

6

CHAPTER

A Roadmap to Change

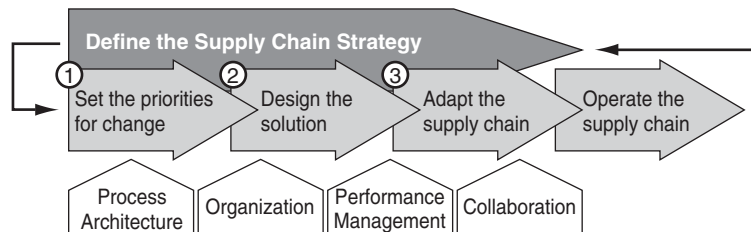
While the five core disciplines provide the foundation for supply chain excellence, none is sufficient on its own. Supply chain performance is all about integration—integration of strategy, processes, organization, and information systems. Moreover, making sure that this integration happens—given the complexity of the supply chain and the hundreds of potential practices and competing priorities—requires a multidimensional plan. We call this plan the *roadmap to change*.

An effective roadmap is developed and managed as an iterative and ongoing activity. Unlike a plan that focuses on a single project, a roadmap describes each of the major initiatives to be executed over a given time period—typically one to three budget cycles. It shows the links between the different initiatives and the expected performance improvements at meaningful intervals. Progress toward objectives is monitored as part of regular business or operations reviews.

Creating and managing a roadmap to change (see Figure 6-1) is a cross-functional effort with ongoing collaboration among the supply chain organization, the information technology organization, and other functions, such as marketing, sales, finance, and engineering. Working together, thought leaders from these groups ensure that each initiative is clearly defined, launched, and executed in a manner consistent with the overall business strategy.

FIGURE 6-1

Creating the roadmap to change.



Developing and executing the roadmap can be time-consuming and resource-intensive but is the key to supply chain maturity and is well worth the effort. A highly mature supply chain is one that has achieved advanced capability across each of the core disciplines (see Figure 6-2). Research by PRTM's benchmarking subsidiary, The Performance Measurement Group, LLC (PMG), finds that there is a strong correlation between supply chain maturity and superior performance. Companies with mature supply chains experience

- ♦ A 40 percent profitability advantage, where profitability is expressed as earnings before income and tax as a percentage of revenue
- ♦ Average total supply chain costs just above 8 percent of revenue, versus 10 percent for companies with less mature supply chain practices
- ♦ Superior customer service, with 25 percent less inventory investment

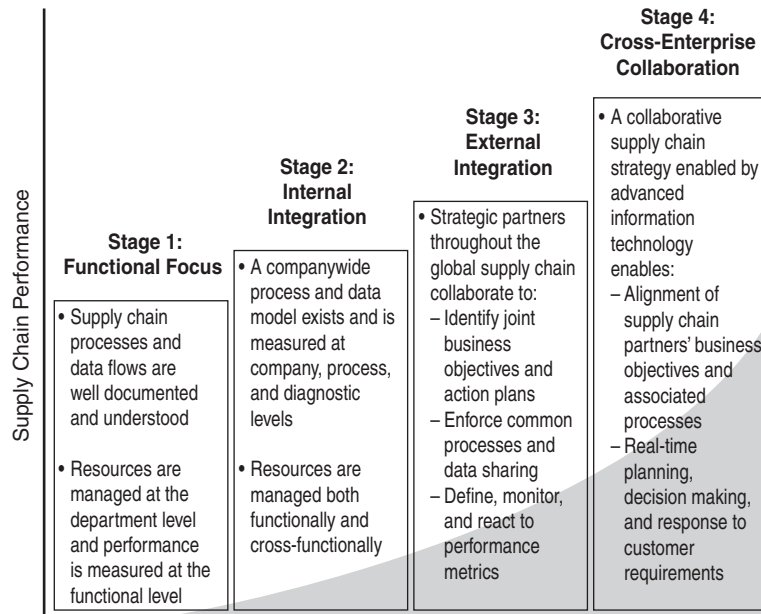
ADVANCED SYSTEMS AREN'T ENOUGH

There is a strong correlation between supply chain maturity and superior performance.

Advancing your company's supply chain performance means moving from where you are today to a future state that includes next-generation processes and infrastructure, including information systems. Technology is only one part of the story—and it isn't the first chapter. Throughout this book we have noted where the five core disciplines can and should be enabled by effec-

FIGURE 6-2

Stages of supply chain process maturity.



tive information systems, but we've deliberately avoided structuring them around systems. Why? Clearly, a high-performance supply chain depends on integrating processes and data both inside the enterprise and with trading partners. Yet many companies are ill-prepared to take advantage of the power of the tools that enable integration—because their strategy is unclear, their processes are weak, their organization lacks required skills and capabilities, or the companies they want to partner with aren't ready to do so. Positioning a company to excel in the next generation requires addressing these issues.

In addition, while much of today's technology has existed for several years, it hasn't evolved enough to support the way supply chains actually operate. Many of the information systems that came into being at the height of the Internet bubble were like solutions looking for problems to solve. Those that were focused too narrowly or attempted to create a market where none existed disappeared when the bubble burst. The "survivors" are now being refined to address the way companies really work,

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as opposed to a technologist's opinion as to how they *should* operate.¹ In the next generation, we believe applications will be far better aligned with what companies want and need.

To understand the appropriate role of systems in creating your roadmap, think of creating a ladder that will allow you to climb from where you are today to the next generation. If the core disciplines form the sides of the ladder, then the supporting systems are the rungs that allow you to climb. Although it is possible to ascend a ladder with no rungs, you would have to pull yourself along with great effort to do so. Now imagine the rungs with no supporting sides—there is no way to climb at all! This is what happens when companies attempt to achieve the characteristics of the next-generation supply chain without focusing on the core disciplines first.

