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The Supply Chain Council (SCC) is an international 700 member consortium of companies and individuals who are working to establish a standard framework and a common notation for designing supply chain systems.

SCOR is a framework and a methodology that allows companies to create high-level designs or architectures for supply chain systems. This white paper provides an overview of how the SCOR methodology works.

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An Introduction to the Supply Chain Council's SCOR Methodology

The Supply Chain Council

The Supply Chain Council (SCC) has established what it calls the SCOR Project Roadmap, which is a kind of methodology. The methodology suggests an order in which specific SCOR activities could be accomplished. Unfortunately, the SCOR methodology isn't followed in the SCOR training workshop that the SCC gives. We will describe a slightly different methodology that is more in keeping with actual practice.

In essence, the thing that's wrong with the SCOR Project Roadmap is that it assumes that one determines the measures and goals for a supply chain process before one has defined the existing process. The SCOR Project Roadmap might work for a company that was creating a new supply chain, or for a company that had already defined an existing supply chain and was already tracking measures using the SCOR approach. For most projects, however, business managers need to begin by defining the existing process and measuring it before they are really ready to make strategic decisions about whether and how they might change it.

Phases in the SCOR Methodology

We suggest that readers think of their first SCOR project in terms of six phases, as follows:

- 0. Review Corporate Strategy.** This isn't so much a project phase, as a decision to consider whether an existing supply chain can be improved. Once this decision is taken, a team is set up, trained in the SCOR methodology if necessary, and set to work.
- I. Define the Supply Chain Process.** SCOR provides a common vocabulary and notation system for defining the major processes that make up supply chains. The first phase the team undertakes is the actual analysis of the existing process. This effort includes decisions about the number and scope of the supply chain processes to be examined.
- II. Determine the Performance of the Existing Supply Chain.** Once one has scoped the existing supply chain process, one can use historic data to define how the existing supply chain is performing. In addition, one can compare the performance of your supply chain with benchmarks to determine how your process stacks up against similar processes in similar industries.

- III. Establish Your Supply Chain Strategy, Goals and Priorities.** Once one has hard data on the performance of your existing supply chain, and benchmark data, one is in a position to consider if your supply chain strategy is reasonable, and how it might be improved. One can consider alternative targets for improvement and determine how they might improve the company's performance. Similarly, one can identify which changes would yield the highest return and prioritize any improvement efforts.
- IV. Redesign Your Supply Chain as Needed.** SCOR provides a number of tools to help in redesigning a supply chain. It provides tools for identifying problems and gaps and suggests the best practices used by companies with superior supply chains. Tools are available to simulate your redesign so that you can be sure it will yield the results you have targeted.
- V. Enable the Redesign and Implement.** Once the design is complete, you must implement the redesign using software and human performance improvement techniques. Then you must implement the new supply chain and gather data to determine if you are, in fact, meeting your new targets.

We'll consider each of these phases in more detail, describing what happens in each phase and what tools SCOR provides to facilitate that phase.

Phase 0. Review Corporate Strategy

The SCOR Roadmap suggests that one begins with a consideration of your organization's supply chain strategy. If your company has used SCOR in the past and you have already completed Phase I and II in some previous analysis effort, then it might be able to start with a strategy review. (In that case you could skip directly to Phase III.) If you are new to SCOR, however, then you will probably find it more useful to work through Phases I and II, as defined below, before considering your supply chain strategy. In such a case, the initial phase is really a commitment on the part of your organization to undertake a review of your supply chain process.

Phase I. Define the Supply Chain Process

Companies have been creating supply chains for decades. Different departments have different ways of talking about the work they do to facilitate the flow of supplies. Different industries talk about their supply chain problems in different ways. The first challenge the Supply Chain Council faced was the variety of ways in which people talked about, and diagrammed supply chains. The first thing the SCC did was to establish a standard vocabulary and a notation that could be used to describe any supply chain. The first thing a team that wants to use SCOR must do is acquire that same vocabulary to assure they all talk about the same things in the same way.

Scott Stephens, the CTO of the Supply Chain Council, instructs most of the SCOR training workshops. He quips that SCOR is the result of a consensus or compromise – and that guarantees that no one likes everything about it. Each individual can see things he or she would have done differently. The key to making SCOR work, however, is for everyone to suppress their desire to modify some element and accept



SCOR as it is. The existing vocabulary and notation work well enough. Everyone can learn how to use them in a day and become much more productive as a result.

The first thing one does when one defines a supply chain process is to establish boundaries. One typically does this in an interactive way, diagramming an existing process and deciding, in the process, if one wants to try to treat everything as a single process or to subdivide the process into two or more processes. This becomes clearer as one begins learns the vocabulary and prepares some draft diagrams.

The High-Level SCOR Vocabulary

SCOR begins by assuming that all supply chain processes can be subdivide into one of five general subtypes: Plan, Source, Make, Deliver, and Return. Complex supply chains are made up of multiple combinations of these basic processes.

In fact, SCOR realizes that not all sourcing processes are the same. In analyzing a process, one first decides that there is a sourcing process (Level 1 Process), and then decides which of three (Level 2) types of sourcing process it is: S1, Source Stocked Products, S2, Source Made-to-Order Products, or S3, Source Engineered-to-Order Products.

Figure 1 provide an overview of the five basic SCOR processes, and the varieties of each basic type.

The SCOR Manual carefully defines each of the Level 1 and Level 2 processes. Once workshop attendees become familiar with these basic categories, they can quickly diagram processes, describing each process in terms of the level 2 process types.

The first diagram the SCOR analysts usually prepare is a As-Is Geography Map. In other words, they describe the existing process, indicating the sources, manufacturing sites and distribution centers, using the Level 2 types. Figure 2 illustrates an As-IS Geography Map prepared for a simple supply chain. This supply chain describes the operations within a single international company. (Two good heuristics: Start with the Make sites, and then fill in the Source and Deliver sites later. Ignore Plan and Return when you prepare your initial Geography Map.)

The Geography Map usually challenges the SCOR analysts to rethink the scope issues. How much of your supplier's supply chain do you want to include in your analysis? Do you distribute through wholesalers and do you want to include them in your analysis? Are you really talking about one product line and one set of target customers, or are their significant variations for multiple groups of customers?

