SCM in a Pharmaceutical Company 25

Tanguy Caillet

Competitive advantage in the pharmaceutical industry is driven by first class research and development and by optimised supply chain operations. Harmonised SCM processes, systems and organisations will lead to reduced inventories, increased capacity utilization, reduced order lead time, less obsolescences and lower IT system maintenance costs. Critical decisions can be made faster resulting in an improved customer service level. Based on common, standardised data, error rates are reduced and most importantly, full FDA CFR 21 part 11 and GMP compliance can be guaranteed and sustained.

The case study described in this chapter is based on a project in a European pharmaceutical company, that initiated to implement best practice supply chain operations for five European manufacturing plants and the European logistics organization (active ingredients supply, distribution centers, affiliate customers and third party manufacturers). The project scope includes SCM planning processes, supporting the production planning and detailed scheduling within the pharmaceutical plants as well as the network planning across the company's supply chain to optimally match supply and demand. The planning processes are implemented based on SAP R/3 4.6C and APO 3.1. The case study focuses on the implementation of the APS components SAP APO PP/DS to model the production planning and detailed scheduling in the manufacturing plants, and SAP APO SNP to model the supply network planning of the supply chain. The main results and benefits of the project will be highlighted as well as the major hurdles encountered in the implementation of the SAP APO PP/DS and SNP solution.

T. Caillet (✉)
Ernst & Young GmbH, Wirtschaftsprüfungsgesellschaft, Heinrich-Böcking-Straße 6–8, 66121 Saarbrücken, Germany
e-mail: tanguy.caillet@de.ey.com

H. Stadtler, C. Kilger and H. Meyr (eds.), *Supply Chain Management and Advanced Planning*, Springer Texts in Business and Economics,
DOI 10.1007/978-3-642-55309-7_25,

25.1 Case Description

25.1.1 Topology of the Pharmaceuticals Supply Chain

The supply chain consists basically of three main levels: chemical plants, pharmaceutical plants and marketing affiliates.

The *chemical plants* deliver the active ingredient (AI). The production of the AI within the chemical plants has not been tackled within the project as the manufacturing process differs significantly from the one of the pharmaceutical plants. The chemical plants, either part of the same company or third party suppliers, are treated as suppliers. Material requirements are planned by the Supply Network Planning module for the entire planning horizon (24 months).

The five *pharmaceutical plants*, spread over Europe, manufacture a wide range of product types. Solids (coated and uncoated tablets, capsules), liquids and creams, biotech medicaments, medical devices, consumer and OTC ("over the counter") products, sterile products and patches. All manufacturing processes consist of two main steps, formulation and packaging. The output of the formulation step is bulk material (unpacked tablets, liquids, etc.). The bulk material is packed in the packaging step into different put-ups (e.g. blister sizes, country specific packaging). As an order of magnitude, 50 active ingredients are formulated into 500 bulk materials, those are packed into 10,000 finished products.[1]

The *marketing affiliates* represent the biggest customer group in terms of volume. Other customer types, e.g. tender business, small countries, wholesalers, government agencies, non-governmental agencies complete the demand picture. All customers forecast their future demand. Depending on the customer type, these forecast figures are converted into sales orders according to Service Level Agreements (SLA) within a certain horizon (on average 9–12 weeks). Demand assigned to one plant can also result from a dependent requirement of another plant. For example a bulk material is produced in one plant, but packed by a second plant.

The supply and demand flows are handled by a *sourcing company*. The sourcing company, headquartered in a tax-optimised country, owns the valuable products. The ownership of finished products is transferred immediately upon the quality release to the sourcing company. The active ingredient, as the most valuable part of the product, is always owned by the sourcing company. Thus, the plant acts as a contractor for the sourcing company, transforming the active ingredient into finished products, only invoicing the manufacturing fee.

Distribution centers and warehouses are mainly located close to the plants. In most cases, products are directly shipped from the DCs and warehouses to the customers. In other distribution scenarios finished goods are shipped from one manufacturing plant to another plant due to regulatory reasons and are then delivered to the customer. The distribution itself is not considered as critical, as the value of the finished goods is rather high compared to physical volume and transportation

[1] In the remainder of this chapter the shortform "plant" is used to denote pharmaceutical plants.