Perhaps the most interesting finding of our research is the benefit of the synergy that results from integration of best practices *and* effective information systems. It's not surprising that mature processes, combined with advanced technologies, lead to better performance. What is surprising, however, is that companies that implement sophisticated technology—such as an advanced planning system—without the same level of attention paid to their processes and organization actually perform worse than those that make no use of advanced technology at all.²

CHARACTERISTICS OF THE NEXT GENERATION

An effective roadmap will take you to the next generation—but what will the next generation look like, and how will it be different from today? Few would argue about the benefits of the extended supply chain and the idea that in order to optimize value, you need to look beyond your own organization and your immediate customers and suppliers.

In practice, this means achieving

- ♦ *Enterprise connectivity*—business and transactional systems that are linked, allowing data to be seen and transported to different entities within the supply chain
- ♦ *Distributed decision making*—bidirectional information flow and defined business rules used to manage ongoing changes in demand and supply

- ◆ *Real-time performance management*—real-time, accurate information available to enable rapid and informed decision making

While reacting immediately to events within the extended supply chain and establishing seamless collaborative processes are objectives for many companies, in actuality, very few can do them effectively. This is so because today, process and data standards, as well as information-system architectures, can be major inhibitors to the various collaboration approaches discussed in Chapter 4. Many systems in use today still rely on point-to-point or hub-and-spoke architectures. Their primary utility is to move materials more quickly and efficiently. And today's supply chain strategies and processes reflect the limitations of these tools.

Next-generation supply chain tools will emphasize collaboration and information availability more than speed and efficiency and support three fundamental characteristics: *transparency*, *flexibility*, and *simultaneity*. As these technologies continue to evolve and supply chain practitioners become more comfortable with their effectiveness, strategies, processes, and organizational capabilities will evolve in parallel. Figure 6-3 shows some specific applications that you may consider using to enable these next-generation characteristics as you develop and manage your roadmap to change.

Transparency

Transparency enables visibility into the end-to-end supply chain. Companies that can see the status of their supply chain resources and transactions—both internal and external—can make more timely decisions. Transparency can create value in numerous ways. If you know the status of key resources, you can make better use of them and optimize the ongoing balance between demand and supply, boosting efficiency and productivity and lowering costs. End-to-end visibility also can provide early warning of potential problems and facilitate root-cause analysis when something goes wrong.

Flexibility

Flexibility is the modern-day hedge against uncertainty. As supply chains become increasingly lean, cushions of inventory and backup resources used to meet unexpected demand surges or supply constraints are being called into question and scrutinized carefully—they're too costly to serve as buffers. Thus companies will find new ways to be flexible without the

FIGURE 6-3

Enablers of next-generation systems capability.

| Next Generation Characteristic | Examples of Information System Solutions | Description |
|---------------------------------------|---|--|
| <i>Transparency</i> | Enterprise Resource Planning (ERP) | Provides a foundation for visibility of information, such as inventory levels by location |
| | Supply Chain Analytics | Enables extracting, processing, and pushing data toward decision makers |
| | Supply Chain Event Management (SCEM) | Alerts designated recipients to exceptions to preset boundary conditions so that corrective actions can be taken as needed |
| | Radio Frequency Identification (RFID) | Wireless, radio-wave-based technology that allows companies to track tagged items without contact or line-of-sight scanning |
| <i>Flexibility</i> | Portals | Enables shared information on orders, forecasts, inventory status, and stockouts |
| | Private Networks | Enables shared information on orders, forecasts, inventory status, and stockouts |
| | Advanced Planning and Scheduling (APS) | Optimizes use of supply chain resources, including capacity, materials, and labor, while enabling execution in accordance with company-defined priorities |
| | Collaborative Supply Chain Planning Tools | Allows companies and their key customers and suppliers to integrate the requirements and constraints of each collaboration partner in co-developing forward supply plans |
| <i>Simultaneity</i> | Enterprise Application Integration (EAI) | Integrates the workflows needed for simultaneity |
| | Business Process Automation (BPA) | Defines business rules and associates them with business processes so that companies can create expert systems that monitor the supply chain |

asset “cushions” of the past. They’ll use a combination of internal flexibility (e.g., highly configurable products and effective use of postponement strategies), supplier flexibility, and the ability to substitute highly accurate information for physical inventory.

Simultaneity

Simultaneity refers to the execution of supply chain activities in parallel rather than sequentially. It results in start-to-finish transactions that can be completed quickly without further inputs, allowing greater customer responsiveness and lower transaction costs. This means that each participant has all the information needed to make decisions at the moment an event—such as a new customer order or replenishment signal—occurs. Within the extended supply chain, this information is available both within an enterprise and, for collaborative practices, between the organization and its trading partners.

A supply chain that is transparent, flexible, and simultaneous can substitute execution based on real-time requirements for the frequent planning and replanning that characterize most supply chains today, enabling increased manufacturing responsiveness and automatic sequencing and fulfillment of customer requirements.

Why are these elements so important? For one thing, the supply chain is fast becoming a critical driver of both shareholder value and competitive differentiation. The pressures of global competition that exist today will increase in the years to come, making a focus on efficiency and ongoing cost reduction essential for staying power. In addition, supply chain performance will grow in importance as a competitive differentiator as companies become better at adapting their supply chain strategies and capabilities in accordance with changing market requirements. Solid processes will be the price of entry; superior processes will set companies apart.

We’ve noted that the next generation is all about integration—and the innovation results in a highly integrated supply chain that can have an impact on both revenue and profitability. This means that you need to build your roadmap with a vision of the future in mind—and the innovative practices and tools that will enable this vision to become a reality. While every industry is different, we see several trends that should be incorporated in any company’s vision of the future.