As these issues are refined, the SCOR analysis move on the create a SCOR Thread Diagram. In effect, sequences of Level 2 processes, usually simply represented by a letter and number, are placed inside arrows and linked together. Bold vertical lines separate companies. Dashed vertical lines represent divisions within the same organization. The thread diagram often becomes the basis for a subsequent analysis to the time it takes to move items through the supply chain. Thus, in some cases the analysts will want to represent intermediary organizations, like customs, that can cause predictable delays in the flow of materials. In SCOR terms, an intermediary

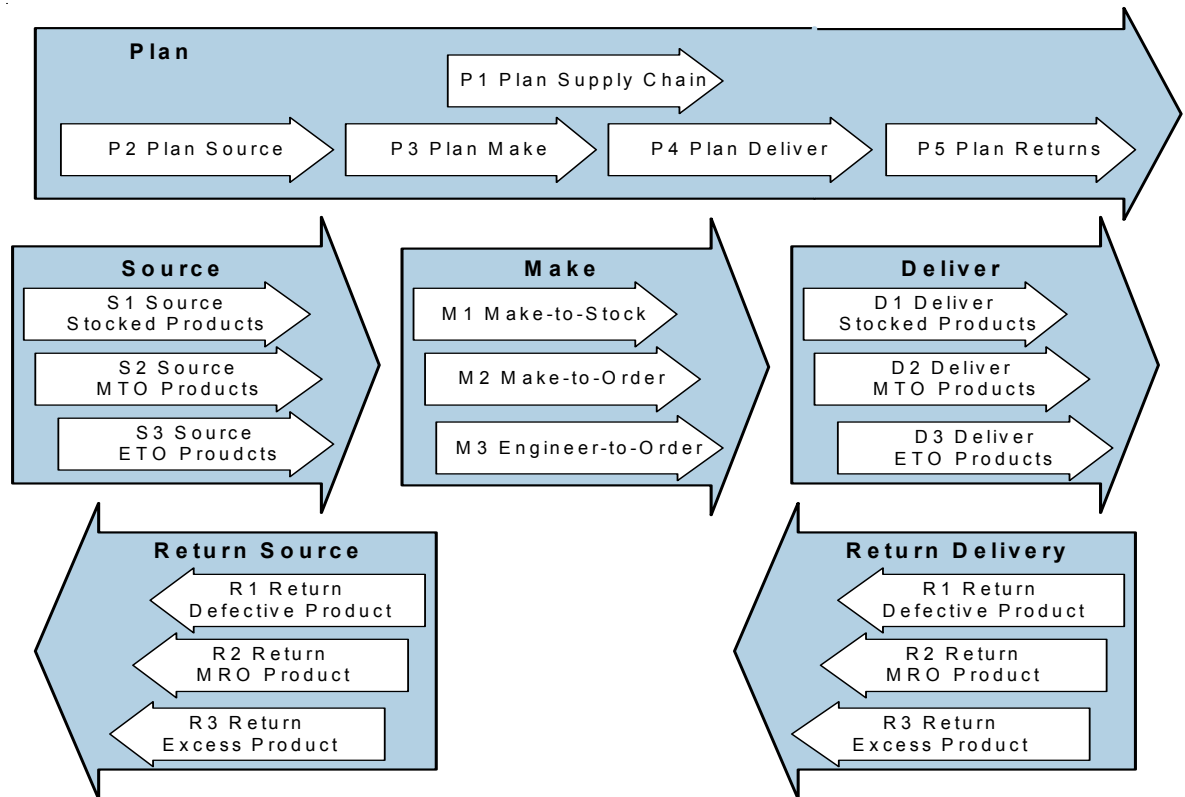


Figure 1. SCOR Level 1 Processes and Level 2 Alternative Sub-processes.

operation, like customs, or an outside shipper, would be represented by a Source process and a Deliver process. Obviously, in these cases there is no Make process, since the materials being moved are not changed in the process. Figure 3 illustrates a simple thread diagram of the same supply chain we illustrated earlier in Figure 2.

As with the Geography Map, one initially focuses only on the outbound processes. Later, however, the Thread Diagram is refined to include intermediary organizations, planning processes and various types of return processes, when appropriate. Figure 4 provides a more detailed description of the SCOR Thread Diagram we showed in Figure 3.

In addition to the two levels of process we have considered up to this point, SCOR also defines a third level. In essence, SCOR defines a generic set of activities within each of the Level 2 processes. Figure 5 illustrates the decomposition of one process, S1, Source Stocked Products, into a sequence of activities. In Phase I, one rarely needs to consider these Level 3 processes, but one occasionally checks them just to be sure if one is really looking at a SCOR Source process or a SCOR Make process, or to decide other issues that involve considering a more detailed description of one of the Level 2 processes.

When the team is satisfied with the detailed Thread Diagram, then they have also settled on the nature and scope of the As-Is process they are going to consider in more detail.



