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HOW TO USE THIS BOOK: APO AS A MIND MAP

As with most SAP applications, the best path through this text is not a straight one. SAP applications in general and SAP APO in particular are simply too multidimensional to be suited to a simple, linear decomposition. Just the same, we have undertaken great pains to make SAP SCM as navigable as humanly possible. SAP APO seeks to replace some work that until recently has been strictly limited to the aegis of the human intellect—yet it ultimately does not replace people as much as it elevates their purpose by providing better computation and leveraging more strongly on the human specialties of reason, interaction, and qualitative judgment. Where SAP APO expands the scope of the system in supply planning is when it computationally takes over as much as possible of what used to be exclusively a human analytical domain; in this respect APO may be said to “map a supply planner’s mind,” yet there is no simple way to lay out a map to the human mind. The mind, like APO, is nonlinear. In finding the best way through SAP APO we should think of the supply chain models created in it as models of all the objects, relationships, and dynamics that a human master scheduler, buyer, or production planner intellectually masters in order to employ his or her craft.

Our planner, as such, is concerned with certain components of the supply chain: locations of plants, customers, vendors; products, their components, the transportation lanes between them and methods of transport; the means of production. She is likewise concerned with different end-goals in analyzing the information about these supply chains: determining the best, most current picture of demand without respect to supply (demand planning), organizing the entire supply chain to work collaboratively—even collaborating outside organizational walls with suppliers and customers—to optimally meet known demand (supply network planning), and deriving the best schedule to fully utilize the resources of a specific plant (production planning/detailed scheduling).

To grapple with the complex and multidimensional organization of a mind that thinks about the supply chain, analyzes and master plans it, a straight line simply will not do. Instead we will employ the metaphor of a cookbook and divide our treatment into three major functional parts:

1. A *contextual introduction*, such as introduction to the cultural background that gave rise to a particular cooking genre such as Italian or Thai—in this case an introduction of the overall SAP APO architecture and its supply chain context, as well as “tips and tricks” for improving the critical strategic judgments and

decisions of project managers, executives, and project sponsors that have so much impact on APO and SCM projects' success or failure.

2. Ingredient *stocks and bases that form the core of more sophisticated entree dishes*, such as beef or vegetable stock, dressings, batters, and icings—but here with SCM our basis shall be supply chain *master data and transactional data elements* that form the basis of any manner of supply chain model (i.e., locations, products, orders, etc.).
3. *Actual complete entrée recipes*, which simply make reference to bases in the second section without redundantly reprinting them, as they may occur many times over in many different recipes—in our case recipes to deliver with SCM techniques for employing planning modules to work with master data, model supply chains, and forecast or produce operational schedules.

Unlike cooking, however, SAP's SCM product is expansive, crossing boundaries into whole additional disciplines; so in addition to these three sections we must add a fourth to address the major disciplines with a direct impact on supply chain planning:

4. *The SAP BW data basis and analytical adjunct to APO and the SCM ICH application*, the latter of which enables sophisticated planning collaboration with customers and suppliers.

As with a cookbook, the introduction sets the stage for the subject of the text, it explains backgrounds and starting requirements (i.e., kitchen appliances, tools, materials), and sets expectations. From there many cookbooks include a section for making common stock materials that are found as ingredients to recipes for entrees or side dishes, but which are not usually served alone, for example, vegetable stock, gravies, dough, batters, and dressings. The recipes for these stock food components are used repeatedly as parts of other recipes and there is no point in repeating them each time they are used, so they are stated independently in their own section and then referred to whenever they come up later on. The last section of the cookbook may then contain recipes to make the actual entrees, sides, deserts, and dishes that are the business of dinner, which each may or may not refer back to stock recipes as a prerequisite.

