate deployment planning strategy is critical to allocate the available supplies to the stocking locations. SAP IBP for response and supply provides two planning algorithm approaches to solve deployment problems. You may select either the finite heuristic or optimizer planning approach based on your business scenario.

The finite heuristic execution generates a priority-based deployment plan. On the other hand, the optimizer approach creates a cost-based deployment plan. In the next sections, we cover the planning approach of a finite-heuristic-based deployment run, the integration of the deployment plan with the execution system, and the prerequisites of deployment planning.

Planning Approach

The deployment planning run takes into account the forecast, sales orders, confirmed component demands, and safety stock. It then reads the supplies based on the available-to-deploy profile and tries to satisfy the distribution demands. The result of the deployment planning run is deployment stock transfer requisitions. These requisitions are pegged to the available-to-deploy supply elements. After reviewing the deployment plan, you can transfer these stock transfer requisitions to SAP ERP or SAP S/4HANA for execution.

Figure 4.1 shows the SAP IBP, add-in for Microsoft Excel planning view, in which you can visualize the deployment stock transfer requisitions created by the deployment run against the distribution demands from the downstream stocking locations.

Material Number	Ship-From Loc. ID	Ship-To Location ID	Mode of Transport ID	Key Figure	10/28/2021	10/29/2021	10/30/2021	10/31/2021	11/01/2021
IBP-FG-100	PL01	DC01	ROAD	Distribution Demand (Lane)	760	710	760	0	0
				Distribution Demand (Lane; Deployment)	760	710	760	0	0
				Distribution Receipt (Lane)	0	0	760	710	760
				Distribution Receipt (Lane; Deployment)	0	0	760	710	760
	PL02	DC01	ROAD	Distribution Demand (Lane)	0	0	0	0	0
				Distribution Demand (Lane; Deployment)	0	0	0	0	0
				Distribution Receipt (Lane)	0	0	0	0	0
				Distribution Receipt (Lane; Deployment)	0	0	0	0	0
	DC02	ROAD	Distribution Demand (Lane)	0	710	740	136	0	
			Distribution Demand (Lane; Deployment)	0	710	740	136	0	
			Distribution Receipt (Lane)	0	0	710	740	136	
			Distribution Receipt (Lane; Deployment)	0	0	710	740	136	
IBP-FG-200	PL01	DC01	ROAD	Distribution Demand (Lane)	0	840	820	0	0
				Distribution Demand (Lane; Deployment)	0	840	820	0	0
				Distribution Receipt (Lane)	0	0	0	840	820
				Distribution Receipt (Lane; Deployment)	0	0	0	840	820
					0	0	0	840	820

Figure 4.1 SAP IBP, Add-In for Microsoft Excel View for Deployment Planning

Integration of the Deployment Plan with the Execution System

You can transfer the deployment stock transfer requisitions from SAP IBP to SAP ERP or SAP S/4HANA via the SAP IBP outbound data integration jobs. These requisitions can be viewed in the **Stock/Requirement List** transaction. You can then schedule these requisitions to convert them into stock transfer orders to execute the supply plan in SAP ERP or SAP S/4HANA.

These converted stock transfer orders are integrated back to SAP IBP via the SAP IBP inbound data integration jobs. The subsequent planning runs in SAP IBP consider these orders as firm receipts. Figure 4.2 shows how the stock transfer requisitions generated in SAP IBP from constrained planning, confirmation, and deployment runs are integrated with the execution system.

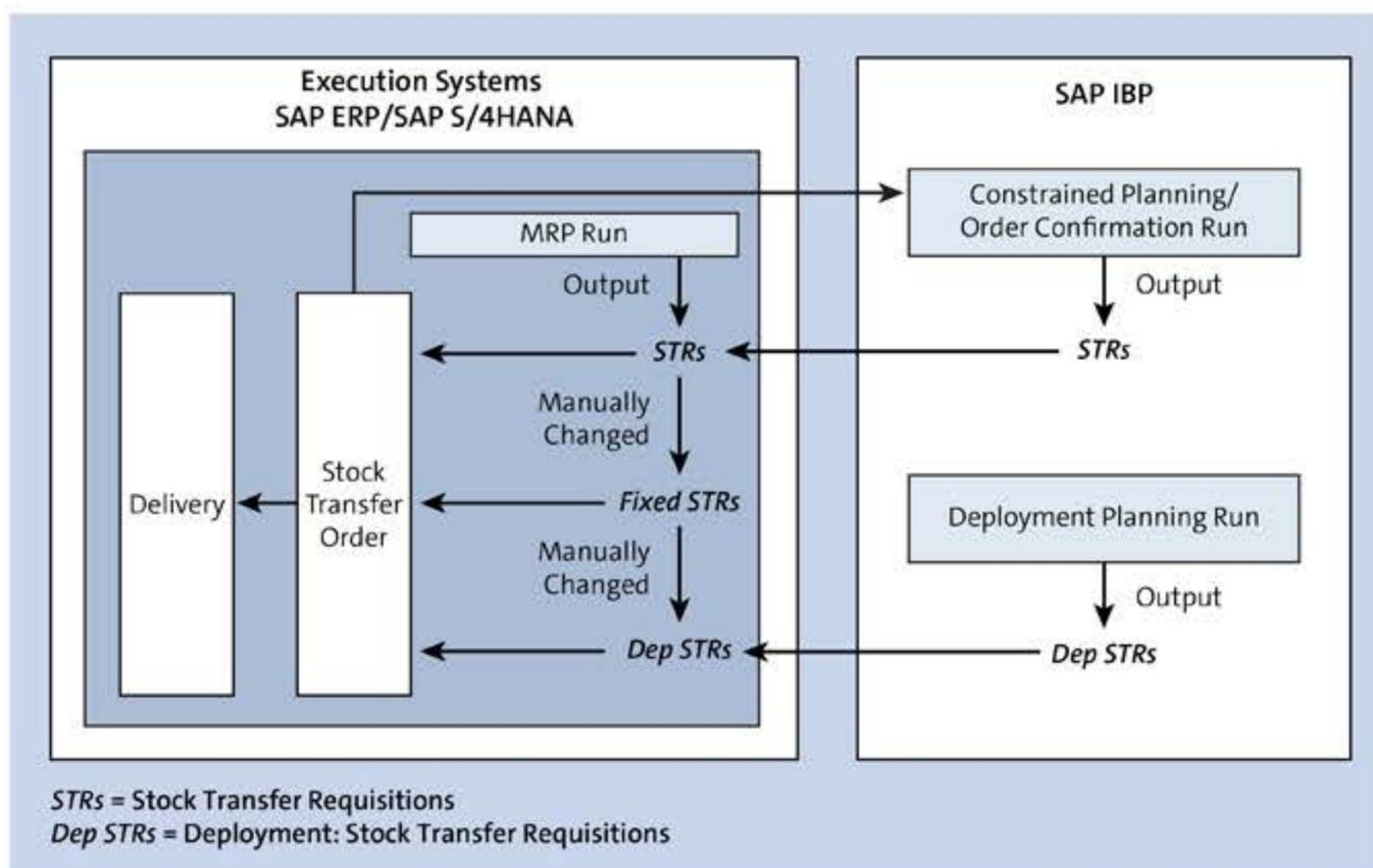


Figure 4.2 Deployment Plan Integration with Execution System

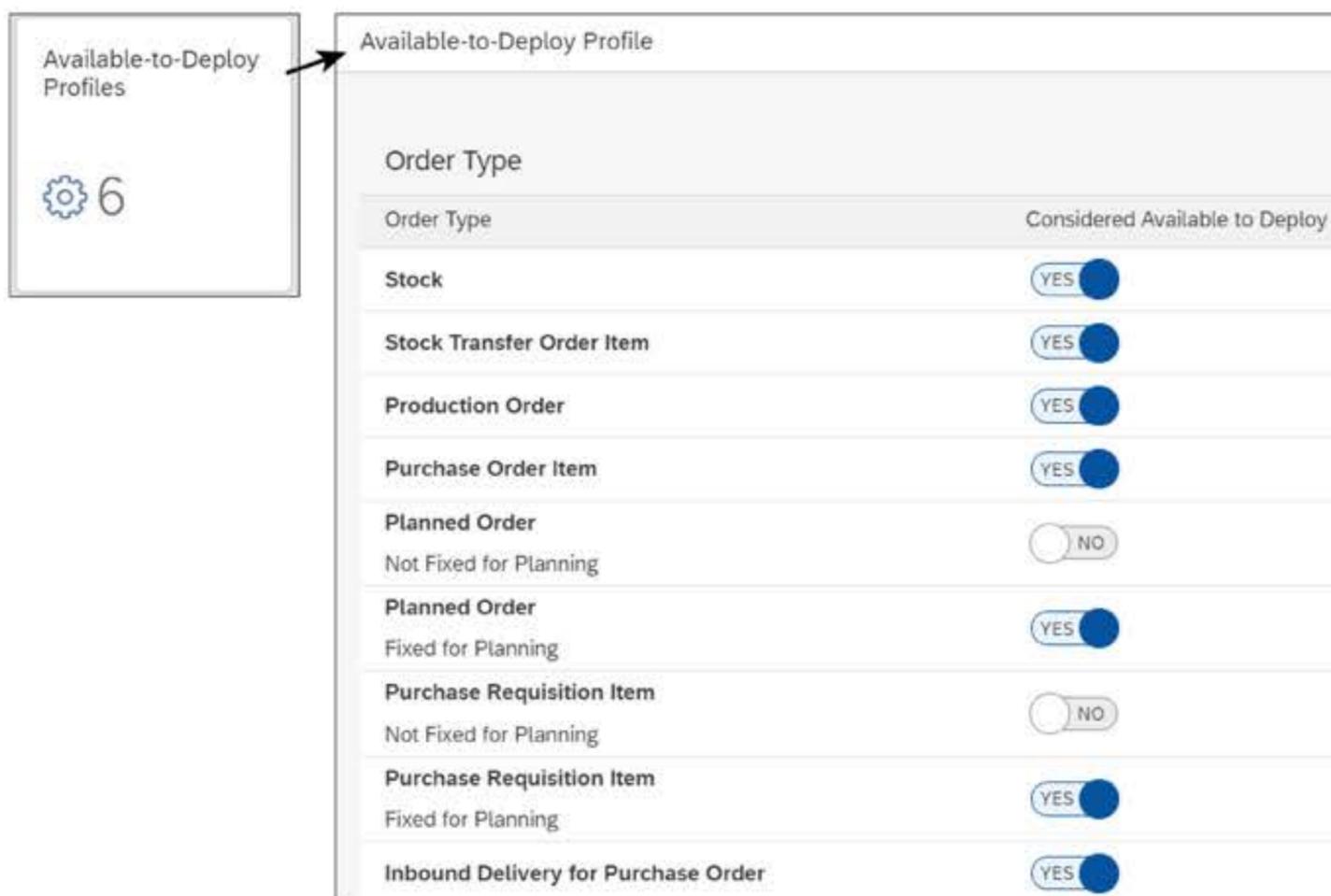
Prerequisites

Before executing deployment planning in SAP IBP for response and supply, you must take the following actions:

- The planning area for order-based planning is set up.
- Settings for order-based planning are maintained.
- Planning Run Profile, including demand prioritization rules, is maintained.
- Product allocation profiles have been set up if you use the product allocation capability.

- The forecast consumption profile is defined.
- The available-to-deploy profile is set up.

In Section 2 and Section 3, you learned about prerequisite activities, such as planning area setup, settings for order-based planning, profile settings for the planning run, product allocation, and forecast consumption. An additional prerequisite for deployment planning is to define the available-to-deploy profile, as shown in Figure 4.3. In this profile, you specify which order types should be considered by the deployment run as available supplies.