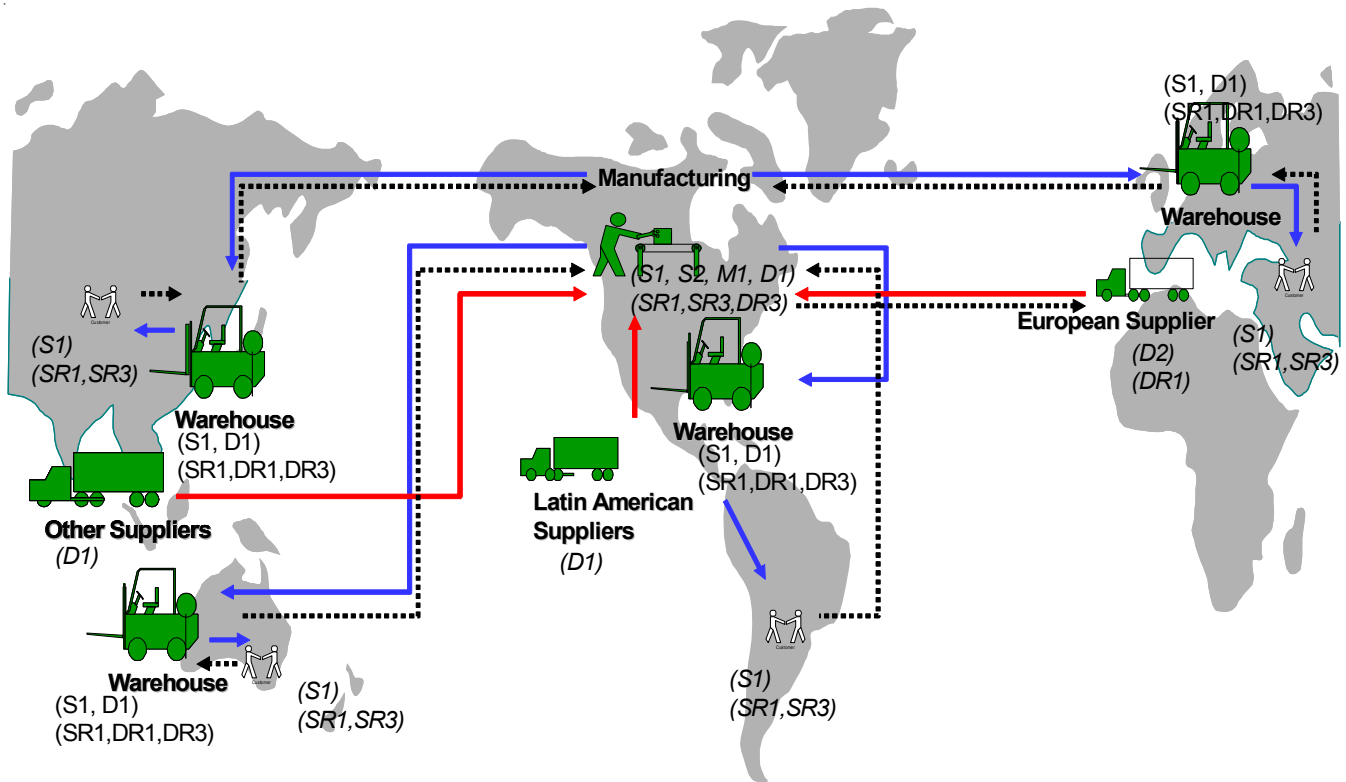


Figure 2. An As-Is Geography Map of a Company's Supply Chain

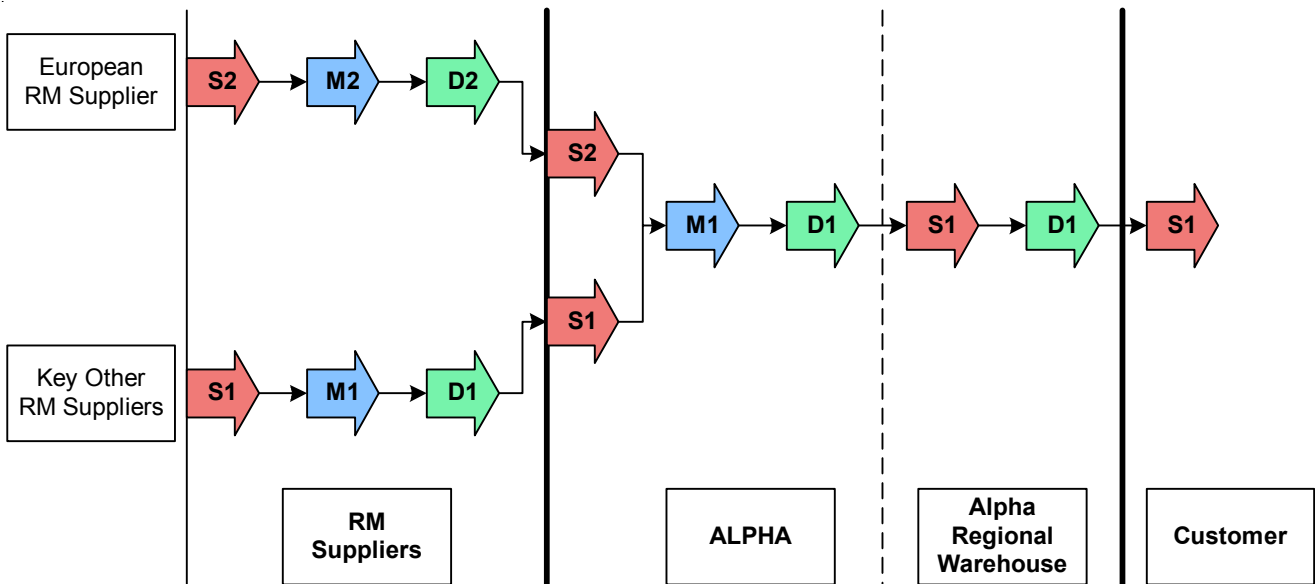


Figure 3. A SCOR Thread Diagram of a simple supply chain process.