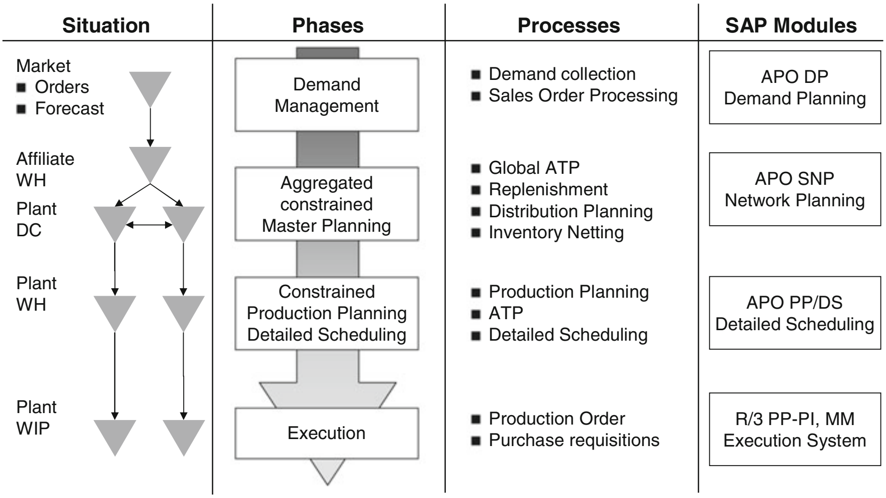

Fig. 25.1 Supply chain, systems and processes

costs. From a master planning perspective the distribution and transportation lead times have to be considered.

Figure 25.1 gives a high level overview of the pharmaceutical supply chain, including processes and IT systems. Table 25.1 summarises the supply chain typology of the pharmaceuticals supply chain.

25.1.2 The As-Is Situation

At the start of the project, a very heterogeneous environment, grown over the last decades, was in place. The following list highlights some key aspects of the company's as-is situation:

- Four SAP R/3 systems (two running R/3 PP, two running R/3 PP-PI), one BPCS system,[2] one R/2 system were used. Data integration between the systems was low, data structures not harmonised. The same product existed with several material numbers in different systems. Information sharing as well as synergies out of a common system were not achievable.
- No central supply chain network planning system was available, resulting in basically no central visibility of the supply chain constraints and problems.
- Production Planning and Detailed Scheduling of the manufacturing processes were performed in various stand-alone systems and spreadsheets, interfaced with

[2]Business Planning and Control System, an ERP-system sold by Systems Software Associates (SSA).

Table 25.1 Typology for the pharmaceuticals supply chain

Functional attributes	
Attributes	Contents
Number and type of products procured	Few (Active Ingredients, AI) specific (Packaging Materials)
Sourcing type	Single (Active Ingredients) multiple (Packaging Materials)
Supplier lead time and reliability	Long, based on forecast (AI) short, reliable (Packaging Materials)
Materials' life cycle	Long
Organization of the production process	Two steps (formulation & packaging)
Repetition of operations	Batch production
Changeover characteristics	Sequence dep. setup times & costs
Bottlenecks in production	Known, almost stationary
Working time flexibility	Frequently used, additional shifts
Distribution structure	Two stages
Pattern of delivery	Cyclic with specific country demand Dynamic with standard export demand
Deployment of transportation means	Unlimited compared to Cost of products & stock-outs
Availability of future demands	Forecasted
Demand curve	Seasonal for medications linked to winter illnesses for example static for others
Products' life cycle	Several years
Number of product types	Several (solids, creams, liquids, steriles, patches, biotechs, medical devices)
Degree of customization	Standard products (country specific)
Bill of materials	Divergent in formulation step divergent in packaging step
Portion of service operations	Tangible goods
Structural attributes	
Attributes	Contents
Network structure	Divergent
Degree of globalization	Europe
Location of decoupling point(s)	Assemble-to-order (country specific) deliver-to-order (standard export)
Major constraints	Capacity of formulation lines manpower in packaging lines
Legal position	Intra-organizational
Balance of power	Customers
Direction of coordination	Mixture
Type of information exchanged	Forecasts and orders

local ERP systems. This resulted in massive manual planning effort and sub optimal capacity utilization.

- There was no central statistical forecasting system in the as-is environment.
- KPI measurements were not consistently defined and did not support common targets.

- The business processes were rather complex, without uniquely defined responsibilities for core planning tasks like Materials Planning, Detailed Scheduling and Master Planning.

25.2 Objectives of Project

The objectives of the project were the creation of

1. a *to-be supply chain vision* with a clear objective to implement best practice processes enabling the future growth of the company
2. a *to-be system landscape* supporting the to-be supply chain vision and following a global strategy.