Our text closely follows this model. We begin with a basic background in supply chain management that is essential to understanding the use, applications, and power of SAP SCM. Without a solid background in the basics of supply chain management, users run the risk of repeating many of the mistakes made with legacy tools when they deploy the product, using it the same way they used much more primitive tools. One would not purchase a modern rice cooker if one meant only to steam up Uncle Ben's from time to time. One buys the modern rice cooker because there are 6,000 years of multicultural history of rice and thousands of ways to prepare it. Don't get stuck with ordinary, fluffy white rice—learn the basics of supply chain management so that you can deploy the full power of APO!

Second, there are two kinds of data used in APO, as in almost any business-oriented computer system: *master data* and *transactional data*. Master data is the architectural or skeletal data that forms the infrastructure of the system: things like product and location setup. Transaction data is data that is put to use describing actual events, like 100 units

of plastic cups that a factory means to build on Tuesday. So much master data in APO is used in every module that there is no use in repeating the steps for setup of locations and products in *both* the SNP and PP/DS modules, for example. The master data section will list instructions for setting up each element of master data.

Like a cookbook, Part Three contains “recipes” for using the actual planning modules of APO to plan and manage the various aspects of the supply chain: demand planning, supply network planning, production planning and detailed scheduling, global available to promise, and transportation planning and vehicle scheduling. Wherever master data elements are called on as prerequisites by these modules, their recipe will be referenced so that readers can go to the appropriate section in Part Two for details of how to set them up.

Finally, in order to empower users, developers, and their respective organizations to employ the full power of APO, we include an additional section that explores two other, major integrated applications found within the SAP SCM platform in versions 4.1 and 5.0: SAP BW and SAP SCM ICH. The Business Information Warehouse (BW) forms both the data basis of SCM, including and especially APO, as well as provides mature, first-class reporting and analytics that are actually integrated with and manifested in Microsoft Excel. SAP SCM ICH, the Inventory Collaboration Hub, comes as a separate application in SAP SCM with APO, but empowers users of SAP R/3 to collaborate directly with external suppliers and customers—either outsourcing materials replenishment to suppliers or including them in the planning process or both. Together, BW and ICH are like height and depth to APO’s length: exponentially increasing its power to provide value-return to organizations that adopt it.

ONE BOOK, MANY CURRICULUMS: CUSTOM RECOMMENDATIONS FOR READING ORDER

As indicated earlier, this book will not make for a good straight-line read. Because of its cookbook-like organization, it will not make sense for most users to read this text from cover to cover as most users will not need or interact with all the modules of APO or all the applications of SCM; and even if they did, it still would not make sense to read Part Two in its entirety before reading Parts Three or Four, for example. Readers will need the SCM foundations established in the first section. We always recommend starting there and reading Part One in its entirety. Failure to read this first part may result in an unintentional underutilization of the full power of APO simply by way of ignorance of all the different business and information domain spaces it covers and its depth of integration.

From there, however, *end*-users should skip to Part Three and focus only on the module or modules they expect to use in the course of their work, referring back to chapters in Part Two whenever the planning module “recipe” of their interest instructs them to do so. Even readers who mean to absorb the entire scope of APO’s planning modules may wish to skip to Part Three, as this will lead to the most orderly and nonrepetitive coverage of Part Two. For example, if your organization has deployed DP and PP/DS, skip Part Two and read only the DP and PP/DS sections of Part Three. Wherever necessary, those sections will instruct you to go back and read master data sections in Part Two and you

will have the option to read only those sections specified, and when you do so it will be in the mental context of how they will be used for the tool you are interested in.

Depending on whether one comes to APO and this text as a first-time learner or seasoned system analyst or consultant, one may go about exploring and reading this book differently. In contrast to end-users, analysts, consultants, and engineers will usually do best to work through the book from cover to cover in a nearly strict 1, 2, 3, 4 order. Executives interested in APO but involved in direct delivery may be interested only in Part One and overviews of modules in Parts Three or Four. Project managers will have a similar scope as executives but should also familiarize themselves to some degree with the use of master data and the CIF in Part Two. Seasoned developers directly involved in construction and deployment may start with Part One, skip to Part Three, and only refer to Part Two in reference. Furthermore, tool experts specializing in DP and/or BW should cover all of Part One but may wish to limit further reading to Chapter 6, on analytical master data, and Chapters 8 or 11, DP and BW. Supply chain planning specialists, however, may start with the same foundation in Part One but cover supply chain master data in Chapter 5 and SNP and PP/DS in Chapters 9 and 10. (See Exhibit 1.1.)