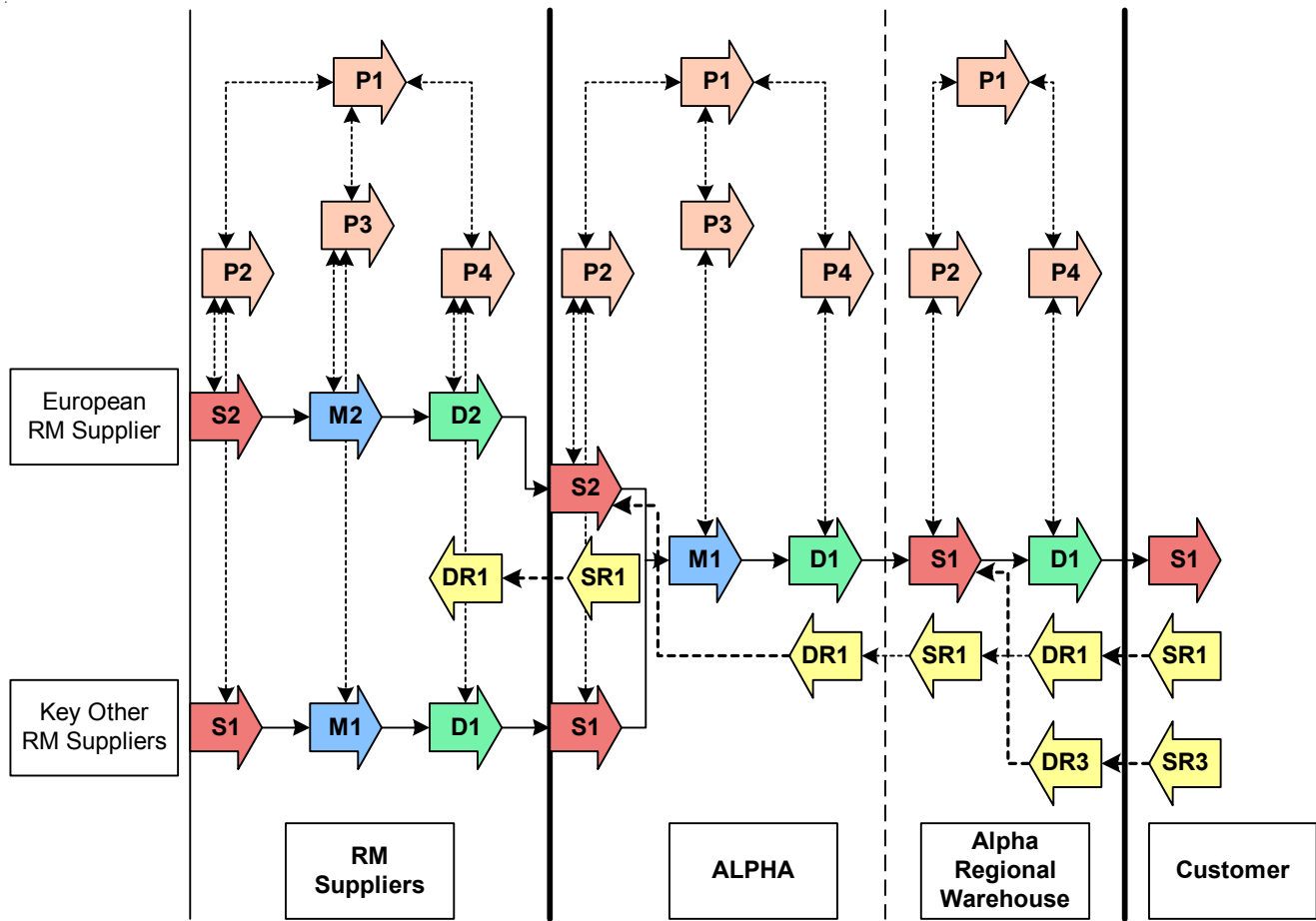


Figure 4. A more detailed SCOR Thread Diagram of a simple supply chain process.

Phase II. Determine the Performance of the Existing Supply Chain

Once the SCOR team has scoped the existing supply chain process, they can use historical data to define how the existing supply chain is performing.

SCOR defines five generic performance attributes and three levels of measures that the analysts can use. Figure 6 suggests where we could measure a supply chain process. In the case of m0 measures, we are measuring the performance of the organization, as a whole and attributing it to the overall effectiveness of the supply chain. In the case of m1 measures, we are measuring the performance of the supply chain as a whole. (SCOR refers to m0 measures as Internal Facing Measures and to m1 as Customer Facing Measures.) m2 measures check on the performance of one of the Level 2 processes, while m3 measures check on the performance of specific sub-processes within a Level 2 process.

Figure 7 shows how SCOR defines the five performance attributes and the Level 1 measure. Different companies or consultants use some of the terms listed in Figure 7 in slightly different ways. Similarly, some industries rely on some of these measures

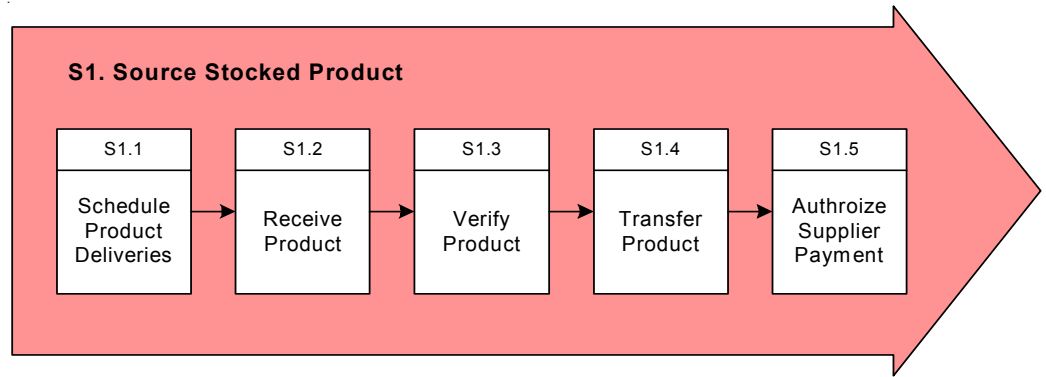


Figure 5. The sub-processes that define a single Level 2 Process.

and not on others, or give the measures a different name to emphasize what the measure focuses on within the specific industry. The SCOR manual and training workshop define each of the measures very precisely, and provide a formula for calculating each measure. Thus, once the SCOR team has scoped the As-Is supply chain, it can begin to review historical data and determine which measures they can use to define their specific supply chain. (In many cases, the supply chain managers will already have data on the measures most commonly used at their company.)

SCOR relies on variations and refinements of the measures shown in Figure 7 to measure sub-processes or activities. Precise measures are specified in the SCOR manual. In this phase, the SCOR team will probably be satisfied with the Level 1 measures. If a team decided it wanted to study an S1 process in more detail, however, it could look in the SCOR manual and find the following table, which specifies

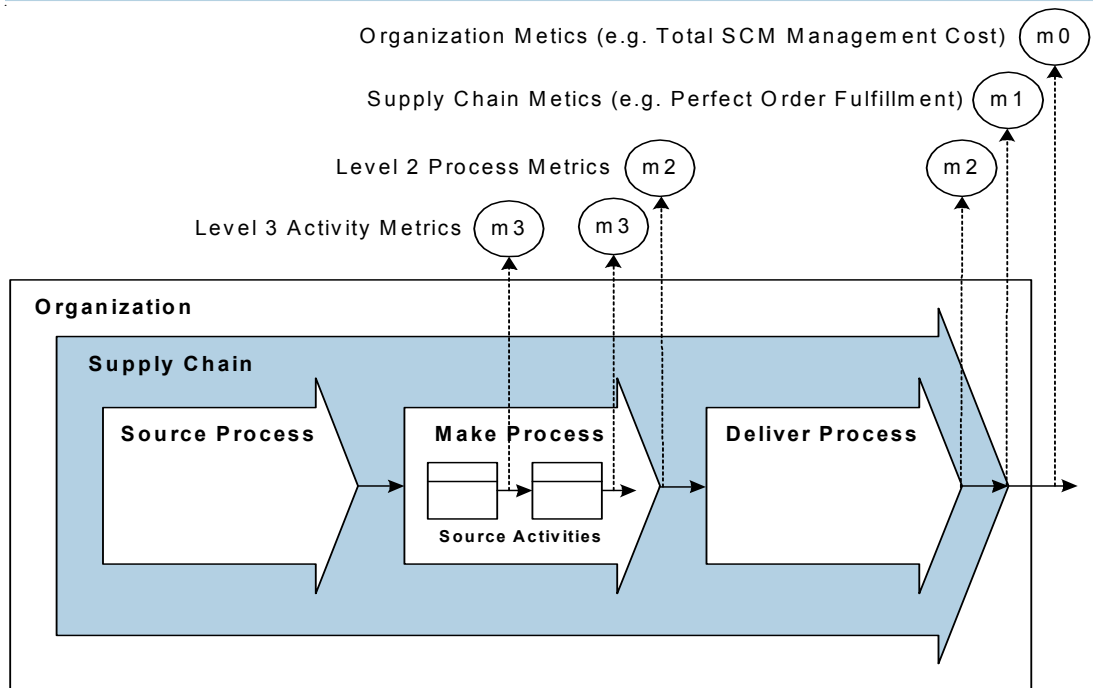


Figure 6. Places from which one can derive measures.