Order Type	Considered Available to Deploy
Stock	YES
Stock Transfer Order Item	YES
Production Order	YES
Purchase Order Item	YES
Planned Order Not Fixed for Planning	NO
Planned Order Fixed for Planning	YES
Purchase Requisition Item Not Fixed for Planning	NO
Purchase Requisition Item Fixed for Planning	YES
Inbound Delivery for Purchase Order	YES

Figure 4.3 Available-to-Deploy Profile

Depending on your deployment requirements, you may choose the relevant order types to be considered as available quantities to be allocated to the downstream locations. For example, if you can predict your unfixed planned orders or purchase requisitions to be available in the future for deployment, you can include these as well in your available-to-deploy profile.

4.2 Execution with Optimizer

The optimizer algorithm aims to achieve a feasible and cost-effective solution based on the defined cost rules and parameters. The deployment optimizer considers the order data aggregated in daily periods and creates the deployment stock transfer

requisitions while considering the supply chain constraints. During the run, the algorithm also pegs the generated supply to the demand elements. In the following sections, we cover the planning approach of the optimizer-based deployment run, cost rules, and other key optimization parameters for deployment planning.

Planning Approach

The deployment optimizer run can read the costs from the Planning Run Profile app, the cost time series, and a combination of both. The cost input for deployment optimization planning are inventory costs, transportation costs, late delivery costs, and non-delivery costs. The deployment planning run does not consider the production and procurement costs because it does not create any production or procurement receipts.

Note

The costs maintained for the optimizer are the relative values to help the planning engine make decisions; these are not the absolute currency values.

You can either specify the fixed cost values in the Planning Run Profile app or maintain the time-dependent costs in the time-series cost key figures. The optimizer prioritizes the time-series costs over the fixed costs defined in the profile.

Cost Parameters and Rules

Figure 4.4 shows the maintenance of the inventory cost parameters and rules maintenance in the Planning Run Profile app. In the **Fair Share for Inventory** section, you can define whether the deployment planning run should consider the safety stock, maximum stock, and excess stock inventory costs while calculating the stock transfer requisitions. Once you activate these parameters in the profile, you can maintain the fixed costs against these parameters and define your rules. For example, if you want the deployment planning run to also fulfill the safety stock at all locations, you need to maintain the **Safety Stock Violation Cost** rule.

Similarly, you define the demand cost rules and parameters for the optimizer algorithm, as shown in Figure 4.5. Under **Demand Cost Determination**, you can select how the demand costs are considered by the deployment optimizer run.

Demand Prioritization Rule Switchable Constraints Maximum Lateness **Inventory Costs** Transportation Costs

Inventory Costs

Fair Share for Inventory

Safety Stock: On Excess Stock: On

Maximum Stock: On

Demand Prioritization Rule Switchable Constraints Maximum Lateness **Inventory Costs** Transportation Costs Procurement

Inventory Holding Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
9999	Catch-All Segment		10.000000

Safety Stock Violation Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
1	Safety Stock Violation Cost		5.000000 >
9999	Catch-All Segment		0.000000

Maximum Stock Violation Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
1	Maximum Stock Violation Cost		2.000000 >

Figure 4.4 Inventory Cost Parameters for Optimizer Run

< Production Costs Substitution Costs **Demand Costs** Optimizer Parameters General Parameters Support

Demand Costs

Fair Share for Demands: ON

Demand Cost Determination

Determine Demand Costs By:

- Demand Cost Rules
- Demand Cost Rules
- Demand Prioritization

Create Delete Copy

Late Delivery Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
1	S_ORD		1000.000000 >
9999	Catch-All Segment		0.000000

Non-Delivery Cost Rule

Sequence Number	Segment Description	Condition Preview	Cost Value
9999	Catch-All Segment		1000.000000

Figure 4.5 Demand Cost Parameters for Optimizer Run

You can define the demand cost determination in two ways, as shown in Table 4.2:

Demand Cost Determination	Details
By demand cost rules	The demand groups are formed for all demands of a particular material in a specific location. Based on this, a fair-share distribution is executed globally across all location-materials. The demands are sequenced by requested date for one location-material and fulfilled until the supply is consumed for a particular demand group.
By demand prioritization	The demand groups are formed based on the fair-share set profiles defined in the demand fair-share segments of the demand prioritization rule, as shown in Figure 4.6.

Table 4.2 Demand Cost Determination for Optimization Run

Note

To use the demand-prioritization-based cost determination, the demand prioritization rules in the Planning Run Profile app must contain at least one demand fair-share segment, as shown in Figure 4.6.

The screenshot displays the configuration for a Demand Prioritization Rule. The top section, 'Demand Prioritization Rule', shows a table of segments. Segment 4, 'Fair Share for Forecast', is highlighted with a black box. Below this, the 'Condition' section shows a rule: Demand = DemandType Equal to Forecast. The 'Prioritization Settings' section shows 'Demand Fair-Share Segment' selected. The 'Fair-Share Set Profile' is set to 'DE90BP-FAIRSHAREPR'.

Segment Priority	Segment Description	Condition Preview	Pegging Strategy
0	Pre-Allocation Segment		Prefer just-in-time supply
1	Sales Orders of Priority A Customers	Demand.DemandTy...	Prefer just-in-time supply
2	Forecasts of Priority A Customers	ShipToCustomer.Cla...	Prefer just-in-time supply
3	Fair Share for Sales Orders	Demand.DemandTy...	Prefer just-in-time supply
4	Fair Share for Forecast	Demand.DemandTy...	Prefer just-in-time supply
9999	Catch-All Segment		Prefer just-in-time supply

Condition: Demand = DemandType Equal to Forecast

Prioritization Type: Demand Fair-Share Segment

Fair-Share Set Profile: DE90BP-FAIRSHAREPR

Figure 4.6 Fair-Share Segment in Demand Prioritization Profile

In addition to maintaining the inventory and demand costs, you also need to define the transportation costs for the deployment optimizer.

Other Optimizer Parameters

There are a few other critical **Optimizer Parameters** available in the Planning Run Profile app, shown in Figure 4.7, that you should maintain before executing the planning run.

- **Maximum runtime**

This is the maximum runtime for the optimization process execution. If the maximum time is reached, the optimization stops with the valid solution achieved by this time. However, it may not be the optimal solution.

- **Planning horizon**

This is the number of days into the future, starting today, that are considered by the optimization run.

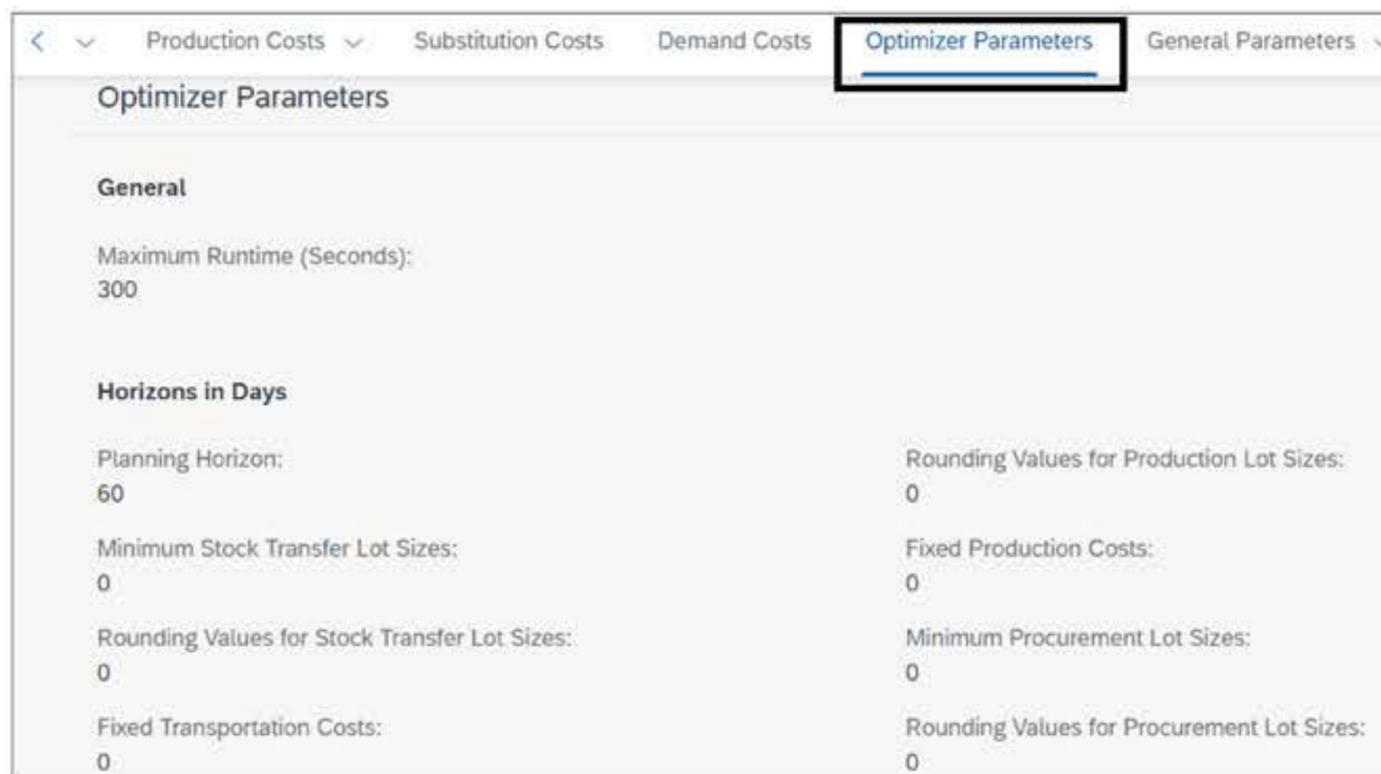


Figure 4.7 Optimizer Parameters in the Planning Run Profile App

Note

Unfulfilled demands from the past horizon, planner adjusted quantities, and fixed orders are considered by the optimization run, even when they exist beyond the planning horizon.

Deployment Cost Generation

Using this functionality, the deployment optimizer can itself generate costs during the optimization execution. The costs are determined by the planning engine based

on the demand prioritization rules, priorities maintained in the transportation lanes, and other parameters. This function can be enabled in the Planning Run Profile app, as shown in Figure 4.8.

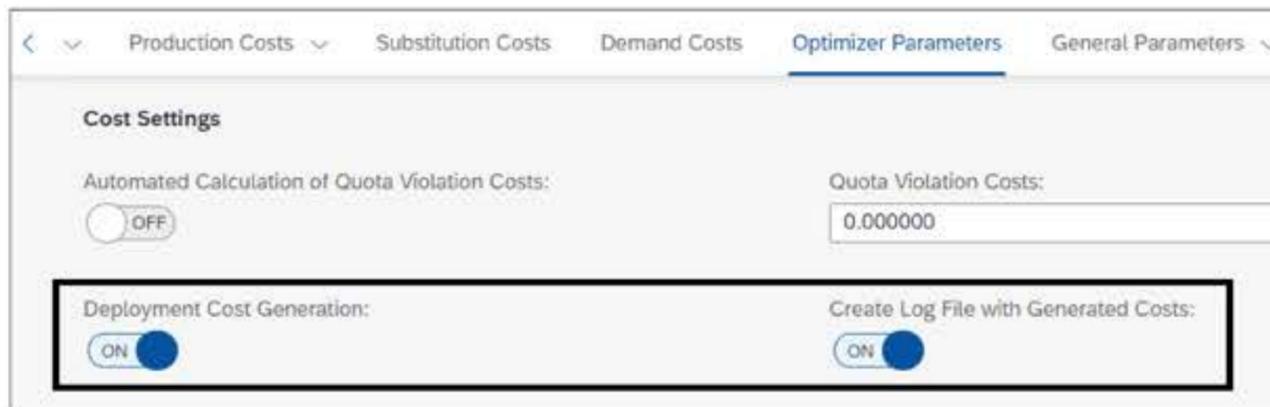


Figure 4.8 Deployment Cost Generation

The deployment planning run generates the costs in a particular sequence:

1. Inventory costs

These are generated based on the required safety stock and maximum stock values defined for individual locations.