25.2.1 The To-Be Vision

To achieve the targeted goals of harmonised processes, systems, data and organizational units, the heterogeneous as-is environment was reengineered, and a streamlined and integrated to-be environment had to be designed. In the to-be environment the six ERP systems are integrated into one central SAP R/3 system. Based on the central ERP system for the entire company one central APS will be setup, representing the entire supply chain. The list below summarises the major features of the to-be environment:

- Changing the entire organization from local, function-oriented thinking to a common European company, sharing the same targets and commitment in true collaboration between the business functions and the supporting IT function
- Building of an European team to support that challenging vision on both, IT and business side
- Basing the project funding on expected benefits, proven by a business case performed before the implementation started
- Buy-in of all involved stakeholders right from the beginning to propagate the new vision and to support its implementation
- Setup a collaborative forecasting
- Visibility of the demand and the supply through the complete network of the supply chain based on one global, constrained master plan
- One common detailed scheduling system used by all plants, customised to support local specificities and process inherent constraints
- Installation of a common European reporting and controlling process, supported by common key performance indicators (KPIs)
- Integration of suppliers into the master planning processes
- Implementation of VMI processes for the major affiliates and customers
- Transportation planning and vehicle scheduling done by the third party logistics providers.

The to-be process map shown in Fig. 25.2 illustrates the vision set at the start of the project.

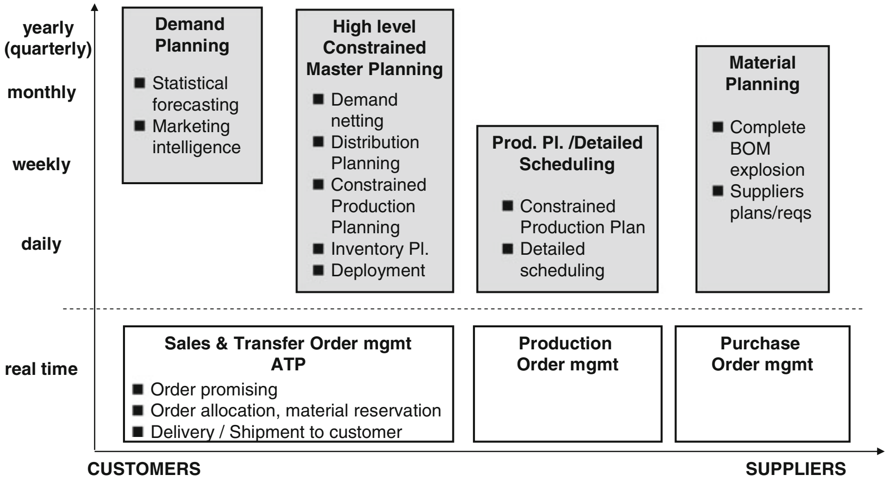

Fig. 25.2 Simplified process map

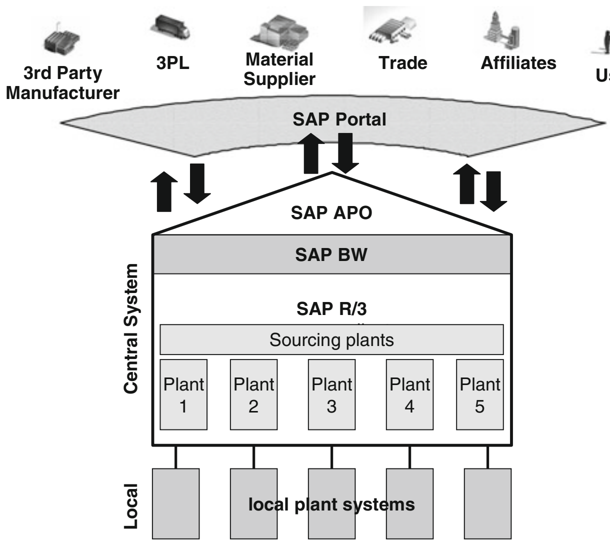

Fig. 25.3 Simplified system landscape

25.2.2 The To-Be Landscape Implemented

Figure 25.3 visualises the new IT system landscape supporting the to-be vision of the project. The IT system landscape is based on SAP R/3 4.6C, SAP APO 3.1, the standard core interface (CIF) to integrate R/3 and APO, SAP Business Warehouse (BW) and SAP Enterprise Portals (EP).