As the supply chain becomes a larger contributor to both the top and the bottom lines, activities that occur before and after a product ships will

become increasingly important. In the next generation, the supply chain will be used as a way to increase sales opportunities and enhance customer relationships before, during, and after the sale. This means that you'll need to pay close attention to the front end of the supply chain—the activities associated with demand creation—and the increasing impact of the Internet, online marketplaces, and collaborative relationships. And as customers focus increasingly on their total cost of ownership, they will look for suppliers who can extend superior supply chain execution to their service offerings. Thus your roadmap also needs to include a focus on the service supply chain.

We expect that today's trend toward outsourcing will continue to gather steam and that, in the future, companies will outsource even more heavily in an attempt to transition as many fixed costs to variable costs as possible. This means that effective collaboration will be even more critical to success. Companies will need to be highly skilled at evaluating their prospective partners and identifying those with whom a relationship will result in the maximum economic value for each party. Logistics service providers and manufacturing outsourcers will expand their skill sets, helping their customers increase efficiencies while reducing labor requirements.

As technologies such as Web-enabled planning and optimization tools continue to advance, more data will be available, and integration with suppliers and customers will become more straightforward. At the same time, the functionality enabled by these technologies will become more modular, "commoditized," and widely available. This means that information systems aren't likely to provide the level of competitive advantage they imparted in the past; as with robust processes, they simply will be the price of entry.

DEVELOPING A ROADMAP

To understand how to develop your roadmap for an integrated, extended supply chain, then, let's revisit the steps shown in Figure 6-1 one by one.

Step 1: Set the Priorities for Change

The complexity of the supply chain—which touches numerous corporate functions, including product design, procurement, manufacturing, distribution, and postsales support, as well as diverse, often global sales channels and external partners—makes pinpointing the right focus for improvement efforts a challenge. Your supply chain strategy is the right place to start.

Note that developing and executing to your roadmap and addressing the core disciplines may be somewhat iterative. As an example, the approach you take to a certain roadmap initiative may require that you make changes to the organization or redefine performance targets. However, your strategy always should drive your roadmap, not the other way around.

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Chapter 1 provides a detailed approach to developing your supply chain strategy; use the strategy to evaluate your current capabilities and determine any structural supply chain changes that are required to execute it. Clearly, if any basics are broken, you'll need to fix them. Perhaps you are experiencing specific performance problems. Or if you've bought or sold a business recently, you may have to adapt your supply chain accordingly.

To set the priorities for change, use the following principles as a guide:

- ◆ Use a business-driven approach.
- ◆ Identify the type of change required.
- ◆ Understand the interrelationships among initiatives.
- ◆ Consider your culture and environment.

Use a Business-Driven Approach

You need to ensure that each improvement initiative will deliver real business value. Almost invariably, a portfolio of prospective initiatives will have total resource requirements far in excess of the resources actually available to support them—and varying opinions about what needs to be done first.

To overcome these obstacles, define the performance objectives for key supply chain metrics, such as on-time delivery, inventory days of supply, or total supply chain management costs. As described in Chapter 5, you'll need to look at these metrics as an interdependent set and make any necessary trade-offs. Base these trade-offs on the primary basis of competition that forms the foundation of your strategy—innovation, cost, service, or quality. Then decide on appropriate targets and performance priorities.

Next, quantify the value of reaching these targets—this may be a cost saving or an improvement in customer service that will result in increased revenue. Then, when you have determined the resource level required to make the changes that will result in these benefits, you will be prepared to calculate the overall return for a specific set of initiatives. This

will give you an objective way to make the trade-offs necessary to maximize the overall benefit to your business.

As an example, let's look at Company X, a consumer-electronics company that has chosen superior customer service as its primary basis of competition. For Company X, on-time delivery or fast-order fulfillment will be a high priority. This means that the management team should establish quantitative, time-phased targets for ongoing performance improvement in areas such as "improve on-time delivery to commit performance by x percent every six months." They'll need to tie these objectives to specific initiatives designed to enhance performance. They'll also need to quantify the value of achieving these targets and balance this value against the investment required to achieve it.

Identify the Type of Change Required

Before even considering specific initiatives for your roadmap, it's important to have a view of the order of magnitude of change required to realize the value of the performance objectives. Although large investments in new processes, skill sets, or information systems may seem like prerequisites for significant performance improvement, they may not be the right place to start.

You need to fix what isn't working today before you can focus on taking major steps toward next-generation performance.

You need to fix what isn't working today before you can focus on taking major steps toward next-generation performance. For example, many companies own enterprise resources planning (ERP) systems that provide them with standard material requirements planning (MRP) functionality but manage material requirements planning offline. These same companies may look to sophisticated applications, such as advanced planning and scheduling (APS) applications, as the solution to the issues they experience as a result of not having centralized planning data. While using MRP isn't necessarily a prerequisite to a successful APS implementation, the discipline, control, and data integrity inherent in a stable planning process are. This means that these companies will need to focus first on resolving any data-quality and process-compliance issues. Layering a sophisticated information system on top of a weak process is likely to make things worse, not better.

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As noted earlier, on-time delivery or fast-order fulfillment is critical for organizations such as Company X which compete based on superior customer service. These companies may seek technology-based solutions designed to improve performance in these areas, such as a Web-based order-entry portal for customers or real-time radio frequency identification (RFID)-based tracking of products that are in transit to the customer. If customers are unwilling to use a portal, or if orders are constantly bogged down by internal inefficiencies or product shortages, however, these solutions won't improve performance in the short term. These operational problems need to be addressed first, with the technological solution being part of the longer-term roadmap.

Figure 6-4 shows the categories of change, which range from fixing the basics, to extracting additional value from existing processes and information systems, to investments in wholly new processes and technology.