2. Demand costs

Demand costs are generated based on the demand prioritization profile. Late delivery and non-delivery costs are determined from the segment priority of the prioritization profile. For example, the first priority segment is assigned the highest non-delivery costs.

3. Transportation costs

These costs are generated based on the transportation lane priority. The lowest transportation costs are assigned to the highest priority transportation lane.

Note

If you enable **Deployment Cost Generation**, time-independent cost rules and cost time-series values are ignored by the deployment planning run.

You can also choose to create a log file with the generated costs in the Planning Run Profile app. This helps you analyze how the deployment run determined various costs while generating the supply elements.

After the optimizer run completes, you can view the optimizer run details by navigating to the planning run logs. Here, you can visualize how the optimizer solution quality was developed over the planning runtime. You can also review the cost type distribution to analyze how various costs impacted the optimizer results.

5 Integration with Other Planning Applications

Operational or order-based planning integrates with several other planning applications bi-directionally within the synchronized planning space. Output from operational planning that goes into execution will only be as good as the input it receives from other planning functions. In today's business environment, supply chain constraints are dynamic, and operational planning needs to be agile to quickly react to changing market conditions. To do this effectively, operational planning needs to be a synchronized, interconnected plan. In this section, we cover the integration of order-based planning with other planning functions within SAP IBP, advanced planning and scheduling (APS) applications, SAP S/4HANA, and SAP ERP.

Figure 5.1 outlines a simplified view of how applications are integrated for planning and collaboration, execution, and reporting layers. Looking at SAP's vision of synchronized planning, solutions and systems are aligned with the planning horizons that are used. Strategic, tactical, and operational order-based planning are available in SAP IBP, while the planning functions more relevant to the execution horizon (e.g., detailed scheduling, ATP, and transportation management) are included within the SAP S/4HANA digital core.

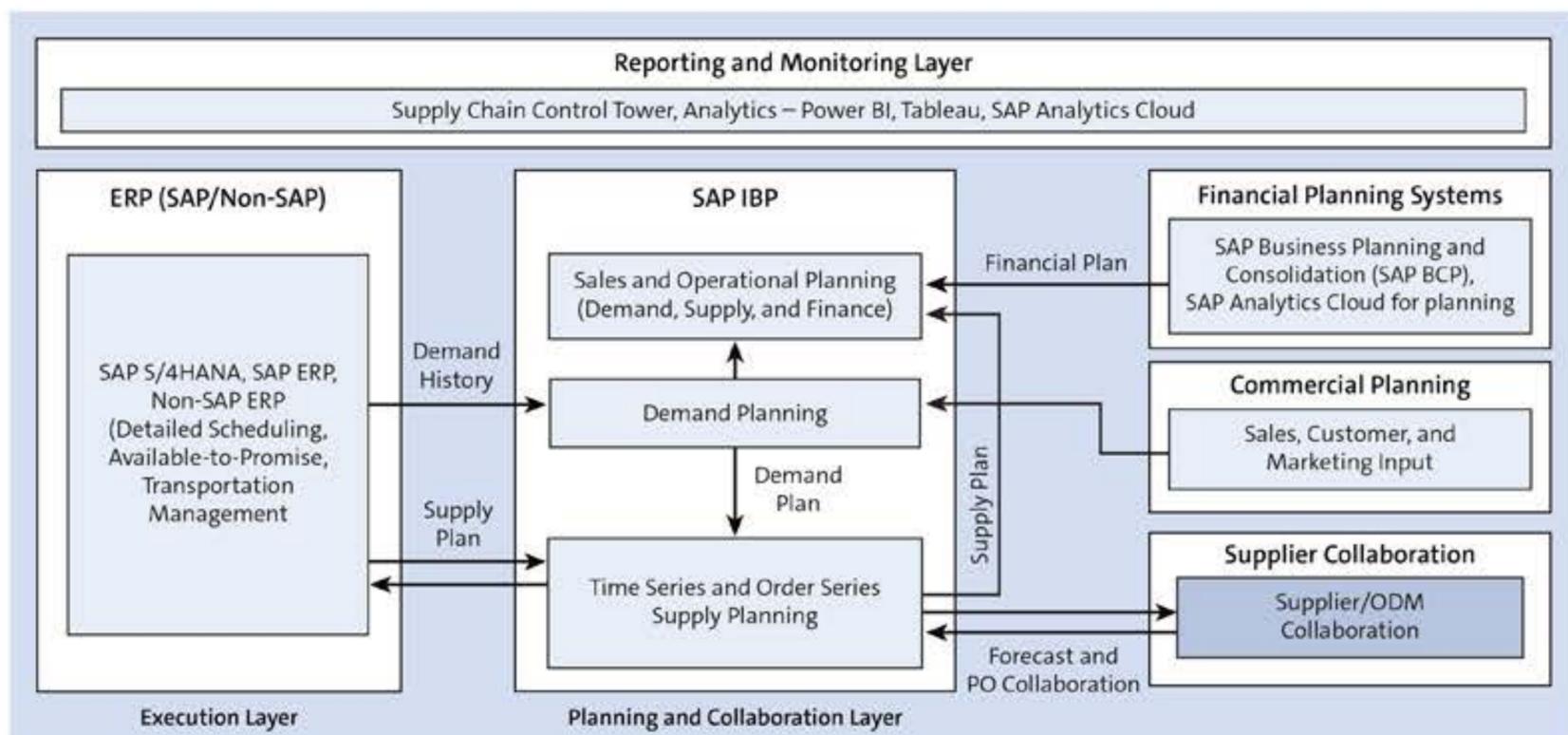


Figure 5.1 Synergy in Planning Functions

5.1 Strategic and Tactical Time Series Planning

As discussed previously in Section 1.2 and Figure 1.4, order-based planning has several interconnected dependencies with time series planning.

Figure 5.2 illustrates the integrated planning flow steps between these two planning horizons. Time series planning starts with the generation of an unconstrained consensus demand plan using statistical forecast and sales and market intelligence methods going into unconstrained supply planning. S&OP supply or infinite capacity-based net requirement planning drives demand propagation and capacity visibility at all the upstream nodes in the extended supply network, including suppliers. Another approach, especially for supply chains with good data and technology maturity, is to run finite time series planning using the finite heuristic or optimizer algorithm. This will generate a constrained supply plan for the mid-to-long term based on the costs and priority rules set to fulfill demands.

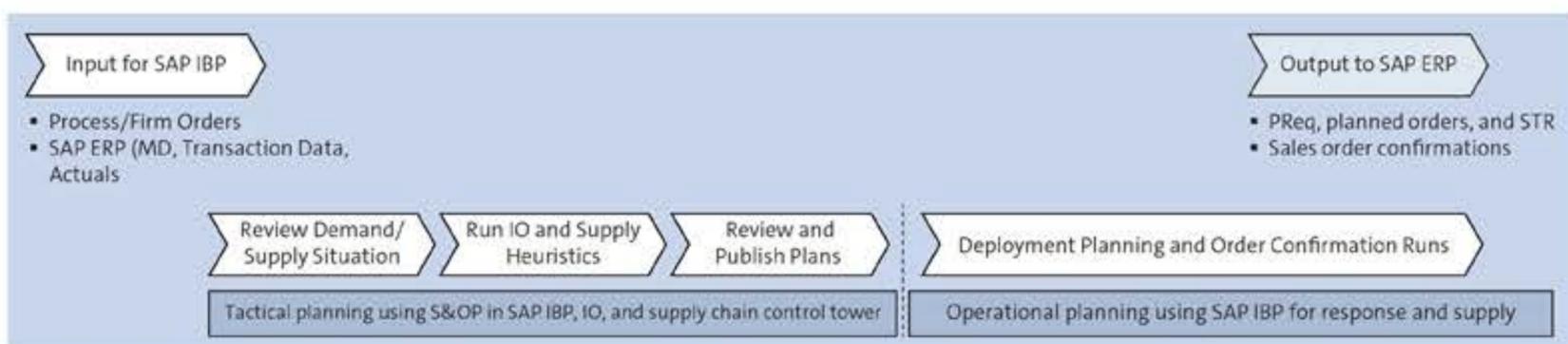


Figure 5.2 Tactical and Operational Planning Interconnected Flow

Unconstrained and constrained demand and supply plans are sent to the order-based or operational horizon to generate output for the following:

- **Supply and allocations planning**

Create allocations and a supply plan based on prioritized forecast demands and supply chain constraints.

- **Response planning**

Create order confirmations and an adopted supply plan based on prioritized demands, allocations, and supply chain constraints.

- **Deployment planning**

Create a deployment plan and adjust other supply proposals and order confirmations based on prioritized demands, allocations, supply chain constraints, and deployment settings.

The objectives of tactical time series planning include the following:

- Create advanced supply planning simulations for S&OP based on forecasts, orders, and inventory or safety stock targets.
- Utilize unconstrained heuristic, constrained priority, or constrained optimization algorithms to create a supply plan.

- Develop a rough cut capacity plan and determine multi-level sourcing for both distribution and bills of material.
- Meet optimized inventory targets set by SAP IBP for inventory or user-defined settings.
- Gain visibility for projected stock or shortages at relevant levels of aggregation.

The objectives of operational order series planning include the following:

- Generate a finite capacity supply plan based on prioritized and categorized demand, such as orders and forecasts.
- Utilize a fast, rules-based, priority-driven solution for supply and allocations planning, order rescheduling, and deployment planning.
- Support what-if analysis and root-cause analysis of actual or hypothetical changes to demand or supply.
- Generate and provide allocations to ATP for online confirmations of sales orders (order-based and demand-based).
- Use finite heuristic with the demand fair share option during (priority rules-driven) planning.

5.2 Available-to-Promise Planning

ATP is one of the critical functions to provide the right committed date to customers or internal demands. This area takes input from tactical and operational planning functions. There are two main functions in ATP, product allocation and product availability. With SAP IBP for response and supply, these two objectives can be met with the supply and allocations planning and response planning functions.

Figure 5.3 illustrates the supply and allocations planning output generated from the SAP IBP order-based planning function. The supply–demand match engine looks at all the gating factors and comes up with constrained supply based on prioritization rules, which will be integrated into SAP ERP systems. Also, product allocations handle customer priorities and commitments.

Figure 5.4 illustrates the order confirmation output generated from the SAP IBP order-based planning function. Taking the input from the previous step of product allocations and prioritization rules, an order confirmation is generated and can be sent to SAP ERP.