The central SAP R/3 system covers functionalities provided by the following modules: Production Planning/Process Industry (PP-PI), Materials Management (MM), Sales & Distribution (SD), Quality Management (QM, for batch management, quality inspection lots only), Controlling (CO, for product costing and budget planning), Warehouse Management (WM). After all relevant functionalities were migrated from the old (local) ERP systems of the plants to the new central ERP system, the remaining local non-ERP systems had to be interfaced to the central environment. These are mostly execution control systems, laboratory information management systems (LIMS), material handling systems (MHS) and warehouse management systems (WH).

The central R/3 system provides the integration basis for the APO system. From APO, the modules Demand Planning (DP), Supply Network Planning (SNP) and Production Planning/Detailed Scheduling (PP/DS) are used. The process coverage of the APO modules is shown in Fig. 25.1. SAP BW is the foundation of a common reporting and performance measurement system. SAP EP is used to integrate customers into the demand planning process and to enable customers to access sales orders and delivery confirmations.

25.3 Planning Processes

The planning processes introduced in Fig. 25.2 were mapped to the following ERP and APS modules:

Demand Planning	SAP APO DP
Master Planning	SAP APO SNP
Detailed Scheduling	SAP APO PP/DS
Materials Requirements Planning	SAP R/3 MRP
Production Order Management	SAP R/3 PP-PI
Inventory Management	SAP R/3 IM-WM
Procurement Direct Materials	SAP R/3 MM
Master Data Management	SAP R/3 MM
Supply Chain Controlling	SAP R/3 CO and SAP BW

The implementation of SAP APO PP/DS and SAP APO SNP, being the main enablers of the supply chain benefits envisioned in the initial phase of the project, are described in the next two sections.

25.3.1 Production Planning and Detailed Scheduling: APO PP/DS

The Planning Model. As mentioned before, the product range of the company is very heterogeneous, including solids, liquids & creams, steriles, patches, biotech and medical devices. This variety requires APO PP/DS to support a broad range of constraints and planning scenarios:

- Finite capacity of manufacturing resources
- Availability of labor force
- Prohibition to operate defined resources in parallel
- Priorities for a production or procurement alternative
- Availability of critical components
- Maximum holding time of products before next processing step
- Minimum waiting time between manufacturing steps
- Various lot-sizing rules.

The production plan is generated automatically by APO PP/DS. Based on the production plan a sequenced schedule is computed. This requires the optimization of the following parameters:

- Reduction of machine set-ups by producing products of equal set-up groups in a sequence
- Production sequence ordered by increasing compound concentrations to avoid intermediate cleanings
- Production sequence grouped by product and ordered by increasing order quantity, such that in case of quantity deviations of the packed bulk batch, the yield is on the biggest order (the relative deviation will be the smallest for the biggest order)
- In case of bulk material with an intermediate storage in a holding tank, the holding tank has to be emptied as soon as possible, requiring to group products consuming the same bulk material together.

In Fig. 25.4 an example is given for the creation of a sequenced schedule. The production planning run creates, changes or deletes unfixed planned orders. The planning run is executed bottom-up starting with the finished goods demand. The finished goods demand is covered by corresponding planned orders. The planning run creates dependant demand for components and the half finished goods bulk, which are covered either by planned orders or by purchase requisitions.

The resulting production plan considers all material and capacity constraints and tries to keep the due dates, but the sequence of the orders is not good. The optimization of the sequence is done interactively by the planner as not all parameters for an optimal sequence can be considered by the system automatically. To obtain an optimal sequence, the planner selects orders for a certain time period on one or multiple resources in the detailed scheduling planning board (DSPB) of PP/DS and calls the PP/DS optimiser. Using the genetic algorithm provided by the system, set-up times and delay costs are optimised as visualised in Fig. 25.4. The resulting sequenced plan respects due dates and avoids unnecessary set-ups.

The PP/DS optimiser does not take all of the mentioned sequence parameters into account. Therefore, the planner has to further improve the plan manually. The first option is to manually select a group of orders (e.g. a sequence of orders of the same set-up group) and improve their sequence using a sorting heuristic of APO (e.g. by order quantity or compound concentration). As a second option the planner may improve the sequence by manually moving orders and operations in the Gantt chart.