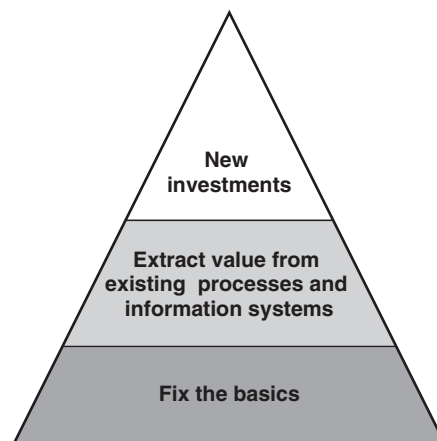
Companies that begin their roadmap development after achieving a high level of process maturity may need to consider more significant investments in processes, organization, and information systems to reach the next level of performance.

Understand the Interrelationships among Initiatives

The General Motors (GM) profile highlights the importance of evaluating prospective supply chain initiatives as an integrated effort. Rather than

FIGURE 6-4

Categories of change.



focusing on the return on investment of individual supply chain initiatives, GM looks closely at how different initiatives can work together to support its overall supply chain goals and analyzes which need to precede others. This sort of approach is critical in creating a path to next-generation performance.

Consider, for instance, the interrelationship between structural-simplification and process-change initiatives. Should the physical distribution network be simplified before inventory management practices are changed? Should SKU proliferation be addressed before embarking on a new approach to supply chain planning? Identifying dependencies may reveal that initiatives previously thought to be unrelated are, in fact, on the critical path to the success of the overall effort. You also may find that a proposed initiative is likely to have an impact on the return of one or more existing projects, which may lead to reprioritizing or even canceling an in-process effort.

Continuing our example of Company X, the management team will need to consider a number of factors that affect delivery performance. These may include

- ◆ Issues with the core planning processes that result in ongoing imbalances between demand and supply
- ◆ Internal policies that cause orders to get caught in an extensive credit-verification process
- ◆ Aggressive inventory targets that cause business units to operate with overly conservative inventory levels
- ◆ Skill gaps inside the organization that limit overall effectiveness
- ◆ Conflicting performance targets that drive suboptimal behavior
- ◆ Inconsistent performance by key partners, such as material suppliers or logistics service providers

Addressing these issues requires a clear understanding of the interdependencies of the major activities being considered. Will a redesign of the planning process have the necessary impact if supplier delivery performance remains below acceptable levels? Do the responsible individuals have the experience and skills to define and execute the required process changes? Are the new processes dependent on new systems capabilities? These are just a few of the questions that need to be answered as part of developing the roadmap.

Consider Your Culture and Environment

Including an initiative in your roadmap requires that you look beyond any technical solutions and consider the “softer” factors of your culture and

environment. How does your organization deal with change? At some companies, transformation efforts are embraced. At others, past experience has created a strong mistrust of large-scale initiatives, and only small steps are acceptable.

Also consider your business environment. How important is improving supply chain performance relative to other business priorities? Can the right resources be made available? Although current performance may be well below what is dictated by your supply chain strategy, the reality of how your company operates may override what you view as a critical initiative, and other business imperatives may claim the resources necessary to execute the roadmap. If this happens, you'll need to adjust your ambitions accordingly.

Finally, take the stability of your organization's management team into account, particularly at the most senior level. Next-generation supply chain practices have a major impact on decision making; as such, any new initiative will be shaped by the management team's vision of how decisions should be made. A lack of continuity at the executive level, especially during the more difficult, early phases of implementation, may destroy an initiative's momentum. If this is a concern, consider delaying the start of the roadmap execution until you are confident that you will have the ongoing support you need.

Test your readiness to establish and manage the priorities for change by making sure that you can answer the following questions:

- ◆ What are your value objectives and priorities?
- ◆ What type of change is needed to create the value?
- ◆ Are ongoing supply chain initiatives still appropriate, or do you need to stop or redirect initiatives?
- ◆ Given your environment (resources, other business priorities, potential management team turnover), what type of change is feasible?
- ◆ Given your culture, what approach (big bang, small steps, etc.) is most appropriate?

Step 2: Design the Solution

Once you have consensus on your priorities, the next step is to identify the changes needed to support your value objectives. To do this effectively,

Look beyond any technical solutions and consider the “softer” factors of your culture and environment.

you'll need to be familiar with each of the remaining core disciplines—and know how you plan to approach creation of your supply chain process architecture, organizational structure, a plan for collaborating with selected supply chain partners, and appropriate metrics.

Your solution design should focus on streamlining business processes and increasing the velocity of product and information flow. The overall objective: delivering the business value you used to set the priorities.

Understand What's Already There

In essence, the solution design describes how work will be performed in the future. In order to get this right, you'll need a clear understanding of how things work today. Start by analyzing the major supply chain processes that drive the critical metrics and understand the sequences of processes and events. As necessary, decompose these processes into smaller activities. You are looking for causes of errors, non-value-added activity, redundancy, queuing, and any other factors that have an impact on process efficiency and effectiveness.

Let's return to Company X, where the management team is planning an initiative focused on implementing improvements to the overall order-fulfillment process. As we saw in Chapter 5, from the customer's perspective, this process starts when a sales order is generated and stops when the product is received. Analysis of the current process needs to be consistent with the customer's viewpoint.

Company X should start by analyzing current performance and what metrics are being used, how they are defined, and the data sources. What is the average order-fulfillment cycle time? What does the distribution of the data look like? Do some orders take much longer than others? How good is the company at making and meeting commitments? Is there a good understanding of the causes of delays or missed commitments? Are clear targets and accountabilities in place?

Next, the company needs to document the path orders take once they are generated by the customer and understand exactly what happens to them. Some of the questions to consider are: In what order are activities done? Where and why does an order get "stuck"? How many people handle each order? Who can modify orders? Who is responsible for scheduling delivery and communicating with the customer? Are there any areas of rework or backtracking? Is the same activity performed more than once? How long does each activity take? Where is value added? Of critical importance: For each of these questions, Company X must know *why* the activity is performed the way it is.