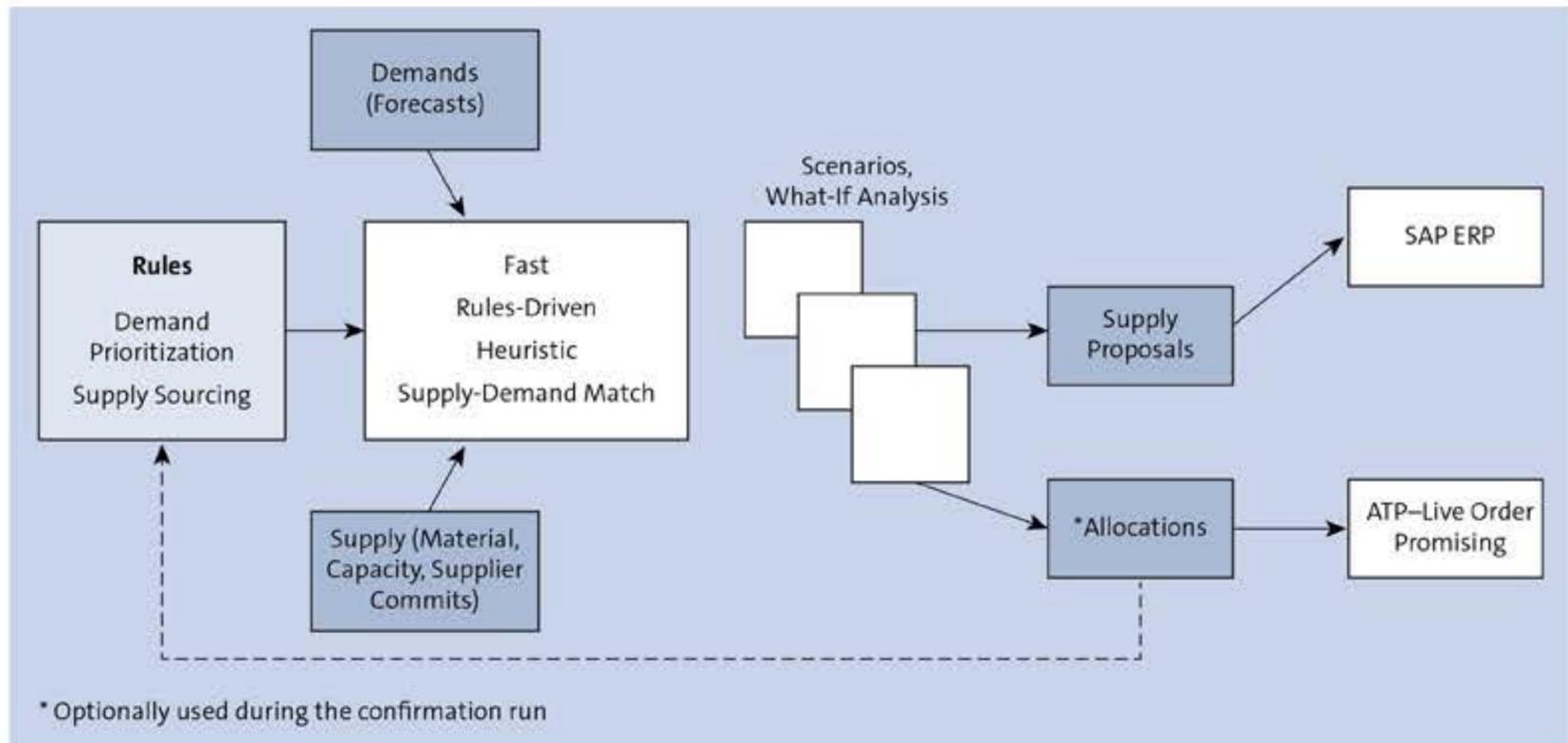


Figure 5.3 Supply and Allocations Planning

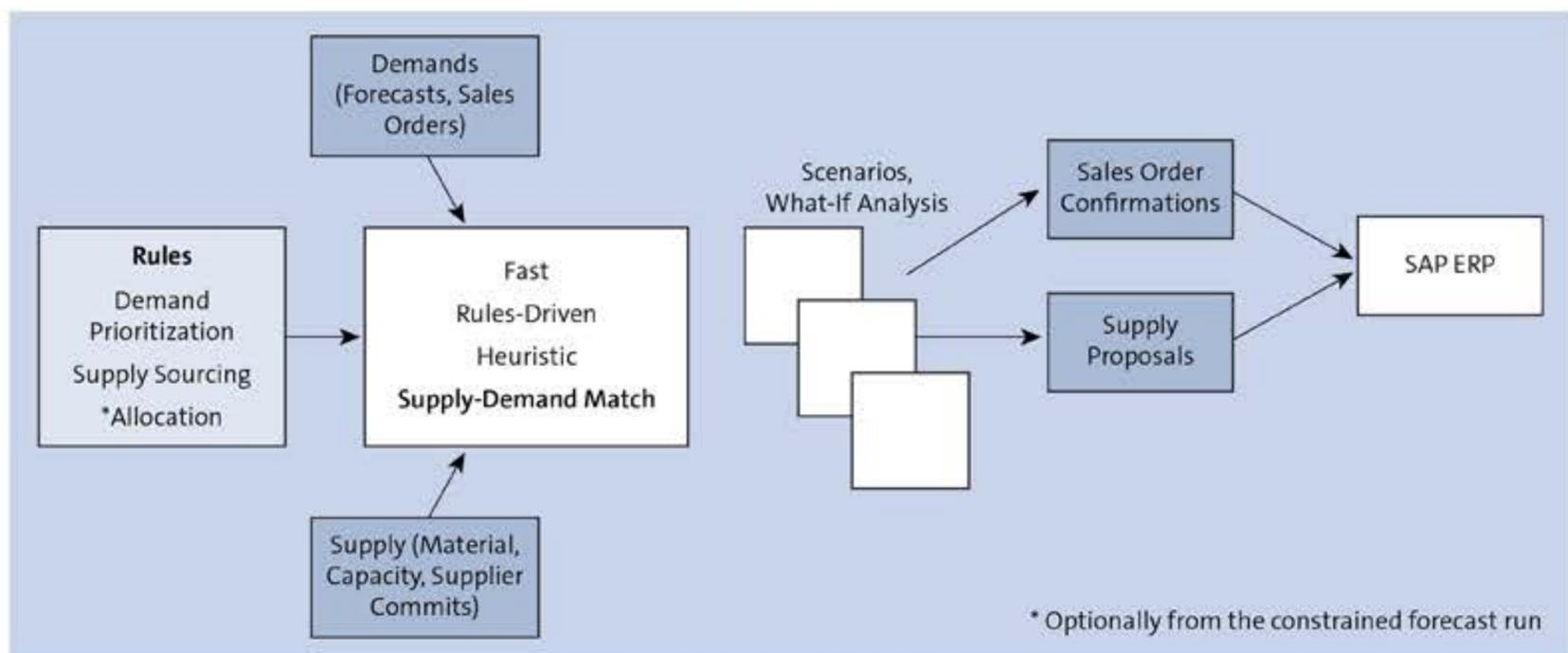


Figure 5.4 Response Planning

There are multiple choices in the integration of product allocation and product availability with SAP ERP systems. Figure 5.5 provides the options to integrate SAP IBP with ATP in SAP ERP systems. Depending on the extent of ATP coverage within SAP IBP, SAP S/4HANA for advanced ATP can be enabled to handle the need. For example, SAP IBP can be used to generate product allocation data and transfer to SAP S/4HANA for advanced ATP to use these allocation data and priority rules to drive ATP functions. In simple terms, SAP IBP can be treated as an ATP planning engine, and SAP S/4HANA for advanced ATP as an ATP execution engine.

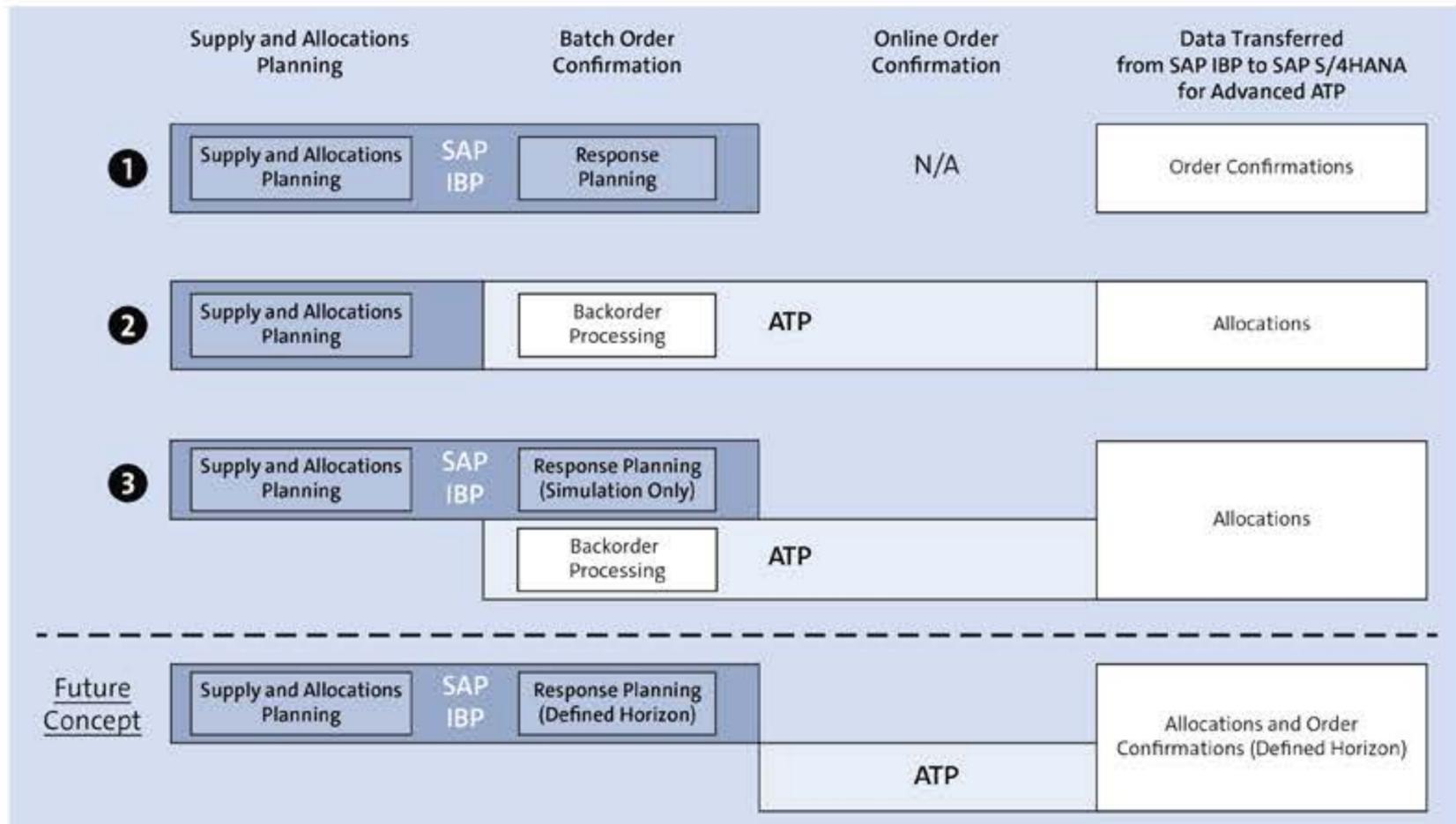


Figure 5.5 Product Allocation and Product Availability Integration between SAP IBP and SAP S/4HANA for Advanced ATP

5.3 Detailed Scheduling

Detailed production scheduling determines the optimal production sequence for execution to meet delivery commitments based on actual constraints on the shop floor. This function is executed in the operational planning short-term horizon. Figure 5.6 illustrates the horizon in which detailed scheduling is typically executed. The objective is to take input from tactical and operational SAP IBP plans to generate a shop-floor scheduling plan that is more granular in time and constraints.

Figure 5.7 shows the integration flow between SAP IBP and the production planning and detailed scheduling (PP-DS) module in SAP S/4HANA, aligning the planning horizons; the unconstrained forecast plan generated from SAP IBP for demand is sent to SAP IBP for response and supply for the constrained supply plan with a time granularity of a week or a month. This data is sent to PP-DS for detailed scheduling functions. PP-DS provides an optimized schedule sequence of constrained supply orders generated from SAP IBP. This is typically handled within the first 2–4 weeks of the horizon.