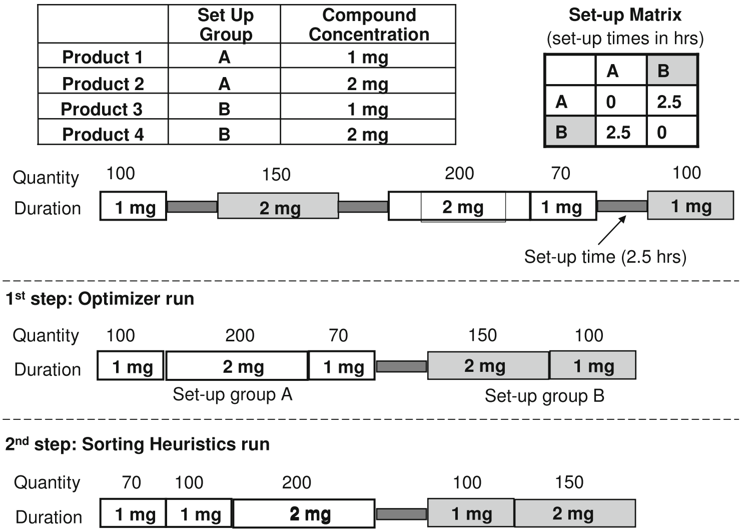

Fig. 25.4 Overview of sequence optimization

Sequence optimization is performed usually weekly for a planning time horizon of 5–9 weeks (4 weeks is the frozen horizon).

Process Integration. The production planning and detailed scheduling process transforms demand into feasible production proposals and feeds back information about the actual production execution into the planning processes. Out of the master plan generated by the Supply Network Planning module (SNP) planned orders (fixed and unfixed ones) are created to be further processed by PP/DS. As a first step in the overall planning cycle (see Fig. 25.5), the SNP planned orders are manually converted into PP/DS planned orders by the planner. Compared to the bucketised SNP orders the PP/DS orders are time continuous, i.e. they have a precise start and end time.[3] The PP/DS production orders are planned with respect to critical materials only that may constrain the plan. Uncritical materials not constraining the plan are planned by the MRP process in R/3, based on the PP/DS production plan.

Close to the execution date, the sequence of planned orders is fixed. Within a horizon of usually 2 weeks, the PP/DS planner triggers the conversion of planned orders into process orders. While the PP/DS planner may still change some attributes of created and released process orders (e.g. limited changes of quantities and adjustment of the plan to the actual production progress), the planning object "process order" is within the responsibility of SAP R/3 as only there GMP relevant tasks can be performed (e.g. allocation of batches, keeping track of the process order life cycle, QA approval). The PP/DS planner can easily identify the status of

[3]The SNP orders are planned based on weekly time buckets.

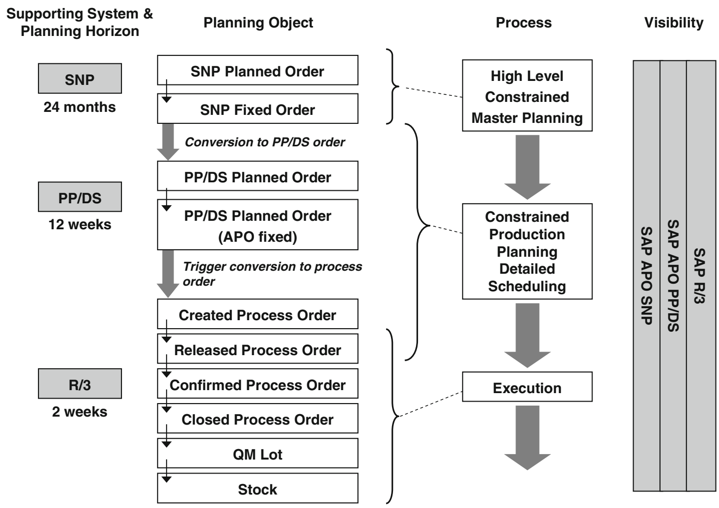

Fig. 25.5 Planning object lifecycle

the execution progress within the PP/DS planning board by a graphical code (shapes and colors), reducing the coordination effort with the shop floor significantly.

Set-Up of the Master Data Model. As the effort spent on master data for the implementation exceeded 60 % of the total project volume, this topic will be discussed in more detail. All relevant master data (see also list below) is mostly already existing in SAP R/3:

- R/3 material master data (= products in APO)
- R/3 resources & capacities (= resources in APO)
- R/3 recipes and bill of materials linked by production versions (= production process models/PPMs in APO)
- Existing in APO only: Set-up matrixes indicating the duration and cost of a transition of one set-up group to another (from one product to another).