This effort is likely to uncover some issues initially thought of as only tangentially related to delivery performance. If product-availability issues are causing a large percentage of problems, attention needs to shift to the planning process. What is causing the stockouts? Is there a problem with the forecasting or demand-management process? Are suppliers failing to deliver? Is the factory having yield issues? Are the system tools being used to balance demand and supply working properly? Is their output being interpreted correctly, and are the right actions being taken?

As it reviews the process, Company X also will look at the associated organization and the specific roles and responsibilities within it. Where are the handoffs between functional areas? Do people understand what they need to do? Are they well trained? Can they think analytically about how the process can be improved?

Company X also will need to look critically at the systems that support the process and determine if there are any issues with current functionality. A word of caution here: In our experience, there is a common tendency to look at systems as the cause of many process problems. Quite often the real problem is how the systems are being used—or misused—rather than an issue with existing functionality. Or the functionality is well suited to the business requirements, but data-integrity issues are causing people to mistrust the system's recommendations.

Develop a Vision of Where You Want to Go

Your supply chain design should incorporate the next-generation characteristics of transparency, flexibility, and simultaneity. Depending on your starting point, this may require major change or only minor updates to what you are already doing. Your roadmap to change doesn't have to be a massive undertaking.

As you design your future supply chain, ensure that it satisfies the four tests of supply chain architecture discussed in Chapter 2: strategic fit, end-to-end focus, simplicity, and integrity. Once your process design is complete, you can define the organizational structure required to ensure that it can be executed effectively and efficiently. You also can identify the information systems that will be needed to support the process and make the necessary data available.

Your supply chain design should incorporate the next-generation characteristics of transparency, flexibility, and simultaneity.

Test the strength of your solution by answering the following questions:

- ◆ Is the future process clearly defined?
- ◆ How does the new process affect the existing process architecture, organization, physical infrastructure, and IT?
- ◆ Do business and IT managers agree on the nature and scope of required changes?
- ◆ Does the initiative meet all evaluation criteria—return on investment, strategic alignment, business risk, and supply chain architecture rules?
- ◆ Are the proposed changes ambitious but achievable?
- ◆ How will you measure success?

Step 3: Adapt the Supply Chain

The final step in managing the roadmap to change is all about implementation—and ensuring that the solution is implemented in a way that achieves your value objectives. How you adapt your supply chain will depend on the types of initiatives you include in your roadmap, but the core disciplines provide an excellent framework for guiding your efforts.

The most successful roadmap implementations use a phased approach, which minimizes risk and maximizes the likelihood of success. The phases generally include detailed design, prototyping or proof-of-concept, a controlled pilot, refinement based on the results from the pilot, and rollout. A number of work streams are needed to support these phases, including program management, change management, and value management. While it is not our intent to provide a primer on effective program-management methodologies in this book, we note that successful implementation requires understanding and mastering these challenges. We will touch on each briefly, focusing on specific challenges associated with increasing focus on collaboration and information availability.

Value Management

The next-generation supply chain emphasizes the value of information and the ability to make real-time decisions far more than in the past. This means that many of the changes you put in place will focus less on tangible physical assets making it more difficult to measure and manage the value of your efforts. As an example, the value of reducing inventory days

of supply from 150 to 100 days is relatively easy to measure. However, the value of increasing on-time delivery to commit from 70 to 90 percent is much more difficult.

Since you'll need to monitor performance improvements at critical milestones, make sure that you have agreement up front on the specific metrics definitions and on the value created by hitting certain targets. Perhaps for every percentage point in improved delivery performance you can expect a 5 percent increase in the customer revenue stream for the life of the product. Or for every day you reduce your average order-fulfillment cycle time you will realize a one-time release of cash equal to one day's revenue, which can then be invested at your current cost of capital. Since the value of performance improvements will be different for every organization, there is no set formula to follow—so make sure that you have agreement up front.

Use the operational metrics you chose while designing the solution to measure progress toward your overall business objectives, and systematically audit value achievement after significant milestones are reached to assess whether the solution needs fine-tuning.

Program Management

Although all core elements of program management—issue management, resource management, scope management, risk management, action-item management, status reporting, budgeting, and planning—are important in implementing the roadmap to change, our experience is that managing the overall scope of effort can be the most challenging.

Changes affecting physical assets or human resources are relatively easy to “see,” but the inherent complexity of the next-generation supply chain and its focus on information and decision making mean that the scope of effort will go far beyond changes to tangible resources. And because the technologies that enable next-generation characteristics are still not widely adopted, many companies don't fully understand the challenge of collecting, manipulating, and maintaining information across the supply chain. This can lead to initiatives with unrealistic expectations and high rates of failure.

You can minimize “scope creep” by actively involving your supply chain architects—your business-process and IT experts who are in the best position to understand the details of your process and applications architecture—during implementation.³ Moreover, regular program reviews help to maintain a focus on scope management and ensure that the executive management team approves any major scope changes.

Change Management

Since your supply chain should be evolving constantly, you need to ensure that the culture within your organization is one that embraces frequent change. This means that you need to understand and use basic change-management principles: managing expectations, communicating frequently, involving key stakeholders, identifying and managing resistance to change, and monitoring and reporting on progress. You'll also need to ensure that this culture extends to your supply chain partners. Involve them early and often—in team-building exercises, training programs, and progress reporting.

Poor communication is often the culprit when roadmap initiatives don't progress according to plan.

Poor communication is often the culprit when roadmap initiatives don't progress according to plan, but the next-generation supply chain also requires new skills. As discussed in Chapter 3, next-generation practices have a major impact on the organization, creating new roles and required capabilities. These include the ability to manage collaborative relationships and supply chain performance and to ensure tighter integration between the supply chain and other core processes, such as technology and product and service development.