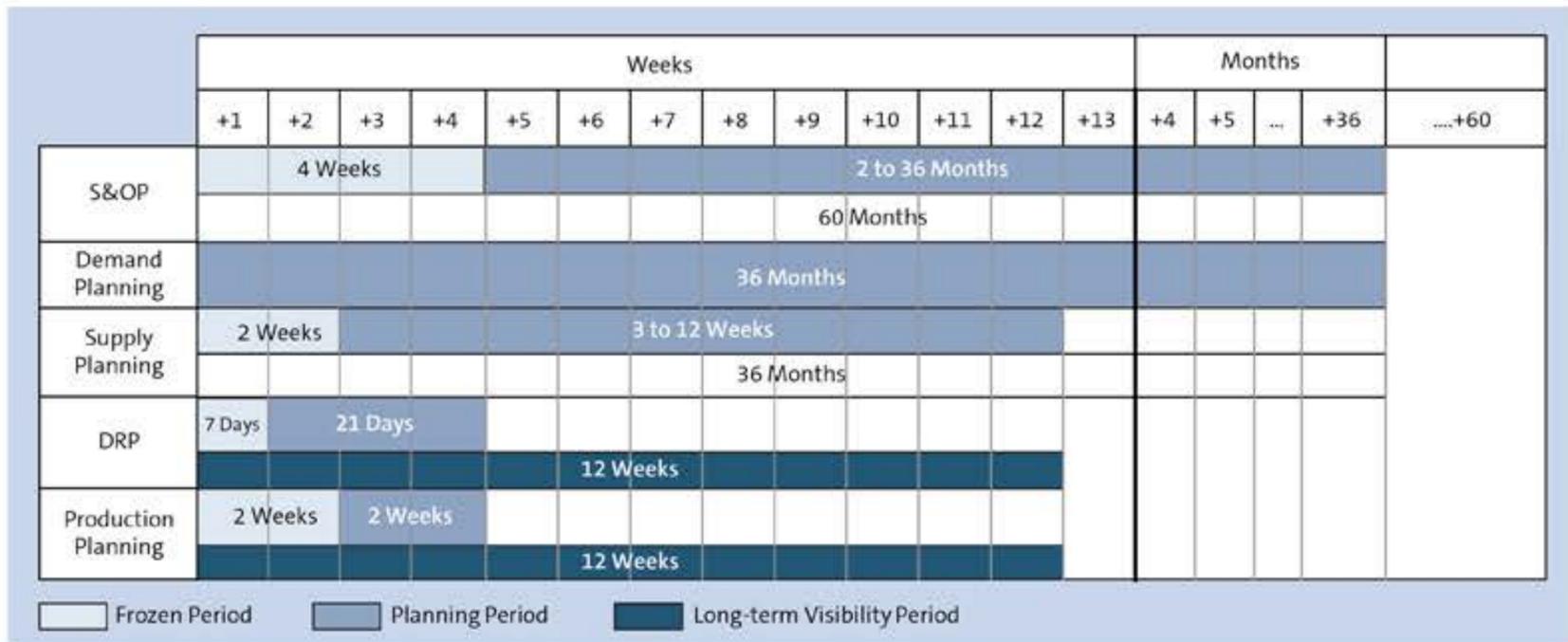


Figure 5.6 Planning Process and Horizons

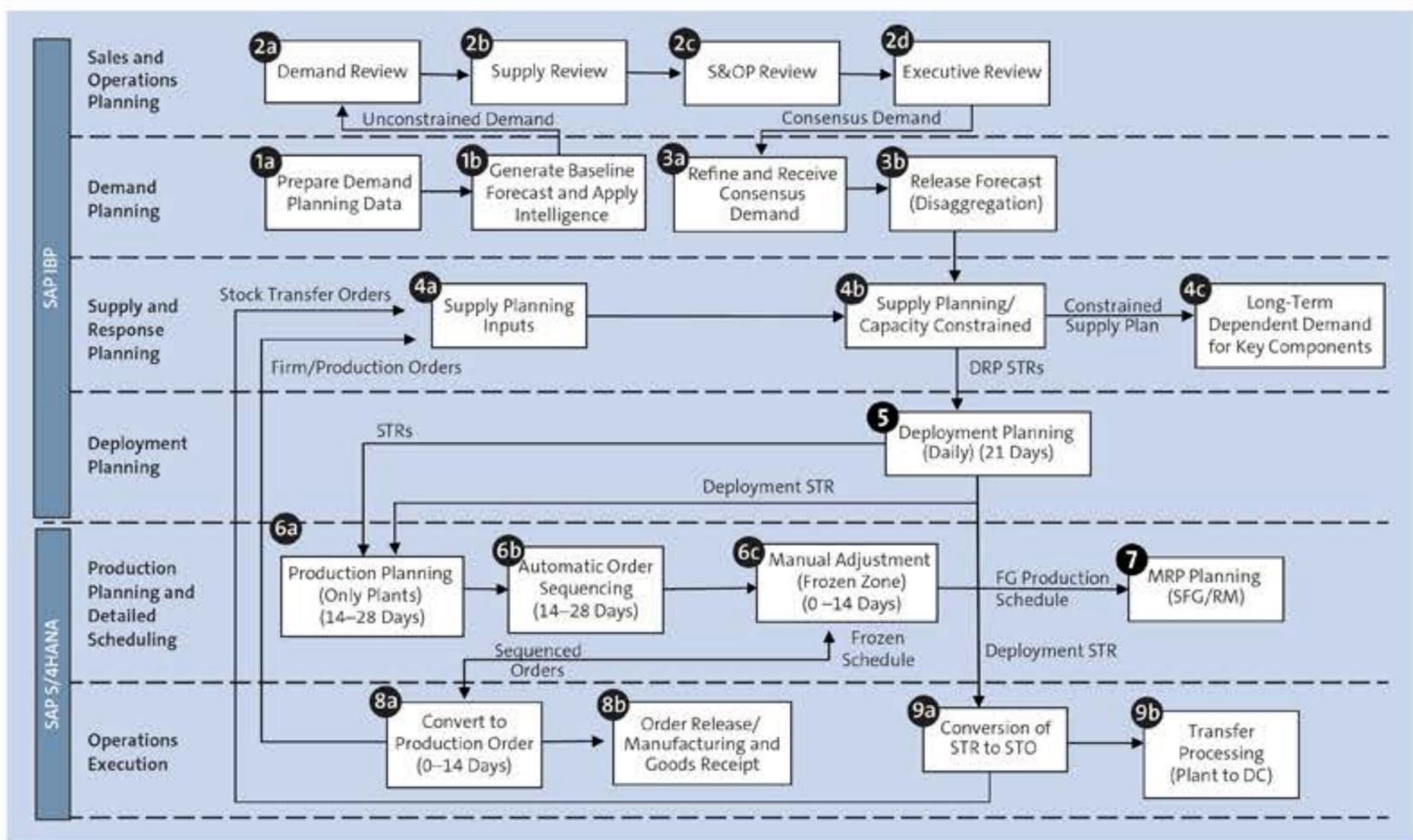


Figure 5.7 Integration of SAP IBP Tactical and Operational Planning with Production Planning and Detailed Scheduling

5.4 External Suppliers

Depending on the planning horizon, supplier collaboration within the SAP landscape happens in two different ways, as shown in Figure 5.8:

- **Forecast collaboration with suppliers**

In SAP IBP, time series supply planning collaborates with the SAP Ariba Supply Chain Collaboration for Buyers, forecast add-on

- **Order collaboration with suppliers**

Operational supply planning collaborates with SAP Ariba Supply Chain Collaboration for Buyers for order elements like purchase orders

We cover these two methods in more detail in the following sections.

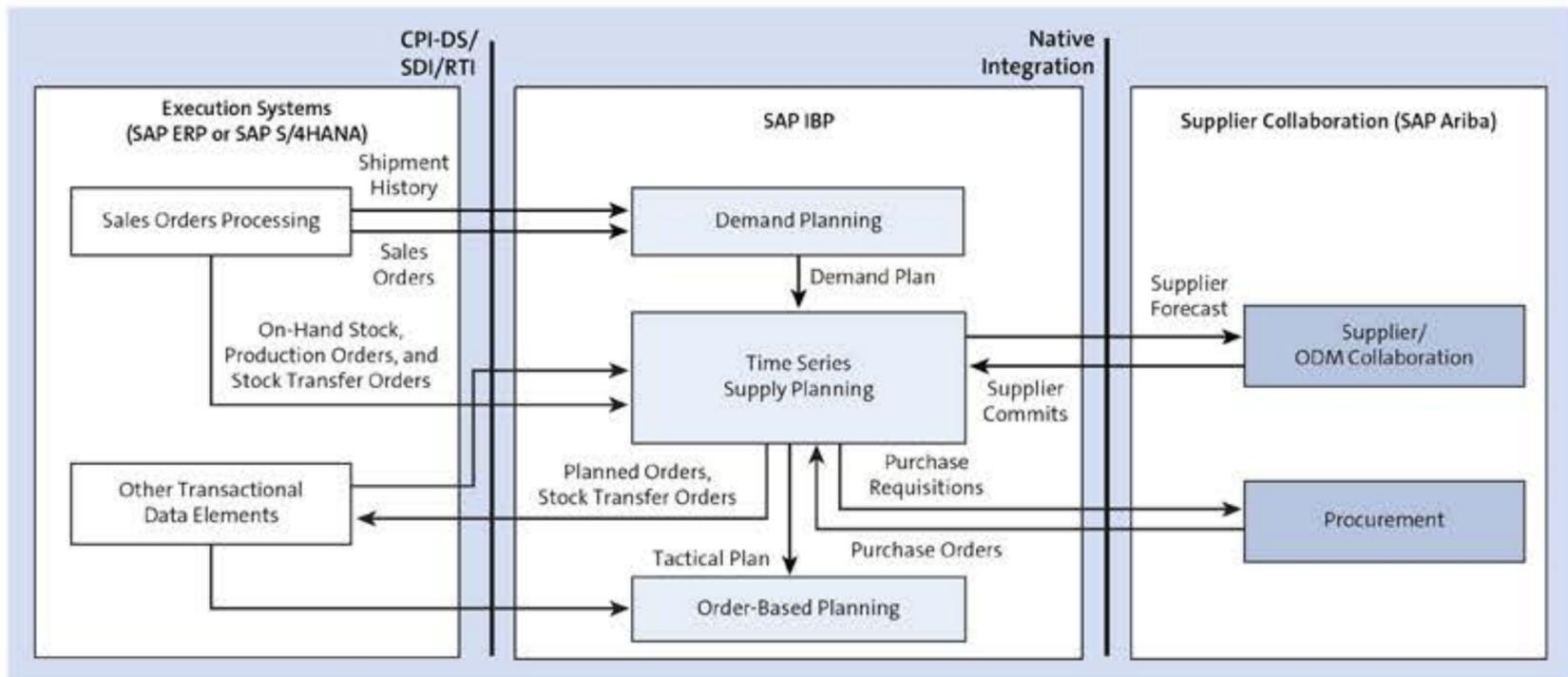


Figure 5.8 Supplier Collaboration Integration with SAP IBP and SAP ERP Systems

Forecast Collaboration with Suppliers

One of the key forms of input into constrained supply planning is the supplier commit to the unconstrained material plan. This is more significant in the current environment of supply chain constraints. Regardless of the industry (high-tech, industrial, life sciences, etc.), almost every customer is impacted with material constraint challenges. It is important to have commitments from supplier nodes to minimize the impact on the supply chain.

Figure 5.9 illustrates the integration of the demand plan cycle to supply and allocations planning. After the demand planning process and the finished good level is complete, time series supply planning generates the net requirements or dependent demand to all the supply nodes in the network. This is an unconstrained component forecast that can be shared with suppliers via SAP Ariba Supply Chain Collaboration for Buyers, the SAP IBP web-based supplier view, or a simple view within SAP IBP, add-in for Microsoft Excel (Figure 5.10). The supplier reviews the forecast and provides a

supplier commit plan, which in turn is used as a material constraint during the finite supply planning executed via the supply optimizer or finite heuristic algorithm.