	Performance Attribute	Performance Attribute Definition	Level 1 Metric
Customer Facing Attributes	Supply Chain Delivery Reliability	The performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer.	Delivery Performance
			Fill Rates
			Perfect Order Fulfillment
	Supply Chain Responsiveness	The velocity at which a supply chain provides products to the customer.	Order Fulfillment Lead Times
Supply Chain Flexibility	The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage.	Supply Chain Response Time	
		Production Flexibility	
Internal Facing Attributes	Supply Chain Costs	The costs associated with operating the supply chain.	Cost of Goods Sold
			Total Supply Chain Management Costs
			Value-Added Productivity
			Warranty / Returns Processing Costs
	Supply Chain Asset Management Efficiency	The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital.	Cash-to-Cash Cycle Time
			Inventory Days of Supply
Asset Turns			

Figure 7. SCOR Performance Attributes and Level 1 Metrics.

the measures that SCC companies have found most useful in analyzing the Source Stocked Products process. (See Figure 8.)

At least two organizations that track benchmarks are working with the Supply Chain Council and can provide generic benchmarks for SCOR measures for specific industries. If a company wants specific benchmark data, it needs to contract with one of the benchmarking groups. For a fee, and their own data, the company doing

Process Category: Source Stocked Product		Process Number: S1
Process Category Definition		
The procurement, delivery, receipt and transfer of raw material items, subassemblies, product and or services.		
Performance Attributes	Metrics	
Reliability	% Orders/lines processed complete	
Responsiveness	Total source cycle time to completion	
Flexibility	Time and cost related to expediting the sourcing processes of procurement, delivery, receiving and transfer	
Cost	Product acquisition costs	
Assets	Inventory DOS	
Best Practices	Features	
Joint Service Agreements	None identified	
Alliance and Leverage Agreements		

Figure 8. A Table from the SCOR Manual describing S1 Source Stocked Product.

Supply Chain SCORcard				Industry Benchmarks			Value from Improvements
Overview Metrics	SCOR Level 1 Metrics	Actual	Parity	Advantage	Superior		
EXTERNAL	Supply Chain Reliability	Delivery Performance to Commit Date	50%	85%	90%	95%	
		Fill Rates	63%	94%	96%	98%	
		Perfect Order Fulfillment	0%	80%	85%	90%	\$30M Revenue
	Responsiveness	Order Fulfillment Lead Times	35 days	7 days	5 days	3 days	\$30M Revenue
	Flexibility	Supply Chain Response Time	97 days	82 days	55 days	13 days	Key enabler to cost and asset improvements
		Production Flexibility	45 days	30 days	25 days	20 days	
INTERNAL	Cost	Total SCM Management Cost	19%	13%	8%	3%	\$30M Indirect Cost
		Warranty Cost	NA	NA	NA	NA	NA
		Value Added Employee Productivity	NA	\$156K	\$306K	\$460K	NA
	Assets	Inventory Days of Supply	119 days	55 days	38 days	22 days	NA
		Cash-to-Cash Cycle Time	196 days	80 days	46 days	28 days	\$7 M Capital Charge
		Net Asset Turns (Working Capital)	2.2 turns	8 turns	12 turns	19 turns	NA

Figure 9. A SCORcard with actual and benchmark data, and some guesses about the value that might be achieved by redesigning the supply chain being analyzed.

the benchmarks will provide the latest composite data for a specific industry. One group is Performance Measurement Group LLC, a group that works closely with SCC, but there are several other sources of benchmarks.

In Figure 9, we show what SCOR refers to as a SCORcard. It shows the performance attributes, a set of metrics and the benchmark data for a hypothetical company described in more detail in the SCOR workshop. In the right hand column, the team has made some “guesstimates” about what kind of value the hypothetical companies might achieve, assuming it could move its supply chain process closer to the average for the industry. SCOR terms the comparison of the company’s actual, historical performance, with the benchmarks for the company’s industry as a gap analysis, and uses it to determine if redesign or improvements in the As-Is supply chain will really justify an investment.

Once the SCOR team has examine the Level 1, and in some cases the Level 2 As-Is historical data, it is in a position to decide if the supply chain should be changed. In effect, it is now ready to review the organization’s existing approach to its supply



chain and, in necessary, define a new supply chain strategy and to set some targets, priorities and a budget for any redesign effort.

Phase III. Establish Your Supply Chain Strategy, Goals and Priorities

Once the SCOR team has a good understanding of the strengths and weaknesses of the As-Is process, they are in a good position to think about how they want to compete and what they will have to do to implement whatever supply chain strategy they choose.

In a sense, we are returning to Phase 0, with the information needed to make some serious decisions. From Phase 0 one already has an organizational plan and a generic corporate strategy. One may have very precise statements about how the company wants to position its products, its various product lines and so forth. One probably also has statements about the company's current strengths and weaknesses and some idea of how senior managers perceive the threats and opportunities the company faces.

SCOR suggests that one consider the supply chain performance attributes we have already encountered and decide where the company's supply chain is superior, has an advantage, has parity, or is below average. Specifically, the SCOR team should fill out the chart illustrated in Figure 10. The SCORcard already developed during Phase II provides a good picture of how your supply chain ranks, compared with others in your industry. The goal now, is to decide how you want your supply chain to be in the future. You should assign one black ball to the box beside the performance attribute that you expect to dominate. You then assign one or two bold circles for performance areas in which you expect to be above average, and narrow circles for the remainder, where you expect to be at least on par with the competition. The constraints on the assignment of balls simply reflects reality. You can't expect to be superior in every category, and you should expect to be very good in at least one or two.