Achieving these new capabilities is a key success factor, and progress should be assessed on a regular basis. We recommend placing managers in their new roles even before a new supply chain solution has been rolled out. And whenever possible, managers who will be taking on new roles also should be involved even earlier in defining the parts of the solution that relate to those roles. (See the Owens-Corning profile for an example of role reengineering.)

IN CONCLUSION

As you develop and manage your roadmap, make performance a priority. As we noted at the beginning of this chapter, companies with more mature supply chain practices already have a significant performance advantage. As these more advanced companies adopt next-generation practices, the performance gap between leaders and laggards will grow—and those with less mature supply chains likely will experience declining profitability.

The five disciplines provide the foundation for supply chain excellence and are the levers that allow your supply chain to increasingly contribute directly to the growth of both revenue and profit. Many companies have already made significant progress in putting these disciplines in place—and are reaping major benefits as a result.

Our consulting experience and our in-depth discussions with the companies profiled in this book show clearly that process work has to precede technology enablement. The two can then work, hand in glove, to make both quantum and incremental improvements in performance. By focusing on improving the five core disciplines of strategic supply chain management, you'll be prepared for the increased competitiveness, speed, and agility of next-generation supply chain management.

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Seagate Technology Profile: Real-Time Response to Demand

Driven by a vision of multitiered visibility and real-time demand fulfillment, Seagate Technology is investing heavily in technology and process improvements and an electronically linked end-to-end supply chain.

Founded in 1979, Seagate helped fuel the information age by building the personal computer (PC) disc drives needed to store vast sums of data. Today, data-storage technology has evolved far beyond the PC. And as our appetite for storage keeps on growing—driven by the Internet, consumer electronics, and our desire for anytime, anywhere access to information—so does the need for increasingly sophisticated disc drives.

What few people realize is just how complex these products are. Seagate notes on its Web site that building disc drives is considered the “extreme sport” of the high-tech industry, involving expertise in physics, aerodynamics, fluid mechanics, information theory, magnetics, process technology, and many other disciplines. The company constantly strives to boost storage capacity and set new records for disc-drive performance. Besides staying ahead of the technology curve, Seagate faces a number of unique business challenges that drive its supply chain strategy.

KEY BUSINESS CHALLENGES

Seagate’s products use components that are so complex to manufacture that lead times can range from one month to an entire quarter. Then there’s the geographic challenge. The component manufacturing plants are often far removed from the subassembly and drive manufacturing plants. Explains Karl Chicca, senior vice president of global materials, “Every disc drive has several hundred of these very complex parts, each of which

Seagate produces 15 to 20 million disc drives a quarter using 65 million components a *day*.

has process technologies that are literally bleeding edge, coming together from all corners of the world, in massive quantities—we produce 15 to 20 million disc drives a quarter.” This translates into about 65 million components a day—many purchased from outside suppliers—that go into disc drives that are increasingly customized to specific customer needs. Customers range from Sony and Microsoft which use Seagate’s drives for consumer applications, to companies with high-end storage systems, such as EMC.

For every customer, Seagate maintains one or more just-in-time (JIT) hubs—inventory warehouses operated by a third-party logistics provider. These vendor-managed inventory (VMI) arrangements are the industry norm. Each hub is stocked with anywhere from one or two to dozens of different types of disc drives, depending on how broad a range of products the customer sells. Some of Seagate’s customers have 15 to 20 locations—and just as many JIT hubs—but they don’t pay for the inventory stocked in their hubs until they use it.

Seagate’s ambitious goal is to ship to real-time changes in demand—not to plans or forecasts.

Now add the complexity of unpredictable demand. In this business, customer demand is infinitely dynamic, and Seagate’s ambitious goal is to ship to real-time changes in demand—not to plans or forecasts. This means that the company has to monitor the economy, the high-tech industry, and the information-technology subset of the industry to get a sense of which way demand is flowing.

In the early days, a plan would hold for six months. No more. Notes Richard Becks, vice president of e-business and supply chain, “Looking back on almost 25 years in this business, the biggest change has been the demand dynamic. It can’t be predicted anymore. We’ve had to migrate from a mind-set of plan-based stability to a model of infinite flexibility and building to pure customer demand.”

Extreme product complexity, lengthy component lead times, global operations, high volume, dynamic demand, customized products—Seagate has to meet these challenges as well or better than its competitors to sustain and build on its leadership position. The company’s supply chain plays a critical, strategic role.

REAL-TIME DEMAND FULFILLMENT

Earlier in its history, Seagate focused on low-cost manufacturing and operating to plan. But the company has evolved. Today, the focus is on being a technology leader, getting more innovative products to market more quickly, and building speed and flexibility into the organization for greater agility—all while maintaining a sharp focus on customer satisfaction. Notes Chicca, “Everything we do has the fundamental premise that it has to benefit the customer.”

Seagate’s supply chain has evolved accordingly. A cornerstone of the company’s supply chain strategy is meeting customer demand in real time—literally responding to customer orders as they arise. To do this successfully and cost-effectively, Seagate has to maintain a greater degree of flexibility in its factories and lower levels of inventory overall. The key is information flow, and that’s been a critical focus of the company’s supply chain efforts.

Seagate acquired a jumble of dissimilar processes and information systems in its early years as it grew through acquisition. For the last five years, making processes, systems, applications, and databases consistent throughout the company has been a top priority. For example, the company had several engineering-change control tools to manage product configurations. Now Seagate has just one worldwide system—Metaphase from EDS. The company also consolidated nine enterprise resources planning (ERP) systems from Oracle into two worldwide systems and eventually will move to a single system. This effort to consolidate and standardize is paying dividends now. Information is flowing more freely throughout the supply chain because it no longer has to be reworked or reentered manually. And integrated systems give the company a clear view into every aspect of operations—a must for real-time demand fulfillment.