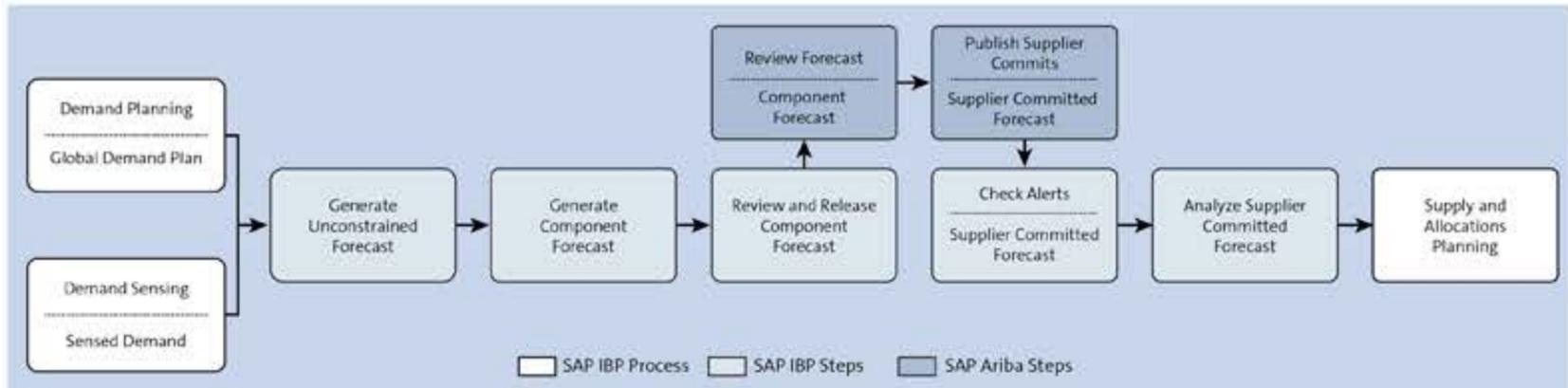


Figure 5.9 Supplier Collaboration Process View

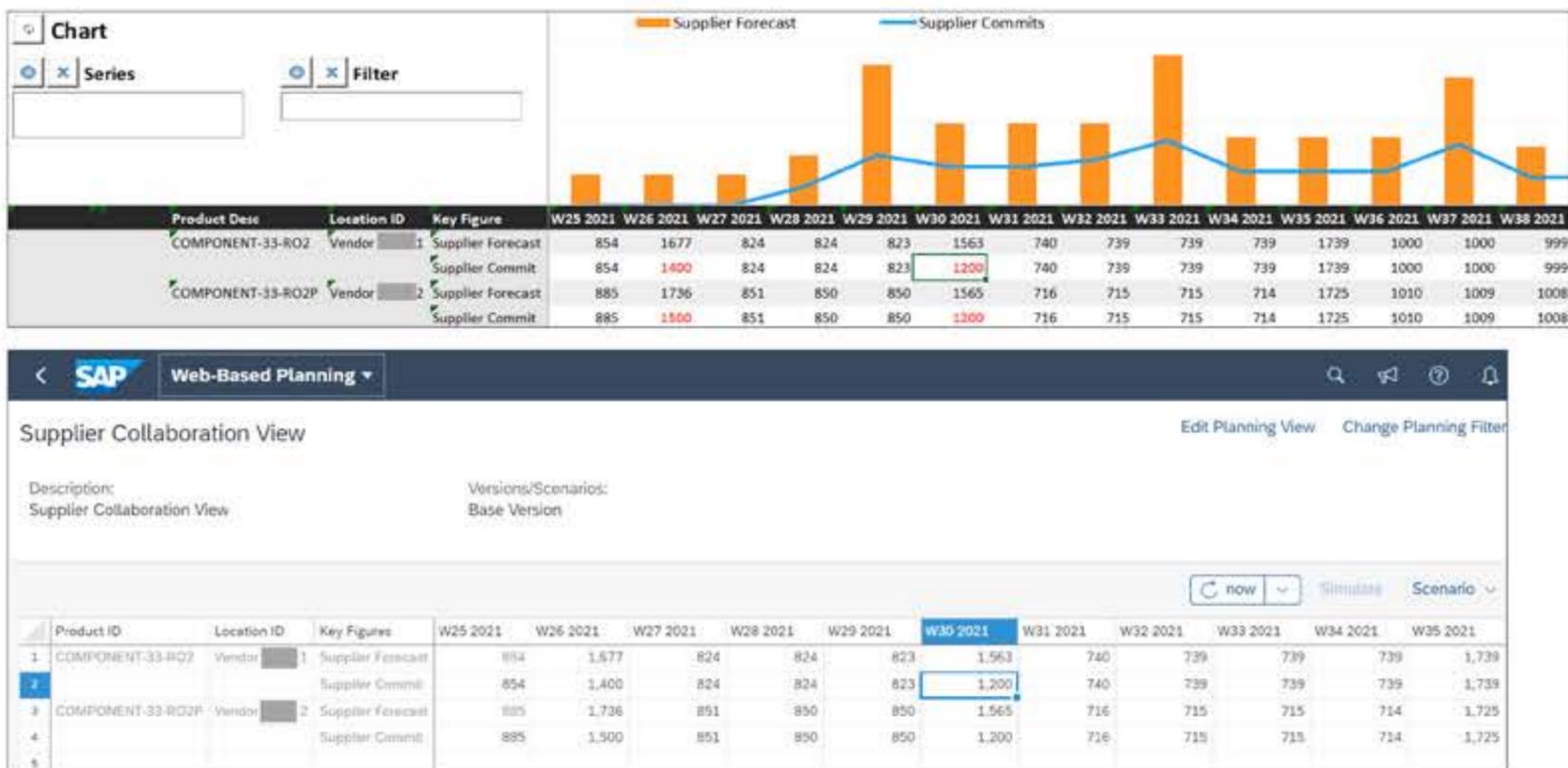


Figure 5.10 SAP IBP Web-Based and Microsoft Excel-Based Supplier Collaboration

Order Collaboration with Suppliers

In the operational planning horizon, available supply includes firm orders like purchase orders and scheduling agreements. Committed dates and the status of these orders are used to track the material movements and to get a more realistic supply plan in the execution horizon. In order-based planning, these procurement order firm dates become gating factors to fulfill the customer demand.

Figure 5.11 shows the impacts of delays in purchase orders and gating factors on customer orders in order-based planning.

Order Number: 1209 / Item Number: 10

Competing Sales Orders Order Network

Gating Factors (2)

- Supplier Constraint Exceeded **286.00**
EA
Material: IBP-RM-100
Supplier Constraint Exceeded: IBP-VE
- Product Allocation Quantity Exceeded **143.00**
EA
Material: IBP-FG-100
Location: DC02

Order Network Items (10) Standard* v Period Settings v

	Receipt or Requirement	Gating Order	Material Number	Material Descri
<input type="checkbox"/>	Sales Order	No	IBP-FG-100	IBP-FG-100
<input type="checkbox"/>	Stock Transfer Requisi	No	IBP-FG-100	IBP-FG-100
<input type="checkbox"/>	Planned Order	No	IBP-FG-100	IBP-FG-100
<input type="checkbox"/>	Planned Order	No	IBP-SFG-100	IBP-SFG-100
<input type="checkbox"/>	Purchase Reqi	No	IBP-RM-100	IBP-RM-100
<input type="checkbox"/>	Sales Order	Yes	IBP-FG-100	IBP-FG-100

Figure 5.11 Gating Factor Analysis in Order-Based Planning

5.5 Transportation Management

The objective of SAP Transportation Management (SAP TM) is to manage end-to-end transportation operations and improve service levels through automated transportation planning and execution. SAP TM has four main components: capacity and demand planning, order management and freight planning, freight execution and monitoring, and freight settlement. With challenging market dynamics and supply chain disruptions, freight and transportation information is extremely important, and the efficacy of this information relies heavily on operational planning data and logistics. There is a bi-directional flow of information between these two planning functions (shown in Figure 5.12).

These functions are integrated as follows:

- **SAP TM to operational planning in SAP IBP**

While performing supply chain operational planning, planners can see the status of SAP TM order information directly in SAP IBP via intelligent visibility. The freight unit document status allows planners to understand the impacts of order execution and to identify all the gating factors of the planning process. Also, planners would be able to analyze or change the freight units directly by accessing the SAP TM execution functions from SAP IBP. This data is used to run an effective exception management process in both tactical and operational planning to provide accurate information on order commitment dates.

- **Operational planning in SAP IBP to SAP TM**

After the constrained supply and the deployment planning run in SAP IBP, the stock transfer order proposals provide good visibility of quantities to be sent at a granu-

larity of a day or a week. However, these are not freight optimized; this is where SAP TM comes into the picture. SAP TM helps with freight planning and driving freight orders to the stock transfer proposals generated by SAP IBP. Also, during the sales order process, order commitment dates are primarily driven by supply proposals from SAP IBP; this information, along with extended warehouse management delivery planning, drives efficient on-time delivery metrics to the customer.

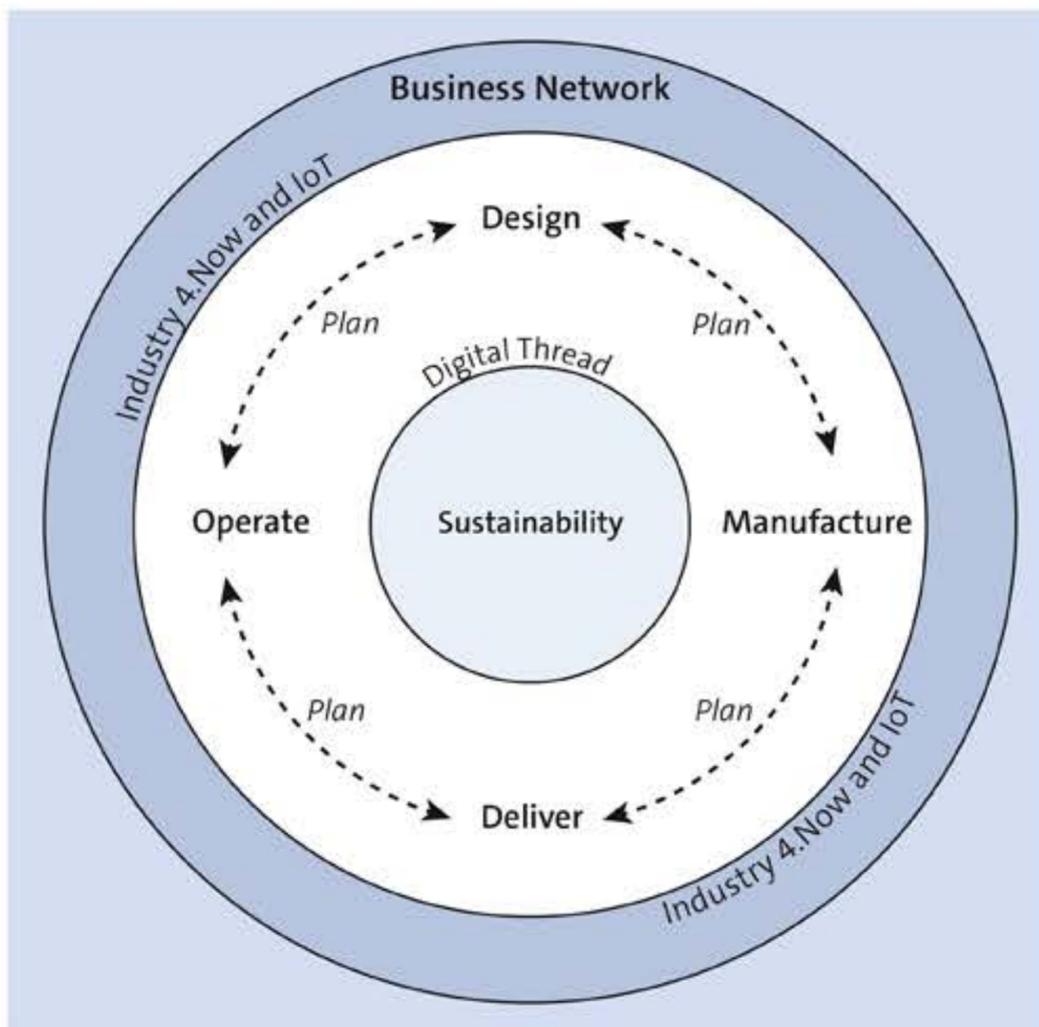


Figure 5.12 Plan to Deliver Flow

6 Implementation Approach

This section provides key aspects to consider for a successful SAP IBP operational or order-based planning implementation. The supply chain planning solution transformation is a very complex task and, more often than expected, will not generate the desired business value and objectives.