Competition Model		
Performance Attributes	Performance versus the Competition	
	As-Is	To-Be
Supply Chain Reliability		
Responsiveness		
Flexibility		
SC Management Costs		
SC Mang Asset Utilization		

● Superior ○ Advantage ○ Parity

Figure 10 Performance priorities for your organization's supply chain.

Obviously assigning the black ball is a strategic decision. If you decide that your company's success will depend on always getting products to your customer on time, then delivery reliability might be your highest priority. If, on the other hand, you operate in an industry in which there is great flexibility in demand, you might decide that corporate success will depend on being able to scale product up or down with a minimum of fuss, and stress flexibility. Obviously if you intend to be the low cost provider of the product, overall supply chain costs will be very important.

Once you have considered your supply chain strategy and assigned priorities, you are ready to think very seriously about where you stand, relative to where you will need to be to achieve your strategy. If you assign the highest priority to Delivery Reliability, and your historical data and the benchmark data indicate that your supply chain is already Superior, then you are in good shape. On the other hand, if you decide your strategy depends on superiority and you are only par, then you know where you need to focus your initial efforts. Assuming you are superior where you want to be, but only par everywhere else, you will probably want to consider how to improve one or two other performance areas that will support your overall strategy.

You can, of course, also examine the gap between where your supply chain process is now, and where it would be if it were to achieve the targets you assigned and determine what the difference might earn your company. If your supply chain is performing very nearly on target and the gaps are small, you might want to focus your attention on some other processes – on sales and marketing, or on new product development, for example. In most cases, however, companies identify significant returns that they can achieve if they improve their existing supply chain. Moreover, since the benchmarks are usually quite specific, the SCOR team can usually choose specific measures and assign specific numbers as targets for any redesign effort.

Another exercise, which is usually delayed till the next phase, but which might be undertaken in this phase if you are trying to determine where to focus your first improvement effort, is to determine how your company's practices compare with the best practices described in the SCOR manual for specific processes and sub-processes. (Recall that when we looked up S1 in the manual, we not only found metrics, but a list of best practices for S1.) The manual identifies best practices used by superior companies for all Level 2 and 3 processes. If you are considering trying to improve two different processes, and one of your processes already uses the recommended best processes, while the other doesn't, then simply moving to the best practices in the latter case is probably a relatively cheap and safe way to significantly improve the latter process.

The SCOR team completes Phase III when it has decided whether or not to redesign the existing process. If the team has decided to attempt to improve the existing supply chain, the team should also have assigned targets for each performance attribute and have selected and prioritized gaps or opportunities to focus on in a redesign effort. The team should not have redesigned the supply chain; that will happen in the next phase. At this point, the SCOR team should have decided on goals and targets for the process improvement effort.

Phase IV. Redesign Your Supply Chain as Needed

In Phase IV, the SCOR team creates a new design for the company's supply chain. In other words they design a To-Be supply chain.

The tools used in this phase are all those we have already examined, plus a few more. Historical data and a review of benchmarks has already revealed the As-Is chain's strengths and weaknesses. By assigning performance priorities, the team has already decided what to focus on in their redesign efforts. By examining Level 3 sub-processes and the tables associated with each subprocess in the SCOR manual, the team creates a list of the best practices.

The first steps in redesign are the creation of a To-Be geographical map and a To-Be Thread diagram. The SCOR workshop provides designers with some insights about how changes in sequences can improve times or efficiencies. In addition, the workshop provides designers with lists of opportunities and transactions that are often causes of difficulty. The redesign team may change its To-Be Thread diagram several times as it explores possibilities and studies the problem in more depth. The place to start, however, is with a tentative redesign.

Once the first draft of the Level 2 Thread diagram is complete, the team will move to a Level 3 diagram. In this case, the team will want to determine just how the process will be accomplished and assign responsibilities for specific activities. SCOR recommends that the Level 3 activities be placed on a swimlane diagram where the lanes are labeled to identify the functional entities in the organization that will be responsible for the various activities.

For the purposes of our discussion, let's assume that the new supply chain still begins with an S1, Source Stocked Products process. In Figure 11 we show how the Level 3 Source Stocked Process activities are displayed on a swimlane diagram. To the left we show a small organization chart to indicate how the lanes represent departments that will ultimately manage the various activities.

In the redesign phase, many companies will proceed to create Level 4 diagrams. These diagrams are not defined by SCOR. They describe how the activities described in a SCOR Level 3 diagram are actually implemented. Thus, although Make-to-Stock and M1.3, Produce and Test, may be generic to most organizations, the specific steps in the M1.3 activity will vary if the company is producing cereal, clothing or auto parts. At Level 4, using the swimlane diagram, the actual process is described in whatever detail is appropriate, and refined.

The SCOR team should not create Level 4 diagrams for the entire supply chain process. The whole purpose of the top-down approach used in SCOR is to allow the team to focus in on just those aspects of a supply chain that need to be changed and that will yield value if they are changed. Processes and sub-processes that are already performing well don't need to be analyzed in detail.

For each Level 3 process that the team decides to analyze, it should first consult the table for that process or subprocess in the SCOR Manual. Figure 12 reproduces a portion of the table for one subprocess, S1.1 Source Stocked Product/Schedule Product Deliveries. In this case, the team can compare what they actually do with