“Electronic connectivity gives us visibility up and down the supply chain, so we don’t have to generate new capacity every time there’s a request for more product,” says Chicca. “We understand what our capability to flex really is, and we can commit to the customer very quickly.” Responding to customer requests used to take a week or longer. Now it takes about a day to inform customers if and when they’ll get product. Seagate’s goal is to commit on the spot.

Responding to customer requests used to take about a week. Now it takes about a day.

END-TO-END CONNECTIVITY

Seagate’s customers and suppliers are linked electronically to its internal network.

When a customer pulls a drive from the JIT hub, that pull sends a signal back to the factory and triggers two things: an automatic shipment request to replenish the drive or drives that have been pulled and an automatic order to the manufacturing line to start additional drives to backfill the ones used. Seagate's automatic response to real demand allows the company to maintain lower levels of inventory, while industry competitors still shoulder the cost of loading up the JIT hubs. Seagate's annual inventory turns have nearly doubled, going from 8 per year to 15.

But it doesn't stop there. Those pull signals are also conveyed upstream to Seagate's internal subassembly and component manufacturing plants and to external suppliers. Seagate's internal subassembly plants use the same JIT hub processes that are required of external suppliers and stock inventory ahead of the downstream factories that use the inventory. These internal hubs are continually resized to accommodate actual customer demand.

By integrating electronically with its factories and suppliers, Seagate eliminates the touch points that slow things down and lead to errors. Over 160 suppliers are connected, with a direct view to Seagate's daily consumption rates. The suppliers can track changes in demand over time, analyze consumption rates, and start to make better use of their own capacity. To make this work, Seagate partnered with e2open to set up a business-to-business (B2B) supply chain hub to communicate real-time demand and immediate supplier acknowledgment. e2open worked with suppliers that already used electronic data interchange (EDI) to translate their feedback into the RosettaNet signals that Seagate uses. During this transition, Seagate became one of the world's largest RosettaNet implementations, sending supply and demand information to all its direct materials suppliers.

Unlike a few years ago when EDI put this level of connectivity out of reach for many suppliers, the Internet has leveled the playing field—everyone can access the World Wide Web. e2open provided an Internet-based application that any supplier with a Web browser can use. This allowed even small suppliers with limited information technology capabilities to have the same visibility as larger, more sophisticated suppliers.

The suppliers that adopted the Web-based system are very pleased with the results. Now they're looking for the next level of integration, where the unfiltered demand goes directly into their planning systems so that they can respond even more quickly to Seagate's needs. To this end, e2open is developing a low-cost B2B server appliance with integration software premapped and loaded for most of the popular ERP systems in use today. This server appliance will sit behind a supplier's firewall.

Seagate sees this as a major opportunity to cut costs both internally and externally while increasing the speed and accuracy of information flowing up and down the supply chain.

Linking with suppliers also gives Seagate a better idea of where its orders are in the queue. This information is especially critical when suppliers have long lead times, such as semiconductor manufacturers. Seagate can get a better view into their processes and immediate updates on order status.

VISIBILITY—THE HOLY GRAIL

This multitiered visibility—the ability to see up and down the supply chain—is a critical component of Seagate’s supply chain strategy. It’s also the “Holy Grail” for many of Seagate’s customers that have outsourced production to contract manufacturers. These customers have less control over their supply chain as a result and fear that scarce components may go to their competitors.

Seagate is extending the concept of multitiered visibility beyond its immediate suppliers, as reflected in its dealings with providers of application-specific integrated circuit (ASIC) semiconductors, for instance. Once vertically integrated, ASIC suppliers could no longer afford to maintain their manufacturing facilities, so the companies sold their plants and outsourced production to major subcontractors. Seagate is now in the position of placing orders and forecast demands with suppliers that aren’t actually manufacturing the parts—and through multiple levels of subcontractors. The wafers may be built in Taiwan, for instance, sent to Korea for testing, and then shipped to Singapore for packaging and final testing before going back to the original semiconductor company for shipment to Seagate.

To deal with this added layer of complexity, Seagate is working on a process for gaining visibility into these subcontractors. The company is piloting a project that dives deep into a supplier’s supply chain. And then it is tying that process all the way through to one of Seagate’s end customers for true end-to-end multitiered visibility. The bottom line of multitiered visibility, both upstream and downstream, is better capacity utilization throughout the supply chain.

VERTICAL INTEGRATION

Gaining visibility into subcontractors is one way that Seagate manages the risks inherent in an extended supply chain. But the company also maintains

control through vertical integration—a maverick approach among industry players.

The industry trend has been to disaggregate, outsource, and get lean. Bucking that trend, Seagate adopted a vertically integrated model, which many observers thought was unwise. The benefits of breadth, control, and flexibility seem to work to Seagate's advantage. The company's competitors can't always be sure they'll get the critical components they need when they need them, and any change order triggers a negotiation process and a series of requests that has to trickle down through many layers. By contrast, Seagate can move more quickly on behalf of the customer and believes that developing component technology in-house gives the company an edge, given the technical complexity of its products. Seagate can codevelop and codesign each component and the respective process technologies instead of buying components from a variety of vendors and cobbling them together. Today, Seagate manufactures many of its high-cost/high-complexity components in-house.

Vertical integration doesn't come cheap, though. The barriers to entry are huge, given the capital needed for technology development and to produce components and drives. Seagate spends \$700 million a year on research and development and \$600 million in capital—far more than its non-vertically-integrated competitors. This investment pays handsome dividends. Customers are willing to pay a premium for Seagate's high-performance disc drives while the company's competitors race to catch up.