For the integration of master data from SAP R/3 to APO PP/DS the standard core interface (CIF) was used.

A commonly underestimated effort though is hidden in the fact that the R/3 master data is usually set-up in a way to support execution processes, but do not take planning aspects into account. Prior to this project master data was existing in various systems like SAP R/3, SAP R/2 and BPCS, and planning was performed in stand alone systems with proprietary master data and complex interfaces. The re-usability of this master data for the APO implementation was low. Efforts had to be spent for redefining all MRP parameters to support the technical integration aspects of R/3 with APO and to support the new planning processes. The material master data of R/3 had to be completed with MRP and APO parameters, conflicts with established MRP processes had to be resolved. The R/3 resources define the basis for all capacity planning in APO. Resources had to be adjusted or newly defined in R/3 in order to create the resource models in APO correctly. For example, it must be defined whether a resource can be used by APO PP/DS and SNP or not, whether multiple operations can be executed in parallel or not, and whether resources are alternates. The standard core interface between R/3 and APO was extended by additional fields and additional rules and default values for data objects used by APO.

Probably the most complex master data element in APO is the production process model (PPM). The PPM combines R/3 information from the production recipes, the bill of materials and the production versions. As the name "PPM" is already indicating, the PPM models the production process. Information like on which resources a production is to be executed, what are the relationships and time dependencies between operations, how much time does an operation need to run, which set-ups are to be performed, etc. are defined in the PPM. The PPMs in APO are generated mainly based on standard R/3 data objects like recipe, bill of materials and production version. Due to the GMP compliance, recipes, bill of materials and production versions in R/3 are critical elements; any change to the objects requires an approval from quality assurance. In the project, basically all recipes had to be restructured and additional information was added to support the planning processes in APO:

- Phases and operations in the R/3 recipes had to be split into individual production steps that require an individual visualisation in APO.
- Dummy phases or dummy resources were added to model specific constraints in APO.
- Recipes were split into APO-relevant and non-relevant phases.
- Sequence dependant set-up informations (the set-up groups) were added to recipes.
- Additional production versions were created to support time dependent changes in the recipe.

In addition to the changes required, the general quality of the existing master data required rework, too. Interdisciplinary skills were needed in the project team to cope with all impacts that an R/3 master data change may have.

A significant set of R/3 master data was made available already at the beginning of the APO modeling phase. This helped to assess the quality of the existing master data for all relevant production processes. However, the improvement of the data quality took longer than expected and consumed more effort than originally planned.

25.3.2 Master Planning: APO SNP

The SAP APO SNP solution was designed to take full advantage of the standard functionalities of the tool, and to prepare the company for the future steps in the evolution of their supply chain. The list below is a summary of the main requirements that were to be implemented:

- Master Planning performed by APO SNP on a 24-months horizon
- Global network representing the complete flow of materials from affiliates to distribution centers, the pharmaceutical and the chemical plants
- Integration of critical suppliers, for direct purchasing as well as third party manufacturers with monitoring of their available capacity
- Utilisation of the Vendor Managed Inventory scenario with 20 affiliates
- Weekly release of the forecast from Demand Planning to SNP
- Demand constrained by the supply plan based on the global SNP optimiser run
- Monitoring of the supply network with generation of alerts depending of the planning situation
- Deployment of the available supply at the plants and at distribution centers to the VMI customers
- Transport Load Building to propose an optimised loading of the different transportation modes (truck, air cargo, sea container, parcel) for the VMI customers only.

SNP Planning Process. The SNP planning process is based on a weekly planning run of the SNP optimiser for the complete supply chain except the third party manufacturers.[4] Based on the weekly release of the forecast from the Demand Planning module at the VMI customers and at the shipping distribution center for non-VMI customers, the optimiser is planning the network while respecting the following constraints:

- Production constraints at the plants
- Due dates of the demand
- Safety stock levels at the VMI customers
- Availability of the critical components like active ingredients from the chemical plants
- Fixed lot size of the formulation batches
- Distribution and transportation lead times.

By including the VMI customers in the optimiser run, master planning became more stable. VMI customers may use their safety stocks to prevent shortages. This increases the flexibility for optimizing the plan. Stability of the master plan also helped the plants to stabilize their production plan. Non-VMI customers usually create more demand fluctuations than VMI customers. Those could be better served due to the additional flexibility gained by the VMI customers' safety stocks and the stable demand signal from the VMI customers. As a result, the delivery on time was improved and inventories could be significantly reduced.