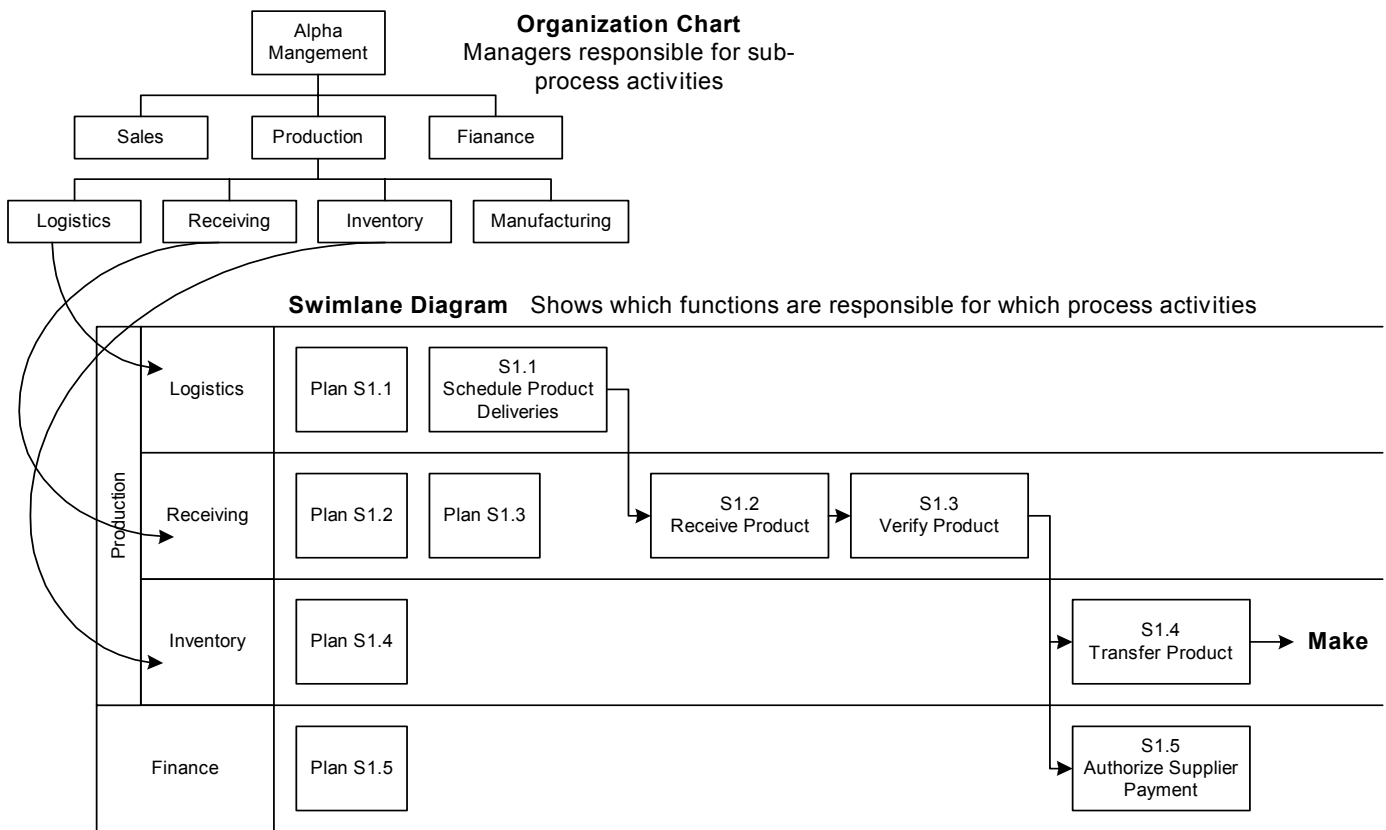


Figure 11. Level 3 Source Stocked Process activities on a swimlane diagram.

the best practices listed and consider what changes they might make if they were to adopt one or more of the best practices.

As a strong generalization, best practice suggestions can be subdivided into three general types. They can recommend new management practices. They can recommend new employee practices, or they can recommend the use of software applications or systems to automate an activity or to support the employees who perform the activity.

Management and Plan Processes

To this point, we haven't said much about the Plan processes that are included in the SCOR model. Although SCOR doesn't describe it in quite the way we do, in effect, every operational process must be managed. An assembly operation in a factory has a supervisor who is responsible for the employees and for the results produced by the unit. We usually picture the relationship between management activities and operational processes as shown in Figure 13.

The SCOR model consider both the operational processes and the control processes. Thus, for every Source operation, there is also a Source Plan. When SCOR represents the Plan modules on a swimlane diagram, it simply clusters them on the

Process Category: Schedule Product Deliveries		Process Element Number: S1.1
Process Element Definition		
Scheduling and managing the execution of the individual deliveries of product against an existing contract or purchase order. The requirements for product releases are determined based on the detailed sourcing plan or other types of product pull signals.		
Performance Attributes	Metrics	
Reliability	% Schedules generated within Supplier's lead time % Schedules changed within Supplier's lead time	
Responsiveness	Average release cycle of changes	
Flexibility	Average days per schedule change Average days per engineering change	
Cost	Product management and planning costs as a % of product acquisitions costs	
Assets	None identified	
Best Practices	Features	
Utilize EDI transactions to reduce cycle time and costs	EDI interface for 830, 850, 856 & 862 transactions	
VMI agreements allow suppliers to manage (replenish) inventory	Supplier managed inventories with scheduling interfaces to external supplier systems	
Mechanical (Kanban) pull signals are used to notify suppliers of the need to deliver product	Electronic Kanban support	
Consignment agreements are used to reduce assets and cycle time while increasing the availability of critical items	Consignment inventory management	
Advanced ship notices allow for tight synchronization between SOURCE and MAKE processes.	Blanket order support with scheduling interfaces to external supplier systems	

Figure 12. Portion of SCOR Manual Table for S1.1 Schedule Product Deliveries.

left side, close to the name of the functional unit that will provide the managers to oversee the operational processes. In effect, Plan processes are activities that must be assigned to managers who must oversee operational processes. And just as Level 2 processes can be divided into sub-processes, Level 2 Plan processes can be divided into Level 3 activities. Moreover, just as operational processes can be enabled by software applications or other best practices, Plan processes can also be improved by best practices. The SCOR team can check the SCOR Manual to see how managerial processes related to specific operational processes can be improved. Figure 14 shows the table on the Level 2 process, P2, Plan Source.

As with the operational processes, management Plan best practices may suggest activities and tools that individual managers can use, or they may include software modules that can be used to automate the managerial planning functions, or some combination.

Changes in Employee Practices

Just as SCOR recommends specific Plan activities for managers responsible for operational processes, it also recommends tools and activities that employees can