INCLUDED AND EXCLUDED: SCOPE OF THIS TEXT

APO and the wider SAP SCM suite of tools including BW and the Inventory Collaboration Hub that are now included in the SCM package form a truly deep and vast body of software applications—there are more than 4,300 transactions in SCM! It is simply impossible within one volume to do instructional justice to this mighty corpus of tools and it is not our intent to attempt so. In principle, this book is scoped to focus on supply chain planning and its direct support in data management, analytics, and external collaboration (Exhibit 1.2). Specifically we include detailed, modular, and step-by-step “how-to” instructions on the supply-chain *planning* modules of APO, that is, DP, SNP, and PP/DS. Even covering only these three parts of APO it will still not be possible to consider every setting and their effects, but we will seek to comprehensively describe the relevant planning processes of each tool and the range of options available to users. Additionally, since DP is built on the same master-data basis as is BW, a natural bonus of this text will be a miniprimer in the setup and use of the BW tool, which will be by no means comprehensive by itself but which should leave the reader with an appreciation for the business value of the tool, some skills to set it up and conduct minimal reporting, and a sound foundation for further study. Since industry interest has shifted great energies to exploiting return-on-investment opportunities available through increased supply-line efficiency via external collaboration and vendor-managed inventory, and as SAP has greatly expanded the power of SCM ICH in the 5.0 revision, we will also visit this tool and explore its business use, integration with SCM and R/3, and basic configuration.

Much energy has been spent and oil burned hailing the vitality of solvers and optimization in the improvement of supply chain planning and execution, and we will certainly pay our dues here to those important changes in the technical landscape of commerce. Yet, though not often hailed, of minimally equal value to the improvement of supply chain management efficiency, effectiveness, and bottom-line ROI-value in commerce is the quality of two signals that traverse the supply chain: the customer-originated demand

Role-based Curriculum/Common Roles	Recommended Reading Order
<i>Executive/Project Manager</i>	Part I (Chs. 1–4, architecture, strategy)
<ul style="list-style-type: none"> • Executives • Project Managers 	Section: Use of Profiles in APO Chapter 11: BW and strategies Optional—Chapter 12: ICH
<i>Demand Planning</i>	Part I (Chs. 1–4, architecture, strategy)
<ul style="list-style-type: none"> • Demand or forecast analyst • Supply/demand analyst 	Chapter 5: Supply chain master data Chapter 6: Analytical master data Chapter 8: (UI section) Chapter 9: Demand Planning Chapter 11: BW and strategies
<i>Supply Network Planning and External Collaboration</i>	Novice:
<ul style="list-style-type: none"> • Sales/operational planner • Master scheduler • Business analyst • Buyer (medium-range) 	Part I (Chs. 1–4, architecture, strategy) Chapter 5: Supply chain master data Chapter 8: (UI section) Chapter 9: Supply Network Planning
	Advanced:▼
	Chapter 7: Core interface Chapter 6: Analytical master data Chapter 11: BW and strategies Chapter 12: ICH and other collaboration
<i>Production Planning/Detailed Scheduling</i>	Novice:
<ul style="list-style-type: none"> • Production planner • Production scheduler • Ground controller • Buyer (tactical/short-range) • Site scheduler (i.e.; factory, warehouse, distribution center, port) 	Part I (Chs. 1–4, architecture, strategy) Chapter 5: Supply chain master data Chapter 8 (whole chapter): Production Planning/ Detailed Scheduling
	Advanced:
	Chapter 7: Core interface Chapter 6: Analytical master data Chapter 11: BW and strategies
<i>Developer</i>	General:
<ul style="list-style-type: none"> • Business analyst/application consultant • System analyst • Software/SC engineers • Other developers 	Part I → Part II → Part III

EXHIBIT 1.1 CURRICULUMS BY BUSINESS ROLE AND EXPERIENCE

▼Advanced users are also counseled to rely on cookbooks wherever possible, selectively dipping into textual explorations only when necessary, thereby avoiding the necessity of digesting all the verbal detail that is required to bring novices up to pace with the tool.