After a planning run of the SNP optimiser (usually performed over the weekend), the master planners look at the alerts generated by SNP and will solve the issues

[4]Third party manufacturers were excluded from the SNP optimization run due to technical reasons of the SAP APO 3.1 release.

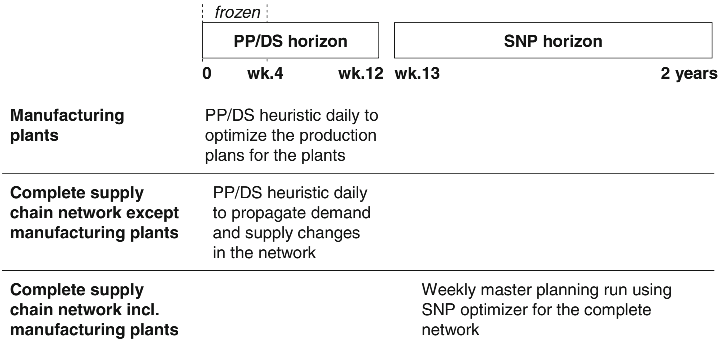

Fig. 25.6 Planning horizons of PP/DS and SNP

during the week. For the issues involving production capacity, the master planners will need to decide on the shift pattern to use for the given weekly bucket in order to tune the available capacity. For a constrained capacity planning on a mid to long term horizon, a weekly planning frequency is sufficient.

For the near term horizon, the planning system must be able to react quickly to demand and supply changes: supply information is changed daily based on the production plan, sales orders are changed online (whereas the forecast is released only once per week by APO DP). To propagate short term demand and supply changes through the complete supply chain, a further planning run was designed to optimize the complete supply chain network except for the plants. This planning run operates in the PP/DS planning horizon and is based on the PP/DS heuristics (see Fig. 25.6). However, note that this short term planning run is executed by the master planners as it covers the complete network except the plants. The demand (forecast and sales orders) and supply information is propagated daily through the complete network using the planning heuristics of PP/DS. The main result of this planning run are production requirements from the distribution centers to the plants. By that, the production planner gained additional visibility, as the orders received from the distribution centers were not anymore aggregated to weekly buckets, but represented individually in the plan. This visibility was a major business requirement, as many production orders are customer specific orders (e.g. country specific packaging).

The supply generated by production orders within the frozen PP/DS horizon (week 0 to 4) is deployed by the master planner to the distribution centers and to the VMI customers using the deployment heuristic of SNP. The deployment heuristic generates confirmed stock transfers. Based on these stock transfers the master planner creates the VMI sales orders for each VMI customer by running the Transport Load Building module of SNP. This module aggregates for a given transportation lane (a DC to a VMI customer) all the products to be shipped at a certain date, and optimises the load of the trucks or containers based on their weight, volume and forms of transportation. The generated VMI sales orders are transfered to R/3 SD and are sent to the VMI customers as confirmation of the future replenishment deliveries through the SAP Enterprise Portal (see Fig. 25.3).

Set-Up of the Master Data Model. The data model for APO SNP was based on the PP/DS data model. By that, corrected data for materials, resources and PPMs of the plants was provided to the SNP project. For the remaining master data at the distribution centers level, we had to rely on data maintained in the central R/3 system transfered by the standard CIF interface from R/3 to APO. However, two important types of master data could not be transferred from R/3 to APO using CIF, these are the SNP PPMs and the transportation lanes.

The SNP PPMs are normally generated from the PP/DS PPMs by a standard program within APO. One useful feature of this program is to take into account the different modes of PP/DS PPMs: Operations in a PP/DS PPM may be run on alternate resources, called *modes*. The PP/DS planning algorithms consider the availability of alternate resources in order to optimize the production plan. Unfortunately, the planning algorithms of SNP cannot consider PPMs containing alternate resources for the same operation. Therefore, based on the given standard program in APO, an "enhanced" conversion program was written that

1. splits a PP/DS PPM with alternate resources into multiple SNP PPMs, and
2. creates the SNP PPMs in such a way that the structure of the PP/DS PPMs are kept and the users see the same structures in both modules, PP/DS and SNP.