CHANGE-MANAGEMENT CHALLENGES

Although Seagate's supply chain efforts have delivered substantial benefits, managing change has been a challenge, both internally and externally. Altering decades-old attitudes takes time and effort. Not surprisingly, customers and suppliers didn't embrace the changes Seagate introduced immediately. Customers were used to the security of a fully stocked JIT hub, even if it was a false sense of security. The drives in stock weren't necessarily the drives they'd need. And those safety cushions of inventory were driving up costs throughout the supply chain.

Seagate's value proposition was a strong one: Let us cut the inventory levels of your JIT hubs, and we'll actually be more responsive to changes in your demand—we'll have the capacity in reserve to meet your needs as they arise. To further support this effort, Seagate has invested heavily in a "factory of the future" alliance—fully automated drive assem-

bly lines that also are so flexible that any drive can be built on any line at any time.

The education process is ongoing. Some customers get it. Others just won't hear of it, especially those with conflicting incentive systems. If a customer's procurement people aren't measured against excess inventory or total cost of ownership—even in a VMI/JIT system—they'll want as much inventory as they can get. Today, even Seagate's most hardened critics acknowledge a night-and-day difference between current service and that of five years ago. "They'd much rather have today's supply chain servicing them than yesterday's," notes Becks.

Suppliers also were reluctant to change their old ways of operating. Before coming on board, they suspected that Seagate was just passing costs on to them. In the late 1990s, VMI had begun to spread throughout the industry, and the suppliers were getting pressure from all sides. Their first reaction was that it would not be good for their business. But Seagate's value proposition was that if suppliers would agree to link up electronically and share information on order status, Seagate would be completely open with them on consumption. This is critical information for suppliers, especially in times of constraint, when many buyers start to double-book. Explains Becks, "I can look those suppliers in the eye and say, 'Look, I don't have the ability to waste your capacity by double-booking you—you've got online visibility in real time to what we're actually consuming.' The suppliers love this."

Industry observers have commented on the "new" discipline in the electronics industry today, notes Becks, but it's not really more discipline—it's more visibility. He explains, "When everyone switched to VMI, suppliers got a better sense of consumption, of what the customer was really using, as opposed to just delivering pallets of parts—only to be surprised by unexpected demand once those pallets ran out."

NEW REWARD SYSTEM

Changing internal attitudes and behaviors has been equally challenging. Seagate is in the process of putting in place new reward systems that better align with its new ways of working. The company's old "build to forecast" incentives rewarded plant managers for using capacity to its fullest extent. Now Seagate realizes that running capital equipment or a plant "full out" actually wastes capacity if the product it's building isn't what the customer really needs. The result is high levels of inventory waiting for customer demand. This hurts Seagate in two ways. First, an oversupply of

finished goods inventory can quickly cause price erosion. And second, if a customer comes along with a real order and capacity is unavailable, then there's the opportunity cost of wasted capacity.

At Seagate today, success is more often defined as changing the manufacturing line many times and getting lower scores on capacity utilization—but better scores on meeting customer demand and reducing inventory levels. The key is to balance immediate customer demand with forecasted demand that's expected, validated, and underpinned with a sales commitment but hasn't yet arrived. It's a trade-off. Sometimes it makes sense to prepare for expected spikes in demand; other times it makes sense to wait to see the demand first.

Seagate knows that it can't truly anticipate changes in demand or build to plan. Instead, by electronically linking to its customers and suppliers, the company can sense and respond to real demand based on actual pull rates and tee up suppliers to restock inventory based on actual consumption. This makes Seagate's supply chain very opportunistic and nimble.

AN EVOLVING SUPPLY CHAIN

To make sure that Seagate's supply chain strategy stays aligned with the company's business strategy, Becks's team chairs a monthly meeting of senior-level supply chain sponsors and project team members. Meeting participants review the status of all supply chain projects that are underway and recalibrate those efforts as needed to align them with changes in business direction or new customer requests. Seagate has already invested about \$5 million in supply chain improvements—a reflection of the company's commitment to supply chain excellence.

The company typically tracks about 30 supply chain projects at any given time. One major new initiative is enterprise planning, which will improve data accuracy and integration among functions and processes, eliminating data silos and separate functional plans. The goal is that when a customer calls and wants to double its order on one disc model and cut another order in half, the order-management group will be able to commit to the order immediately but also calculate the impact on revenue, margin, and capacity utilization throughout the company.

Seagate often puts in place one building block of its supply chain architecture and then monitors how well it works out. If a better solution comes along that delivers more flexibility, responsiveness, or value, the company doesn't hesitate to rethink its first approach and deploy the new solution.

Like its business, Seagate's supply chain is flexible, agile, and evolving constantly. What doesn't change, though, is the company's view of its supply chain as a key source of competitive advantage—one well worth the ongoing investment.

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APPENDIX

Source and Methodology for Benchmarking Data

The benchmarking data presented in this book are sourced from The Performance Measurement Group, LLC (PMG), a subsidiary of PRTM.

PMG maintains a repository of company-confidential supply-chain information dating back to 1995. Companies that access this database are required to complete extensive surveys of their supply chain performance, practices, and information-technology (IT) usage. They can then compare their performance against benchmarks derived from the performance of a selected population of companies in the database. This provides them with a basis in fact for assessment, highlights differences in practices, and helps them to understand which practices will help them improve performance.

PMG conducts analysis on an ongoing basis to determine trends in dominant and emerging practices, supply chain strategy, and performance levels for key supply chain metrics.

The metrics used in this book were chosen because they show the level of performance gains that can be obtained from better practices and systems and what supply chain performance is considered significantly better than average, as well as what is considered best overall. To accomplish these objectives, PMG explored the link between supply chain practices and financial performance, developed an aggregate measure of supply chain