Business Function	SCM Application	Module	In Scope
Supply Chain Planning	APO	Demand Planning	<input checked="" type="checkbox"/>
		Supply Network Planning	<input checked="" type="checkbox"/>
Supply Chain Planning and Execution		Production Planning/Detailed Scheduling	<input checked="" type="checkbox"/>
Supply Chain Planning for Logistics Execution		Transportation Planning/Vehicle Scheduling	<input checked="" type="checkbox"/>
Planning Specialization		Global Available to Promise	<input checked="" type="checkbox"/>
Supply Chain Execution		Deployment	<input checked="" type="checkbox"/>
		Transport Load Builder	<input checked="" type="checkbox"/>
Real-time Logistics Tracking	EM	n/a	<input checked="" type="checkbox"/>
Supply Chain Planning and Collaboration	ICH n/a	n/a	<input checked="" type="checkbox"/>
Supply Chain Data Management and Analytics/Reporting	BW data mart	n/a	<input checked="" type="checkbox"/>

EXHIBIT 1.2 SCM PLANNING APPLICATION/MODULE SCOPE

signal and the global inventory signal. The better visibility that suppliers have of changing customer demand data and the better visibility that buyers, planners, and automated planning runs have at all stages of planning—the more time-dollar-cost efficiency will be realized. Collaboration tools such as those provided in SCM and explored in Chapter 12 go to great lengths to make levels of supply chain power available off-the-shelf to small- and medium-sized organizations that were until recently the exclusive domain of such players as UPS and Wal-Mart.

While some discussion of the transactional nature of the CIF interface is essential because almost all installations of SAP APO will acquire master data from SAP R/3 using the CIF, not covered here will be any of the technical basis-level installation, configuration, or management of internal components for liveCache or the CIF, nor for that matter installation of the APO tool itself. Neither will we look at system/server network configuration or optimization.¹ Do not look to this text, for example, for instruction on how to install APO and optimize a server or network platform for its use.

Also not covered are the ancillary SCM tools that have been added to the SCM 4.1 and 5.0 releases: Forecast and Replenishment or Event Management; though in the latter case of Event Management (EM), with a mind to the powerful supply chain advantage of inventory visibility across the supply chain, we nonetheless strongly recommend further investigation outside this text by the reader and any interested organization. The advanced planning techniques of APO, the inventory and demand signal quality advantage of ICH, and the power of the EM tool through its employment of radio frequency identification (RFID) in logistics tracking will together make for a potent blend of twenty-first-century supply chain excellence for SCM-adopting organizations, which have every reason to expect realization of concrete and far-reaching competitive advantages in supply chain execution that would be altogether unaffordable if technology adoption was limited to in-house technical development. Regrettably, space and experience simply do not allow for coverage of EM here.

We will not cover parallel functions of APO in the R/3 tool, such as opening customer orders, management of independent requirements, materials requirements planning (MRP), or inventory any more than they are absolutely essential to understanding their role in APO itself. Other exclusions will be the Global Available to Promise module of APO (GATP), the Transportation Planning and Vehicle Scheduling module (TP/VS), and the Deployment and Transport Load Builder (TLB) submodules. Global Available to Promise, though a powerful planning specialization that can enhance SNP and PP/DS, is nonetheless such a specialization as to be a departure from our key emphasis on planning. The structure of SCM and APO is continuous, stretching from the highest aggregate of planning in the forecasting of the DP module to the lowest level of production order management in the DS submodule, and therefore it does not allow us to dogmatically exclude supply chain execution and control from scope. Sitting at the end of the planning line, the PP/DS module ultimately converts planning to management of day-to-day physical action, and to address PP/DS as we must because of its role in planning, we necessarily address supply chain execution. That said, our intent here is to explore planning, covering other areas only where necessary, so TP/VS, Deployment, and the TLB, each of which are primarily related to supply chain execution, fall outside our scope.