The second type of master data that could not be transferred from R/3 via standard CIF are the transportation lanes. Transportation lanes are the backbone of the SNP solution, as they represent the connections in the supply network. SAP provides a standard tool for mass creation of transportation lanes. This tool had two weaknesses preventing its use in the project:

- With the tool, transportation lanes for two locations can easily be created for *all* products. In this project we needed *product-specific* transportation lanes, that cannot be created easily using that tool.
- Transportation times are computed by the tool based on the distance between the start and end locations. Here, a more complex transportation time computation was needed, depending on the forms of transportation, internal lead time of the third party logistics provider, etc.

In order to overcome the weaknesses of the SAP standard tool, a project specific toolset for the creation of transportation lanes was designed and implemented. A *flow database* was setup containing all flows in the network from finished goods at VMI locations to the active ingredient stock at the chemical plants. This database proved to be a very useful tool to gather knowledge about product flows forming the network that is usually scattered across many people in the organization. The flow database was then interfaced with R/3 to store for each flow the product code and the sending and receiving location in R/3. Based on these fields, R/3 complements this data with the means of transportation and the transportation lead time generated by the standard route determination logic of the R/3 SD module. Finally, for one sending location and one receiving location, the product codes and their respective means of transportation and transportation lead times are aggregated to form a transportation lane that is uploaded to APO SNP through the standard BAPI.

25.4 Results and Lessons Learned

25.4.1 Achieved Results

The main benefits envisioned in the business case prior to the APS implementation were achieved. These are in detail:

- The visibility and problem solving capabilities of the entire organization improved by the use of a common data basis and a common visualisation tool, allowing better and faster decisions.
- System based finite capacity scheduling and fast simulation capabilities improved the plan stability and resource utilization significantly.
- Collaborative demand planning with the customers allows for a proactive stabilisation of the demand as changes in the demand by the customer are compared with a constrained demand from the previous master planning run and exceptions are generated.
- The master planning run enables the company to better foresee the future capacity issues and plan accordingly future investments.
- By reducing the order to cash cycle, as well as pushing for more collaboration with the affiliates through a VMI process, the inventory levels were reduced.
- The collaborative concept and the reduction of supply chain steps have increased the overall reliability of the processes. The reduced time to market has lessened the risk of obsolescences which is an important driver to improve the cash flow of a pharmaceutical company.
- By consolidating the system landscape, the IT maintenance costs were reduced significantly.
- Standardization of the master data enables the visibility and interchangeability of information faster across the supply chain.
- The overall administrative workload for tasks performed previously manually or based on wrong information was reduced significantly.
- Seven local organisations grew together into one European organization.

25.4.2 Lessons Learned

Without organizational changes and business process reengineering, the risk of implementing the as-is situation within a new tool is real. The to-be vision needs to be propagated by the upper management towards the different organisations of the company to reduce their resistance to change. This has proven mainly true wherever boundaries between the organisations had to be broken down. The KPI measurements should follow the new processes and be revised accordingly. Keeping previous KPIs will not facilitate change as the old way of working is imposed. The planning processes have to be seen and defined in an integrated way. Demand planning—master planning—production planning—materials requirements planning have to be integrated technically and from an organizational point of view.

VMI processes based on Collaborative Planning, Forecasting, and Replenishment (CPFR) could only partly be realised. The marketing affiliates, although part of the same company, were granted control of the replenishment demand towards the plants. They were accepting the result of the replenishment planning run and/or changing the result according to their needs, allowing manual override of the VMI concept. Therefore, contingencies have to be built up in form of inventory to cover uncertain changes in the affiliate's requirements, annihilating the benefits of the VMI process. The success in the implementation of a VMI scenario is not determined by the technical integration of different systems, but strikingly driven by the relationship of the partners and their ability to rely on one another.

A global master planning run as foreseen and supplied by SAP APO SNP will be implemented gradually only. The change management efforts from the function oriented supply chain organization to a single and integrated European supply chain is estimated as a project risk due to the expected resistance within the organisations. Reactivity of the supply chain will only increase once the master planning can be executed in one integrated step. Resistance to a central master planning in planning and production departments of the plants has to be anticipated and avoided by an involvement of all users, right from the beginning.

Availability and consistency of R/3 Master Data is crucial for succeeding an APO implementation, more than 60 % of the APO PP/DS and SNP implementation time had to be spent actually on R/3 master data definition and revision. Double maintenance of data in different systems (R/3 and APO), especially in a validated environment is not acceptable. Enhancements had to be foreseen to minimize the maintenance effort and the risk of discrepancies.