6.1 Organizational Planning Process Maturity

Technology transformation can be successful only if the other two dimensions (i.e., the people and the process) have the maturity and ability to take this leap. Planning

a transformation project does not mean changing a solution from one system to another system. It needs to be business driven with clear objectives and an understanding of the organization's current maturity. This section covers some of the guiding principles that help in developing a holistic vision for the transformation program.

Key Considerations

As the saying goes, "Life is what happens to us while we are making other plans." This saying applies to organizations too. For the least disruptive approach, the supply chain planning process and solutions should be robust and nimble and be able to dynamically sense and respond to a constraints-based world. Some of the factors to look for in while going through the synchronized planning transformation journey include the following:

- **Executive participation and sponsorship**

It is important to have deep stakeholder engagement to define the strategic executive vision, not just from supply chain leadership but also from the commercial and financial areas. The success and sustainability of deployment depends on product ownership and driving adoption in alignment with global process standards.

- **Process cadence**

It is paramount to delineate how planning activities will be conducted at the strategic and tactical levels. Questions such as "What is the goal of S&OP planning?" need to be answered.

- **Data analysis**

The parameterization and setup of integrated business planning methods should be rooted in deep data analysis. Facts such as forecast accuracies, lead time variabilities, and historical usage probabilities for components need to be uncovered and accounted for.

- **Data integration**

Establish sources of data and design robust transformations to facilitate smooth and accurate integrated business planning processes. Integration requirements with SAP systems and/or legacy applications need to be evaluated.

- **Change management**

Involve users at the inception of the project. Listen to what they want, build user stories, conduct effective joint application design and development sessions, and provide early access to the system for maximal engagement and value.

- **Supply chain network design**

A multi-echelon network for demand and supply propagation that is consistent with the global S&OP and operational needs must be modeled correctly within the SAP IBP solution, with all scenarios considered.

- **The implement and operate methodologies**

Major technology transformation projects are considered once-in-a-decade events in which all problems need to be solved. This burdens projects with corner cases, weakening the foundation. In this world of ever-growing SaaS solutions, it is important to be agile and to rapidly drive innovation solutions in an operate-to-innovate approach.

Capability Maturity

Related to our discussion on the DCM, the success of a digital transformation depends on an assessment of the organization's capability maturity: where the organization currently is and where the organization needs to go in terms of process, data, technology, and people. Aligning to six capabilities of synchronized planning, four maturity verticals are defined: ad-hoc, typical, advanced, and leading.

Table 6.1 explains the capability maturity matrix for synchronized planning:

Dimension	Ad-Hoc	Typical	Advanced	Leading
Intelligent Demand Management	Aggregate product family forecasting, primarily from historical data, with limited data cleansing, demand classification, and product performance visibility	Detailed product family time-series-based algorithmic forecast, with inconsistent historical cleansing, demand categorization, assumption tracking, and driver monitoring	Top-down and bottom-up forecasts that integrate drivers across functions, with disaggregation down to products; limited scenario analysis	Disaggregated network forecasts integrated across functions; allows for scalable scenario analysis on a cleansed data model; advanced data science methods that consider non-traditional variables such as economic and environmental factors

Table 6.1 Capability Maturity Model for Synchronized Planning

Dimension	Ad-Hoc	Typical	Advanced	Leading
Responsive Supply–Demand Matching	Independent silos reacting to demand with remediation planning that is controlled by each individual planner; use of a short planning horizon with a just-get-by approach by most organizations	A consensus-based demand and supply plan that drives operations; limited ability to react to variance from consensus	Robust processes established to identify key business disruptions and predict and sense disruptions, allowing for quick, dynamic replanning and what-if analysis capabilities	Proactively resolve supply-demand mismatches through generated alerts; system recommendations for course of action to help assess risks and opportunities; real-time, data-enriched, and fact-based decisions
Dynamic Flow Optimization	Reactive order fulfillment based on orders from customers; orders fulfilled on a first-come, first-served basis without other considerations; no formal demand or flow prioritization, inventory positioning, or postponement	Normal replenishment based on the requested delivery date for product and material flow; limited capability to plan alternate locations or routes for products	Rule-based methodology to proactively position material and product inventory and have near-real-time visibility into inbound shipments; an alert-based mechanism indicating off-schedule shipments and ATP of alternative products	Automated make-and-transfer recommendations to position materials and products most profitably to proactively meet demand due dates through flexible shipment methods, inventory replenishment, and production levers
Enterprise Plan Reconciliation	Lack of data visibility and availability for modeling, which delays or prevents appropriate cost avoidance and mitigation; plans not reconciled; reactionary outlook	Aligned volume-based demand plans and supply capabilities; a financial plan developed as an outcome of these two plans	Reconcile all financial, operating, and demand-planning information; profitability driven through margin-maximizing demand and supply decisions	Strategy-driving decisions, which cascade down all operations and financial activities; financial forecasting, governance of plan changes, and reporting through top-down and bottom-up views; automated reconciliation

Table 6.1 Capability Maturity Model for Synchronized Planning (Cont.)

Dimension	Ad-Hoc	Typical	Advanced	Leading
Portfolio Lifecycle Planning	No stable environment for new product development; tendency toward ineffective planning; limited communication; lack of reaction-driven commercialization mechanisms	Well-documented and well-integrated product development and product discontinuation processes as well as clear visibility of cost, schedule, product quantity, and product quality performance	Established robust metrics about products and processes; a predictable development and metrics support process to reduce time-to-market for new product development	Cost-optimized product development and end-of-life processes with a focus on continuous process improvement; innovative methods using data science to drive predictions of product performance
Supply Network Design	Supply network nodes in place from legacy demand and decisions; tendency for organizations to have an incorrect number of or incorrectly placed supply facilities	Reactive supply network with unnecessary buffer capacity in network nodes and hard-wired routes with limited flexibility	Responsive supply network aligned to supply chain and commercial strategy, with auto-resizing based on forecasted product flow needs in the network	Nodes and channels built or developed with service-level strategy and optimized for total landed cost across the value chain. Data science techniques suggesting alternate network designs that planners can easily evaluate through real-time what-if scenario analyses and network simulations

Table 6.1 Capability Maturity Model for Synchronized Planning (Cont.)

Deployment Maturity

Based on the experience of over 160 deployments, the hybrid Agile methodology (Figure 6.1), designing and building with an Agile approach and testing with a waterfall approach, is proven to be the successful.

The hybrid Agile methodology fosters effective communication between all stakeholders, developers, and functional teams, allowing for real-time adjustments to changing scenarios and requirements, unlike fixed models such as waterfall. Along with creating a stronger team, the hybrid Agile methodology allows a better product to be delivered more promptly to the client, creating a satisfying experience for all parties.

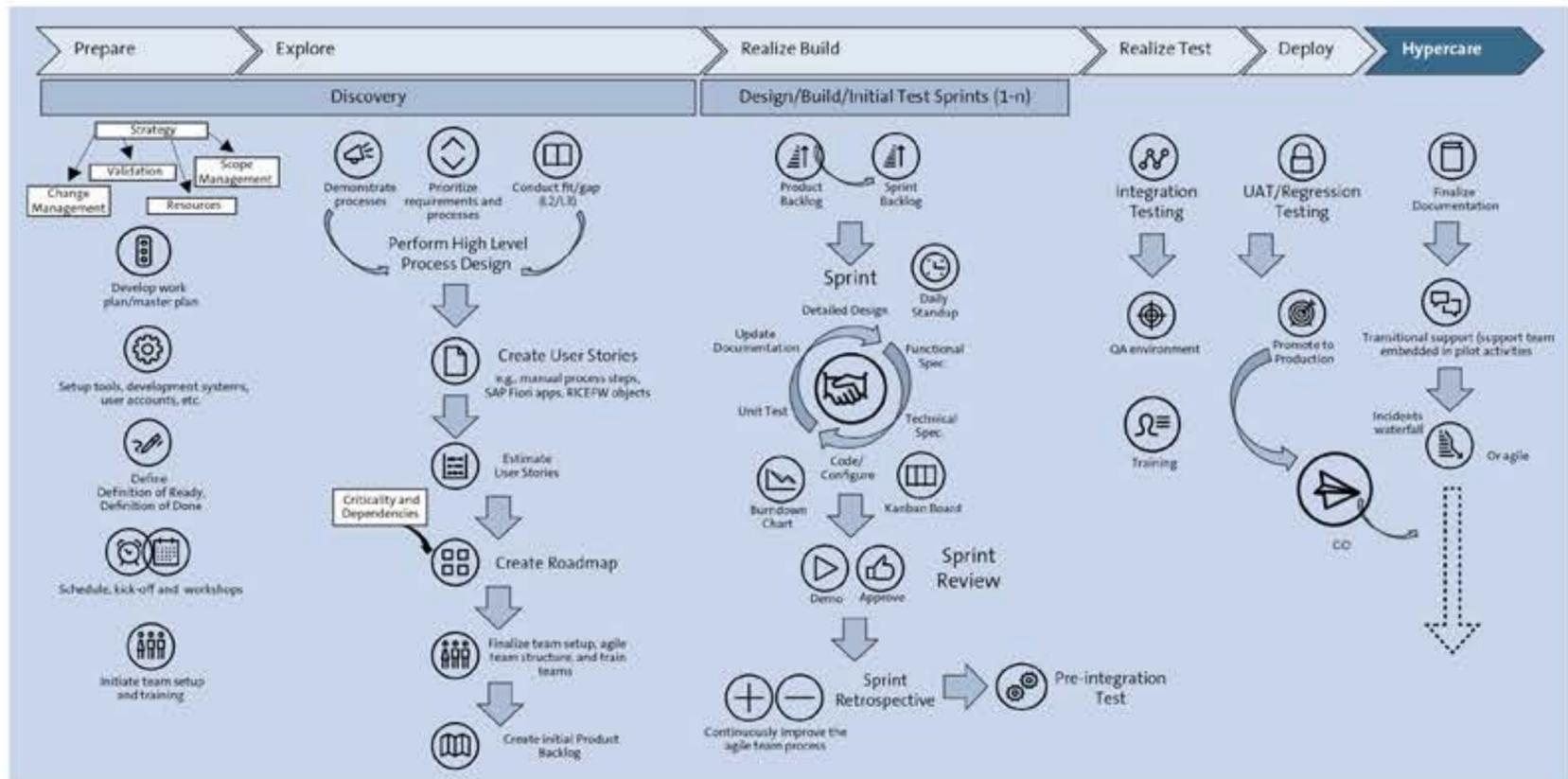


Figure 6.1 Hybrid Agile Deployment Methodology

6.2 Think Big, Start Small, Scale Fast

As we discussed in the previous section, before embarking on a technology implementation journey, assess your organization's maturity and plan for change in sequential steps with a simple yet renowned approach (i.e., crawl-walk-run). It is important to focus on having an end-state vision and an approach that will fit into the organization's constraints. Figure 6.2 explains an approach of looking at a planning transformation journey.