One last note on what is not covered: the Mass Maintenance transaction (MASSD). Found under APO's Master Data node in General Master Data Functions, we feel it necessary to exclude this transaction with special treatment. We usually exclude whole areas without picking on individual transactions, and with greater than 4,300 transactions in SCM to explore we have much reason to do so, but MASSD requires a little explaining for a text that targets the end-user as much as the developer: Why would we exclude a transaction whose existence is explicitly intended to ease the end-users' experience of the tool?

We address this with a few short points: First, mass maintenance is indeed a process that *may* be applied during productive use of the tool and is of limited utility during development and, as the case happens to be, this text is written by a developer. As such, we come to the second point, which is that for data on experiences with this transaction we must rely on the authority of anecdotes from those in the trenches who sometimes are called upon to use it. Anecdotes, unfortunately, are unreliable teachers and should be treated with instructive authority usually only when good research and direct experience supports their suggested conclusions. While we have no research or experience to corroborate the hearsay that sometimes besmirches MASSD, there is a certain air of credibility to the reports about it, and as the consequences are so severe, we choose to err on the side of conservatism and note them here.

This brings us to the third point: the reports. We have heard from many quarters not so much that MASSD is buggy (and we do not claim here that it has any bugs) as that it is *dangerous*. MASSD (Mass Maintenance as the name implies) is a transaction that is applied to make mass changes across whole swaths of master data without being troubled with the necessity of individually investigating each change-case. Of course, it may be a master data manager's *job* to investigate each use case when making mass changes, but we nonetheless face the inescapable fact that angelic beings are in very short supply on the labor market and master data managers are too often of the run-of-the-mill human type. It is nice to have a feature like MASSD when all one wants to do is change a setting

from “P” to “S” on 500 products. Nonetheless, it seems to be too easy for some users to include products (or other objects) on their changes lists that they did not notice or intend. Alternatively, it also sometimes occurs that users will make a small, unintended change—or even a small change that was intended but not carefully thought out—but to 500 or 1,000 cases. In a production environment these changes may equate to money, usually money lost and sometimes lots of it—before changes are noticed and corrections made.

So, anecdotes: yes; direct experience or research: no; but strangely credible to the ears of those dirtied by years in the trenches of IT: You better believe it. In fact it is possible to carefully design master data interfaces and business processes to minimize if not eliminate the need for regular mass maintenance, and while we would caution against the oversensitivity of some securities professionals who would “solve” problems such as this via the oft-abused power to forbid, we must nonetheless urge developers to think carefully through data maintenance processes in such a way as to treat use of mass maintenance as an exception process rather than a regular event. As to its use: Like so many of the 4,000 transactions that we cannot cover in one text, nimble SCM/APO users such as the type we wish to create with the following instruction will find it relatively easy to master without explicit step-by-step coverage; and moreover, users should probably not even be in the transaction until they have risen to that appropriate credit of “nimble.”

Enough, then, for what we will not cover; let us consider what is included. Generally speaking this text is both inclusive of and limited to whatever facts, techniques, or methods are necessary for a business user to employ SAP APO usefully to conduct supply chain management *planning* on an already-deployed, already-optimized (technically) software platform while expansively applying APO’s unique integrative power to add ROI-improving dimensions of data visibility, business intelligence, and data communications that are provided through SCM integration with the R/3 (ECC), BW, and ICH products.

NOTE

1. That is, *system* optimization, which will not be considered. We will, of course, consider linear optimization as APO employs it in the use of developing schedules and plans, as that is one of the central objects of this text.