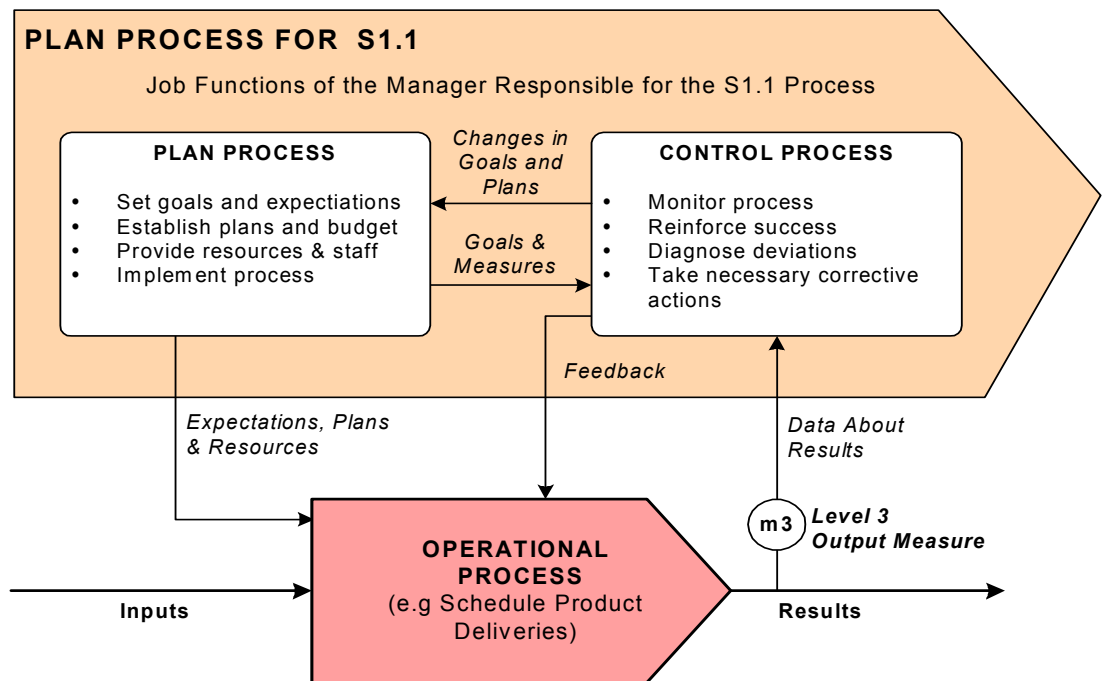


Figure 13. Management processes and operational processes.

utilize to improve the success or outcomes of a given activity. In some cases these practices can be employed by existing employees. In other cases it will require job changes and new job descriptions to implement the changes.

Process Automation

There are a wide variety of software components, modules and applications available to assist in the automation of supply chain processes. In many cases, unfortunately, the modules do not exactly match the sup-process descriptions used in SCOR, and designers will need to decide if a given software application that seems to cover three different SCOR sub-processes will, in fact, deliver the functionality required. Similarly, large, comprehensive supply chain applications often require that you adopt their approach to processes and makes it hard to measure the success of sub-processes using the metrics that SCOR recommends. Obviously software applications vary considerably by industry and task. Each SCOR design team will need to consider its design, the legacy applications already used in the company's existing processes and the changes they hope to make and decide if software can be acquired or developed to improve their existing supply chain.

Simulation

Once the SCOR team has decided how it might change its existing supply chain process, it would be well advised to test the new design in a simulation tool. Many of the software products that support SCOR modeling also provide simulation facilities. In addition, there are more specialized simulation tools that can be used



Process Category: Plan Source		Process Number: P2
Process Category Definition		
The development and establishment of courses of action over specified time periods that represent a projected appropriation of material resources to meet supply chain requirements		
Performance Attributes	Metrics	
Reliability	Supplier delivery on-time delivery performance Supplier fill rate	
Responsiveness	Cumulative source cycle time	
Flexibility	Source flexibility	
Cost	None identified	
Assets	None identified	
Best Practices	Features	
EDI links integrate supplier resource information (inventory, capacity availability, etc.) with own resources	Inter-company resource planning with EDI/Internet communication	
Joint service agreements with suppliers define the levels of "flexibility" or resource upside available within stated lead times and agreed upon conditions	None identified	
Distinct and consistent linkages exist to ensure disruptions and opportunities in material resources are quickly and accurately communicated and acted upon	Bi-directional digital links (XML, EDI, etc.) or Internet procurement networks to customer service linkage	
All key participants in the supply chain, including strategic partners, have full visibility of the demand/supply plan	Supply chain event management systems	

Figure 14. A table describing metrics and best practices for P2 Plan Source.

to model SCOR designs. The essence of simulation is that you model the To-Be process in the tool, identify your assumptions about the cost and efficiency of new activities, and then run simulated workloads through the system to see if it performs as anticipated. In complex supply systems, its sometimes hard for humans to identify bottlenecks that are obvious once you run several large sets of data through a simulated model of the system. Simulation can take time and it requires developers who are familiar with the techniques required by the simulation tools, but if you are seeking to make millions of dollars of changes in a key supply chain system, spending two months and a hundred thousand dollars to be sure that your system will work as designed is well worth it.

At the end of this phase the SCOR team has a plan for the redesign of the organization's supply chain. It has, in effect, a recommendation for how the process should be changed. It will probably need to present the recommendation to senior managers to obtain permission to proceed and to obtain resources to fund the actual changes. Depending on the scope of the recommended To-Be process, the SCOR team may need to phase the changes, accomplishing some in a first push and putting others off until later. Once again, the analysis undertaken in Phase II and III should provide guidance. In general, one undertakes changes that will quickly bring the supply chain into line with the strategic performance priorities identified in III, as well as



changes that will generate the greatest value. In some cases, if it can't all be done at once, then most companies will take some combination of the most critical and the easiest to accomplish first.

Once management has approved the redesign, the SCOR team is ready to move into Phase V and actually acquire software and make the job changes necessary to enable the redesign.

Phase V. Enable the Redesign and Implement

SCOR doesn't say much about the specifics of enabling and implementing new supply chain systems. It assumes that different companies, in different industries, will operate under different constraints, have different Level 4 processes and that they will use different best practices to improve their processes.

SCOR groups all the processes involved in enabling changes in supply chain systems under the term Enable, and includes software development and human resource efforts in that category. In essence, the SCOR methodology helps companies create new designs, and then assumes that individual companies will determine how to implement the changes.

The Supply Chain Council does urge companies to take part in SCOR committees and provide feedback on what practices work best, and to share information about their overall success with benchmarking groups so that everyone involved in supply chain analysis and design will gradually learn to create the best possible supply chain systems.

Equally important, SCOR provides the vocabulary for future efforts within the company and without. Most companies are still focused on linking their own internal supply chain processes and making their corporate supply chain as efficient as possible. Increasingly, however, companies are working other companies to create multi-company supply chains. All of the issues faced within specific companies are faced again when one tries to work with other companies. The SCOR approach, with its vocabulary, its notation, and its top-down, systematic approach is just as valuable when a multi-company SCOR team is assembled.

Obviously, once a company or a set of companies have revised one or all of their supply chain processes using SCOR, they will approach future improvement projects with a foundation of SCOR data and technique. In subsequent rounds of improvement, the methodology we have just described will be modified to suit the SCOR team, which may very well begin with a good description of the As-Is process and move rapidly to deciding how to achieve an even more efficient supply chain. ■