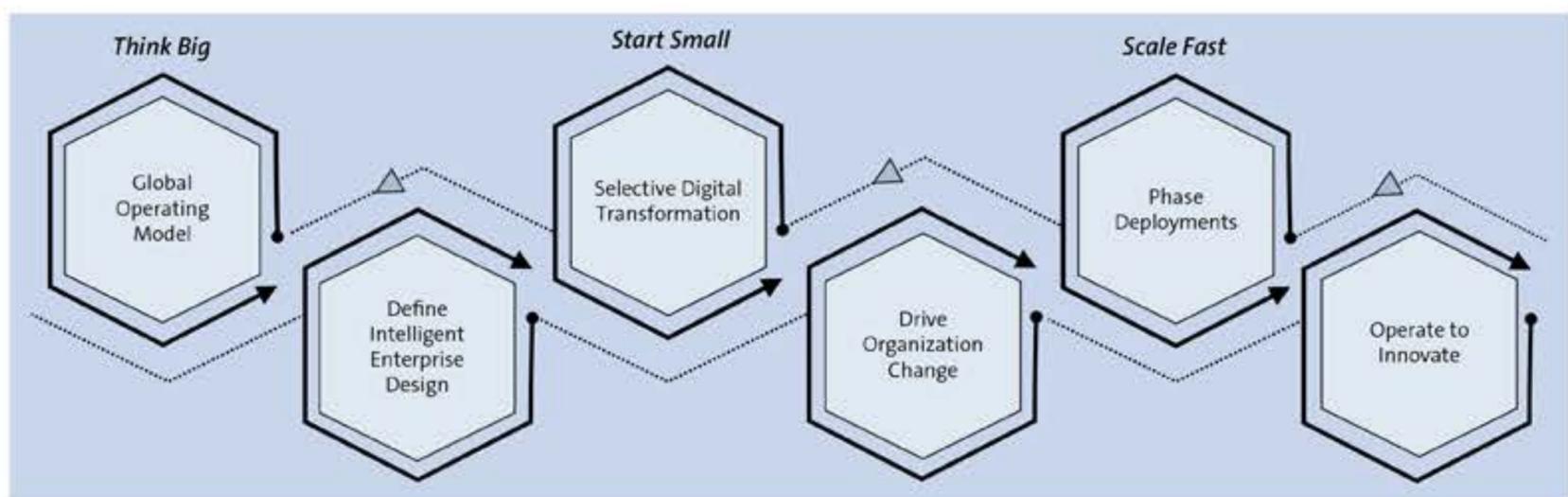


Figure 6.2 Think Big, Start Small, Scale Fast Approach for Technology Transformation

One key point for any technology implementation is the sequence of solutions that are being implemented (i.e., a big bang versus phased implementation). When it comes to SAP IBP, the current state of the solution landscape needs to be assessed before deciding on order-based planning. If the current system relies primarily on Microsoft Excel spreadsheets, it is critical to ensure that foundational planning elements like S&OP, demand, and tactical time series supply planning functions are established and that the technology landscape has the ability to integrate with order-based planning.

The success of synchronized planning transformation projects relies on several factors, and, though they look similar to other digital transformation engagements, there is a heavy reliance on process and data to get valuable results that can steer strategic, tactical, and operational plans for the whole organization.

Progressing to Synchronized Planning—A Case Study

To effectively implement synchronized planning, we used a four-step process to design around the business's appetite for change to help ensure planning capabilities are adopted and used effectively.

1. Process-driven approach

- Conducted a maturity assessment to review readiness from process and organization
- Developed a consistent SAP IBP process using the company framework
- Reviewed data and metrics to prioritize core planning processes

2. Data improvements and solution design

- Accelerated data improvements with a clear action plan
- Developed a solution design with the agility to adapt to future needs
- Developed a “show and tell” approach to align on the design from the start

3. Built to evolve

- Built a demand-planning foundation using SAP IBP for demand for an improved consensus demand process
- Established an integrated supply network planning capability using SAP IBP
- Improved inventory optimization for working capital reduction

4. Operate to innovate

- Focused on continuous improvement, aligning to quarterly SAP IBP upgrades
- Deployed AI capabilities to enhance data reconciliation and increase productivity during S&OP process

Figure 6.3 provides detail on the implemented SAP IBP solutions and the integration between each solution for the planning process flow.

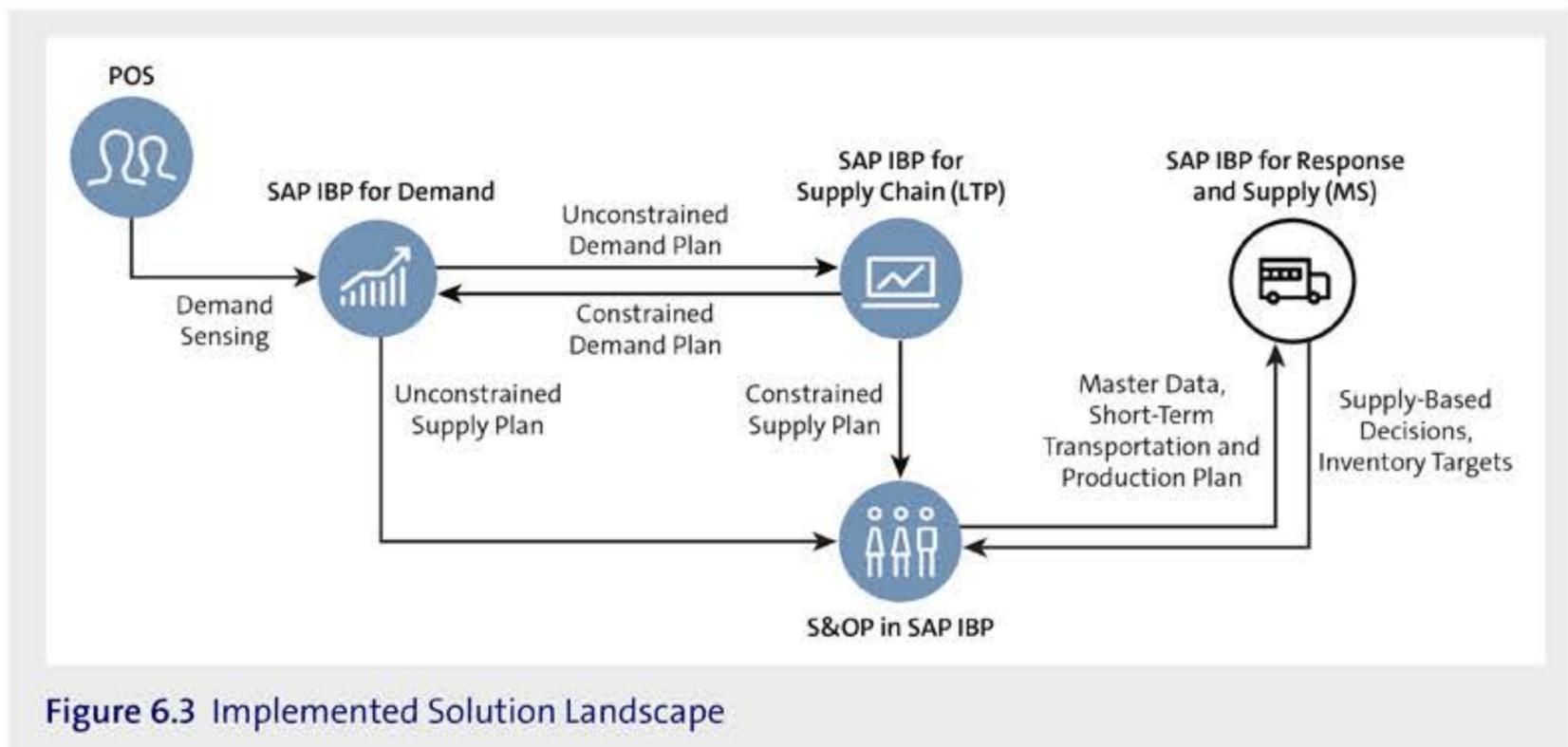
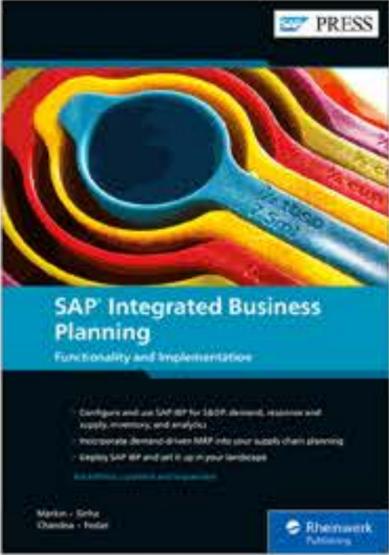


Figure 6.3 Implemented Solution Landscape

7 What's Next?

Now that you understand how operational planning works in SAP IBP for response and supply, learn more about SAP IBP's other capabilities! Start with a configuration guide, or focus on S&OP or inventory planning and optimization. Looking for more logistics content? Dive into our in-depth guide to production planning in SAP S/4HANA!



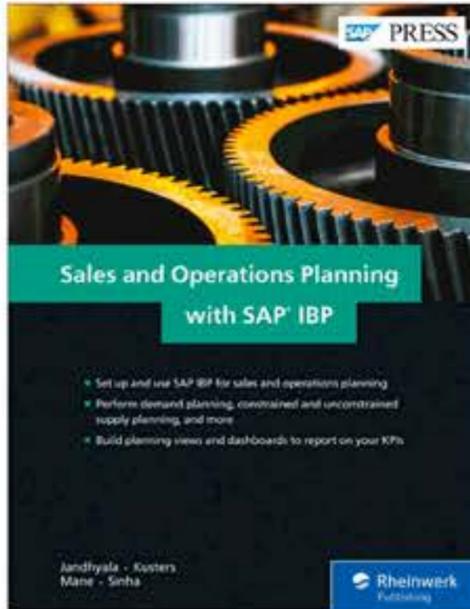
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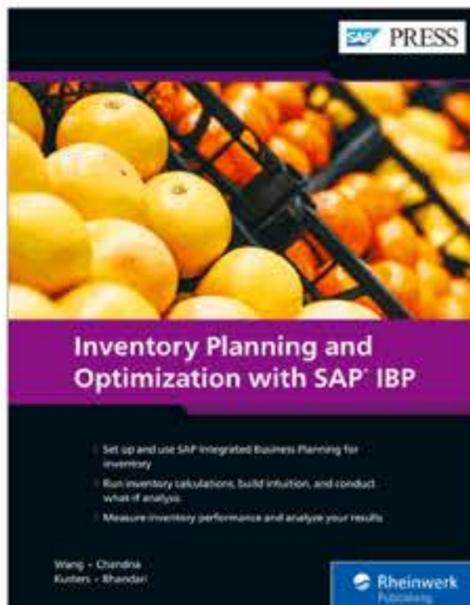
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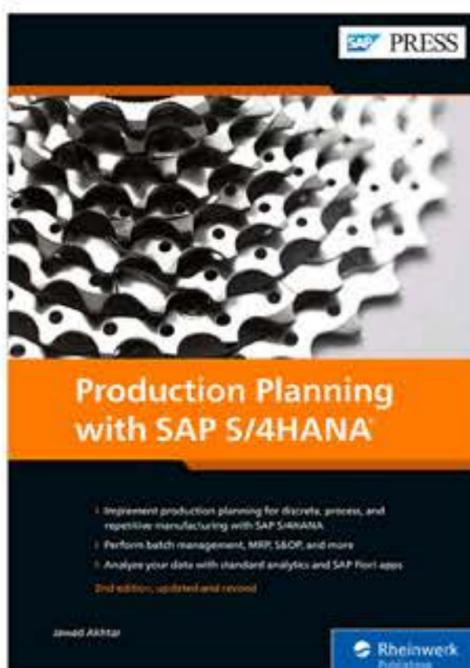
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